

THE NARRATIVE OF DREAM REPORTS

PART 1

A Thesis submitted for the degree of Doctor of Philosophy

by

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March 1989

THE NARRATIVE OF DREAM REPORTS (1989)

Two questions are addressed:

1) whether a dream is meaningful as a whole, or whether the scenes are separate and unconnected,

and 2) whether dream images are an epiphenomenon of a functional physiological process of REM sleep, or whether they are akin to waking thought.

Theories of REM sleep as a period of information-processing are reviewed. This is linked with work on the relationship between dreaming and creativity, and between memory and imagery. Because of the persuasive evidence that REM sleep is implicated in the consolidation of memories there is a review of recent work on neural associative network models of memory. Two theories of dreams based on these models are described, and predictions with regard to the above two questions are made. Psychological evidence of relevance to the neural network theories is extensively reviewed. These predictions are compared with those of the recent application of structuralism to the study of dreams, which is an extension from its usual field of mythology and anthropology.

The different theories are tested against four nights of dreams recorded in a sleep lab. The analysis shows that not only do dreams concretise waking concerns as metaphors but that these concerns are depicted in oppositional terms, such as, for example, inside/outside or revolving/static. These oppositions are then permuted from one dream to the next until a resolution of the initial concern is achieved at the end of the night. An account of the use of the single case-study methodology in psychology is given, in addition to a replication of the analysis of one night's dreams by five independent judges. There is an examination of objections to the structuralist methodology, and of objections to the paradigm of multiple dream awakenings.

The conclusion is drawn that dreams involve the unconscious dialectical step-by-step resolution of conflicts which to a great extent are consciously known to the subject. The similarity of dreams to day-dreams is explored, with the conclusion that the content of dreams is better explained by an account of metaphors we use when awake and by our daily concerns, than by reference to the physiology of REM sleep. It is emphasised that dreams can be meaningful even if they do not have a function.

ACKNOWLEDGEMENTS

I am grateful for the help of my supervisors, Professor Adam Kuper, Professor Liam Hudson, and Professor Michael Wright. I also wish to thank Professor Alan Stone and Dr. Vernon Dobson for many useful suggestions. This research was funded in part by a grant from the Ann Murray Award Fund, which was greatly appreciated and very helpful. The texts of the dreams of the subject KJ were kindly supplied to Professor Kuper by Professor Rosalind Cartwright.

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INTRODUCTION

There are two questions that remain unanswered in current dream research.

1) Do individual dreams have meaning as a whole, with each scene related to the other scenes, or are they collections of separate scenes which do not influence each other and which the conscious mind then sometimes ties together?

2) Are dreams related to low level neural activity in the brain, such as neurochemical or synaptic changes, or are they related to higher brain activity and akin to waking thoughts, albeit in a different language?

Each of the possible answers to the two questions is coherent, and each has cogency because of its everyday counterparts. So, the first question can be paraphrased as: is a dream (or a series of dreams) like a play, which progresses towards a conclusion, or is it like a revue, with separate unrelated snippets, incidental pieces and extemporary elaborations? The second can be paraphrased as: is a dream like gurglings in the stomach, which do have their causes and meanings, or is it like a composed song?

I consider that these questions may be answerable by a detailed study of the phenomenology of the experience of dreams, and that such data may be used to decide between some theories of dreaming which are presently postulated.

I relate in chapter 1 some facts about the physiology and biology of dreaming which will help us in an initial evaluation of the theories presented later. In chapter 2 I give evidence about the experience of dreams for humans, and I suggest that an important

aspect to be explained is the narrative of the scenes. This choice of a feature of dreams which is often ignored in the emphasis on their bizarreness and creativity mirrors the study by Rechtschaffen (1978) of 'single-mindedness' as an almost continuously present and equally ignored facet of dreams. I examine in this chapter the physiological concomitants of the images of dreams, and in chapter 3 review old theories of where these images come from.

Chapter 4 shows the problems and strengths in certain theories which hold dreams to be an epiphenomenon of Rapid Eye Movement Sleep, and introduces the idea of dream sleep being a state of information-processing, separate and different from the processing that occurs during waking life. Chapter 5 provides evidence that our time of unconsciousness during REM sleep has beneficial effects on memory storage and examines common criticisms of this idea. Chapter 6 expands on the conclusions of the previous chapter with evidence memories are creatively manipulated during REM sleep, and relates this activity to the fact that dreams occur as images, that REM sleep provides a state of mind different from that of waking life.

Chapter 7 describes theories of memory storage in associative neural nets, which are composed of many interconnected artificial neurones. Two types of such networks are reviewed, with the conclusion that their efficiency is increased if they have periodic changes of state, during which their activity follows different rules than normal. This serves as an introduction to chapter 8, which gives details of two theories of human and mammalian dreaming which are based upon these two neural network theories. I show that the theories as published are not completely applicable to biological dreaming, but

that they do explain much of the data reviewed in the first 6 chapters, and that they have a similarity with a third, psychoanalytically based theory of dreams.

Chapter 9 argues that a solely psychological account of dreams is needed as opposed to the psychophysiological work of the previous chapters. A review is given of the use of case studies and content-analysis in psychology. Chapter 10 explains the different facets of dreams from the standpoint of classical psychoanalysis. Chapter 11 is concerned with Rycroft's revision of such an account, based on dreams as a source of enlightening metaphors rather than obscuring disguises of the unconscious. This chapter introduces the notion that, as Jung (1968) wrote, 'the dream does not conceal; we simply do not understand its language'.

In Chapter 12 I explain the suggestion that one method of analysing myths, totems, kinship, and various other languages, that of Structuralism, may be applicable to the study of dreams. I give examples of the application of the method in its original field, that of social anthropology, and give evidence that the vicissitudes in the development of social anthropology over the last hundred years are similar to the changes in the theories of dreams over the same period.

In chapter 13 I compare the seven major theories from chapters 3-12 from the stance of their phenomenological predictions about narrative and condensation.

Chapters 14-17 contain the reports of every dream of the night for a subject who attended a dream lab for 4 separate nights. (The full-length reports are in the second appendix.) I analyse this

data in the light of the different theories, measuring the evidence against the predictions made.

However, there are problems with the whole project of interpretation and the discovery of what thought and meaning is 'really there' in texts. In chapter 18 I compare the scepticism towards exegesis that Structuralism and Psychoanalysis both encounter, and then reply to criticisms that the findings of this piece of dream lab research, and other work using multiple awakenings, are artefactual to the experimental regimen used. An account is given of a replication of the analysis of night 4 by five independent judges. The differences between this experiment on reliability and proposed ones on validity are explained.

In chapter 19 I show what theoretical conclusions can be drawn from the results of the previous 4 empirical chapters. I conclude with an account of the features of the mentation present during dreams and show its similarities to day-dreaming. Experiments are proposed to explore this similarity.

Appendix 1 is the full text of the paper by Hopfield, Feinstein and Palmer (1983) examined in chapter 7.

Appendix 2 is the full texts of the dreams and interviews used in chapters 14-17.

(Note on terminology: although images and thought can occur during non-REM sleep, and the subject can be said in such instances to be dreaming, throughout this thesis 'dreaming' and 'dreams' refer to mentation that occurs during REM sleep alone.)

CHAPTER 1

THE NATURAL HISTORY OF DREAMING

The Discovery of REM Sleep

In 1951 Aserinsky and Kleitman discovered slow rolling eye movements in sleeping infants, which occurred in association with periodic body movements which had been studied by other workers. Dement and Kleitman (1957 a&b) proceeded to find the same movements, lasting about 3 to 4 seconds, in adults, but also noticed periods of rapid jerky eye movements during which there would be short pauses with the eyes still. They also found periodic changes in the sleeping subjects' EEGs, with an awake-like desynchronized pattern of brain-waves during rapid eye movement sleep alternating with large slow 'delta waves' occurring during non-rapid eye movement sleep.

This REM sleep is dependent on the phylogenetically older areas of the brain, notably the rostral pons, and so a decorticated cat shows only evidence of REM sleep, without NREM sleep (Jouvet, 1969). Furthermore, Velluti (1985) found that there is a phasic oxygen consumption change during REM sleep in the reticular formation, hypothalamus, amygdala and cerebellum, but not in the neocortex or white matter, which are phylogenetically recent.

With the exception of two specie , all mammals so far studied show alternating periods of REM and non-REM sleep. Nothing resembling sleep is found in animals below the reptiles, except a periodic decrease in movement. One of the more primitive surviving reptiles, the tortoise, shows no evidence of it. Chameleon lizards have REMs themselves during sleep but brain electrical activity is

unchanged. Reptiles do sleep yet have no REMs, while birds do have REM sleep.

The Ontogeny of REM Sleep

Roffwarg, Muzio & Dement (1966) found that human neonates spend around 16 hours of the day asleep, of which half is in stage REM. However, there are problems defining REM sleep at this stage because its constituent parts (that is, REMs, desynchronized EEG, lack of K-sleep spindles in the EEG, and total loss of muscle tone) are often dissociated, rather than occurring together. While the total amount of sleep decreases throughout life the amount of REM sleep decreases faster. Among infants duration of NREM sleep is quite consistent, while the REM periods are more variable. This would fit in with the hypothesised linking of NREM sleep with bodily needs and REM sleep with the needs of the brain, which is as yet functioning imperfectly. There is increased movement during neonates REMS with sucking and even grimacing in evidence, the latter not yet being seen in waking life. This finding is similar to that of the posturing shown by cats in REMS that have had their motor system disinhibited surgically (Jouvet, 1969).

The decrease in dream time found in the growing human (which is also found in other mammals) must be due to one of the following reasons:

- 1) REM sleep becomes more efficiently organised, with a more orderly switching on and off, and a decrease in Intermediate sleep (a period of atonia, desynchronization of EEG and rolling slow eye movements). Valatx, Jouvet and Jouvet (1964, reported in Clemente,

Purpura & Mayer, 1972, chp. 13) state that the onset of slow wave sleep is contemporaneous with the achievement of cortical maturation. Exemplifying the immaturity of the sleep system is the presence of Intermediate Sleep in some animals (which has only some of the characteristics of REM sleep), the 'trace alternant' EEG burst pattern, which is present in humans for the first 1-2 months, the absence of a stable distribution of sleep and wakefulness for the first 1-3 months, and the amplitude increase in EEG with age through infancy, which then decreases throughout life. The sleep periods consolidate and lengthen in the first months, another indication that the brain is approaching an optimum state by maturation rather than that the erratic sleep and high REM time are actually functional. There is a shift in balance of inhibition of neurones to that of excitation occurring in the first 4-5 weeks, when there is ontogenesis of sleep spindle bursts. McGinty (ibid. pp.276-278) opposes this idea of brain immaturity with the finding that both quiet sleep and active sleep are reduced by stimulus deprivation in kittens, so there may be a functional reason for the prevalence of REM sleep, but his results may be due to other factors such as eating changes in the animals used. Ornitz (Development of sleep patterns in autistic children, in ibid.) notes that auditory evoked potential to clicks was high in REM sleep in infancy, suggesting that phasic inhibition of the nervous system is not fully developed in the first year. Phasic inhibition thus develops at a time of great decrease in REM time. Ornitz cites Pompeiano (1967a&b) as showing that REM phasic events (such as the actual REMs which occur during the period of REM sleep) depend upon the integrity of the vestibular system, and that this dependence

matures from birth. Also note that because in the newborn REMS periods follow waking, and it is only later that NREM periods intervene, it may be that young animals have so much REM sleep because they have so little NREM sleep.

2) REM sleep has a function in the younger animal but later on this is not so necessary. Dreyfus-Brisac (1967, in Clemente et al. *ibid.* pp.202-203) found few REMs at 24-26 weeks gestation, sparse eye movements at 28-30 weeks, with dense eye movements at 32 weeks. The major decrease in REM sleep occurs in the first 3 months after birth. Roffwarg, Muzio & Dement (1966) suggest that REM sleep for the fetus is a time of stimulation of the visual system (all other senses in the uterus will be stimulated by the environment), for there is substantial myelination of the visual system before birth which must be explained. The problem remains, though, as to why REMS should persist in later life; after all, various reflexes in the newborn (such as Babinsky's, on the feet) do die away and never return. Dreaming may thus simply be like all other instances of childhood overactivity and playfulness, which also mellow with time, but the problem is why it does not fade completely.

3) Its functions are taken over by thought, imagery and fantasy. See Cartwright & Monroe (1968) in which waking fantasy was found to reduce post-deprivation REM rebound more than mathematical reasoning on waking did. Similar to this suggestion is the claim that eidetic imagery is lost after childhood because of the growth of propositional thinking.

The Purpose of REM Sleep

Some have suggested that the stimulation from the brain stem that mammals receive during REM sleep (termed 'PGO' stimulation) may not contain any useful information, but is instead random stimulation used to avoid the brain becoming comatose during its long periods of useful NREM sleep. It may be objected that the brain would have evolved a system of alternating NREMS-awake-NREMS-awake-NREMS-awake rather than waste 2 hours per day (in the case of humans) randomly stimulating itself, or have very short periods of REMS, as birds do. Alternatively, Berger (1969) provides evidence that REMS has the function of tuning the eye muscles in stereoptic animals (although the mole has a large REM time!). That NREM sleep is itself important is shown by experiments in which animals are deprived of all sleep; they subsequently have more REM sleep than usual, but have an even greater increase in the amount of stage 4 NREM sleep, which is made up in preference to REM sleep in this 'rebound' paradigm (Agnew, Webb & Williams, 1964, 1967). Another possibility is that the stimulation from the brain stem (pons) is analogous with that obtained during waking life from the Ascending Reticular Activating System. When we are awake it is not the stimuli from the environment which keep us awake, they merely impinge upon a brain independently made receptive by the ARAS stimulation. It may be that PGO bursts maintain the cortex in a state in which vivid imagery is possible; in the next chapter I will provide further evidence for this position. The two systems are connected via the hippocampus, which has desynchronized activity when the subject is awake, and hippocampal theta wave activity when the subject is in REM sleep. Grastyan (1959) has found that hippocampal

theta rhythm also inhibits the activity of ARAS. PGO bursts are found to occur before REM bursts, and are detected by implanted electrodes in either the pons, lateral geniculate nucleus, or visual occipital cortex. (This method is not used for humans.)

Winson (1985) notes that hippocampal theta is sometimes generated during waking life in mammals, but only during species-specific activities involved with biological survival. The same neurones are involved in both cases, and he proceeds to construct the theory that, as the hippocampus is involved with the processing of refined information from the neocortex and back either to the neocortex or to the limbic system, REM sleep is a period of 'off-line' information-processing, concerned with the consolidation of memories. As an incidental piece of evidence, he notes that the two extant examples of monotremes (the most primitive mammals, which hatch their young from eggs), the duck-billed platypus and the spiny anteater, do not have REM sleep. He also notes that the latter has a very large frontal-cortex, proportionately greater than that of humans (1985, p.57). The former has an even larger neocortex, measured as a percentage of brain volume, than does the anteater (reported by Tauber and Glovinsky, 1987). He hypothesises that REM sleep evolved in order to facilitate the integration and memorising of experience without the need for a massive prefrontal cortex which would have been performing this function during waking life at the same time as its function of 'executive' of the whole brain.

After this brief summary of some of the major points of the natural history of REM sleep, and an introduction to the idea that REMS is a time of information-processing, we now proceed to a

description of the experience that humans have mainly during REMS,
that of dreaming.

CHAPTER 2

THE HUMAN EXPERIENCE OF DREAMING

Experiments on the Phenomenology of Dreaming

Dement and Kleitman (1957 a&b) found that subjects awakened during REMS were much more likely to report that they had been having a dream than were subjects awakened during NREMS. Foulkes (1962) showed that not only do dreams occur at all stages of sleep to a much greater extent than had been realised in earlier work, implying their occurrence without concomitant PGO stimulation, but also that the contrast between REM and NREM sleep experiences does not concern bizarreness, which is the stereotypical hallmark of dreams, but rather the following formal differences:

	REMS reports	NREMS reports
	% yes	% yes
Subject's emotion	50	32
Other's emotion	55	31
Visual	90	66
Clear visual imagery	80	62
Physical movement (self)	67	38
Locomotion (self)	42	21
Locomotion (others)	45	25
Only one other character	34	57
More than one part	37	17
Scene shifts	63	33
Memory processes	1	17

(Also, see McCarley & Hoffman, 1981, for further evidence relating REMs to dream activity, and Duffy & Lombroso, 1968, about the effect of saccadic eye movements in waking life on visual imagery.)

Rechtschaffen (1978) and Fiss (1986) state that the ego in REM sleep is less critical and more passive than the ego in NREM sleep, and can only follow one train of thought, while Hunt (1986) suggests that what is distinctive about dreams is what they lack; they show single-mindedness and loss of context (context only being restored on waking). He writes that they can be as creative or as pragmatic as can waking thought.

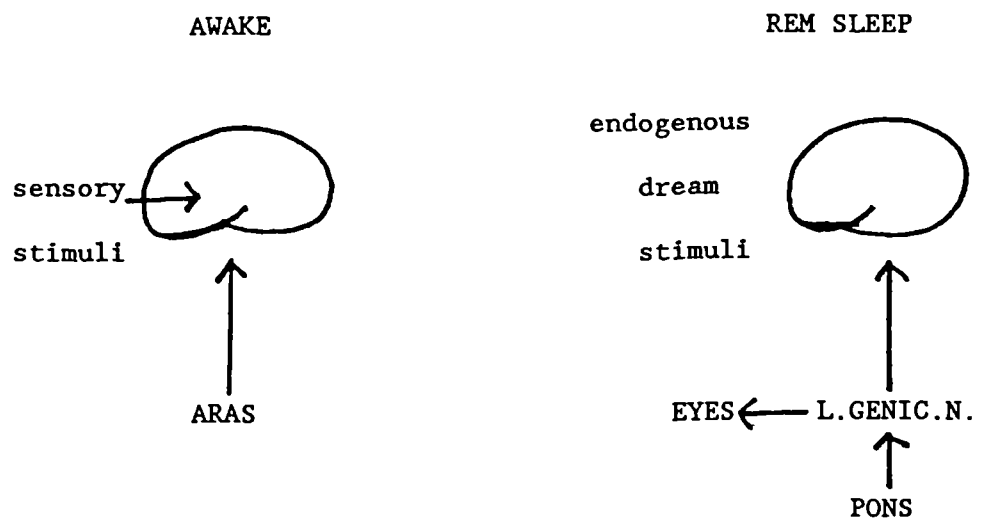
The REM reports were longer and contained less references to the subject's work activities, less continuation of a prior dream thought and much less evidence of memory processes. It is the NREM reports that have a greater correspondence to waking life. (These results contradict the earlier theory of Dement and Kleitman, 1957b, that NREM reports were memories of preceding REM dreams).

In addition to the data of the above table note that Hunt (1982) reports that sudden changes of scene are only found in 20% of home recall dreams, and that condensation (a dream image containing a mixture of two parts of waking life, such as the image of a character with the face of one friend and the gait of another) is very rare, occurring in less than 10% of the reports. We therefore see that the PGO stimulation, if it is involved at all, is correlated with a greater vividness, affect and complexity, rather than bizarreness.

As noted briefly in the last chapter the PGO input may be especially needed by the occipital cortex to maintain its ability to produce pictures, for the effect of occipital lesions is to remove

imagery but still allow dream-like thoughts. Of interest here are the doubtful findings of some studies aimed at correlating dream images with specific eye movements during REM sleep; the PGO bursts are thus not indicative of any particular dream image, or of a single fast movement or a scene discontinuity. Therefore, PGO stimulation is as unrelated to particular experiences as is ARAS stimulation. Now, sensory stimuli do not directly keep the cortex awake, the ARAS does that, and by analogy the content of dream images may not be sufficient to ensure that the image occurs; a general facilitation may be needed, as illustrated next.

Physiological Phasic Events and the Dream Experience



As the case of comas in patients with no cortical damage shows us, the brain must be maintained in a receptive state, as well as receiving stimuli, in order to be active. Hersch, Antrobus, Arkin & Singer (1970) found that an injection of noradrenaline during NREM sleep increased salience (defined as vividness, emotionality, and bizarreness) and Chase (1972) reports a significant correlation

between cardiac and respiratory irregularity and dream salience (though this tells us nothing about the direction of causation). However, autonomic nervous system arousal decreases from earlier to later REM periods (Snyder, Hobson, Morrison & Goldfrank, 1964) so it is not possible to say that the difference between REM sleep and NREM sleep is simply one of arousal. A specific factor involving the occipital cortex may be needed, a role that PGO stimulation may perform. This is a different proposal from that of Brooks (in Webb, 1973), who says "... a stimulus of brainstem origin prepares the visual system for the arrival of an entirely new image, and the process manifests itself as a PGO wave... As a result the net image will be perceived as a new one, rather than as an initially blurred or displaced version of the preceding image... the neuronal events associated with the imagery occur in the intervals between PGO waves." Rechtschaffen (1973) also suggested that the PGO burst breaks up the flow of information. If PGO stimulation has the function of aiding the vividness of dream imagery, this would indicate the importance of dream imagery itself, and suggest that dream images are purposeful rather than epiphenomena of the physiology of REMS.

Supportive of the view of PGO stimulation as a random jolt is Cohen, Edelman, Bowen and Dement (1972) and Steiner and Ellman (1972) who report that Intracranial (electrical) Self-Stimulation reduces REM rebound after deprivation, while REM deprivation increases ICSS activity. (This work also relates the random stimulation more to overall neurochemistry than to individual memories, and hence is contrary to information-processing theories.) The opposing work of Hobson and McCarley (1977), who propose that PGO stimulation is

structured has not been proved. They propose that the bursts contain basic motor and spatial information around which the dream is built (with affect being laid on later). Support to some extent for this view comes from Lerma & Garcia-Austt (1985), who found a relationship between hippocampal theta rhythm and phasic events - (the former are connected with movement in waking life). Also note that Gadea-Ciria (1977) found that decorticate cats had a dramatic change in PGO sequencing, becoming grouped in bursts separated by longer intervals, which "suggests that the cerebral cortex is involved in the regulation of patterns of PGO sequences." (ibid.) REM sequences themselves are also structured, as shown by Weber, Muzet, Schieber & Lienhard (1983). Other work on the pons shows its relationship to structured, non-random, information: Glickstein and Gibson (1976) showed it to be a relay station for sensory information that guides motor activity. They found that visual information, which reaches the occipital cortex via the lateral geniculate bodies, is relayed to the pons. There is then a sequence pons to cerebellar cortex to thalamus to motor cortex, and there is a similar pathway for other modalities. Lerner (1967) suggested that the PGO stimulation reactivates body image schemata, thus giving an explanation for the predominance of REM sleep during childhood. (Similarly, Breger, 1967, considers that dreams give us images to aid the feeling of bodily integrity.) Still, however, all this work does not prove that the PGO bursts contain any information, and we remain with the proposition that PGO stimulation is a general activator of the cortical areas involved in dream imagery.

Further dismissal of the relevance of PGO stimulation to bizarreness comes from Pivik and Foulkes (1968), who noted qualitative

changes in NREM mentation over the night. Ideation became more dreamlike and dreamlike reports were more likely on awakenings with a shorter orientation time. Moreover, Fiss, Klein and Shollar (1974) reported that the dreams of two subjects (volunteers with significant psychopathology) were more intense, vivid, and more clearly narrated (but not more bizarre) after a regimen of REM awakenings. There was also an increase in eye movement density. They did not find the increases in the control group who were awakened at the end of each REM period, rather than at the start. Foulkes (1966) had found both these results for REM sleep. However, Watson (1972) found that regardless of the presence or absence of REMs, PIPs (periorbital phasic integrated orbital potentials, a phasic event detected near the eyes) were related to distortion and bizarreness in NREM sleep. Rechtschaffen, Watson, Wincor, Molinari & Barta (1972) also found PIPs occurring during NREMS and related them to the bizarreness of the reports, and Arkin (1978) suggested that such REM intrusions are the cause of night terrors.

It is important that PGO stimulation is reported to be more related to the vividness, movement and complexity of dreams than to dream bizarreness. Initially Dement and Wolpert (1958) and Roffwarg, Dement, Muzio & Fisher (1962) proposed that the dreaming subject is following the movement of the image. This was disproved by Jouvet's (1962) finding that decorticated cats also have eye movements, yet presumably no images, and also by the presence of REMs in newborn humans. Also, Moskowitz and Berger (1969) found that whether recorded REMs were horizontal, vertical or oblique did not correspond with concomitant dream images. Berger and Oswald (1962) found a significant

association between activity/passivity of the dream events and frequency and size of the eye movements. An active dream was defined as one which would have been accompanied by many shifts of gaze, if it had occurred in real life. The frequency and size of the REMs were given more weight if they occurred later in the period, in assessing the final correlation. Fifty dreams were classed as active, and in 42 instances the corresponding REM record was classed as active, 39 reports were classed as passive and in 23 of these cases the eye movements were independently classed as passive. Furthermore, Pivik and Foulkes (1966) showed that dreams after a period of dream deprivation (which causes an increase in REM density when the subject is allowed to dream again) are more vivid. Similarly, Dement and Wolpert (1958) report that 'the amount of observed eye movement was related to the degree of participation of subjects in the events of the dreams'. Note, though, that Firth and Oswald (1975) found a weaker correlation between dream activity level and REM density than found previously. Also, Broughton and Mamelek (1980) showed narcoleptics have a mean REM density within the normal range, yet they do have particularly vivid dreams.

The degree of bizarreness in the dream is dependent upon the subject's waking personality - Schechter, Schmeidler & Staal (1965) found significant correlations ($+0.38$, $p=0.001$) between scores of waking creativity and dream imaginativeness (defined as "condensed symbols, vivid and bizarre images, a development of character and setting, and other evidence of the lightening of ego defences") for 87 recallers. The rating scale evaluated logic, realism and ego-control, but it did not rate subjects' moving images.

Foulkes and Rechtschaffen (1964) found that a pre-sleep showing of a violent film led to REMS awakening reports that were more imaginative, more vivid, more emotional and longer than did a neutral film, but, significantly, it did not lead to more distortion or to regression in time reference. Therefore, dreams can alter in vividness without altering in bizarreness. (Unfortunately, there was no record of REM intensity in the study for us to see if it correlated with the bizarreness.)

A dream can contain more activity and still be entirely realistic. For example, Rechtschaffen and Buchigiani (1983) found that vivid material was no different in bizarreness than less vivid material, on average. Some lucid dreams fit into the opposite category, the subject may just passively watch and wonder about some incongruous aspect of the experience, and then actively take part. Furthermore, Hartmann (1984), attempting to provide further evidence for his theory that REM sleep is caused by noradrenaline and serotonin depletion in the brain, coupled with acetylcholine excess (and that nightmares have dopamine excess in addition to these factors), gave small amounts of l-dopa to subjects. He found that measures of "dreamlikeness", "vividness" and "detail" were all increased. He notes (ibid. p.259) that propranolol does the same.

Antrobus (1986) claims that dream cognition and phenomenology is explainable in terms of cortical activation and heightened sensory thresholds alone, and he proceeds to cite Lehmann, Dumermuth, Lange & Meier (1981) and Williamson, Galin & Mamelak (1983), who report an association between dreaming indices and spectral power in the frequency bands <12 Hz., but he notes that they

used small sample sizes. Conversely, Antrobus, Ehrlichman, Weiner & Wollman (1983) found no relation between EEG power in the band 2-12 Hz. and several indices of dreamlike mentation (N=21). He proceeds (1986) to give persuasive evidence against the relation of phasic events with dream breaks and bizarreness. Zimmermann (1970) proposed that waking thought occurs at a lower level of brain activation than does dreaming, and LaBerge, Levitan & Dement (1986) found that lucid REM dreams have an even higher level of physiological activation than do non-lucid dreams. So, PGO stimulation rate correlates with the above-mentioned dream indices but it is not certain that EEG values do so also.

I will now review the relevant work done on awakenings following PGO stimulation (or, more precisely, phasic events in the case of humans, because the PGO bursts cannot be detected without intracranial electrodes).

Moruzzi (1963) noted that tonic aspects of REM sleep (such as the low voltage EEG trace and EMG suppression) are interspersed with phasic aspects, notably REMs, which are found to correlate with PGO spikes (Pompeiano, 1967b), with pupillary dilation (Berlucchi, Morruzi, Salvi & Strata, 1964), electrodermal responses (Broughton, Poire & Tassinari, 1965 a&b), shallowing of respiration (Aserinsky, 1967) and with augmented EMG suppression (Pompeiano, 1967b and Wolpert, 1960). Many papers show that dreams with profuse eye movement are more active, vivid, emotional and anxiety provoking than those with few eye movements (Dement and Wolpert, 1958; Hobson, Goldfrank & Snyder, 1965; Karacan, Goodenough, Shapiro & Starker, 1966; Goodenough, Witkin, Lewis, Koulack & Cohen, 1974). The dreams become

more intense with increased REMs, but not more bizarre. Bizarreness is more related to time passing since last contact with waking reality, and with the subject's personality. Note also Salzarulo's (1972) finding that EM density is at a maximum in the middle of each REM sleep phase, and that "over the first FS [REMS] phases of the night EM density stays almost constant whereas it increases abruptly at the beginning of the last FS phases".

Molinari and Foulkes (1969) obtained reports from REM-Quiescent and from REM-Active parts of sleep. Reports were divided into Primary Visual Experience and Secondary Cognitive Elaboration categories, but partly with the knowledge of the accompanying eye activity. (Aserinsky, 1967, had speculated that REM sleep episodes with ocular movement and those with ocular quiescence may be differentiated by their "levels of dreaming" and not just in relation to the scanning hypothesis.) As with tests of the scanning hypothesis Molinari and Foulkes had subjects report their very last preawakening experience. One hundred and sixty awakenings occurred, with SCE defined as:

- 1) Thinking, being aware, recognising, interpreting
- or 2) Forming alternatives, comparisons or conceptual relationships
- or 3) Presence of verbalisation or explanation.

Anything else was classed as PVE: SCE can include visual experience but must include one of the above. The results were:

				[sleep onset]	
	REM-M	REM-Q	NREM-Asc.	SO-2	SO-1
%age SCE	12	80	77	57	64
%age PVE	88	20	23	43	36

Note that SCE should not be equated with Freud's secondary processes, or with waking thought, because it can have regressive features and a lack of reality testing. "The distinguishing characteristic of PVE is not the presence of visual experience, but the absence of an active intellectual orientation toward such experience..." (ibid.). Foulkes and Molinari go on to compare the PVE-SCE distinction to that between condensation and displacement. However, Medoff (1972) found that 3 subjects could not discriminate REM-phasic from REM-tonic awakenings in terms of PVE vs. SCE. The subjects were specifically asked about the presence of conceptual material. Similarly, Foulkes and Pope (1973) used 3 arousal categories and found no significant differences in bizarreness, as well as the following:

	Awakening Category		
	REM-burst	Sawtooth burst/no REM	No sawtooth
Subject's			
discontinuity scale	.80 *	1.25 *	1.12
Nothing earlier			
recalled	12% *	21% *	21%
Spontaneous report			
of PVE	100%	100% *	63% *
(* means significant difference)			

(A sawtooth burst is a phasic event measured by the EEG over the top of the head.)

The PVE-SCE distinction was not significant for interview data. There was a greater likelihood of a discontinuity only if sawtooth-burst/no REM is compared to REM burst, which no doubt had an accompanying sawtooth burst, so this significant correlation is best taken as specious.

Holmes (1976) replicated the Molinari and Foulkes (1969) results. The latter had used a written questionnaire which Holmes considered an interference with recall, and he therefore used tapes. The reports were assigned to one of the categories PVE or SCE, on the basis of the final event, and two further judges graded the report for manifest drive expression, that is, sexual and aggressive interactions. The REMs were classified as REM-Q only if there were 30 seconds of REM sleep with no REMs preceding waking. His results were:

		%age	%age	%age
	N	SCE	PVE	Visual Reports
REM-M	56	13%	87%	100%
REM-Q	38	89%	11%	47%

Again the linkage of REM-M (and hence of PGO bursts) to the visual system is shown, rather than a linkage to the production of bizarre associations alone. These bizarre associations occur independently of visualisation (as shown by studies of blind people who have bizarre mentation but no visual imagery of it during REM sleep). Holmes states that the visual imagery associated with REM-Q awakenings is "less peremptory", less "captivating" and less vivid, but not less bizarre.

The rest of his results are concerned with correlating recall from these two categories with the subjects' personality, classified as "diverger" or "converger" (a measure of, respectively, creative, artistic thinking, and narrow scientific thinking) - that correlations were found provides indirect evidence for the phasic/tonic distinction. For example, convergers showed 50% recall on REM-M awakenings, divergers 95%, while with recall on REM-Q awakenings the convergers were superior. (These results he related to the threatening content of some REM-M material which he said was dealt with by repression in the case of convergers, and by rationalisation in the case of divergers.)

The reasons for the greater amount of time - up to 30 seconds between phasic bursts - that divergers spend in tonic REM sleep may be different from those suggested by Holmes.

Because Foulkes (1962) found that 66% of NREM reports were visual, which shows that phasic stimulation is not a necessary precondition for visual dreams, I suggest that one possible purpose for them is to increase any vividness which occurs upon turning away from the outside world. I also note that REM sleep reports are more complicated than NREM reports from the same part of the night, but late NREM mentation is similar to early REM mentation (Kales, Hoedemaker, Jacobson, Kales, Paulson & Wilson, 1967). Much of the work just reviewed is based upon the idea that PGO bursts are a unique feature of REM sleep and are somehow necessary for REM sleep to occur. However, recent work has complicated this account, and will be reviewed in the next section.

The Function of PGO Activity

Evidence has been adduced for the correlation between the density of phasic events and the amount of activity in the dream. Although this can support the idea that PGO bursts somehow maintain the brain in an excited condition, recent work by various authors can be taken to show that the causality works in the other direction, that is, that it is the dream activity that causes the phasic PGO bursts. Individual PGO spikes are very similar to startle reflexes in awake animals, an EEG reflex rarely seen due to the mundane conditions that experimental animals are kept under. Bowker and Morrison (1976) found that spikes 'identical in configuration, amplitude and duration to spontaneous PGO spikes can be elicited in the lateral geniculate body and visual cortex by auditory ... and tactile stimuli during quiet wakefulness, drowsiness, synchronized sleep, and PS.' (ibid. p.23.) They cite evidence that waking EEG recorded eye movement potentials are similar to REMS PGO bursts, and that both type of wave are simultaneously abolished by local cooling of the pontomesencephalic isthmus. However, the two types of wave (termed PGOrem and PGOw by Brooks and Gershon, 1971) do differ in some respects. PGO rem occurs prior to eye movements, whereas PGOw follows them; PGOw recorded in the LGN are 50% of the amplitude of PGO rem occurring spontaneously during REMS. However, Bowker and Morrison claim that this difference is due to the degree of alertness common in the laboratory animals. Brooks (1976) notes that ascending pathways responsible for PGOw are similar to those subserving PGO rem.

This suggests that PGO spikes during REMS are indicators of hyperalertness, and that during REMS 'because the internal alerting

stimuli are generated in the reticular formation rather than via the retina, the eye movements of PS tend to follow rather than precede PGOrems'. Bowker & Morrison (1976). They do not comment on whether the alerting PGO bursts are spontaneous during REMS, or whether they are orienting responses provoked by the dream imagery. The result of Molinari and Foulkes (1969) supports the latter position, as does the result of Foulkes and Pope (1973), in which only imagery spontaneously mentioned as vivid, rather than that reported in answer to a questionnaire, was found to correlate with PGO activity. Horne (1988, p.288) relates these orienting responses to the short-lived changes in many physiological systems which occur during REMS. He proceeds to suggest that 'REM sleep is very similar to alert wakefulness. We might even begin to query whether REM sleep really is a state of sleep, or a peculiar form of wakefulness within sleep!' (ibid. p.289.)

Adrien (1976 & 1977) reports that in the cat lesions of the anterior raphe nuclei are followed by a state of permanent PGO discharge, and also that visual experience has no influence on the ontogenesis of PGO activity in the visual sensory system. Cespuglio and Valatx (1977) write that 'there are significant differences in the frequency and distribution of eye movements between the two strains.' This they take as evidence of a 'genetic component in the pattern of PGO activity.' (ibid.) They note that phasic activity in the cat is marked in the visual system but not in the whiskers, and is marked in the whiskers of a rat but not in the LGN: this they relate to the reliance of the rat on touch and smell. They suggest that 'PGO activity may act to maintain functional the systems necessary for the survival of a particular species of animal.' (ibid.)

Whether Bowker and Morrison (1976) are correct or not,

has no implications for the debate over the meaningfulness and function of dreams. However, if they are correct then theories of REMS that emphasise the importance of PGO stimulation as an essential and unique part of REMS are misguided, although the the bursts could still be interpreted as cortical stimulation. Conclusions reached about PGO stimulation keeping the cortex in a receptive state are not affected by these results, although there is the possibility that a third variable causes both the dream vividness and the PGO bursts, which would thus be causally independent of each other.

Other Characteristics of Dreams Through the Night

What explanations can be offered for the increase in dream intensity and bizarreness as the night progresses, and also for the lack of bizarreness in children's dreams (examples of which are given in Kimmins, 1920), the time of life with greatest proportion of REMS? Foulkes (1982b) found that children's earliest REM dreams, at ages 3-5, do not involve kinematic imagery: movement and activity are seldom reported. They lack not only narrative but also any consistent presence of human characters and social interactions. He also found that children's dreams are just a recreation of past waking experience, or a totally plausible portrayal of real-life contingencies.

Pivik and Foulkes (1968) suggest that the increase in bizarre content in dreams as the night progresses is a function of total sleep time before the awakening. However, contrary to the claim that the subject must be asleep a long time in order to develop bizarre imagery, Bertini, Lewis & Witkin (1969, in *Altered States of*

Consciousness, ed. Tart) found that at sleep onset there are dreamlike transformations of elements from films shown just before sleep; for example, one subject "dreamt" of the head of a worm sticking out of an apple after seeing a film about a birth, and another subject saw a suitcase being emptied. Other work shows that longer REM periods have more vivid, emotional and active dreams, but that their plausibility and sensibleness are unaffected by REM time length, again showing the lack of association between dream intensity and dream bizarreness.

Finally, I wish to emphasise the narrative nature of dreams by reference to the findings of Kerr and Foulkes (1981) and also Kerr, Foulkes and Jurkovic (1978). In both papers a patient is found to have narrative dreaming and yet no visual imagery, either when asleep or when awake. (However, Hudson, 1971, describes patients with Turner's syndrome, who were used in the latter experiment, and shows how it is not certain that they are devoid of visual imagery; they have many genetic disabilities which could be affecting the results. Also, Humphrey and Zangwill, 1951, reported three patients with parieto-occipital damage, defective visualisation and spatial judgement, who all had a loss of dream recall.) I also wish to mention the possible relation between narrative and the frontal lobes, following Jus, Jus, Villeneuve, Pires, Lachance, Fortier & Villeneuve's (1973) report that frontal lobe damage (in lobotomised chronic schizophrenic patients) leads to a halt in dream recall, the relation between the posterior portion of the left-hemisphere and the generation of imagery in waking life (Farah, 1984), and Foulkes' (1982a) idea of the dependence of dream production on the language parts of the left brain.

CHAPTER 3

OLDER PHYSIOLOGICAL THEORIES OF DREAMS

There have been speculations about the cause of dreams for over two thousand years. In this chapter I will describe some of the most influential theories dating from antiquity to the turn of this century. I will provide more detail about Freud's work in chapter 9.

The oldest theories held the mind to be passive during sleep, with dream images caused by the impingement of stimuli external to the mind. Freud saw other accounts as dividing dreams into two types - those concerned with the past and those with predicting the future. There was also a division between those who thought dreams intelligible, or at least amenable to interpretation, and those who considered them meaningless. In chapter 8 we will see that these standpoints are still with us.

The Source of Dream Images

Later philosophers divided on their opinions of the source of these stimuli which caused the images of dreams. Some held that some stimuli could be supernatural, others that they derived from the body (Maury, who had noted the changes in his dreams during periods of illness) or from the outside world (Jessen, for example). Others emphasised either the presence of waking concerns in dreams (Cicero, J. Mauss) or the presence of subliminal impressions from the day before, or from the remote past. For example, H. de Saint-Denys, who noted that it was often just good luck when the source of an image is discovered. Freud was to emphasise the presence of episodes of the day before in dreams, especially minor, incidental events. He warned:

'It is easy to see how the remarkable preference shown by the memory in dreams for indifferent, and consequently unnoticed, elements in waking experience is bound to lead people to overlook in general the dependence of dreams upon waking life...' (1953, p.19)

Some philosophers before Freud, however, developed the idea that dreams result from endogenous processes in the brain. Lavie and Hobson (1986) claim that Freud didn't review these in 'The Interpretation of Dreams' because of his concentration on French and German writers. This tradition was based in Britain. Some were influenced by Leibnitz's dogma that thought and psychological activity had to be continuous, carrying on during sleep, with the resultant dependence of dreaming on waking mentation. Locke countered this school in positivist style with the observation that we are only rarely aware of these putative sleeping thoughts. Hartley followed Locke with the claim that the state of sleep is so different from that of waking life that the associations during sleep are different from the products of waking vigilance. He also attributed the ease of forgetting dreams to the difference in mental state between sleep and waking, which coincides with some modern views.

In Scotland Reid introduced the idea of dreaming being a state 'intermediate' between sleep and waking, in which one was able to attend to important stimulations present in the outside world. Stewart, in the early nineteenth century, built on this to suggest that dreams are like waking thought, except that the will is absent, leaving only associations between thoughts.

Also in Scotland Hamilton was elaborating Leibnitz's idea of the continuity of sleep and waking. He traced the continuity between

perception and thoughts in the two states, and performed experiments in which he was abruptly awakened during the night in order to catch himself dreaming. Despite believing in the continuity theory he did realise that the type of thinking during sleep was different to that of the day. Similarly, Wundt, the founder of experimental psychology, stated that stimuli impinge on the sleeping mind under conditions favourable to the formation of illusions.

The Purpose of Dreaming

By the middle of the nineteenth century physiology had advanced such that dreaming could be related to nerve reflexes and to changes in the circulation of the blood. Laycock, in 1851, wrote that sleep serves a restorative function for the body, and G. Lewes replied that sleep restores fatigued nerves. The former also held that dreams occur during imperfect sleep, when the mind is still conscious of internal and external stimuli. Nearer the end of the century arose the claim that dreams are the differential activation of separate parts of the brain. Freud applauded such a view of dreams which placed them within normal physiology, rather than as a response to illness.

Freud produced a theory of dreams in 1900 which went far beyond a basis of memory, physiology and dream-day stimuli. He wanted to explain how dreams deal with this material, and also what the function of dreams is. Most previous theories provided accounts of the mechanism of dreams, but not of their purpose. He claimed that for the writers who came before him, 'dreams are a reaction to the disturbance of sleep brought about by a stimulus - a reaction, incidentally, which is quite superfluous' (ibid. p.78). He applied this criticism to

Scherner's notion that the mind in sleep plays with and symbolises the stimuli that impinge upon it. He also complained that even some of the proposed mechanisms were inadequate - stimulation theories could only account for a small number of dream images. He countered that our mental processes can account for dreams just as they can account for neuroses and slips of the tongue - the product is strange, however, because the thinking in them is done with images, which are believed in because the person has 'turned away from the external world' (ibid. passim).

With regard to mechanism, Freud's major contribution is in the notion of unconscious thoughts gaining access to consciousness through disguise and through their association with events of the dream-day with the purpose of protecting the subject's sleep. He held that dreams do this by incorporating disturbing thoughts (both conscious and unconscious) and the occasional disturbing sensation into the images of the dream.

NEWER PHYSIOLOGICAL THEORIES OF REM SLEEP

The Catecholamine Depletion Hypothesis

Hartmann (1973) and Hartmann & Bridwell (1970) proposed that, whatever dreams do, REM sleep restores depleted catecholamine levels. This explained work on anti-depressants which are independently known to increase catecholamine levels, but which also severely reduce REM sleep time, and the observation that manic subjects are believed to be high in catecholamines and tend to have less REMS (Schildkraut, Schanberg, Breese & Kopin, 1967). Conversely, alphanethylparatrypt-amine and 6-hydroxydopamine both interfere with catecholamine synthesis and both increase REM time (Hartmann, Chung, Draskoczy & Schildkraut, 1971), while Nakazawa, Tachibana, Kotorii & Ogata (1973) found that L-Dopa administration reduces REM rebound; this concurs with reports that some schizophrenics have reduced REM rebound and that one proposed aetiology for schizophrenia is of an excess of the catecholamine dopamine. Hartmann and Stern (1972) reported that whereas four days of REM sleep deprivation in rats resulted in a deficit in acquisition of an active avoidance task this was reversed by administration of L-Dopa (a precursor of the catecholamine dopamine). He had previously shown that the anti-depressant MAO inhibitors and imipramine both reduce REMDep learning deficits. (See Linden, Bern and Fishbein, 1975, for a study relating REM sleep to learning, and my fifth chapter.) Iskander and Kaelbling (1970) reduced catecholamine levels in cats and found an increase in paradoxical sleep - that REM rebound cannot increase indefinitely with

deprivation led them to hypothesise that REM sleep is related to a 'physiological system having absolute values, such as catecholamine stores'.

Iskander and Kaelbling (ibid.) provide a reply to the most embarrassing problem for the catecholamine hypothesis, namely that REM deprivation has a therapeutic effect on endogenous depressives, who are hypothesised to have too little catecholamine. (See Vogel, McAbee, Barker & Thurmond, 1977, who found that depression improvement correlates with REM pressure after deprivation. This improvement is embarrassing for many theories that propose functions for REM sleep in terms of information- processing and aiding memory.) They suggest that while "there is probably no single aetiological factor in depressive illness, the evidence suggests that changes in delta sleep are more significant than changes in paradoxical sleep in this clinical state." They review the evidence that depressive patients have more awakenings during the night and a gross loss of delta sleep, with a less noticeable reduction of REM sleep, and that patients treated with ECT have paradoxical sleep returning to normal levels "at about the time of clinical improvement", and that delta sleep also returns to normal levels. Similarly, MAO inhibitors cause a decrease in PS time and an increase in Delta sleep; they also increase serotonin availability, which is related to delta sleep. It is thus possible that lack of paradoxical sleep in these patients is due to lack of delta sleep, and it is suggested that the therapeutic effect of REM deprivation works by increasing delta sleep time. Cartwright (1983) found shortened REM latencies in women undergoing divorce, REM latency returned to normal at 1-2 year follow up except for those initially most depressed, and

Iskander and Kaelbling (1970) similarly report that at the time of clinical improvement PS activity returns to normal. PS may thus not be directly related to depression and its cure, which lessens the impact of the depression data towards the catecholamine depletion hypothesis. However, Zarcone and Benson (1983) do report that subjects who rated themselves as depressed had greater REMS eye movement densities than did controls.

The catecholamine system (specifically noradrenaline) that we are concerned with has widespread terminations in the forebrain, an area which is implicated in mammalian intelligent activity. Hartmann is suggesting that the NA system is inactive, and is possibly being repaired, during REM sleep. This is indicated by Schildkraut and Hartmann's (1972) finding that NA metabolism is increased after 72 hours of REM sleep deprivation. The NA system originates in the locus coeruleus, which is confirmed by single-cell recordings to be inactive during REM sleep (Hobson, McCarley & Wyzinski, 1975).

The Continuity Between Waking and Dream Experience

This theory challenges the assumption of the continuity between waking and dreaming brain conditions. Ever since Leibnitz there has been hypothesised a continuity between waking life and dream content. This hypothesis has its experimental justification in studies comparing the dream life of creative and non-creative people; for example, Adelson (1959), who reports dreams of more creative college women as being more interesting and innovative than those of less creative peers, Domino (1976), who used two high-school groups that differed in creativity and found more "primary process thinking"

(defined as unusual or impossible events, inexplicable transformations, condensations etc.) from the more creative group, and Schechter, Schmeidler & Staal (1965), who found dream diary reports of art students to be more imaginative than those of science or engineering students. If critical judgement, task orientation, reality testing, sense of identity and free-will are connected with the catecholamine system (as hypothesised by Hartmann, 1973, and by Stern and Morgane, 1974), then the lack of these, and concomitant bizarreness, are solely the preserve of REM sleep (and possibly some biochemically disordered individuals).

Note that this argument for a lack of continuity between dreaming and waking mentation does not depend upon the truth of any particular biochemical theory of dreaming, although I have here used Hartmann's theory for illustration and because of the mass of evidence in its favour. This theory is anyway opposed by evidence that noradrenaline may act as the trigger for REM sleep, see Kanno and Clarenbach (1985) and Jouvet (1969), and by another biochemically based theory of dreams and hallucinations, that of Hernandez-Peon (1966). It is the presence of a temporary neurochemical disorder that leads to the discontinuity prediction: that REM sleep has a physiological function would not be enough to predict waking/dreaming discontinuity.

The Brain Over-Excitation Hypothesis

The above theory of dream function emphasises the effect of REM sleep upon the brain as a whole. A similar theory holds that REM

sleep acts to make the whole brain less excitable, and that dream deprivation will increase susceptibility to epileptic attacks. There is evidence that after REM sleep deprivation there is a change in threshold of electrical current able to produce epileptic fits. Cohen and Dement (1965) hypothesised that REM deprivation causes a generalised increase in neural excitability. This was based on the increasingly severe convulsive spasms of face and body seen in the REM deprived animal, and the increased availability of cells able to respond to a second click in REM deprived cats (the accelerated auditory recovery, found by Dewson, 1965). He found base thresholds for electroconvulsion for 48 rats. 24 were REM deprived but obtained SWS and 24 controls were allowed to sleep normally for the six days of the experiment. The former group showed a fall in the mean threshold of 23%, whereas the control group showed a slight increase. However, in a third group used to control for the non-specific effects of sleep deprivation only 2 non-REM sleep deprived animals were used, one of which had a 4% drop in threshold. Bearing in mind that some REM deprived animals had a threshold drop almost as small as 5% it is not proven that REM deprivation is the relevant factor; more NREM sleep deprived controls are needed. He states that REM deprivation may be affecting plasma electrolytes, steroids or hormones, and hence these may be the mediators of the effect. In favour of this interpretation is the finding of Ukponmwan and Dzoljic (1984) that enkephalinase inhibition antagonises the increased susceptibility to handling-induced seizure caused by REM sleep deprivation.

An increase in REM sleep time is found after daytime electrical stimulation of the Ascending Reticular Activating System

(Frederickson & Hobson, 1969), which accords with the biochemical recuperation theories mentioned above, and may provide a link between the two theories.

Another experiment explained by gross neurochemical and electrical changes is that of Cohen, Duncan and Dement (1967), who found that electroconvulsive shock reduced REM rebound in REM deprived cats. (This can be related to Jouvett's (1967 a&b) postulation of catecholamines as the mediator of REM sleep, to Pujol, Mouret, Jouvett & Glowinski's (1968) finding that there is increased noradrenaline turnover during REM rebound, and to Kety, Evarts & Williams' [1967] finding of an increased turnover of noradrenaline in the CNS after repeated electroshocks.) This result suggests that REM sleep and ECS both augment NA synthesis, and that changes of parameters for either REM sleep or ECS may be related to NA on a neurophysiological level rather than to the 'dry' level. The suppression of REM phase in the cat after ECS was shown by Cohen and Dement (1966).

Strangely, in view of the above theory that REM sleep prevents over-excitation of the cortex, seizures can substitute for REM sleep (also shown by Kaelbling, Koski & Hartwig, 1968). REM deprivation leads to an increase in Intracranial Self Stimulation rates, and a decrease in current threshold (Steiner and Ellman, 1972), but again this result can be globally and chemically explained in that noradrenaline is implicated in ICSS (Stein, 1966). Also, Cohen and Dement (1965) found that amphetamine lethality is actually reduced by REM sleep deprivation, and postulated that this was due to a reduction in brain catecholamine levels. The experiments cited so far in this chapter indicate that dream sleep is implicated in neurochemical

changes in the whole brain; such theories may or may not be at variance with those to be reviewed in the next chapter, that claim that REM sleep aids the consolidation of individual memories themselves.

In favour of some connection between REM sleep and a protective function, though, is the report by Dement (1976, p.92) that a narcoleptic patient had complete REMS suppression when given a monoamine oxidase inhibitor. Upon withdrawal of the drug the patient 'entered an almost continuous REM sleep interrupted by waking hallucinatory periods'. Similarly, cats whose synthesis of serotonin was temporarily inhibited by the drug PCPA had reduced sleep time (REMS and NREMS). After a few days they were able to sleep more, but PGO spikes began to emerge into the waking state. However, it must be noted that although the barrier between REM sleep and waking life can be breached in this way, This does not prove that REM sleep has the function of keeping PGO activity away from waking life. An analogy is that extremely hungry people may try to eat grass, but that does not prove that we normally eat food in order to avoid eating grass! Alternatively, to remove a valve from a radio may result in a high-pitched noise, but the valve is not present in order to suppress that sound. Furthermore, according to Purpura, Shofer & Scarff (1965), in the newborn mammal (and at a time of much REM sleep) there is a precocious development of synaptic inhibition, maybe as a brake against overexcitation before the appropriate sensorimotor systems are mature. The threshold of seizure induction is actually greater at earlier ages. They also state that spontaneous activity of neurones is virtually absent.

I conclude that evidence that REM sleep is connected with the staying off of electrical seizures is not conclusive. However, Horne (1988, p.71) notes that human studies show that 'sleep deprivation may promote epilepsy in those people with a history of the disorder'. He states that the sleep-deprived brain lives from moment to moment, without pre-planned preparation, and that 'although subjects can quickly respond to stimuli when these arrive, subjects seem to react to each stimulus as a sudden surprise, rather than treat it as an expected event.' (1988, p.75.)

Information-Processing Theories

Newman and Evans' (1965, also reported in Evans and Newman, 1964, and Evans, 1983) computer theory holds that REM sleep is a time for practising programs and erasing wasteful sub-routines. This theory was inspired by the function of the off-line state in computers. During this state a computer is run without actually having any effect on the outside world, so that programs may be explored on their own, without providing any output to the tasks normally controlled by it. The theory can provide many reasons to explain the decline in REM sleep with age, and also the unconsciousness and isolation of the subject during sleep.

One objection to the theory is the infant's need for reality feedback to obtain such schemata as object permanence, attachment and sensorimotor skills; whereas later in life the brain can obtain important results by turning to itself, why then is dreaming concentrated in the early years? One answer is that at early ages so much more is new, even though so much less has been learned in total.

In later years we are just learning more of the same thing, rather than whole new schemata. The REM period is thus providing a playback of what has happened recently, which fits in with the prevalence of images from the previous few days. REMS time thus correlates with amount of information being picked up (and its ease of assimilation) rather than with the amount already in storage. (The latter is a prediction of any computer theory holding REM sleep as a checker of all programs.)

Possibly all mammals are preprogrammed to decrease REM time with age because few new concepts are learned later on in life; this is true for human culture where after picking up new concepts like alphabet, etiquette, language and morality most additions then are just more of the same thing (e.g. a second language), knowledge then increases quantitatively. But maybe the system is not rigidly pre-wired though and a conceptual jolt, such as bereavement or religious conversion, could lead to a greater time spent in REM sleep. (See Fishbein and Gutwein, 1977, for a review of the findings of increased REM time after learning, and Maho, 1977, concerning the critical learning period preceding stabilisation of performance during which REM time is maximised. Cohen (1979, p.93) summarises evidence for REM time being related to amount of material still to be learnt in a learning experiment.) Cartwright (1986) cites evidence for REM time changes during divorce proceedings, covarying with whether the subject was depressed or not.

For no increase in REM time to occur upon presentation of a conceptual jolt would not falsify this suggestion of this computer theory, for vividness could change instead. Cohen (1979)

states that, "it is my impression that to the degree that physical activation determines dream content, it will influence the quality more than the specific content of the dream".

A similar theory, also based upon an information-processing point of view, is that of the Activation-Synthesis Hypothesis (Hobson and McCarley, 1977, with further experimental evidence summarised in McCarley and Hoffman, 1981). It is based upon the claim that PGO stimulation from the brain-stem provides structured input about movement, and hence it explains the finding that REM periods with greater frequency of PGO bursts occur with more active dreams (Berger and Oswald, 1962). It proposes that the PGO stimulation contains sensorimotor information which is passed to the Lateral Geniculate Nucleus and cortex, and that the amount of information about movement will correlate with the rate of activity in the dream imagery. This theory provides not just an explanation for dreaming, but also a purpose for REM sleep in the infant fetus, in that visual neurones are provided with excitation in order to aid their maturation. (The other four senses will be obtaining stimulation from the uterine environment.) Unlike the first two theories mentioned this one provides an information-processing function for dreams - we will now examine another such theory, which holds that REM sleep is involved with the alteration and storage of memories, rather than just with the preparation of neurones prior to learning (evidence for which also comes from Roffwarg, Muzio & Dement, 1966).

CHAPTER 5

EXPERIMENTS ON REM SLEEP AND MEMORY

REM Sleep Aids Recall

The advantageous effect of REM sleep on memory is beyond dispute, as shown by the following brief review of studies linking dream sleep to learning. It should be noted that some of the studies can be interpreted as simply showing that REM sleep halts memory interference, whereas others claim that REM sleep has a positive and actively beneficial effect on the laying down of memories. This effect on memories is separate from the claims of the 'brain restoration and repair' theories; the high level of neural activity during REM sleep would, in fact, point away from the repair type of explanation.

1) REM deprivation prior to training, or immediately afterwards, impairs the formation of a permanent trace, even though the new information has been registered (Fishbein, 1970; Segales and Domino, 1973; Fishbein, 1972). Most of the studies that do find such an effect use simple tasks.

2) Some results have been obtained indicating that REMS deprivation affects initial acquisition of responses. However, in favour of no effect is the result of Oniani (reported 1987), who found that REM sleep deprived rats performed a passive avoidance task as well as controls, provided that the deprivation was effected through 'nonemotional' awaking, by hand, rather than by the water tank method.

3) Post-training prolonged REM deprivation affects memory consolidation (putting the contents of STM into LTM) and stabilisation (of LT memories themselves). Fishbein (1971) indicated that REMS may function in the maintenance of LTM, as well as in its initial consolidation. Fishbein, McGaugh & Swarz (1971) showed this directly by training mice in an inhibitory avoidance task, they were then REM deprived for 48 hours, and then given electroconvulsive shock (which usually only causes amnesia if given immediately after training). This group were found to be amnesic, the control sham-ECS group were not. The dream deprivation did not destroy the memory traces, rather it left them fragile and liable to disruption. Fishbein and Gutwein (1977) similarly go beyond the evidence that REM sleep facilitates the conversion of learned responses into long term memory, to show that REM sleep actively maintains the stability of already consolidated memory traces. Memory traces are thus made permanent and prevented from decaying. (Note, in opposition to this, van Hulzen & Coenen's [1979] finding that rats deprived of REM sleep after shuttle-box avoidance learning did not perform worse than controls. However, they did awaken the rats every time that REM sleep started, as the means of REM deprivation, and so it is possible that consolidation occurred during these waking periods, offsetting the effect of lack of consolidation during REM sleep. Also, it is possible that the memory was maintained in a labile state for these experimental group animals, REM sleep having the effect of making the memories more stable, rather than just consolidating them before forgetting occurs. They suggest that the excited behaviour that REM deprivation causes may be the reason behind learning changes in these experiments.)

There is also the finding of Zornetzer and Gold (1976) that locus coeruleus lesions prolong the period during which an established memory is susceptible to disruption. (The locus coeruleus is involved in the production of REMS.) The only maladaptive feature of the memory trace is its fragility.

4) The phenomenon of REM time augmentation after learning. Lucero (1970) showed that rats trained in a labyrinth-like maze had an increase in REM time but no change in total sleep time, whereas rats which walked the same distances in the maze but without learning imposed had no REM augmentation - this result argues against the use of the notion of greater brain excitation rather than learning itself, to explain some of the results reviewed here. (Similarly, Matsumoto, Nishisho, Suto, Sadahiro & Miyoshi, 1968, found that even exercising rats to the point of exhaustion has no effect on REM sleep parameters.) Greater detail on this effect is presented by Smith, Kitahama, Valatx & Jouvet (1974), who trained mice in a multiple-trial discrimination task and found that REM sleep augmentation dissipates as the learning curve approaches the point of maximum learning. Maho (1977) found that there was a critical learning period for 7 cats undergoing avoidance conditioning, characterised by a high rate of respiratory, heart rate and arousal reactions, as well as an increase in PS length. This period preceded the stabilisation of preferences. In opposition to these results Meienberg (1977) found that a subject on a language course had no change in baseline PS length. This may indicate, though, that dreaming is only concerned with knowledge of affective significance. However, Meienberg's result is contradicted by de Koninck (1978), who found that English speaking Canadians who took

an intensive course in French showed marked elevation in REM sleep, but only when their learning was effective. Further evidence for REM augmentation is provided by Leconte, Hennevin & Bloch (1972) with rats, and Solodkin, Cardona & Corsi-Cabrera (1985) in chicks after imprinting.

5) There is indirect evidence linking REM sleep with learning, such as the following: Gutwein and Fishbein (1980) showed that environmentally deprived mice had less PS following learning of a brightness discrimination task than did normally reared mice. Stern, Morgane, Panksepp, Zolovick & Jalowiec (1972) found REMS to be increased after protein synthesis was inhibited - such synthesis is connected with the formation of memories. Jasper and Tessier (1970) and Gadea-Ciria, Stadler, Lhoyd & Bartholini (1973) found that desynchronized EEG is correlated with increased acetylcholine in the neocortex. Bowers, Hartmann and Freedman (1966) showed that REM deprivation is related to a reduction in brain ACh levels; we know that ACh is related to learning because an enriched environment increases the rate of release of acetylcholine, as measured by the presence of acetylcholinesterase. Also, Skinner, Overstreet & Orbach (1976) found that physostigmine (an anticholinesterase) prevented the memory disruptive effects of REMS deprivation, suggesting that the disruptive effect is cholinergically mediated.

Spreux (1982) submitted 8 subjects to a learning of a calculation. There was an increase in the ratio of high- to low-frequency eye movements (<1sec. as opposed to >2 sec.) compared to the reference night, but sleep durations did not change. This was interpreted as showing the information-processing nature of REM sleep.

Other work which finds a relationship between amount of REMs and intelligence includes Tanguay, Ornitz, Forsythe & Ritvo (1976), who found that autistic children show an immaturity in the organisation of eye movements into discreet bursts, and Clausen, Sersen & Lindsay (1977), who found a larger REM latency and lower EM density in Down's syndrome subjects compared to controls.

In experiments to validate the catecholamine hypothesis (which states that REM sleep restores catecholamine levels after depletion during waking) it was found that reduced learning due to REM deprivation can be reversed by L-Dopa or AMPT administration, compared to control REMDep groups. L-Dopa and AMPT administration alone do not aid learning (Hartmann and Stern, 1972), but do increase catecholamine levels. That a pharmacological procedure can reverse REMDep effects on learning argues against the importance accorded to PGO stimulation in some theories of dreaming. In chapter 2 I showed that PGO stimulation is instead concerned with the production of vivid dream images, rather than with the content of the images.

Work on protein synthesis also shows the similarity between REM sleep and normal learning. Lambrey-Sakai (1972) reported that REM deprivation in rats impaired the incorporation of amino-acids into brain proteins. Furthermore, Pegram (1973) inhibited protein synthesis with anisomycin and found that this suppressed REM sleep. However, it is necessary to note Horne's (1988, p.281) point that REM sleep is more fragile than NREM sleep, and is more likely to be lost due to the stress of the drug study, as well as due to any reduction in protein synthesis.

Drucker-Colin, Spanis, Cotman & McGaugh (1975) found that the

total protein content of cat midbrain perfusates obtained during REM sleep is even higher than that obtained during wakefulness, indicating the learning function of REM sleep.

However, Horne (1988, p.281) points out that measurement of the protein content of fluid from the brain does not tell us about what happens inside neurones and neuroglia, which is where memory proteins would be presumed to be laid down. Any change in protein composition of cells could just be due to the general increase in brain metabolism, and not due to specific memory proteins. He also points out that there are stressful side-effects of the drugs given and that such stress can itself affect memory (ibid.).

6) According to Scrima (1984 & 1982) there is, at least for narcoleptics, a greater advantage in having REM sleep after learning complex associative information than in having NREM sleep, which he says merely prevents retroactive interference. He also found that recall of complex associative information is better after NREMS than after a period of wakefulness, and that in general 'studies demonstrating that dream sleep deprivation produced recall deficiencies used complex associative information, presumably the basis of human memory' as opposed to minimally associative information. Similarly, Tilley & Empson (1978) compared the effects on story retention of REMS deprivation against stage 4 deprivation. For the 20 undergraduate subjects, recall accuracy in the former group was much poorer. Scrima postulates that during REM sleep there is an active consolidation of memories.

7) As a contrast to the finding that recall is better following a period of REM sleep than a similar time spent awake, Portnoff, Baekeland, Goodenough, Karacan & Shapiro (1966) found that NREM sleep impedes the consolidation of memory traces: however, I have doubts about the claim that the control group, who were kept awake before sleeping again, were unlikely to rehearse the learning material during this time, which would lead to a comparative deficit of the NREM group's learning ability.

Dreams and Information-Processing

That some thought processes occur during sleep was shown by Berger (1963), with the incorporation of spoken stimuli into dreams. In addition, Hoelscher, Klinger and Barta (1981) found that 'concern stimuli' were incorporated significantly more often than 'non-concern stimuli' in stage REM, which shows (unlike the Berger result) 'that sleeping subjects are capable of ... complex and subtle cognitive discriminations, based on the waking value of the stimulus to the subject.' They found a much smaller rate of incorporation into stage 2 sleep. Similarly, Cipolli, Fagioli, Maccolini & Salzarulo (1983) found that sentences could be incorporated into dreams depending upon their meaningfulness, another example of discriminative thinking during sleep.

Evidence for the processing during dreaming of waking non-conscious perceptions is provided by Shevrin (1986), who shows that unreported aspects of a briefly flashed (and presumably unconscious) stimulus are recovered in dreams. Further evidence is provided in Nisbett and Wilson (1977) and Zajonc (1980). This idea is associated

with Poetzl, who saw the visual apparatus as like a photographic darkroom in which the developing of images takes place in different stages. However, some of this work, over the decades since Poetzl's publication in 1917, did not use controls, and so blank images are now added. Previously, it was easy to confabulate any connections between dream and stimulus image, and so this tendency had to be controlled for.

Unconscious Adaptive Thinking During Dreams

However, it must be explained how dreams that are not consciously remembered are still beneficial to the subject. As Rycroft puts it, in a book unconcerned with the physiological and functional implications of dreaming:

'... anyone maintaining that dreams have meanings has to explain why the recipient of dream-messages does not even listen to them, let alone take heed of them.' (1981, p.47)

I intend to show that the fact that dreams are for the most part not remembered is no counter to their proposed learning function. Dixon and Henley (1980) refer to eleven areas of psychology research in which stimuli are found to exert a perceptual or behavioural effect without ever entering consciousness. For example, if words are initially associated to electric shock and then presented in the unattended ear in a dichotic listening experiment a galvanic skin response will be evoked (which is not evoked to control words). The subject has no recall of what words were presented in the unattended channel. Moreover, Forster and Govier (1978) showed that the response

even generalises to phonetically similar words, so a low level of processing is occurring. Henley (1976) found that words which were not consciously perceived could disambiguate other presented words. Work on commissurotomized patients shows that the right hemisphere can learn without the subject being aware of the material picked up. Similarly, Nisbett and Wilson (1977) describe Wilson's study of subjects having no conscious knowledge of tones presented in the empty channel of a dichotic listening task, but when asked to rank their guesses they did show some unconscious knowledge. A summary of much of the rest of such evidence is provided by LeDoux (1985). Note also Kaser (1986) who played a sung message to subjects which was speeded up sufficiently to be incomprehensible consciously. It was mixed with a normal music recording, the latter being played alone to the control subjects. All subjects made a drawing before hearing the tape, a drawing afterwards, and a drawing of a dream from that night. Blind ratings showed a significant difference between the experimental and control groups with regards to their post-tape and dream drawings. The conclusion was that the unconscious or preconscious could perceive the message, and that, therefore, unconscious processing can occur in the brain, and sometimes come to mind during dreaming.

Dixon (1971, p.315) notes that the effect of subliminal stimulation is greatest when the recipient is relaxed and passive, and when the stimulus is well below, rather than just below, the awareness threshold. He proposes that the limbic-midbrain activating system (see chapter 1) leads to less restraint on associative processes than the (waking) Ascending Reticular Activating System. Similarly, Haber and Erdelyi (1967) note that free-associational activity between a

tachistoscopic presentation and subsequent recovery of hitherto unperceived material increases the number of items recovered. Another example is given by Sperry (1968) in the paper 'Hemisphere Disconnection and Unity in Conscious Awareness'. He reports flashing a question mark to the left hemisphere and an erotic picture to the right hemisphere of a split-brain patient. While the subject said he saw a question mark he also showed signs of blushing and arousal which he couldn't explain.

That actual learning can occur during sleep (rather than just incorporation into ongoing mentation as shown above) is indicated by Evans, Gustafson, O'Connell, Orne & Shor (1966) who found that an objective bodily response to spoken material could be acquired during stage REM, but not necessarily remembered during waking life. A typical suggestion given during stage REM was "Whenever I say the word 'leg' your left leg will feel extremely cramped and uncomfortable until you move it." The cue word was then spoken in order to test acquisition. In the next stage REM period only the cue word was used, the cues alone were also used on a second night. Eleven of 18 subjects responded while in REM sleep to the appropriate cue words, 6 of these responded in a subsequent REM period. Eight of these 11 were unable to specify what had been said to them while asleep, the other 3 were aware of the cue word but not of its significance, and these three had shown evidence of arousal (alpha rhythm) during presentation. (However, the published paper does imply that, at least for the first retention test and evaluation of behaviour, the same experimenter was used as gave the suggestion.) Unfortunately, the results do not indicate whether the instruction was incorporated into the dream or not.

Learning can thus occur during REM sleep, even to the extent that subjects can learn to shorten their REM periods to 10 minutes in order to avoid the trauma of being woken up at a fixed time after the start of a REMS episode by a loud noise and then asked difficult IQ questions (Fiss & Ellman, 1973). This effect was seen on the first recovery night after the conditioning was ended but wore off on the second night. Similar proof of instrumental learning during sleep is given by Williams, Morlock & Morlock (1966).

Objections to Work in this Paradigm

Horne (1988, pp.278-279) suggests that it is the increased drive behaviour associated with REM sleep deprivation that may distract the animal from its learning task. Such an increase in drives may be directly due to the REM deprivation, or be due to the stress of the procedure. He notes that 'if REM sleep deprivation is more stressful than a control condition, then the animal may be more concerned about reducing stress through producing stereotyped behaviours than about anything else.' (ibid. p.279.) He writes that the REM deprivation studies give more support to the theory that REM sleep is involved with drive reduction and the reduction of the level of excitement produced during wakefulness (1988, p.282). The latter proposal would explain the increases in REM sleep observed in animals kept in 'enriched environments'.

In addition, some of the human data above (of better recall after REMS than after NREMS) is also interpretable as an effect of high arousal during REMS compared to that during NREMS, which may as a side-effect be maintaining the memory trace in a more retrievable

form. Note that such an interpretation does not depend upon whether the subject was more alert after REMS than after NREMS, which these experiments do control for. (Some more dubious experiments did not control for the difference in initial brain activity between someone woken from REM sleep and someone woken from NREM sleep.) Such an interpretation (which has been ignored in Scrima's work) means that the results of these human experiments do not tell us anything about the actual function of REMS. However, Tilley (1981) retorts that consolidation may be helped by REMS precisely by keeping the recent memory traces in a state whereby they can be easily retrieved, and Chernik (1972) indicates that REMS does not have the same advantage over NREMS with regard to minimally associative information. Furthermore, work by Cartwright (1977, p.95-97) on the advantageous effect of REMS on memory for words, as opposed to a night in which REMS was not allowed, is relevant here. Both groups had the same number of awakenings. The material better remembered appeared to be specifically related to 'active, striving, waking life', indicating that REMS involves some selective information-processing, relevant to the balance of outer and inner attention, and that REMS is not leading to better recall of information in general, which would be predicted if the result were due to greater activation of the brain during REMS than during NREMS. I also note that this 'semi-active' interpretation of the REMS data does not explain the observed progression of dream content 'from predominantly elements of recent experiences toward the beginning of sleep to older experiences during later sleep and back to recent experiences again toward the end of a normal night of sleep' (Scrima, 1984).

Evidence for this particular active information-processing view of dreams comes from Roffwarg, Herman, Bowe-Anders & Tauber (1978), in an experiment in which subjects wore coloured goggles during their waking hours, and were awakened at various times during sleep. On the first night goggle-coloured events appeared in some of the scenes of the first dream of the night, and by the fourth or fifth nights the goggle-colour was appearing in just under half of the scenes of the later dreams of the night. The proportion of goggle-colour in the first dream increased progressively. When the goggles were removed the colour disappeared almost completely from all of the dreams of the following night, whereas it persisted for a few days in sleep-onset imagery. Any imagery recorded during NREM sleep did not show as much coloration as did REMS and sleep onset imagery. Similarly, Battaglia, Cavallero & Cicogna (1987) found that sleep onset awakenings have more day residues than REMS awakenings, while Verdone (1965) showed that early REM periods have less memories from the distant past than do late REM periods. Cartwright concludes that such evidence means that 'dreams begin with the feelings and concerns the person was experiencing just before sleep. Those that follow are related to the first, but are older examples of situations in which the same feelings are experienced' (1977, p.129). She claims that the later scenes have contemplated solutions to the concerns. Interestingly, an old account by the psychologist W. Rivers of a series of three of his dreams from one night shows that 'the main features of the three dreams were determined by the conflict arising out of the prospect of a new [university] appointment, the manifest content being determined by an incident of the previous day which had directly stimulated this conflict.' (Rivers, 1923, p.87.) In addition,

whereas the first dream was based directly on the conflict, the second brought in a memory of a trip to India, and the third a boyhood interest in Cambridge.

Conclusion

The balance of the evidence is thus that REM sleep is relevant to the organism's need to consolidate change, while consolidation of ordinary memories can occur during wakefulness, possibly needing just concentration. Consolidation can thus be pictured as writing about an experience on a piece of paper and putting it in the most obvious file, while dreaming is the cross-referencing and retrieval of various similar files. The insights of free-association after dreaming would then be due to using the dream elements as clues for which files to take out again when awake.

We will now proceed to study evidence that REM sleep is not just associated with the storage of waking mentation, but is itself a time of creative thought.

CHAPTER 6

IMAGERY, CREATIVITY AND DREAMS

In this chapter I will give evidence to show that REM sleep is closely connected with divergent thinking and creativity, and attempt to link this finding with the imaginal nature of dreams.

REM Sleep and Creativity

Cartwright and Monroe (1968) found a smaller REM rebound in REM deprived subjects who reported their mental content when awoken from REM sleep, than with subjects who reported a list of digits when awoken. (However, in interpreting the result of a changed rebound length we must remember that method of deprivation can affect the rebound; for example, light exercise also decreases REM rebound.) They also found that the amount of compensation was negatively related to the amount of content judged to be dream-like. This implies that dreaming can be partly substituted for by waking fantasy, and complements work which shows greater creative ability following REM sleep than after waking from NREM sleep. In that work, Fiss, Klein & Bokert (1966) found that thematic apperception test stories (in which a story is told in response to a pictured scene of interacting figures) obtained immediately after REM periods were significantly more dreamlike than TAT stories told after NREM awakenings.

Lewin and Glaubman (1975) suggested that mental activity during dreaming is not integrative and consolidating (as much of the last chapter showed), but is divergent and explorative. They found that for twelve subjects REM deprivation led to poorer performance on measures of divergent thinking, such as uses fluency and originality.

Glaubman (1978) set subjects a divergent thinking task before sleep and found that subjects responses after NREM sleep deprivation were numerically greater, more divergent and original than after REM deprivation. This implies that REM sleep increases divergent thinking during wakefulness, which is easy to believe if we bear in mind the bizarre and innovative nature of dreams. Shevrin and Fisher (1967) found that a waking subliminal stimulus is transformed differently in REM sleep imagery as opposed to NREM sleep imagery, and Shevrin (1986) gives evidence that dreams are necessary to recover primary process transformations that have occurred in the day, or even to produce them initially.

Hartmann (1984, p.128) gives evidence that 'there is some relationship between nightmares and creativity'. Most of the people in his survey of chronic nightmare sufferers were artists or other such creative people. Also, Belicky and Belicky (1982), in a study of over 300 college students, showed that those individuals majoring in art tended to have the most nightmares and vivid dreams, while students majoring in physical education had the fewest. Anecdotally, Rycroft (1981, p.132) writes that Hartmann 'mentions that he knows five physicians who report a decrease in sleep requirements following successful psychoanalytic treatment, and that he has not heard of any cases of change in the opposite direction.'

Hartmann, Baekeland and Zwillling (1972) also related subjects' personalities to amount of dreaming by comparing naturally long and short sleepers. They found that all subjects had almost identical lengths of NREM sleep, which accords with ideas of the bodily, physically restorative, function of NREM sleep. Short

sleepers were found to have significantly less mean REM density, significantly less REM periods, and shorter mean period lengths (which was not significant). Short sleepers were averaging 5.5 hours actually asleep, long sleepers 8 hours. With the help of personality inventories and interview impressions they concluded that short sleepers were more efficient, ambitious, socially adept and politically conformist. Long sleepers had a wider range of employment, most had some neurotic problem, were less sure of themselves, and some were artistic. Hartmann concludes that they are more in need of re-programming than the "pre-programmed" short sleepers. The long sleepers also had more primary process thinking in their dreams, and remembered more dreams at home than the short sleepers. (With regards to this latter point, Cohen, 1982, found that for male subjects, those who usually sleep longer each night have greater recall of dreams.) Upon REM deprivation long sleepers had a greater shortening of the REM cycle than did short sleepers, indicating the greater need for dreaming in the former group. However, note the figures provided by Webb & Agnew (1970), who found that long sleepers had 53% more REM sleep than control sleepers, and 36% more stage 2 than controls, while short sleepers had as much REM sleep and stage 4 as controls, obtaining their lack of sleep by moving through intermediary stages 2 and 3 quicker and more efficiently.

Problematic for the theories of the creativity of dreams is the mundane nature of many of them (as documented by Hunt, 1982) and also of many waking fantasies. Such fantasies are characterised not by bizarre images but by a plausible narrative. Freud (1908, 'Creative Writers and Day-Dreaming') writes that the first traces of adult

fantasy are present in childhood play, a creative manipulation of the environment. He states that adult fantasies are composed of a present wish, which 'harks back to a memory of an earlier experience (usually an infantile one) in which this wish was fulfilled; and it now creates a situation relating to the future which represents a fulfilment of the wish '. Freud emphasised the narrative nature of the fantasy; it is an imagined, plausible story with the aim of reaching some egoistic or erotic satisfaction.

Creative Compensation During Dreams

Of relevance to this are the following studies of compensation in dream sleep: Wood (1962) showed that social isolation for the day led to an increase in "social intercourse" in the dreams of the subjects. Similarly, Hauri (1968, 1970) employed 3 pre-sleep conditions in an own-control design which had 6 hours of each of the following: relaxation, physical exercise, and studying. He found less physical activity in REM and NREM dreams combined in the exercise case. Compensation is also evidenced in Bokert (1965), who found more thirst-related imagery on nights in which the subject was water-deprived, and a negative correlation between evidence of such content and morning thirst. Newton (1970) found that newly paralysed individuals reported more physical activity, and long-term paralysed individuals less activity, than controls. Finally, e la Pena, Zarcone & Dement (1973) found that information-processing, as quantified by REM activity, compensates for acute excess or deficiency of information-processing during the day.

Creativity

Contrary to Freud, Singer (1981) considers fantasy to be healthy and present in even emotionally satisfied people. He writes that regular daydreaming can make the real world more familiar, and lead to less mistaking of internal imagery and thoughts for hallucinations; he notes that in sensory deprivation experiments it is the subjects with less experience of daydreaming who are likely to report that they have hallucinations. (Note also that Wagner and Stegman, 1964, report that adult schizophrenia is not linked with an early history of daydreaming.) He notes that daydreams, like REM dreams, decrease with age - and also that it is more prevalent in upwardly mobile socioeconomic groups than in those whose status is assured and certain; the members of the former, more unstable group also described their fathers as being quite different from their own self-ideal, and do therefore seem to be using fantasy as an explorative tool. Similarly, Cartwright (1974a) studied the influence of a conscious wish or desire to change a personally relevant trait, this time in a dream paradigm. She discovered that the dream-world deals with the problem by revealing different affective attitudes toward the concern than those expressed in waking life.

The adaptive nature of daydreaming is evidenced by Symonds and Jensen (1961) in their finding that major themes of adolescent fantasies were still present in the subjects' adult life and work. According to Singer (ibid. p.148), children showing greater fantasy are more curious and lively and also need to have the skill of organised thinking in order to imagine plots and their endings. He also claims that it is the less imaginative children who are more

aggressive (ibid. p.136). However, lest we oversimplify this subject in assuming that fantasy during waking hours and bizarreness during sleep are not pathological, the finding of Starker (1974) must be borne in mind. He found that more anxious and low self-esteem subjects had more bizarreness in their dreams.

Bolton (1972, p.202) writes of such creativity as a distinct ability of the brain, which can be evaluated numerically. 'The correlation between intelligence and creativity, as defined by performance on tests of divergent thinking, decreases with increase in intelligence and decreasing test atmosphere. ... Different tests of divergent thinking and different measures (i.e. fluency, flexibility and originality) within the same test correlate highly among themselves to form a unitary dimension, although verbal and non-verbal components may be distinguished.' However, we are still left with the question of what this activity consists of. Of relevance is work by Polanyi (1967), who has distinguished between tacit and explicit knowledge. We are focally aware of the latter, whereas the former is like the ground from which the latter emerges. Such a conceptualisation allows us to claim that one can rearrange what is already vaguely known in order to produce new knowledge, which is then explicit. This is in answer to Socrates' claim that the maieutic method shows that what we discover by thought must have been already known anyway. In Polanyi's sense, tacit knowledg is used to make explicit knowledge. Of experimental relevance is the work of Mednick (1962, 1968) on the Remote Associations Test. In this test three words are given, and a fourth one which associates with them all must be supplied by the subject. The major difference between high and low

scorers on the test is found to be connected with attention deployment. When Mendelsohn and Griswold (1964) had subjects memorise 25 words while another 25 were played on a tape recorder, it was found that high RAT scorers could utilise cues from both sets of lists when later asked to solve anagrams which involved some of the words. Furthermore, Laughlin, Doherty & Dunn (1968) found that RAT was a more sensitive predictor of incidental concept learning, while intelligence was a better predictor for intentional concept formation. The latter seems to require focal awareness, the former subsidiary awareness, and I suggest that this work may form another link between dreams, with their loose connections and lack of analytical thinking (despite their 'single-mindedness'), and creativity. This work may help us to tie in dreams with the notion of incubation, for dreams also may be seen as the production of explicit knowledge from tacit knowledge, which is aided by the predominance in dreams of elements which in waking life are incidental and, quite literally, in the background. (Incidentally, Paivio, 1971, suggested that the discovery phase of the creative process is mediated by concrete imagery.)

Luria noted such a predominance of incidental elements in the recall of his brain-damaged patient Zasetzky. He related it to the normal condition of sleep, 'your thoughts are confused and you can readily become disturbed by things that appear trifling during the day. A cortical condition such as this, but pathologically induced, is what Pavlov termed a "damped" ... condition. In this state the cortex functions far less precisely and is barely able to distinguish the essential from the inessential; the dominant characteristics of objects (which it normally would discern) cease to predominate, but

are "levelled off" with secondary, less essential attributes.' (1975, p.97.)

Connected with the activity of incubation is that of play, for both require the relaxation of external constraints. Such is also true of dreams, and, as some have claimed, of mythology. Note that it is the external restrictions at the time of these activities that are decreased: the restrictions of the environment before the activity (that is, respectively for the above cases - the knowledge that is the background to the incubation, the objects played with, the events of the previous day, and the ethnographic background) are all rigidly determined and complexly structured. Wallach and Kogan (1965) similarly found that a creativity dimension of tests is only found when the experiment is performed in a playful, non-evaluative context. In other environments it was found that a measure of intelligence is as good at predicting individuals' results in the creativity tests. On a different note, but still connected with the notion of play in human creativity, Campbell (1984, p.154) writes of artistic epiphanies of early humans which are irrelevant to strategies of adaptation - he notes a 30,000 year old oval plaque from the Dordogne, carved from antler or bone, which has an engraved serpentine chain looped and folded back on itself. Similarly, human dreams may also have a large deficiency of function (redundancy) compared to dreams of other animals, with the intrusion of such playfulness and symbolism into them. This redundancy may explain the lack of pathological consequences in patients with complete suppression of REM sleep as a consequence of taking anti-depressant drugs.

Imagery and Creativity

That REM dreams appear as an image, rather than, say, chaotic verbal sounds and sentences, may be related to their proposed active divergent thought function on the basis of the following work. Hargreaves and Bolton (1972) found a relation between several divergent thinking measures and performance on a pair-associated learning task when subjects were told to form images linking each pair. A greater ability to image each pair would lead to better recall. Similarly, Durndell and Wetherick (1976) found that subjects who could control visual imagery well performed two divergent tasks better than a group with less control of imagery, while no relationship was found between reported imagery ability and performance on two conceptual tasks. Similarly, Shaw and DeMers (1986) found that for 84 high IQ children 'imagery has an important place in both the verbal and nonverbal dimensions of the creative process'. They found that vividness and control of imagery were both correlated with originality scores. They cited Shaw's conclusion that 'imagery as involved here seems to be used not as a primitive (i.e. irreducible) process for recall of passively stored information, but as a process of active manipulation of the given information. Thus, imaging may be able to account for individual differences in the transformation of information in the incubation stage of the creative process.' They conclude that 'originality' and 'flexibility' are the aspects of creative thinking that are most related to imagery. However, note the problems with the claim that imagery is a separate means of information-processing from that of the use of propositional knowledge which have been explored by Pylyshyn, 1973.

CHAPTER 7

THE NEURAL BASIS OF MEMORY

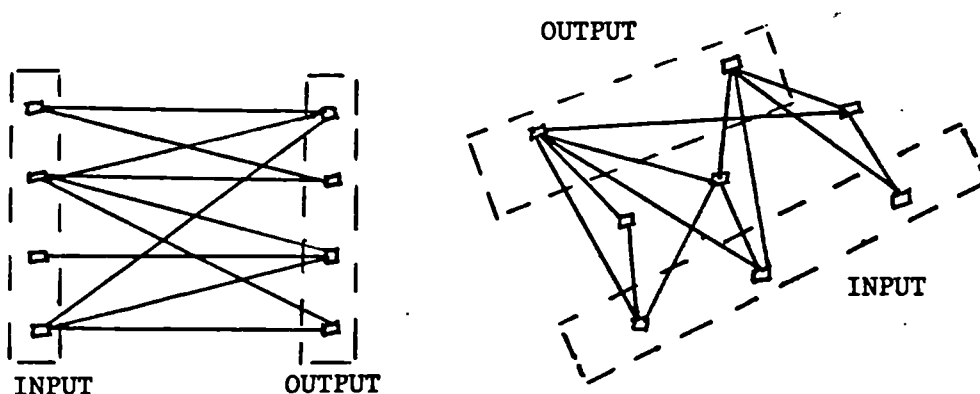
The Theoretical Basis of Neural Networks

Numerous authors have modelled some of the functions of brains using associative nets. This approach differs from traditional Artificial Intelligence work in that the properties of the hardware are important; high-level symbolic processing is not abstracted from the hardware by which it is carried out. The hardware consists of numerous units, the activation of each being dependent on the activation of many others to which the neurone in question is directly connected. These are different from digital computers although the latter can simulate the operations that the former perform - the computer just takes a long time doing so. Brains have a particular style of computation, unlike digital computers having to weigh conflicting and cooperating considerations very rapidly, which is different from the style of digital computers. To mimic this nets are built which store information in the connections between switches which are either on or off. They store representations in terms of their features, whereas computers store a piece of information at one address, which results in computers being bad at generalising from information already held, but being very accurate concerning what is held. As an example of feature analysis, P.Winston of MIT developed a computer program by which the machine distinguishes whether an arrangement of bricks forms an arch or not, but the problem takes hours to solve. Similarly humans take hours to solve the different types of problem that are rapidly processed by a computer. The

difference is because of the serial operation of computers as against the parallel operation of the brain, and also of associative nets. For example, the visual system has many inputs, with cells at each level depending on information from many cells of the previous level, and on lateral inhibition from neighbours. Kohonen actually found that without this lateral inhibition his model of learning to recognise faces from only one presented half leads to a very blurred image on recall.

New attempts to create intelligent systems are thus mimicking the neural structure of the brain, rather than trying to imitate human thinking by writing programmes which perform some of the symbolic manipulations of human thought. An associative net is for the most part unprogrammed, the solutions are found by the system settling down into a stable pattern of neural firing.

An associative net can be two arrays of cells, for the input and output, or one array with intermediary cells and the input and output cells arbitrarily assigned.



Both can work as an autoassociative net in that a pattern can be typed onto the first array which leads to an output which can

be fed back in as the input until the system is at equilibrium (that is, either the input and output arrays are identical or, in other types of net, none of the units switch any more). This final result is a memory.

There are various ways in which the net can be programmed with a memory, which each involve clamping the units and also the use of a synapse correcting algorithm:

Decrementing net - if an output cell fires when an input cell fires then the link between them is cut, otherwise it is left. Young (1978) reports this effect in the memory of the octopus, and likens it to the chipping away of stone to make a statue.

Incrementing net - if two connected cells fire together the link between them is incremented.

Hopfield net - link gains are adjusted according to the product of input and output cells' firing rates.

Similarities of Neural Networks with Biological Brains

There is now evidence that memories are stored by synapse connection strengths (it is found that the activity of the enzyme calpain increases if the synapse is used frequently), and nets so built have many properties in common with brains.

1) Generalisation, for many of the same synapses are used by different memories.

2) A complete representation can be constructed from a partial input. Only the partial input is needed for the net to search

its memory for the complete memory. As Ackley, Hinton & Sejnowski (1985) state:

"Many problems in vision, speech recognition, associative recall, and motor control can be formulated as searches. The similarity between different areas of cerebral cortex suggests that the same kind of massively parallel searches may be performed in many different cortical areas." The ability to reconstruct a memory from a displaced input is also a property of holograms; Willshaw, Buneman & Longuet-Higgins (1969) expand on this to show that useful information storage features of holography can be found in associative nets.

3) "Graceful degradation" is possible, the assembly does not fail completely if some of the elements are lost. Similarly, brain cells are lost from birth onwards but forgetfulness only gradually increases, and that only after middle age. (Amnesias due to brain damage arise from limbic system rather than temporal lobe damage.)

4) Sutherland (1986) points out that the mistakes made by the nets when learning have similarities to the mistakes made by children, for example, in learning regular and irregular verbs.

Although it is the study of vision that is the most advanced of all the studies of the neural basis of the senses, it is work on smell which has provided new insights into the network theories of memory and thinking. Vision is topographical, whereas smell only identifies things, and so whereas research on the former could concentrate on how the brain extracts a mental map from the retina,

research on the latter has had to meet the problem of the role that memory plays in the senses. This is because smell is a matter of association, each smell is significant because of the memory it evokes. Lynch (reported in *The Economist*, 29/6/85, author unnamed) noticed the similarities between the brain's olfactory memory circuits and computer circuits designed to associate concepts, in that each nerve cell has connections with many others, including itself via feedback routes. Lynch says that smell is closely connected with memory and association, for the nose sends nerves to the olfactory bulbs and thence to the hippocampus, via pyriform cortex. The pyriform cortex also sends connections to the frontal lobes. The importance of the sense of smell to mammalian evolution is noted by Jerison (1976). He claims that early mammals were nocturnal and hence needed to enlarge the areas of the brain dealing with smell and hearing, because, unlike with vision, which has some retinal processing, there was no other site for the improved processing to take place. Later, with the extinction of the dinosaurs, the mammals invaded daytime niches and had to encephalise their visual processing in order to integrate it with auditory and olfactory information. He proceeds to describe language as a sensory system, which aids in the creating of labels and the modelling of the real world. Dreaming, I suggest, would then be the use of this 'sense', without the participation of the other five. It was only later, he claims, that language was used for communication between people, and I note that at this point the theory is similar to that of Jaynes (1976). Jaynes writes that people have only been self-conscious for a few millennia. Before that the right-hemisphere of the brain made commands, which were heard as voices,

about activities that were needed. Only recently have we evolved to think about activities consciously, and the voices are thus now redundant. He considers that old myths of hearing the gods speak are an atavism from that time, as are the voices of schizophrenia now. This notion of an internal language is very apposite to the study of dreaming.

Hebb (1949) formulated a rule for how assemblies of neurones form. "Any two cells or system of cells which are repeatedly active at the same time will tend to become 'associated', so that activity in one facilitates activity in the other." The first cell is more likely to activate the second one in future. Hebb's ideas are also used by Hinton and Sejnowski's Boltzmann machine in its efforts to distinguish a figure from its background. In 1973 Stent added the possibility that connections between an active and an inactive cell are weakened. Malsburg then noted that fluctuations in activity must be synchronised to a few thousandths of a second for mutual strengthening to occur, otherwise there would be confusion between overlapping assemblies that should not be connected. Singer used Hebb's ideas to explain how cells in the visual cortex of kittens develop preferences for information coming from one eye rather than the other.

Experiments with the mollusc *Aplysia* have shown the molecular changes that occur at synapses during learning. The snail is given an electric shock which sensitises the animal to give a strong defensive reaction even to a light touch. The response is of withdrawing its gill. If no further shocks follow the effect wears off after about half an hour. Inhibitors of protein synthesis prevent the

long-term sensitisation while leaving the short-term version unaffected. Kandel showed that the inhibitors of protein synthesis act at the same site as the learning changes, rather than affecting the whole animal (as happened in earlier experiments). Inhibitors of RNA synthesis also block the long-term effect. After learning, new proteins are found by using two-dimensional gel-electrophoresis. These proteins might be involved in altering the area of contact between cells, changing the number of synapses, or influencing the production of enzymes that regulate the transmission of electrical signals. One group found that upon learning a protein in the synapse is phosphorylated, thereby closing channels in the cell membrane that allow potassium ions to flow out. Such an outflow is needed in order to return the cell from an excited (depolarised) state to a resting state. The cell stays excited for longer and strengthens the connection. It is the convergence of several inputs simultaneously onto one cell that is crucial. One input activates the cell, which is then simultaneously active with the other input cell - the connection is then strengthened, or, in neural net terms, the connection weight is increased. In addition, Bliss and Lomo found that electrodes giving high-frequency stimulation to the hippocampus strengthened the connections between a pathway there and the area that pathway connected with for several weeks. This they called long-term potentiation and later experimenters found that its prevention affects the learning of spatial tasks in the rat. Crick (1984) suggested a mechanism whereby such synaptic changes can be permanent despite the rapidity of protein turnover. A summary of work on the molecular basis of memory is provided by Rose (1986). (Note, however, that Igor

Aleksander, a pioneer in neural network theories, is now postulating that synapses may not change gradually, and that each neurone does not sum its inputs but rather acts as a pattern recogniser in a network of logic neurones. This removes the need for single neurones to have to calculate changes in weights when learning.)

The network models have much in common with cortex: all or nothing spikes, thresholds, refractory periods, delay time for signal transmission, inhibitory and excitatory post-synaptic potentials and stochastic neural activity. Biological systems and the Hopfield net do not have rigid synchronicity of firing. The Hopfield net mainly has local connections, similar to visual cortex which has a quasi-crystalline layered structure with dense short range interactions within a column and diffuse longer range axonally mediated connections between columns. Some neurones have both inhibitory and excitatory inputs. Also, dendro-dendritic synapses have been found which do not use action-potentials, our models will have to do this also.

Moreover, it is the decrementing net that is popular for a model of learning in the cerebellum (Albus, 1971) and is far simpler than the Hopfield net which postulates that the synapses must have a memory for their own previous firing rate and that of the connecting synapse, and must be able to calculate the change required for learning. The decrementing net needs no such precision, the link is either there or not. Like brain cells (including some that respond to different degrees of profile), the units have rapid changes in their rate of firing, they all have a threshold and information is conveyed according to whether a cell is firing or not, and at what rate. Hopfield's cells have a firing rate of + or -1, while the original

correlative nets had cells with a variety of firing rates (-1, -2, +3...). Similarly, biological neurones have action-potentials at a rate dependent upon the input current, and many have a graded response rather than action-potentials. A Hopfield cell would sum the gains from cells leading to it and then reset itself at either +1 or -1. A later version of the net, though, (Hopfield and Tank, 1986) used non-linear, graded response neurones instead of the 2-state type, and was found to be able to solve various more difficult computational problems. However, an unrealistic property of the net is that a negatively firing unit coupled with a negative connection weight causes the positive firing ($- \times - = +$) of the output cell.

In practice it is found that the Hopfield net works best when there are roughly equal numbers of +vely and -vely firing cells in the whole domain, otherwise many more mistakes in learning are made per pattern learned. (If many separate memories had many non-firing cells then the memories would correlate; such correlations, although necessary in brains, cause problems with the Hopfield net.) At best the network starts to make errors after learning $0.15N$ patterns, where N is the number of cells in the network. It still does better than a decrementing net though, as long as it doesn't have a low number of +vely firing cells. (Note that the brain does have such a paucity of firing cells at each point in time.) Unlike the other nets, but like animal brains, the Hopfield and correlative models can be disturbed by inputting the opposite of a pattern already learned, by varying the sequence in which patterns are put in, or by showing one pattern too many times.

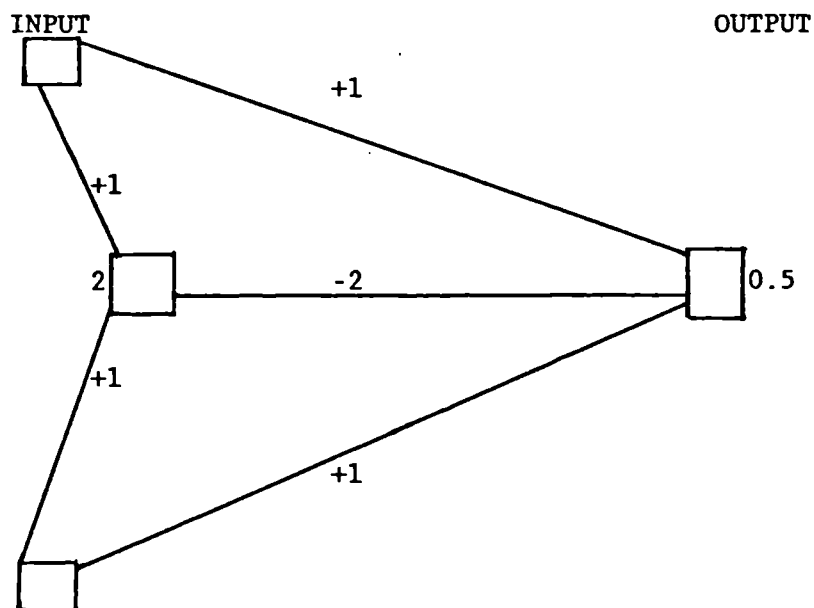
How the Networks Behave

The simplest sort of net has direct connections between all input and output neurones. In order to teach the net a pattern of neural states the neurones are clamped with the desired firing pattern. The connecting weights are then adjusted by an amount equal to the product of the neural firing rates, that is, if both are positively firing then the connection weight increases by 1, if one is positive and one negative then the connection weight is decremented by 1. If the two neurones are set at -1 and -1 then the connection weight is incremented by 1. Once this algorithm has been completed the system can be tested - if the input is not yet learnt then the algorithm is repeated. Once the input pattern is learnt the network can be taught another input pattern. However, often there is no suitable set of weights for all the vectors together. Intermediate levels must be introduced which extract a hierarchy of features from the input vector, and also cross-talk is needed between members of the same layer. An example of a simple task which requires intermediate links is teaching a net to distinguish two sorts of inputs, the input being two 8-bit arrays, one of which is a shifted version of the other. The net has to respond according to whether the shift is one space to the left or one to the right. The difficulty is that each input bit, considered in isolation, provides no information about what the output should be, and therefore combinations of bits must be considered, which needs intermediate units that extract information combinations. A whole list of such problems is provided in "Learning Internal Representations by Error Propagation" by Rumelhart, Hinton & Williams (1985) ICS Report 8506. This includes the XOR problem, which has the

following input and output vectors:

INPUT	OUTPUT
00	0
01	1
10	1
11	0

Again the input and output patterns are very different. A hidden unit is needed to give an internal representation of the input patterns.



The firing threshold for the hidden and output units are 2 and 0.5.

Such hidden units were first used in the perceptron. In the Hopfield net, which has a vast number of homogeneous units, any of which may be designated as input or output units, any unit not chosen as an input or output member can be thought of as an intermediate

unit. Initially there was a history of failure in searching for learning algorithms for complex nets, because when the network did the wrong thing it appeared to be impossible to decide which of the internal connection strengths was at fault. (With perceptrons the convergence theorem just guaranteed the weights for a single layer.) However, there are various ways in which the hidden units can obtain the correct threshold and connection weights: the experimenter can assign the values or the experimenter can hope that the system will itself set the correct values as it does when there are no hidden units. Minsky and Papert (1969) were pessimistic about learning in these multilayered systems, and Rumelhart, Hinton & Williams (1986) found that the learning algorithm sometimes led to an incorrect stable set of threshold and connection values, which they pictured as a minima rather than the desired minimum into which the system should have fallen.

It is hard to analyse such nets with their cross-talk within layers and feedback from later layers to earlier ones. Hopfield's asynchronous net, however, can be analysed in terms of a state space like a bumpy surface (Hopfield, 1982), as can the Boltzmann machine. Diagrams of the state space are given in Hopfield and Tank (1986) and in Tank and Hopfield (1987). (The former paper also analyses the computational properties of such systems with regards to optimisation problems.) Each point in the space corresponds to a certain pattern of active and inactive units. The energy of a pattern is defined as minus the sum of all the weights between active units in the pattern. A very stable pattern will have very low energy and be pictured as a trough in the state space. The system drifts into the parts of lowest energy,

without oscillating. Hopfield and Tank (1986) note that a non-symmetric net would oscillate, and provide trajectories with great computational power - however, the mathematics of such complications are not understood as yet. If two units have a big positive weight between them then patterns in which they are both active will be low in energy, the system will tend to settle into such a state - but it will tend to avoid a state where two units with a large negative weight fire together. Problems arise though because a given input value can produce more than one output depending on the initial states of the intermediate units and the order in which decisions get made.

We can picture the instantaneous state of the network as a ball bearing on a bumpy surface, we want to ensure that the relative probability of ending up in two different minima depends only upon their relative depths, rather than on the contingencies just mentioned. We want the ideal situation where the logarithm of the probabilities of being in one of two states is just their energy difference. We will then have control over the probabilities of each output, a control which just depends upon what the net has been taught. To escape from local minima and to find the point of lowest energy Kirkpatrick, Gelatt & Vecchi (1983) suggested starting with a lot of shaking of the surface, resulting in 'thermal equilibrium', in which the ball bearing constantly moves. With a gradual reduction in shaking the system would evolve toward the state with least energy - this process was called "simulated annealing". To do this in parallel networks the decision rule is changed. Originally a unit would turn on when the sum of its inputs was positive, off when they are negative - this algorithm always leads to a decrease in energy. Now the decision

is taken probabilistically so that it becomes possible to increase in energy, in order to jump out of a local minima. Each output vector at equilibrium will then have a fixed probability that doesn't vary with time. These are called Markov Random Fields, and the Boltzmann machine is one of them. Such a machine learns to give outputs to certain inputs with certain probabilities, and this learning procedure can solve the 8-bit shift problem, for the machine can figure out what to do with internal units whose required behaviour is not specified for it from outside. Such a machine would thrive on the thermal noise already present in transistors, for the logic of the system is made less rigid by the presence of noise.

Ackley, Hinton and Sejnowski (1985) interpret a unit being on or off as meaning the system currently accepts or rejects some hypothesis about the environment. A positive link between two units means that two hypotheses tend to support each other. Link weights are thus symmetric. "The energy of a configuration can be interpreted as the extent to which that combination of hypotheses violates the constraints implicit in the problem domain, so in minimising energy the system evolves towards 'interpretations' of that input that increasingly satisfy the constraints of the problem domain."

A Hopfield net cannot code for sequences and neither can a Boltzmann machine; this is because they only have symmetric links. For memorising sequences, as opposed to just memorising single patterns, asymmetric links must be present, as they are in the cortex. A similarity of the Boltzmann machine to cortex is the probabilistic, asynchronous decision making. This stochastic element in neurones is based on fluctuations in amount of transmitter released by the

presynaptic terminals.

For the Boltzmann machine a variation in "temperature" (the measure of randomness in neural firing) of 25% from unit to unit does not affect the annealing and equilibrium solutions, but its effect on learning is not yet known. Such a variation would be expected in cortex.

How the Nets Misbehave

Hopfield uses +1 and -1 as the possible firing states for each unit, rather than the states 0 and +1 used by cortex. For a fuller description of the workings of the net see appendix 1. His net is adversely affected by the sequence of inputs and by multiple inputs, but then, this is seen in cortex. De Bono (1969) shows that all "memory surfaces" will be affected by the sequence in which learning took place. However, a strange property of their net discovered by Hopfield, Feinstein & Palmer (1983) was that some memories are easier to recall than others, and also that there is a class of parasitic traces of the type below:

inputted memory 1	++++----- ++-+-+--
inputted memory 2	++++----- -+-+----
inputted memory 3	++-+---- +---+---+
parasitic memory	++++----- +---+---+

They state that this would have a human counterpart of:

inputted memory 1	Walter white
inputted memory 2	Walter black
inputted memory 3	Harold grey
parasitic memory	Walter grey

but note that the second parts of computer memories 1 and 2 cancel each other out, which is a very contrived situation. Obviously simple arrangements of + and - can be so contrived that exact opposites result, but surely "black" and "white" will not just have precisely opposite neural firing patterns. They have much in common via their connections with colour and light, semantically they are antonyms but neurally they could well be very similar, as evidenced by their frequent connection in word association tests (Clark, 1970). They will thus have overlapping neural representations. Another objection to such a contrived system is that in the above example the net is being taught to learn two outputs for the same input, i.e. (++++----), so it is no wonder that it provides confused outputs.

With regard to this suggestion that the problems of parasitic memories and unequal recall strengths of memories are because the Hopfield net is contrived to produce them, I refer now to Rumelhart, Hinton & Williams's (1986) experience that:

"... the error surface may contain local minima ... we have only encountered this undesirable behaviour in networks that have just enough connections to perform the task. Adding a few more connections creates extra dimensions in weight-space and these dimensions provide paths around the barriers that create poor local minima in the lower dimensional subspaces." Adding more neurones also

eliminates the problem.

The contrived nature of the Hopfield net, and hence its inapplicability to the case of brain cortex and dreams is further illustrated by the microchip version of the net. The chip is designed to work with almost equal numbers of +1 and -1 units at any one time (completely different from the case of cortex), and, related to this (in that a preponderance of -ve or +ve units means that memories are not orthogonal), "... any correlation between memories causes some memories to be weighted more heavily than others. Statistical orthogonality between memories minimises this effect" (Sivilotti, Emmerling & Mead, 1985). Also, "... the 'attraction' of stable states decays exponentially with the number of memories subsequently added to the matrix" (ibid.), which shows gross inefficiency. It may be claimed that the unlearning function is only needed because the net is so inefficient in the first place.

In order to eliminate these difficulties Hopfield et al (1983) propose the application to the net of an 'unlearning algorithm'. This involves giving the network a random input and allowing it to settle into the nearest minima or minimum. When this state is achieved all excitatory connection weights between similarly firing units (either both positive or both negative) are decremented by a small fraction, and all inhibitory connection weights between similarly firing units are made slightly more inhibitory. In this way parasitic responses which are too prone to be set off by random noise, rather than by a structured input, are weakened. In doing this the unlearning mechanism "separates the memories" so that they interfere less with each other, and so that their accessibilities equalise.

(This algorithm is similar to that used by Hinton for the process of learning. His learning procedure has two phases:

1) Clamp the input and output terminals as required. Where both are active the connections are strengthened.

2) Clamp the input terminals and see what output is obtained. At first an incorrect answer will probably occur, decrement by the same amount as in the first phase all connections between active output and active input neurones.

This algorithm is continued until the correct answer to the input is obtained. The next input and output vectors are similarly learned.)

However, although the overlapping of traces is obviously a disadvantage for a simple storage system, it is essential for an intelligent system. Gardner-Medwin (1976) states, with regard to his own design of an associative net, 'The associations between elements in human experience are by no means random and equiprobable in the way assumed for the analysis in this paper'. Similarly, G.Hinton (1985) states:

"If there is some neat regularity in the mapping from input vectors to output vectors, we would like the [system] to 'capture' this regularity...to give the 'correct' output vectors for input vectors it has never seen before." Surely unlearning, the orthogonalizing of memories which in reality are correlated, will decrease the possibility of this 'capturing'. An example of a regularity is:

INPUT	OUTPUT	
++-	--+	
--+	++-	where the middle digit of the output is
-+-	-+-	always the same as that of the input.

now a random input, as required for the unlearning mechanism, will similarly evoke -- or ++ as the middle digits, and decorrelation will then be applied; this must have the effect of interfering with the system's coding of regularity, and hence with its ability to act intelligently.

Problems in Evaluating the Unlearning Algorithm

What distinguishes these putative bizarre traces from valid, adaptive ones, and why are the former supposedly eradicated in preference to the latter by the unlearning mechanism? It is not being claimed by Hopfield et al that they are simply weaker, but it is parsimonious to hold that their relative weakness is the explanation for the result of Hopfield et al, 1983, shown overleaf.

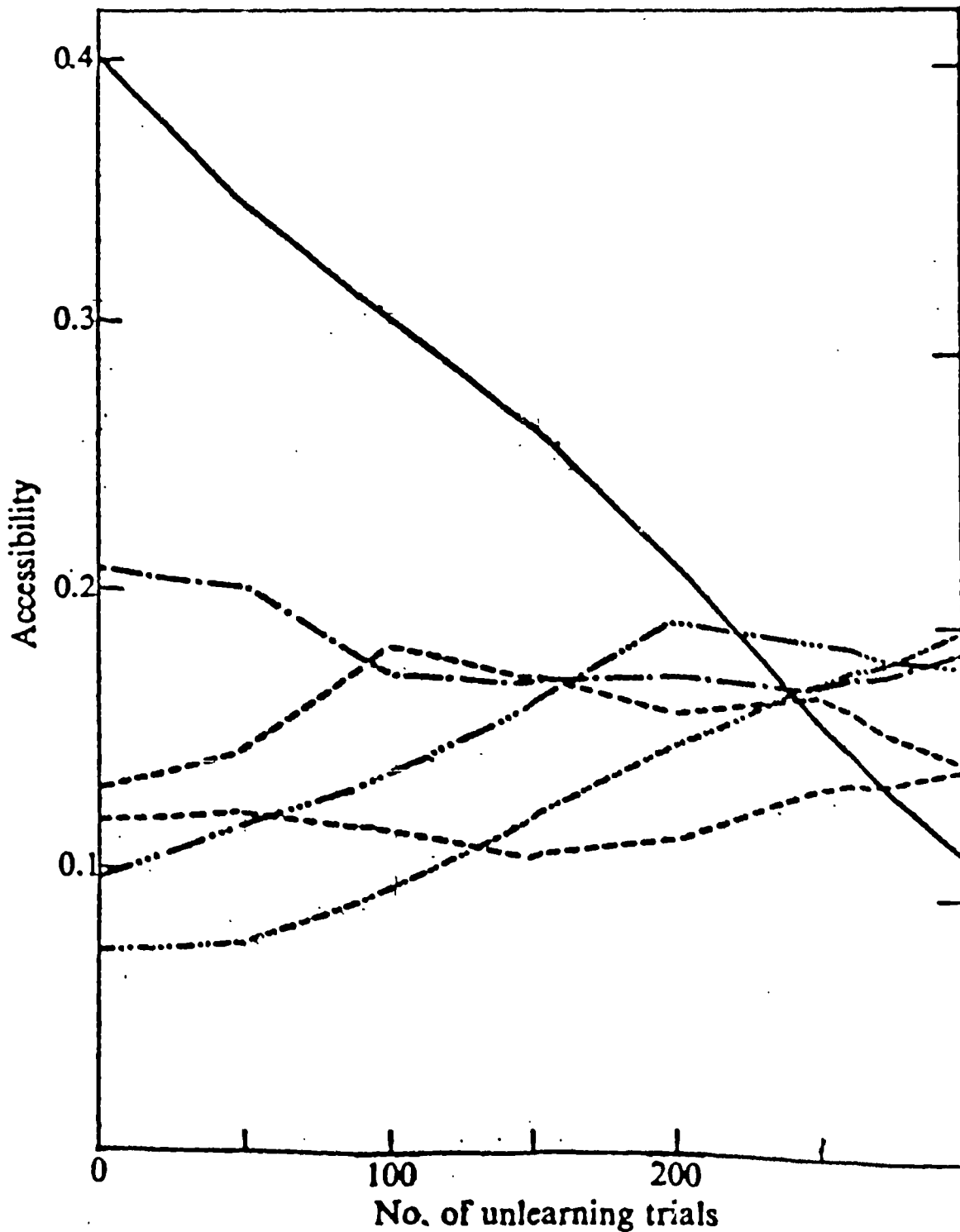


Fig. 1 The fraction of random starting states which leads to particle memories (accessibility). The five dashed lines are the five nominal memories. The solid line is the total accessibility of all spurious memories. In these trials ϵ was set at 0.01.

There is no mention of the experiment continuing after the initial eradication of most of the parasitic traces in order to discover whether the remaining parasitic traces would likewise decrease, and whether they would decrease faster than the valid traces. I suspect that their result was due to the weakening of all memories in the net, resulting in some of the very many small parasitic memories being eradicated.

Unlike in human memory the valid memory items in the Hopfield net are all initially of the same strength. An important test of the unlearning theory would thus be to introduce a weakly learned valid trace and to see the effect of unlearning upon it. In a human memory there are certain traces which are called up frequently, such as concerning one's job or friends. If these are valid and important what protection have they from the unlearning mechanism, which might mistake them for obsessions? A human memory does not have equally accessible states, the production of which is one of the aims of unlearning. In reply, Hopfield et al can argue that equally strong memories become unequally accessible, and unlearning acts to restore them to their true strengths, but surely it is the presence of correlations that results in this inequality, and correlations are the basis of intelligence. Valid correlations and frequently accessed thoughts are threatened by the unlearning algorithm. They list two classes of traces which must be weakened, obsessions and parasitic bizarre traces. They claim that the unlearning function would preferentially decrease such traces, because the method has "a feedback algorithm about the accessibility of particular states." But surely in learning if an input leads to a wrong output it is a case for learning again, a random input will not cause a weakly learned

connection to be strengthened.

Possibly such a simple forgetting algorithm would give much the same result as Hopfield et al (1983). The usefulness of such a forgetting function is described by Levy (1988). However, there are differences between the forgetting and unlearning functions in that the former would lead to a general weakening of all connection weights, whereas for Hopfield's algorithm the memory state must be accessed first so that the change in weight for that particular connection can be calculated. According to the decrementing equation used in Hopfield et al (1983), unlearning has the effect of making inhibitory links even more negative; notably Clark, Rafelski & Winston (1985) define the combination of decreased excitatory links between positively firing cells and the increase of inhibition between such cells as 'forgetting'. Of relevance to these functions is the finding of Cooper, Liberman and Oja (1979) that immature cells between the lateral geniculate and visual cortex become more specific in their response to visual patterns over the first 50 days of life in the cat, but that dark reared cats show a decrease in specific cells. Specificity can be regained with a return of patterned input, whereas a random input leads to a widening of the cortical cell tuning curve, irrespective of how sharply tuned the curve was originally. They found that the gain in specificity is much faster than its loss due to random input - I conclude that the effect of Hopfield et al's proposed random stimulation on valid memories would be quickly remedied when learning has to take place again, and that this experiment does not argue against the application of the unlearning theory to mammals. Cooper, Liberman & Oja (1979) provide more information about the

acquisition and loss of neural specificity.

The Brainwashing Algorithm

The 'unlearning' algorithm has similarities to the 'brainwashing' mechanism of Clark, Rafelski and Winston, which is described in "Brain without Mind" (1985). This plasticity algorithm causes a change in the initial quasirandom connectivity of a newly formed net, in that excitatory connections between positively firing cells are decremented, while inhibitory connections between positively firing cells are made less inhibitory. In the latter case, and in that there is no change made to connections between units that are not both firing positively, this algorithm differs slightly from that of Hopfield et al (1983). In addition, note that the unlearning algorithm is applied after learning has taken place, whereas the brainwashing algorithm is applied in order to prepare a newly-formed net for learning. This helps the net to avoid catastrophic behaviour such as 'epilepsy' or 'dying'. In contrast to Hopfield's net, which drifts towards one state of lowest energy, the net described by Clark et al drifts into a cyclic mode (which they relate to short term memory). They describe four types of net, differentiated by whether the number of inputs to a unit is fixed or variable, whether the number of outputs per unit is fixed or variable, and whether the value of the connection weight is set at 1 or can be varied (symbolised by C_{ij}). If the weight is set at 1 the net learns by cutting, rather than adjusting, connections. If the weight is variable the net is called plastic rather than static; there are then sixteen possible modification schemes which are guided by ongoing neural activity. This

figure is arrived at because there are four configurations of neural pair states (++, --, +-, -+), the link can be excitatory or inhibitory, and the value of the weight can be incremented or decremented. (Overall the total value of all excitatory and all inhibitory connections is kept constant, so that the net doesn't die or become epileptic.) Like changing the number of output or input connections this change in the weights has the effect of making the units more dissimilar, leading to longer periods of cyclic modes, more "eligible" neurones (those that are not constantly either on or off) and not too many firing at once, for then next they would all be within their refractory period at the same time. In order to reduce the number of neurones active at any one time (which is more like the actual brain) and to increase the cycle mode period we increase the number of inhibitory neurones.

There are four useful algorithms, each of which uses a combination of the sixteen possible modification schemes that can be applied to the connection weights:

- 1) Brainwashing; this punishes all active units, i.e. when unit i fires at time T and unit j fires at time $T+t$ then their connection weight decreases, whether the connection is excitatory or inhibitory. No external stimulus is present. Clark, Winston & Rafelski (1984) applied this to nets with initial quasi-random connectivity in order to make the net have more complex cycle modes. Note that the algorithm is applied before any memories are in the net, unlike in the Hopfield model. It is also not intended to reduce the accessibility of spurious states, rather it prevents catastrophic behaviour in the reverberatory system. The net is made less dependent on its initial

conditions (such as initial activity, refractory time, threshold values) and hence better able to learn; the initial weights distribution also has less influence on the ultimate distribution in a brainwashed net. Irregular wide swings of activity occur, unlike the initial regular, high level activity. Clark et al (1984) found experimentally that a (fraction of active neurones) at $t=0$ was 0.6, leading to $a=0.7$ for the rigid net and $0.2 < a < 0.45$ for the brainwashed net.

2) Attention; the net is made more receptive to incoming stimuli than to its own stimuli. This is performed after brainwashing and before learning.

3) Engramming; active channels with excitatory links have weights increased, if inhibitory the weight is decreased. The net is clamped to an external stimulus.

4) Forgetting; there is no external stimulus. Active, excitatory weights are decreased and active inhibitory links are increased in value. This differs from brainwashing in that inhibitory links are increased, which has the effect of decreasing trace strengths. In the brain it has the result of two neurones not firing at all, or their firing not being correlated.

Thus, a net is brainwashed, given a stimulus and we then wait for the cyclic mode, which is then engrammed. This could then either be forgotten, or more memories added. They state that brainwashing can be applied later on in order to "even out the accessibility of engrammed memories" and mention that brainwashing 'or anti-learning' may reduce the interference between recently consolidated traces. However, they do say that these two points are speculative.

Conclusion

Hofstadter (1979, pp.299-300), writes about how computers are programmed in a language which would be almost untranslatable in terms of the lower levels of machine language, or the even lower matrix of the + or - state of all the gates. I suggest that there remains the possibility that associative network theorists have exceeded the experimental evidence in trying to explain the high-level symbolic activity of intelligent thinking in terms of the brain's hardware, as if all cognitive rules will simply emerge from a simple network. Simple networks may have some properties not present in larger networks, for example, Minsky (1975) suggested that small barriers may exist inside minima in order to differentiate concepts within a class, an effect which would not be seen in small networks. I draw support also from Hopfield and Tank's (1986) comment that: 'Hierarchy is necessary to keep the number of synaptic connections to a reasonable level. To extend the present ideas from neural circuit to neural system, such notions will be essential'. The hierarchical organisation of nets, as in the brain, may also obviate the need for the reverse learning algorithm. Similarly, Johnson-Laird (1987) draws attention to the differences between mistakes in language learning by children and in the learning of rules for the past tense by associative nets. He warns that it may be that 'high-level principles are paramount, and that parallel processes are merely the brain's low-level language into which all mental life must ultimately be translated ... At the other extreme, another option is that the mind contains no high-level principles: there is only parallel distributed processing from which all behaviour emerges.' (As an example, the

'cocktail-party effect' in psychology works on a higher level than the 'attention' algorithm of Clark et al, 1985.) This caveat to the paradigm must be held in mind as we now proceed to study two theories of REM sleep which are based upon neural network theories, and which provide a link with the psychological and psychoanalytic theory of dreams proposed by Palombo.

CHAPTER 8

THREE CURRENT THEORIES OF THE PURPOSE OF REM SLEEP

In the last chapter it was shown that state changes have been found useful in the working of associative nets, that for efficiency the nets are made not to remain in the same learning and recall state all the time. We will now study two attempts to assimilate this knowledge of the behaviour of neural nets to the psychology and physiology of dreams and REM sleep.

The Crick and Mitchison Theory of Dreams

In 1983 Robert's (1886) idea of dreams as the excretion of pathological thoughts was revived. The new theory was based on the observation that some dreams contain bizarre condensed images. It attempted to explain this by claiming that the components of such images are real memories which have become mixed together: it stated that a time is set aside by mammals for calling up these 'parasitic memories', which then have a process of 'reverse learning' or 'unlearning' applied to them, so that the real memories are disconnected from each other, and again made separate. A neural model of this was made by Hopfield, Feinstein & Palmer (1983, see last chapter), who found that if too many memories are learnt by the network of artificial neurones then the network recalls mixed memories as well as the real ones, because the memories overlap due to being distributed over the whole net. Hopfield et al applied the unlearning procedure to their neural network and found that it eradicated some of the mixed memories, leaving the system working more efficiently. Crick and Mitchison claim that such a mechanism occurs during REM sleep, and

allows mammals to fit more memories into a smaller brain than if it was not applied. They also claim that parasitic memories, if not eradicated, could be a cause of obsessions, recurrent dreams, a tendency towards far-fetched associations ('fantasy'), over-response to inputs ('hallucinations'), and psychotic thoughts. Such a connection between dreams and insanity has a long history, witness the statement by Hartley (1801, p.389) that:

'The wilderness of our dreams seems to be of singular use to us, for interrupting and breaking the course of our associations. For, if we were always awake, some accidental associations would be so much cemented by as that nothing could afterwards disjoin them; which would be madness.'

Before unlearning is applied the memories have to be evoked. 'The major inputs and outputs of the system should be turned off, so that the system is largely isolated. It should then be given successive "random" activations, from internal sources, so that any incipient parasitic modes would be excited, especially if the general balance of excitation to inhibition had been temporarily tilted towards excitation. Some mechanism is then needed to make changes so that these potentially parasitic modes are damped down.' (1983, p.112)

They claim this evocation is caused by the intermittent PGO stimulation from the brain-stem, which is one of the physiological indicators of REM sleep. Whichever memory traces react to this stimulation are damped down, leaving a greater proportion of non-parasitic traces. The theory holds that this will make the memory more efficient. Note that Docherty, Bradford & Jan-Yen Wu (1987) have found

that some nerve cells can change from activating a neighbouring cell to inhibiting it at other times, showing that temporary changes in rules of neural functioning between two specified cells can occur in biological systems.

Hughlings Jackson (1931) wrote about "doubling of consciousness", where a patient shows a dreamy state with remnants of normal consciousness at the same time, and Penfield and Perot (1963) produced the same by electrical stimulation of the temporal cortex. These two examples, and that of lucid dreams, show that it is possible, physiologically, to 'dream' and to be conscious at the same time. Crick and Mitchison have arrived at a function of REM sleep which requires that we be unconscious, in that the hallucination of what is being unlearned should not be remembered, as that would vitiate the whole process.

An experiment that can be read both in favour and against the theory is Feinberg's (1968) finding that there is a positive relation between the amount of eye movement during REM sleep and estimates of intellectual ability in a group of retarded adults. The assumed greater incidence of PGO stimulation could be because the brighter ones have to eradicate more false-associations than the less intelligent ones, due to having more memories, or alternatively, against the unlearning theory, because during sleep the brain carries out some other cognitive function. Feinberg notes that actual brain damage could be the cause of the correlation.

With regard to its emphasis on the functional significance of PGO stimulation Crick and Mitchison's theory has similarities with the Activation-Synthesis theory of Hobson and McCarley (1977). In the A-S theory the activated forebrain "synthesises the dream by comparing

information generated in specific brain-stem circuits with information stored in memory" (ibid.), whereas in the unlearning theory the brain-stem stimulation contains no information at all. Instead, information (usually parasitic) is said to be evoked by it. The Activation-Synthesis theory states that the best fits to the incomplete data provided by the primary stimuli (from the pons via the vestibular system) are called up from memory. The primary sensorimotor stimuli thus provide a frame into which ideational, volitional and emotional content is projected to produce the final dream images. Such features as scene shifts, time compression and condensations may thus be dictated by the brain-stem. Similarly, the unlearning theory contends that condensation will occur following a PGO burst. An objection to the A-S theory is that PGO stimulation is not a sensory input at all. However, note that it is far from evident why it should be the putative parasitic traces that respond more often than valid traces to this supposedly random input, as was noted in the last chapter.

Although the Crick and Mitchison theory seems to predict that more primitive mammals will need less REM sleep (in fact, humans have the same proportion as moles, and there is evidence that REM proportion correlates better with degree of binocular vision than with evolutionary complexity) the additional variable of brain size means that no such simple prediction is really made, for a greater brain size would supposedly separate memories, obviating the need for an increase in REM sleep time.

They note, as does Winson (1985), that the Australian spiny anteater is a mammal which does not have REM sleep, but instead has a massive frontal cortex. Whereas Winson explains this by the claim that

the larger cortex is needed to connect memories together, which other mammals achieve in REM sleep, Crick and Mitchison claim that the larger cortex is needed in order to separate memories which would otherwise overlap.

**Passive Evocation of Mixed Memories,
or Their Creative Formation?**

In order to provide more information on what the experience of dreaming involves, which will be useful for evaluating the three theories described in this chapter, I will refer to Berger (1963), who presented first names to subjects during stage 1 sleep. The incorporation of the stimulus into the dream was judged by an independent experimenter matching the list of dream contents with the list of names. It was found that emotionally meaningful and neutral names were incorporated to an equal extent, and there were no EEG changes associated with incorporation, indicating that this thought-like activity was occurring during uninterrupted dreaming. In order of decreasing frequency the incorporation was by:

1) Assonance (Similarly, Jung (1918) noted an increase in clang-reactions during word-association experiments with a drowsy subject, showing the importance of assonant processing in subjects who are not fully awake.)

2) Direct incorporation

3) Incorporation by a direct personal association appearing
in the dream

4) Name represented by a symbol or action in the dream.

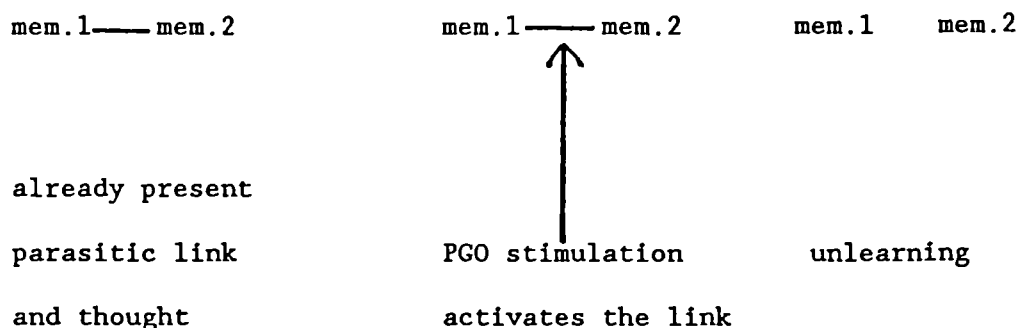
This result fits in with all theories which claim that dreams are a kind of thinking, for example, Evans' (1983) computer theory states that we think out future actions in our dreams, and that we need to be asleep lest environmental stimuli are incorporated into the practising programs, although his theory predicts a more rational and less poetic type of thinking than here.

In waking psychology Voss (1972) categorised the various ways in which stimuli are encoded and related to each other into four dimensions:

- 1) Formal dimension (how many letters in the word)
- 2) Syntactic dimension (type of word)
- 3) Associative dimension (what the word can be associated with)
- 4) Semantic dimension (what the word means, or can be taken as meaning)

He found that distraction will eliminate the higher levels of encoding, starting with number 4) above. I relate this to Berger's (1963) result that incorporation of an external stimulus into a dream occurs in order of decreasing frequency as 1) assonance 2) direct 3) associative and least likely 4) symbolic (which obviously relies most on the semantic dimension, as in my dream in which being emotionally overwhelmed was tied to "Konstanz", a lake in Switzerland [see chapter 12]). Dreaming is not identical to an awake state of distraction with respect to incorporation of external and internal stimuli, but does show a hierarchy of levels of processing similar to the work of Voss just cited. Voss similarly found that the use of a distractor at input produced a higher number of clang errors upon recognition testing of the words inputted.

The Crick and Mitchison theory may be depicted thus:



Learning and thinking do not take place in this scheme, so why should direct incorporation be occurring? Why is a distorted stimulus incorporated, an element looking much like the "parasitic" or mixed-up elements present in many dreams, and which is a distortion that was not produced by PGO stimulation, but by the normal processes of dreaming? The dream in this instance is more a creator of bizarre images than a destroyer of them. The incorporated element was not randomly stimulated out of the memory system, and yet it became part of the dream. Berger (1963) reported also that, although meaningful and neutral names were incorporated to an equal extent, the former often appeared in a manner dependent on their personal meaning to the dreamer. Incorporation was also "at a point in the dream appropriate to the time of presentation of the stimulus", and hence definitely not the result of PGO stimulation. The activity of incorporation shows that dreams are more than replayed memory traces; I suggest that a dream narrative is a continual elaboration of the last image, and hence more akin to thinking than to reminiscing. Evidence for this emphasis on thinking as opposed to the reproduction of memories is obtained if we compare the REM dream images to those present at sleep

onset: Cicogna, Cavallero & Bosinelli (1986), who found that sleep onset imagery and daydreams have greater use of real memories than do REM dreams.

Active Thought During Sleep

Going further than the work on immediate incorporation we can cite Oswald (1960), who found more K-complexes in the EEG record upon playing a meaningful name to sleeping subjects than after playing the name backwards. That this reaction occurs shows that the sleeping brain is performing some thinking activity, which is known from the common experience that some sounds can wake people whereas others of the same intensity don't. Examples of thought used during sleep are also given by Tart (1963, 1966): some subjects can use the presence of dreaming as a stimulus to awakening and others can use some internal measure of how much time has elapsed in order to awaken.

Active thinking in the form of bizarre symbols can even be seen before the subject is fully detached from the environment, as at sleep onset. At sleep onset one can sometimes achieve the concrete visualisation of an abstract thought, such as seeing descending white stairs which symbolise going down with sleepiness (quoted in Tart ed. "Altered States of Consciousness"). Such an image is a metaphor based upon two valid traces, those of stairs and of dropping asleep. If anything I consider that the association formed between these two amplifies them both. It can still be retorted on behalf of the unlearning theory, though, that it is precisely because bizarre images crop up at these times that they must be systematically produced and eradicated during REM sleep, when they are made more profuse.

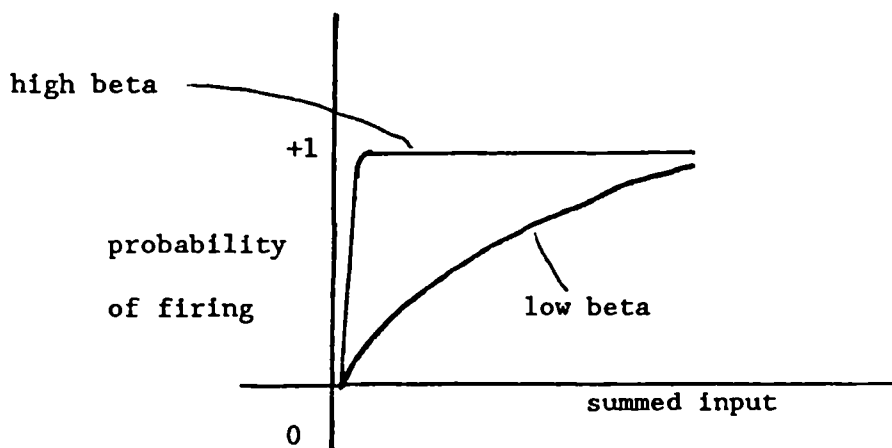
Our efficient recall of supposedly 'unlearnt' dream images is not an objection to the unlearning theory, even though our recall of REM dreams appears quite effective if compared with our inability to remember experiences of NREM sleep somnambulism. I borrow an idea of Foulkes (1978) here that the long-term memory system may be working abnormally (he suggests it is working in reverse, pushing memories back to the sensory areas, as did Freud in 'The Interpretation of Dreams') but that the rest of the brain can use short-term memory to recall the images that have been coming up.

A problem with the claim that it is the memory areas that are changed during dreaming is that PGO stimulation from the brain-stem ends up in the occipital cortex, that the saw-tooth waves then travel from the occipital cortex over the top of the head to the frontal lobes, and that the theta wave then present in the hippocampus is also present during motor activity in waking life. It appears that it is most areas except the temporal lobes that change their activity during dreaming (Yasoshima, Hayashi, Iijima, Sugita, Teshima, Shimizu & Hishikawa, 1984). This, of course, ties in more with theories that ascribe to dreams a creative, recombinative function, which would require the use of the frontal lobes and with memory working much as in waking life.

The Second Theory - Clarke et al's "Positive Learning"

It may be more parsimonious to fit these findings into the neural network theory of Clark, Rafelski & Winston (1985) to accept that the bizarre imagery present in dreams has the same source as the loose thinking images present in drowsy subjects, and not to propose a

new function for the PGO stimulation except as a facilitator of this. Clark, Rafelski & Winston (1985) relate their neural theory to sleep by suggesting that during NREM sleep non-essential experiences are eradicated and that during REM sleep important experiences are associated and abstracted. This is certainly in line with the difficulty in remembering mentation in the former case and the bizarreness of mentation in the latter case. It is the former that they associate with brainwashing (see last chapter), the latter with 'positive learning' with 'heightened noise'. Noise is increased by having the units fire probabilistically, rather than just summing up their inputs and firing accordingly. Crick and Mitchison (1986) state that the bizarreness of REM sleep argues in favour of its being the time for brainwashing; the argument against this is that it is the 'abstracted' learning, the finding of new connections, that is causing the bizarreness, that we have here a loose thinking (which accords with the experimental psychology data) and not the reverse of learning. This stochastic firing may be, in fact, the neural analogue to incubation and fantasy at the psychological level. This would also tie in with the claim of Schatzman (1983a, 1986) that some dreams actively solve waking problems.



Beta is a measure of the stochastic element in the firing. Clark et al (ibid.) are suggesting that during REM sleep beta decreases. Note that this results in the formation of new associations, associations that were not so likely with the higher beta, and not the recall of associations already present, as claimed by Crick and Mitchison. Crick and Mitchison (1986) suggest that as well as the unlearning mechanism there may be a need for a bias towards bizarre associations during REMS - a decrease of beta would produce this but then the associations produced would not necessarily have occurred with the high beta of waking life, in which case it is better to stay awake with a high beta and never have the need for unlearning. The usefulness of probabilistic firing is that it can cause a net to jump from one cyclic mode to another, so that the system doesn't get stuck in unwanted minima. It is also useful in pattern recognition for finding the nearest fit. For the cerebellum, Albus (1971) has already proposed such a concept of generalised excitation resulting in increased sensitivity to inputs because inputs do not have to exceed a certain threshold to effect output.

I also relate it to de Bono's concept of lateral thinking, which involves looking at a problem in a new way, sometimes by having a new starting point in assessing a problem. "A random input from outside can serve to disrupt the old pattern and allow it to reform in a new way." (1969, p.243.) He likens this new way of thinking to poetry, where words are used in provocative and extraordinary ways. This extraordinary way of using a word has no validity in itself, it may be completely nonsensical, but it results in a new arrangement of information. He gives the example of Leonardo da Vinci's diaries being lost for centuries due to being mis-filed in a library and similarly

we need to shake up our stored information in order to avoid dogmatic thinking. Hudson (1967, 1968) gives evidence for the pervasive influence of stereotyping upon perception of the attributes of members of other groups; the groups he used were artists and scientists. This dogmatic thinking has its advantages sometimes though, it leads to quickness of response and familiarity with the surroundings. Rational thinking is applied to the results of the lateral thinking, for otherwise we would remain disorganised. De Bono states that "Vertical thinking is used to dig the same hole deeper, lateral thinking is used to dig a hole in a different place" (1970, p.12.) and that "The distinction between the two sorts of thinking is sharp. For instance in lateral thinking one uses information not for its own sake but for its effect. In lateral thinking one may have to be wrong at some stage [a bizarre intrusion?] in order to achieve a correct solution; in vertical thinking (logic or mathematics) this would be impossible. In lateral thinking one may deliberately seek out irrelevant information." (ibid. p.11.) He also notes the similarity between insight and humour, for both can raise a smile and release tension, in that both "involve the restructuring of patterns" (ibid. p.10).

Roberts (1985) makes the similar point that dreams are concerned with updating our personal myths, with 'reconstructing' our cognitive worlds. Similarly, Krippner (1986) hypothesises that dreams are the synthesising of one's existing myths with one's life experiences, with the caveat that they can sometimes be conservative rather than instigators of change. The neural mechanism of such creative thinking must, however, involve more than the simple generation of new associations. Bolton (1972, p.188) asserts that

sensitivity to the relevance of each new association is necessary when they are produced - he notes that if thinking consists only of associations then we would not be able to discriminate between those that are valid and those that are not, for the act of discrimination is itself a thought.

Dreaming and Constraint Limitation

The increase in stochastic firing, which has been proposed as an integral part of learning and of forming more connections between independent memories, can be related to the often noted perceptual ability of dreams, their ability to pick up on small impressions which are swamped in everyday life by more obvious and harder knowledge. For example, Fromm (1957) reports a man dreaming of an acquaintance being unkind "with a cruel mouth and a hard face", and finding out much later in waking life that this was an accurate picture. (Incidentally, would the unlearning theory assume that this picture was to be erased? The proposed unlearning mechanism would then be working against the useful faculty of intuition.) Fromm (1957, p.5) also states that "another odd thing about our dreams is that we think of events and persons we have not thought of for years, and whom, in the waking state, we would never have remembered." However, it must be noted that if one allowed oneself to think loosely while awake for two hours of the day no doubt many old memories would appear, which the exigencies of waking life would usually prevent.)

Gardner-Medwin (1976) notes that during waking life "deductive processes may assist the associative processes in recall", by generating correct details and inferences or by eliminating

spurious details (which I have suggested is a functional alternative to the unlearning mechanism). He goes on to note that dreams have many of the characteristics of recall in which the constraints of logic have been removed, such as when we overlook bizarreness. (One link here with AI is that 'constraint satisfaction' networks are now being used to implement rules about what can and what cannot occur simultaneously in the environment, and that a relaxation of these rules results in bizarre outputs. Foulkes, 1982, p.178, makes the similar point that 'in dreaming there often seems to be a dissociation of inference markers from the propositions to which they are attached. That is, there is an illogic in the conclusions the dreamer draws from phenomenal facts'. He says that this occurs despite the opposite tendency of 'blending of concepts'.) He says that the reasoning processes and 'the stringent demands of waking life' may actually act as a censor for some memories, and that dreaming is needed in order to keep them strong - this is thus the opposite of the unlearning theory! (This also resembles the psychodynamic theory that dreams may express thoughts which are morally censored in the day.) Note that he is suggesting that REM sleep reruns actual memories, whereas Clark et al (ibid.) suggest REM sleep forms new associations, while Crick and Mitchison propose that spurious memories are accessed and unlearned. On the former theory dream images are loose thinking rather than faulty memories (though obviously any sort of thinking will need to involve memories) and it is possible that the neural basis of this is a decrease in beta leading to a larger spread of activation than in waking life ('spread of activation' is also evidenced in some work on waking memory and perception). That this spread is not dependent upon PGO stimulation is evidenced by the presence of spread of activation

at sleep onset mentation.

The Function of PGO Bursts

In order to explain the results given in chapters 5 and 6 it may be claimed that it is the random PGO stimulation that "joggles" the new memories into position, such "joggling" resulting in the novel links found in many dreams as well as the anecdotal reports of creative links occurring during dreams. (Such "joggling" and random stimulation has similarities with de Bono's (1969, 1970) postulated "PO" function.) The unlearning theory holds, on the other hand, that the PGO stimulation illuminates the parasitic link in order to aid its erasure; it appears that it is the unlearning theory that is multiplying hypotheses, postulating the spontaneous formation of parasitic links and also a process of unlearning, while others are content to assume that dreaming is merely a more vivid version of daydreaming. An extension of Clark et al's theory is thus that it is the random PGO stimulation that forms the links, rather than helps in breaking them, if it has any function at all. I assume that any maladaptive links formed by such "joggling" will be used much less than adaptive links and hence be more susceptible to forgetting and lack of recall anyway, especially as they are likely to be illogical, and the use of logic is often a part of recalling.

However, as we have seen in chapter 2, the PGO bursts, even if they do have a purpose, correlate with complexity and vividness rather than bizarreness of images, and the latter is not then contingent on initial random stimulation. Therefore the connection

with Hopfield, Feinstein & Palmer (1983) is no longer present, for the neural net models presume such random input. The Hopfield work is not relevant to dreaming if bizarre images are caused by other factors such as the drift from the previous image or by unconscious processes, although it can be replied that REM sleep dreams (i.e. PGO bursts present) are generally more bizarre than NREMS dreams, and that the former's relative lack of correspondence with waking life accords with the claim that more parasitic memories are evinced in this state.

Narrative in Dreams

The question remains of why are the dream elements enmeshed in a whole narrative? A reply acceptable to the unlearning theory and to Clark et al's theory is possible along the following lines. Under behaviour therapy it is necessary for the patient to act out, or imagine, the maladaptive behaviour; for example, getting nearer and nearer to a feared high drop. The problem itself may be expressed in only a few words, such as "fear of heights", but for curing it the whole person must live through an episode of that fear, that is, construct a narrative about it. Sometimes a whole story is needed in order to define what the maladaptive behaviour actually is. Maybe sleep onset intervals are not long enough for a run-through of narrative to occur, hence dream states, lasting up to 45 minutes, are needed. However, it is rare for such re-runs of actual memories to occur during stage REM, they are more often acts that could happen, or be imagined to happen, but which haven't. I shall explore in chapters 12-16 this theory that a dream has a narrative because consecutive solutions and classifications are tried out to problems the subject

has; I already noted in chapter 5 that old memories may be being explored and recreated in order to find an appropriate place for an experience from the dream-day to be stored.

Much of a dream is composed of valid associations. For example, a chair in a room in a dream may be in exactly the same position as in waking life. Are these associations unlearned or are they, so to speak, dragged into the dream by the false links to which they are said to be tied? Dreamers can wander around in a lucid dream and be fooled that it is real, a testimony to the number of proper associations present. (And valid associations are needed to define what the parts of a condensation are, that is from where they are taken.) Therefore, despite Crick and Mitchison's denial (1986, p.232[102]), the theory does require and involve narrative, because narrative defines the components of the images; the question is, however, whether narrative has any other uses than this, and how long these narratives are.

It is thus not the whole narrative that is unlearned but only those parts occurring at the point of PGO stimulation. A quite meaningful dream can thus be produced on the basis of the initial false association, but note that other false associations occur by virtue of the sleeping state, rather than caused by the PGO stimulation.

Palombo's Theory And The Importance Of Imagery

It is the importance of encoding memories with respect to each other, which is emphasised by Clark et al, that is the basis of Palombo's (1976, 1978, 1980, 1984a&b) assertion that dreaming is the

simultaneous imaging of present and past memories, in order to learn (rather than unlearn) an association between them. The strength of a memory is thus increased by connecting other memories to it, no matter how bizarrely. He suggests that dreams are the recall of propositional information held in long-term memory and that they allow relevant affect to be reconstituted and relived, which is needed for re-filing new memories affectively rather than simply cognitively. I suggest that this results in a deeper level of encoding, much as there are many such levels possible in waking life. That animals show little adverse effect after REMS deprivation treatment is explained by this notion of dream sleep being a sort of 'icing on the cake', a helpful but not absolutely necessary addition to the cognitive processes of waking life.

With our knowledge that dreaming aids memory consolidation it is now possible to make suggestions about the part that the visual aspect of dreams plays in this. Palombo (1978, p.52) suggests that the re-formation of an image of the body and surroundings acts to evoke the emotions that were present at the time the original experience occurred, which helps in the correct placing of new emotional experiences in long-term storage. However, I would hold that if cognitive information about an event is somehow held in a propositional form in the brain, it is just as possible that affective information about the event is likewise available. I therefore suggest a much simpler explanation, based on the work of Morris and Stevens (1974). They found that subjects who were told to form images that linked together three objects physically had superior recall to those told to image the objects separately, or who were just given

conventional free recall instructions. Richardson (1978) found the same for the linked image condition, and that the separate images condition had poorer memory for most of the list to be memorised than did those with conventional recall instructions. Note also that Morris (1978) cites 14 studies in which there is no benefit in the formation of bizarre images, these being no better than a sensible interactive image. Palombo does make an important point, however, in relating REM sleep to the processing of emotions. It may be that REM sleep is only concerned with the processing of memories that are emotionally meaningful to the subject, as indicated by Greenberg et al (1983).

According to Morris and Hampson (1983, p.253) it is not the imagery as such that aids performance, but rather "the processes which underlie interactive imagery, namely the identification and exploitation of potential relationships between the items". Dreaming, I suggest, is an excellent means for exploring such 'potential relationships'. They proceed to give evidence that producing a meaningful story about items is not quite as efficient as making an image. An image may also have more information present than a related set of propositions, as evidenced by the technique used to answer the question "how many window panes are there at the front of your house?" Most people answer this by evoking the relevant image, for the numerical answer is not stored itself.

However, these unconscious learning experiments may be said to be a far cry from some of the proposed functions of dream sleep, such as problem solving and re-filing memories on a semantic basis. Palombo (1978, p.131) claims that such higher-order functions would be better achieved in waking consciousness, and that his proposed model

of matching present events to past memories is of a much simpler activity than the activities of waking life. I counter to this that our dreams do show a great amount of sensible and deep thought, for example, in one of my dreams I invented and performed an 'experiment' to decide whether I was dreaming or under the influence of a hallucinogenic drug, and obtained the correct answer! Emphasising this 'wakeful' aspect of dreaming led Hunt (1982) to claim that everything in dreams has a counterpart in waking experience, if such pathologies as fugue states and depersonalisation are included. The second, empirical part of the thesis will aim to discover whether during dreams we do more than superimpose present experiences and past memories, that we in fact explore possibilities in either of these domains, and whether in different dreams there are different amounts of exploration and amounts of present or past knowledge used. (I note Professor Alan Stone's (1986) suggestion that dreams may not all be of the same kind, that they may be as varied as waking thought is.)

The latter two theories are suggesting that dream sleep is not just able to aid consolidation of memories, but also causes their recombination. That many animals can use this type of thought is shown by work on cognitive maps and representation. It is mainly mammals and birds which are found to be able to produce internal representations, and hence possibly images, and these are precisely the groups of animals which evidence REM sleep.

Experimental Evidence - The Change of REM Time with Age

The three theories described here must accord with the evidence in chapter 1 that REM time is greater in the fetus than in the newborn, and decreases thereafter.

It may be predicted that under the unlearning theory the brain will be credited with a larger number of false connections and more parasitic information as it grows older, which would mean a greater need for REM sleep later in life. To avoid this problem they postulate that REM sleep also removes catastrophic problems inherent in the net before the problems of mixed traces and learning arise - '... during development, the semi-random process of making synaptic connections is likely to produce parasitic modes. It is these which must be "unlearned" in order to obtain a well-behaved system' (1983, p.113). REM sleep thus has a dual function because of the random links and resonating structures present in the fetus and neonate (for myelination of neurones occurs until age 2 years and interneural connections are still being made). This use of the unlearning algorithm would thus prepare neurones for future learning, and it may be that dream images are merely an epiphenomenon of this anticipation. Note that this suggestion conflates two separate areas of associative net research; those using resonating circuits, and the Hopfield work on static representations (see chapter 7).

There are two other options to explain the negative correlation of REM time with age:

- 1) REM sleep aids the consolidation of new memory traces or, as a variant of the unlearning theory, aids the eradication of new

parasitic traces. The change in REM sleep time would then have to be a function of brain maturity, evidence for which was given in chapter 1.

2) Something different from waking processes is occurring, new memories are already in long-term memory but are now transferred to a better fit with old memories. However, more REM sleep is needed for fitting in conceptually new information, because the brain is not yet 'dogmatic' enough to file information automatically, as it will do when older. Maybe this process cannot occur while the senses are supplying new images and information. This would accord with Clark et al's theory, and others involving cognitive restructuring. Clark et al (1985) proposed that brainwashing may occur in the fetus or newborn in order to provide a competitive disadvantage to active links while connections are still forming. However, according to Purpura, Shofer & Scarff (1965) there is a precocious development of synaptic inhibition, maybe as a brake against overexcitation before the appropriate sensorimotor systems are mature. The threshold of seizure induction is actually greater at earlier ages. They also state that spontaneous activity is virtually absent. This opposes the idea that the brainwashing or unlearning function used in computers (to make a net ready for learning) might also have a use in immature biological systems, as an inhibitor of over-active neurones.

Notwithstanding this finding, there is still the problem of why the algorithm should persist in later life, if it is the basis of REM sleep. Maybe dreams are so bizarre because the physiological basis for them is such an atavism of earlier life, which is possibly even maladaptive in later life. This is contrary to the unlearning theory, which holds that REM sleep is adaptive in early and later life.

CHAPTER 9

THE SCIENTIFIC STUDY OF THE MEANING OF DREAMS

Psychology and Physiology

Having reviewed and evaluated much evidence from physiology which concerns the nature of dreams it is now necessary to introduce another approach to the subject.

That physiology is relevant to the form of cognition is illustrated by the following work:

1) Luria (1973, p.312) writes of parieto-occipital lesions which disrupt the ability to survey and perceive simultaneously the logical scheme of a whole sentence, leaving only the ability to understand simple sentences. That arithmetical and constructional activity are also impaired shows that arithmetic and sentence decoding use a similar mechanism of quasi-spatial analysis. Physiology has here contributed to psychological theory in the discovery of an association and commonality between the two activities.

2) Shallice and Warrington (1970) showed by the neuropsychological study of brain-damaged patients that there are specific impairments of long and short-term memory processes. This double dissociation gave information on the function of the memory system.

Conversely, physiological theories have to accord with psychological facts. For example, the three-colour receptor theory in visual perception must account for our ability to perceive yellow. Similarly, a psychologist may use drugs to analyse personality, and a

pharmacologist may use a subject's behaviour for information about a drug's effects. Physiology may thus provide us with the necessary but not sufficient conditions for dream content. (Likewise, teleology can be dependent upon causal mechanisms, although teleological explanations are only valuable when discovered independently of the knowledge of causal laws.)

In other words, the content of dreams is a psychological fact and must be explained as such. For example, Berger's (1963) incorporation experiments provided a law of the relative likelihood of the different ways in which an external stimulus may be incorporated; it provided a law of how assonance is more common than direct incorporation, which is more common than symbolic or free-associative incorporation. Foulkes (1985, pp.160-161) writes that studies on odd properties of dreaming may provide evidence for psychological theories and models of memory. For example, 'dissociations (expected features are missing in dream imagery), regressions (one character appears as at an earlier age, while the rest are portrayed as they now are known), faulty conclusions (... because it's Saturday I must hurry to work), and reversals (a friend becomes an enemy, or vice versa...)' may provide information about 'dimensions of featural analysis ..., the ways in which we know the "same" people over time..., the kinds of inferences we associate with particular units of knowledge. Reversals may prove explicable not from the old Freudian adage that "You *really* hated that 'loved' person," but from the fact that part of what we know about people, objects, and events is what they are not. We know whales are not fish not so much by inference ... as by direct representation.' (ibid.) He states that for dreams 'the ways in which it joins together or does not join together knowledge representations

also may help us to map out the organization of memory.' (ibid. p.161.)

It is therefore a valid to assert that laws can be discovered, or should be looked for, on the psychological realm independently of the search for physiological laws and bridging laws between physiological and psychological events. D.O. Hebb emphasised the necessity of devising independent psychological laws in stating that:

'... specifying the physical embodiment does not generally lead to an increase in explanatory power ... neurologising is merely a form of intellectual displacement activity' (D.O. Hebb, 1949.)

A corresponding assertion is made by Gardner:

'Why gamble that an elementarist approach will eventually yield large units, when one has the option of beginning instead with these large units, which seem closer to the data and the experiences of everyday life ?' (1985, p.97.)

Gardner proceeds to note that neurologists ignorant of linguistics can only have naive intuitions about language and language disorders, and that 'one cannot have an adequate theory about anything the brain does unless one also has an adequate theory about that activity itself... one can know every brain connection involved in concept formation, but that won't help one bit in understanding what a

concept is.' (1985, pp.286-287.) New advances in science do not only occur when a reductionist theory arises, new disciplines do come up.

Fodor (1981) uses the computer analogy of psychology being concerned with software, and physiology with hardware. This functionalist approach disconnects psychology from the need for specific physiological backup. The merits of functionalism versus the connectionist approach of Crick and Mitchison, which implies an intimate relation between mental and physical function are an issue of current controversy. It remains true, however, that the same psychological functions can be carried out by physically distinct physiological systems, as shown by work on the recovery of singing ability in some birds (Gardner, 1985, p.281). Mehler, Morton and Jasczyk (1984) write that the adequacy of psychological accounts does not depend upon a knowledge of a specific biological model, and that 'a particular psychological process might be underpinned at different times by a variety of different neuropsychological processes and yet from the perspective of the neuropsychological level of functioning there may be ... no reason for treating these processes as members of the same natural kind. Indeed, exactly something like this happens in the case of speech production, where, owing to differences in the shapes of their oral cavities, different speakers may produce the same speech sounds using very different vocal gestures.' (1984, p.87.)

Furthermore, the same physiological event may have different psychological concomitants. For example, Schachter and Singer (1962) showed that the same degree of physiological arousal, as induced by adrenaline injection, was interpreted differently by subjects according to their cognition of the emotional state of a

fellow pseudo-subject. Valins (1966) similarly showed the effect that cognition has on the interpretation of emotion by giving false feedback of their heartbeat to subjects looking at pornographic pictures. Subjects claimed to find pictures more attractive if the picture had been presented at the time of increased heart rate 'feedback', even though their physiological state was constant throughout. Mehler et al (ibid.) note that 'our fields seem to be dominated by the belief that our understanding of a given mental capacity increases in proportion to the extent that it can be localised in the cortex.' (ibid. p.88.) If such a reduction is possible, it will only occur following the discovery of laws and descriptions which are particular to each field alone, with the laws of one field being no more basic than those of the other.

It is possible to compare theories of dreaming which emphasise psychological/physiological isomorphism or comparison (e.g. McCarley and Hoffman, 1981; Gackenbach, Snyder, Rokes & Sachau, 1986) with some theories that stress the autonomy of the realm of psychology. The autonomy of the realm of psychology in dreams is suggested by any evidence that dreams provide recombinative thought, rather than a repetition of waking thoughts, or even a lack of relevance to waking thoughts. I will now review such evidence and will then describe the methodology of content analysis of meaningful texts.

Meaning and Teleology in Dreams

Schwartz, Weinstein and Arkin (1978) review work on the meaning of dreams, pointing out that independent judges in two studies were able to correctly sort dreams in accordance with the subject who

produced them, and to correctly order them according to their occurrence both within and across nights. Similarly, Dement and Wolpert (1958) found that 7 out of a study of 38 whole dream sequences were united by a common overall theme. Kramer, Roth and Cisco (1976) provide similar confirmation of the personal meaning present in dreams, in that judges could sort dream series according to circumstance of occurrence, although they could not do this for individual dreams. Kramer, Hlasny, Jacobs and Roth (1976) found that independent judges could sort dreams according to dreamer and according to night of occurrence, although they could not sort them into the sequential order they were dreamt in. This provides evidence for Foulkes' (1980, pp.249-250) contention that 'psychophysiological correlational research now appears to offer such a low rate of return as not to be a wise place for dream psychology to continue to commit its limited resources. ... Dreaming is a mental process and it must be studied as we now study other mental processes. Whatever brain events accompany dreaming, what the dream is is a mental act.'

Further evidence that dreams have to be studied as mental acts and not just as the correlates of REM sleep physiology comes from Fiss, Klein and Shollar (1974). Subjects had 6 baseline nights of uninterrupted sleep, 4 nights in which every REMP was interrupted, 4 nights in which interruption was close to the end of the REMP, and one recovery night. Subjects were not REM deprived and were awakened by having their names called. Dreams recorded under the interruption procedure were more vivid and emotional than those collected under the completion procedure. They were also equal in length to the completion night reports, even though they originated from shorter REMPs.

Furthermore, Fiss, Ellman and Klein (1969) showed that there is a need to complete dreams such that the carry-over of REM-related mental activity into waking life was strongest in a REMP interruption condition than in a REMP completion condition, or a complete REM deprivation condition. Being prevented from completing a dream was therefore more disruptive than not being allowed to dream at all. Rechtschaffen (1964) similarly found that frequent interruptions of REM periods resulted in a degree of thematic continuity rarely observed in the dreams of a single night.

The dream is therefore meaningful itself, which means that to discover the nature of dreams it is necessary to take account of:

$$\psi \rightarrow \psi$$

as well as $\phi \rightarrow \psi$

and $\phi \rightarrow \phi$.

Fiss (1969) states that 'the biological need for a particular sleep stage needs to be distinguished from the psychological need for a certain quality of sleep experience ... to avoid the fallacy of mistaking synchronous for isomorphic events.'

The role of psychological causation is such that, unlike physiological causation in general, we may need to take into account the subjects' idiosyncrasies. An idiopathic approach is needed for these cases which do not meet the S-R claim that there are standard Ss and Rs which do not need interpretation by the subject. This can be illustrated by the following two studies, which at first sight appear to contradict each other. Fiss (1980) found that for 20 alcoholic inpatients who had just completed a detoxification programme, 80% of high cravers dreamed about drinking, whereas 30% of the low cravers

dreamed about drinking. However, Bokert (1968), who experimented on subjects made thirsty before going to sleep, found that subjects who dreamed about drinking and/or eating drank less water and rated themselves as less thirsty the following morning than did subjects whose dreams did not contain drinking or eating themes. Fiss (1986) resolves the contradiction by noting that in the 1980 study 'the dreams of the low alcohol cravers all contained themes of drive gratification (e.g. having a good time while drinking), whereas the dreams of the high alcohol cravers all contained defensive or conflictual themes (e.g. loss of a love object as a consequence of being caught drinking). ... the ... study underscores the importance of looking at the quality and not just at the quantity of incorporation.' (1986, p.173.) This is a justification for attempting to devise hermeneutic theories of dreams.

The following chapters of the thesis will test competing hermeneutic and physiological theories against the phenomenological data of a series of nights' dreams. The former types of theories need to be justified, given that I have already described the usefulness of the positivist study of REM sleep. A hermeneutic account appears to be necessary because of the above evidence of the meaningfulness and goal-directedness of the dream images. To illustrate the coherence of taking both these paths, if only to test one against the other, take the example of a cat purring. A physiological account of the purring would not allow the claim that 'the cat is happy' because this would entail unjustified statements about the inaccessible private world of the cat. However, to simply describe the tone and volume of the purr is not objective, because it misses out what may be the subjective

experience of the cat. Sometimes the attempt to reduce a phenomenon to a more fundamental level of explanation only succeeds in destroying the meaning essential to an understanding of it; for example, just describing the muscle movements which occur when someone shakes hands with someone else. In this case there are many levels of explanations which can be taken as the more basic: a historical account of the forerunner of handshaking; an anthropological account of its nearest equivalents in other cultures; a physiological account of the muscles used; or a motivational account of the interpersonal consequences. Similarly, although it is necessary to use physiological methods to describe the involvement of REM sleep with memory processing, or with a changed susceptibility to epilepsy, or to discover if some people do not have the neurological expression of dreams, the meaning or lack of meaning of any one person's dreams is another matter, as removed as is linguistics from the neurophysiology of language. Such a search for meaning is still an empirical matter, and mostly differs from physiology only with regards its subject matter. There is a correspondence between humanistic theories of voluntaristic activities and dream theories which emphasise the element of choice in dreams, that one scene is intended to be there rather than another, although it is an empirical matter to discover the limits of this freedom, which would be constrained not only by the type of mentation characteristic of dreams but also by the mnemonic activation present.

I am not prejudging the issue by claiming that a phenomenological approach to dreams is necessary. It is possible that dreams are an epiphenomenon of a functional REM state, and that dreams will then not be the sleeping equivalent of the symbols of waking life, which functionalists claim possess an independence from

the brain's hardware (Fodor, 1981). The point is that theories which do not detach the dream into separate unrelated parts and which regard meaning as central to the whole set of scenes produced must be conjectured and then tested against reductionist theories.

As an example of these two types of theories, take two possible explanations for the result of Fiss, Kremer and Litchman (1977). They found that incorporating a presleep stimulus into dream content facilitated the subsequent recall of the stimulus in the waking state. Opposed to the explanation that the dream image had an effect on the subjects' memories is the rejoinder that it is subjects who were more likely to remember the stimulus who dreamt of it, and that the images do not therefore have any information-processing function. Haskell (1986a, p.156) writes that dream research should be an interdisciplinary subject with its object of research being dreams and dreaming. 'With this approach professional identity is attached more to the object of research than to a given discipline or method ...' (ibid.) This would allow both molar and molecular research. He thus disputes Foulkes' statement that 'we more than have our hands full trying to deal with processing so we needn't take on the onerous chore of characterizing precisely what it is that's being processed' (cited in Haskell, ibid. p.146). In other words, the mechanics of processing should not be given priority over content and meaning. Haskell writes that these are different but equally necessary levels of analysis. Lawfulness of action doesn't preclude meaning. In fact, to suggest otherwise, he states (1986, p.153), implies that meaning is non-lawful. In order to obtain data about the possible meaning of dreams a method of analysis of the dreams' contents is thus needed.

Content Analysis in Psychology

Experimental work has not yet shown us conclusively the purpose of REM sleep, let alone the dreams that accompany REM sleep. There are two extremes for the possible relation of REM sleep to dreams, that the latter are epiphenomena, or that the imagery is an integral part of the function of REM sleep, having a feedback and functional role. In the former case the dream can be meaningful or not. To provide more evidence on this question of meaning there is an alternative to comparing many subjects' dream images with their physiology, or to comparing the images with waking concerns, as described above. Instead we can take the images and compare them with each other. Thus instead of having many subjects and a blanket description of types of images (e.g. active, passive, coloured) we can take many individual and detailed images and compare them to each other for only one subject. Obviously this procedure can then be repeated for more individual subjects; the point is that in experimental sleep lab psychology many subjects are compared over a few dimensions, whereas in interpretative work many dimensions are compared for the one subject. (The validity of an interpretation works at the level of one person, whereas reliability needs many subjects, and/or many judges in order to be tested.) Either method may be found to be unproductive. Dream images may show no relation, no isomorphism, to REM sleep physiology, or individual scenes may show no relation to other scenes. This is all, however, an empirical matter, and both methods must first be applied, once theories are devised which predict inter-image relations.

Content analysis is such a study of the psychological meaning and significance of documents and records. It can be non-reactive, although in the study of all dreams of a night the subject is obviously affected by the awakening regimen. It has been used to assess such variables as sex roles in children's readers, social mood changes, and the motive to avoid success (Lewin, 1979, pp.252-271). That the assessments can be complex is shown by Kohlberg's scoring manual of moral development, which runs to over 100 pages (ibid.).

Allport (1961, p.387) used a matching technique to relate data from individuals such as life histories, photographs, specimens of handwriting, artistic productions, gait, etc. He also got judges to match invented words to abstract line drawings (ibid. p.491-492). This 'has the advantage of permitting complex productions to be ordered with other complex productions ... The method permits the quantitative study of qualitative patterns, though ... it does not tell us why a judge perceives congruence between them.' (ibid. p.387.) By this method he aims for the morphogenic prediction of the future of any particular individual. He does differentiate this work on style and manner, however, from projective techniques, which are aimed at unconscious content (ibid. p.493). Baldwin performed a content analysis of the traits and events mentioned in 'Letters from Jenny' (Allport, 1965). Not only were separate counts of subject matter made, for example, money, art, her son Ross, but also correlations between them. 'For example, when she spoke of Ross, how frequently was he mentioned in a context of money, of art, of women, of favor, of disfavor? When she spoke of money how frequently was this topic associated with Ross, with health, with jobs, with death?' (ibid. p.197.) He used a variant of the chi-square test to determine the

significance of each association and obtained principal clusters of ideas and feelings. Later, automated content analyses could be used, due to advances in computer techniques. However, in order to produce a computer readable set of categories the original rich discourse had its connotations reduced. Factor analysis was then used to determine 8 'most prominent traits' which were found to overlap with a list of traits derived from common-sense interpretation. Allport concluded that 'quantification of the structure of a single personality is possible by means of statistical aids applied to content analysis.' (ibid. p.199.). He gives the following account of why such a methodology is necessary: 'That science likes universals and not particulars is ... a fact. Yet personality itself is a universal phenomenon though it is found only in individual forms. Since it is a universal phenomenon science must study it; but it cannot study it correctly unless it looks into the individuality of patterning! Such is the dilemma.' (Allport, 1961, p.9.) He also notes that how our qualities interact with each other is far more complex than the comparison of single qualities across individuals. The two methodologies are thus distinguished in that nomothetic work can be reliable and yet irrelevant, whereas the idiopathic work which has the merits of significance and understanding can be undermined by the lack of laws and predictability.

He explores the fact that humans do not just exhibit coping behaviour, but also expressive behaviour, which is the manner of performing adaptive acts. The latter is spontaneous and difficult to alter. For example, what is written is part of coping, whereas the style of handwriting is expressive. He does note, however, that 'every

activity, even if loaded heavily with expressivity, has its origin somewhere. That is to say, some stimulus lies behind the scenes. Even a "spontaneous" act follows some sequence of instigation.' (ibid. p.466.) He complains that up to then psychology had concentrated on testing coping abilities. Similarly, Rycroft emphasises not what a symbol in a dream means, but why that particular symbol was chosen, which, like style, is also somewhat idiosyncratic. It is therefore evident that some studies of the meaning of dreams will have to use single-case studies; the pedigree of these in psychology will now be reviewed.

Single Case Studies in Psychology

Most early work in physiology was performed on individual organisms, with the assumption of complete population generality. Pavlov also used single organisms, generalising his case by repetition with other species. In psychology Broca did much work with one particular aphasic patient, and Fechner was concerned with the variability of stimulus detection in individual subjects. Wundt used highly trained individuals to give introspective data on the assumption that the results were generalisable to the population in general. Ebbinghaus administered some 2,000 lists of nonsense syllables to himself. Also related to learning and experience was the Kelloggs' (1933) project of raising one young chimpanzee in their home. In the area of motivation Cannon and Washburn (1912) showed by the use of a swallowed balloon that Washburn's stomach contractions coincided with his introspective reports of hunger pangs. (The last two studies came to my attention in reading Hersen and Barlow, 1976.)

Watson and Rayner's study of Albert, and the sporadic accounts of multiple personality, are case studies important in abnormal psychology. In cognitive psychology an abnormally efficient eidetic imagery ability, the like of which was never seen in any other subject, was reported by Stromeyer and Psotka (1970). A pattern of 10,000 dots was retained by their subject in eidetic imagery for 24 hours. In social psychology a detailed and seminal study of cognitive dissonance was provided by the participant-observers of a group whose members expected the end of the world to be imminent (Festinger, Riecken & Schachter, 1956). Edelson (1975) uses an analysis of just one short poem for his study of language and interpretation in psychoanalysis.

Dukes (1965, p.76) says of work such as this:

'A few studies, each in impact like the single pebble which starts an avalanche, have been the impetus for major developments in research and theory. Others, more like missing pieces from nearly finished jigsaw puzzles, have provided timely data on various controversies.'

However, he goes on to warn:

'This historical recounting of "successful" cases is, of course, not an exhortation for restricted subject samplings, nor does it imply that their greatness is independent of subsequent related work.' (ibid.)

He does not, therefore, go so far as Hudson's (1966, p.12) assertion that statistical studies have little to offer in the realm of meaning and interpretation. Dukes gives three occasions for which a study of $N=1$ is appropriate. 'If uniqueness is involved, a sample of one exhausts the population. At the other extreme, an N of 1 is also

appropriate if complete population generality exists. ... In other studies an N of 1 is adequate because of the dissonant character of the findings. In contrast to its limited usefulness in establishing generalizations from "positive" evidence, an N of 1 when the evidence is "negative," is as useful as an N of 1,000 in rejecting an asserted or assumed universal relationship. ... Teska's (1947) case of a congenital hydrocephalic, 6.5 years old, with an IQ of 113, is sufficient evidence to discount the notion that prolonged congenital hydrocephaly results in some degree of feeble-mindedness.' (ibid. p.77.)

He also notes that there are practical reasons for sometimes choosing a single case study. 'Situational complexity as well as subject sparsity may limit the opportunity to observe.' (ibid. p.78.) He proceeds to advise that 'instead of being oriented either toward the person (uniqueness) or toward a global theory (universality), researchers may sometimes simply focus on a problem. Problem-centered research on only one subject may, by clarifying questions, defining variables, and indicating approaches, make substantial contributions to the study of behavior. Besides answering a specific question, it may (Ebbinghaus' work, 1885, being a classic example) provide important groundwork for the theorists.' (ibid.) Lazarus and Davison (1971) similarly state that case studies can generate hypotheses, which later may be more rigorously tested. A similar point is made by Valentine, who also tempers it with a warning.

'Sympathetic imagination is relevant to the origin but not the validity of explanatory hypotheses. Empathic

identification may serve a heuristic function but it does not guarantee knowledge. Conjecture is not fact nor plausibility probability.' (Valentine, 1982, pp.176-177.)

The study of individual differences started in the early years of this century, partly to investigate Quetelet's idea of the 'average man'. This became the basis for the comparison of groups of individuals. 'Biometricka' was then founded, which recorded statistical tests and quantitative research. Cattell rated people by mental tests, originally devised by Binet for targetting tuition to needy individuals, and this concern with individual differences led to an emphasis on groups and averages. Fisher worked on the problem of generalisability of findings, and the problem of inference from the sample to the population.

Hersen and Barlow (1976, p.8) write that 'by the 1950s, when investigators began to consider the possibility of doing serious research in applied settings, the group comparison approach was so entrenched that anyone studying single organisms was considered something of a revolutionary ...' This was despite Skinner's use of single cases in his study of operant conditioning. '... instead of studying a thousand rats for one hour each, or a hundred rats for ten hours each, the investigator is likely to study one rat for a thousand hours.' (Skinner, 1966, p.21, cited in Hersen and Barlow, *ibid.* p.29.)

Meanwhile, psychotherapy was using single cases in the production of hypotheses, and the case study method was the sole methodology in the first half of this century. For example, Breuer's (1895) treatment of Anna O., in which he admitted that he didn't know

which part of the treatment caused the cure, but in which the effects on the many behaviours were evident. By the 1950s the lack of publicly observable data in such work led to its falling into disrepute; the effects of treatment could not be evaluated, especially due to the lack of recording equipment and reluctance to take detailed notes, '... from the viewpoint of single case experimental designs, this rejection of the careful observation of behavior change in a case report had the effect of throwing out the baby with the bathwater.' (Hersen and Barlow, 1976, p.10.) Allport put it that 'we stop with our wobbly laws of generality and seldom confront them with the concrete person.' (1962, p.407).

Given that terms have been accurately defined there are still problems with the group comparison design. The finding of homogeneous groups is difficult, as is the finding of matched controls. With regard to this myth of patient uniformity 'Bergin ... consulted a prominent statistician about a therapy research project who dissuaded him from employing the usual inferential statistics applied to the group as a whole and suggested instead that individual curves or descriptive analyses of small groups of highly homogeneous patients might be more fruitful.' (ibid. p.16.) Hersen and Barlow (ibid. p.13) thus argue that 'is psychotherapy effective ?' is the wrong question, and that 'what specific treatment is effective with a specific type of client under what circumstances ?' is more useful. Similarly, some dreams may be meaningful whereas some may not be.

Not only is there the problem of generalising from the sample to the population, the clinician also does not know how results from one heterogeneous group are generalisable to one patient. More

random samples are better if comparison is desired with the whole population, but make the results less generalisable to the individual. In addition, as important as inter-subject studies of outcome is the study of the clinical course of a specific patient. In the psychology of dreaming this has its counterpart in the changes of dreams across the night, as opposed to how many subjects get wish-fulfilling or problem-solving dreams.

These difficulties led to an upsurge of naturalistic study, in which there is no systematic manipulation of independent variables. For example, patients can be assigned to different treatment and control groups not at random but according to the clinical decisions of what is the most desirable treatment for each individual patient. This illustrates the scientist-practitioner split, described by Bergin and Strupp (1972, p.440) as being '... a prevailing philosophy among behavioral scientists which subordinates problems to methodology. ... the selection of a problem is dictated by the experimental design.' They proceed to warn that 'the kinds of effects we need to demonstrate at this point in time should be significant enough so that they are readily observable by inspection or descriptive statistics. If this cannot be done, no fixation upon statistical and mathematical niceties will generate fruitful insights, which obviously only come from the researcher's understanding of the subject matter and the descriptive data under scrutiny.' (ibid.)

Apart from naturalistic experimentation the other reaction was in the direction of process research. In this the outcome of therapy is ignored and emphasis is placed upon defining variables concerned with the individual patient-therapist interaction. A

counterpart to this in dream research would be to concentrate upon scene changes and the relationship of one scene or dream to the next one, rather than to evaluate the effects of dream deprivation or the overall occurrence of particular images.

Shapiro (1966) advocated such a scientific study of individual phenomena. Unlike Allport he did manage to construct a methodology to put this idiographic approach into practice. He manipulated independent variables for a single subject by means of an A-B-A design, showing that independent variables can be manipulated in the single case, although it can be difficult to return the independent variable to its original state in the second A section. (Because we can never be sure what would have happened without the independent variable change in an A-B type paradigm, Campbell and Stanley (1963) refer to the A-B strategy as a 'quasi-experimental design'.) In the same way the waking concerns of dream lab subjects can be used as the independent variables, which then change week by week. The only problem here is that the design will then usually become A-B or A-B-C, in that the original state of specific concerns isn't returned to. Note that Holt (1962) considers that the idiographic method as used by Allport is simply the application of nomothetic methods to individual cases, and that idiography is more a choice of subject matter than of method. Caramazza and McCloskey (1988) argue against positions such as the latter by stating that, in neuropsychology, a patient-by-patient analysis, informed by theory, is always needed before even considering the grouping of patients' performances (ibid. p.524).

An example of the use of a case study in dream research is given by Salley (1988). This was a report of the use of hypnotherapy

on Frank, a patient with multiple personality, two of whose 13 personalities claimed a dream production function. As is usual in such cases the host personality only experienced fugues and did not know of the existence of the other personalities. Under hypnosis one of the personalities was found, who identified himself as Self, and who knew of the existence of the other personalities and of Frank. Self acted as a protector of Frank and claimed to use dreams as his only line of communication to Frank; he would use dreams to explain seizures that Frank experienced. Self stated under hypnosis that the seizures resulted from a conflict with Frank during which Self would attempt to force Frank to regain consciousness. 'That night Frank dreamt that he was standing on a pedestal and two voices were shouting at him; one voice shouting "Yes!" and the other "No!" The vibrations from the shouting were so intense that the pedestal began to shake and split open, whereupon he fell to the ground shaking. Free association to the elements of the dream led Frank to relate the shaking to his seizures and the screaming to internal conflict and his resistance to regaining consciousness after a blackout. In the two years since he had this dream, he has experienced no recurrence of the hysterical seizures.' (ibid. p.113.) Therapy then focused on getting to know the other personalities one at a time, with dreams depicting the relations between the other personalities and to which Frank would free associate in order to uncover repressed memories. alley concludes that some dream theories, such as Crick and Mitchison, and Hobson and McCarley, would have difficulty accounting for the data from this one case, and that 'dream theories relying on information-processing models and linkages between past and present data' (ibid. p.115) fare

better.

This example of the successful use of an idiographic case study to provide evidence about the nature of dreams shows that studies of the content of dreams need to be performed. To this end psychological theories of the content of dreams must be produced to guide our observations. In the following three chapters we will examine three of these theories.

CHAPTER 10

FREUD AND THE EXPERIENCE OF DREAMING

In chapter 3 it was noted that the early philosophical examination of dreams resulted in two accounts of the relationship of dreaming to waking experience. One was that dreaming is discontinuous with waking life, the other that mentation can never halt and carries over from waking life into our dreams, in the process aiding our experience of continual personal identity. Freud used elements of both these views; he held that dreams use material which they have obtained from waking life, often from infantile memories, and yet work on this material with unconscious thought processes which are entirely different from those used in waking rationality.

According to Freud a dream is the hallucinatory fulfilment of a wish, the wish usually being unconscious, often infantile. The representation of the wish usually requires some disguise due to its reprehensible nature. In the process of interpretation the dream becomes the 'royal road to the unconscious', giving us evidence not only of the content of the unconscious but also of the method of thinking that that part of the mind uses, that is, the primary processes. The unconscious is more evident during sleep than when one is awake because the 'censor', which controls the exit of thoughts from the unconscious, is more relaxed in the former state. Relaxation is not total, however, and the unconscious thoughts will have to be disguised by the process of the 'dream-work' in order to be allowed into the pre-conscious part of the mind without shocking the sleeper and waking him or her up.

Although Freud gave some physiological justification for

these ideas, the emphasis on 'wishes' and 'censorship' means that this is a top-down theory of dreaming, one in which each image is meaningful and in which there is an active process of translation of the basic 'dream-thoughts' of the 'latent-content' into the overt 'manifest-content'.

According to Freud the experience of a dream is in three senses a regressive one:

1) Topographical Regression. The dream is visual, which he claims is a regression to an infantile and unrealistic hallucinatory way of dealing with the world. Thoughts are usually represented as a scene in dreams, with the odd exceptional case of dream-thoughts remaining as simple thoughts or as pieces of knowledge. In waking life what is experienced is processed by the brain to become thought and memories, producing a sequence of excitation. Freud held that in dreams the direction of excitation is reversed, partly because when one is asleep there is no current of excitation flowing in the usual direction. An initial problem with this formulation is the suggestion that imagery is held to be either infantile or peripheral to cognition, whereas in chapter 6 I have already reviewed evidence that the use of imagery is central to much of creativity and cognition. Freud does remark, though, that in waking life 'this backward movement never extends beyond the mnemonic images; it does not succeed in producing a hallucinatory revival of the perceptual images' (1953, p.543).

2) Temporal Regression. The dream is a substitute for an infantile scene which is modified by being transformed onto a recent experience. By being transferred onto what is usually a harmless

memory the infantile wish is better able to evade the censorship. This is achieved partly because the infantile wishes attract the recent thoughts and memories to them - they are unable to bring about their own revival and hence return as a substitute, a dream. He gives evidence that a colour seen in one of his dreams was 'a recent impression, which attached itself to a number of earlier ones' (ibid. p.547). In the 1920s he revised the theory to include the possibility that conscious thought and intentions of the day before could cause a dream, with the aid of reinforcement from repressed material. These he called 'dreams from above', as opposed to the original 'dreams from below'.

3) Formal Regression. The means of representation and expression of the dream-thoughts are regressed in that the methods used are primitive, not following the rules of the rational secondary processes. Use is made of symbolism (both idiosyncratic and universal), condensation (by which elements of the latent content combine to form a single item in the manifest dream), and displacement (which is the change in what appears important between the two levels of the dream).

The dream experience, the manifest content, is thus the result of the activity of the dream-work on the latent content, or dream-thoughts. The dream can appear well-structured and coherent on some occasions due to the activity of secondary revision, but any such coherence is irrelevant to the actual meaning of the dream, which is discovered by the process of free-association from the individual elements of the manifest content, each taken separately. Freud's

interest in dreams was in translating the manifest content back - similarly he held that the dream-work 'does not think, calculate or judge in any way at all; it restricts itself to giving things a new form' (ibid. p.507). This means that 'the dream content seems like a transcript of the dream-thoughts into another mode of expression' (ibid. p.277), just like a rebus.

Freud thus emphasises the irrelevance of the narrative of the manifest content, claiming that the meaning of the dream does not lie in the manifest sequence of images at all, and that any apparent meaning in the dream as told when waking up is merely a surface gloss over the real message.

CHAPTER 11

DREAMS AND METAPHORS

'Even if one accepts ... that dreams are an involuntary kind of poetry, one has to add that they are usually also an uncompleted kind of poetry' (Rycroft, 1981, p.165).

Problems with the Disguise Theory

In the last chapter we saw how Freud held that dreams protect sleep by a homeostatic process which defuses stimuli (external or internal) that could shock the subject back to wakefulness. In the same way he held that neurotic symptoms allow the safer, symbolic expression of unwanted unconscious processes. Central to this theory of dreams is the disguising function of the censorship. However, a paradox results if we understand dreams, parapraxes and neuroses as analogous to each other. The paradox is that in the latter two states parts of the unconscious are expressed in psychopathologies in question; rather than being 'disguised' it is as if they are being translated into a different language ('somatized' in the case of conversion neuroses).

Charles Rycroft found other problems with the disguise theory of dream contents. He noted that not only do some people have a great ability to interpret their own dreams, but that what is 'disguised' on one night may be shown openly on another - 'it is difficult to imagine that one night a dreamer may wish to repudiate his sexual wishes and another night may admit them freely' (1981,

p.65). In addition, what appears disguised is often perfectly well known to consciousness anyway.

In answer to these problems he developed the notion of dreams as messages expressing unacknowledged parts of the self. He thought that these parts arise because 'changes within ourselves instigated by maturation and ageing ensure that there are always potential, emergent aspects of the Self which the personal I self has yet to assimilate' (1981, p.68).

Dreams as Metaphors

He postulates that such assimilation depends upon metaphor. 'Since the novel and unfamiliar can only be described in terms of the familiar, and the abstract can originally only be described in terms of the concrete, vocabulary is largely built on metaphor, and we use it whenever we speak or write, often without knowing that we are doing so' (ibid. p.70). I suggest that a corollary of this is that dreams often appear bizarre upon waking because of their metaphoric function, but that while they are happening we take the metaphors literally, and hence rarely recognise bizarreness while dreaming.

We now come to a problem with Rycroft's theory. He states, of images in dreams, that 'since ... they often make no sense if presumed to refer to the objects they themselves depict, they must often be symbols referring to or standing for something other than themselves' (ibid. p.73). This, of course, not only overlooks the aforementioned evidence that dreams are predominantly mundane and not devoid of 'sense', but also begs the question of why we can presume that the images are symbolic. Although he nowhere provides any proof

for his analogising of dreams with metaphors (apart from the self-knowledge that such a procedure can bring), and of dream images with symbols, experimental evidence is provided by the work of Silberer (1951) and of Antrobus (1978) on the metaphorical transformation of abstract waking thoughts at sleep onset and REM sleep respectively.

Rycroft notes that Freud formulated his theory of dreams before art became representational and expressive, as with Picasso and James Joyce, leaving him with the realist belief that images either show reality, do not show reality, or disguise reality. Rycroft goes on to show the difficult relationship between art and psychoanalysis, which arises because of the fallacious assumption 'that the primary processes and secondary processes are mutually antagonistic' (ibid. p.158).

We have seen how in each night it is claimed that a subject may concentrate on a limited set of concerns, the dreams are single-minded. I will now introduce Rycroft's idea of the presence of metaphors in dreams, which are held to be useful for classifying and thinking about a specific problem. Such a breaking up of the subject into parts is compatible with Lacan's derision of the concept of a unified ego, the welcome illusion of which, he says, starts at the mirror phase. With this notion of metaphors comes the idea that the signifiers in the dreams are not arbitrary, they depend on their particular referents; Barthes (1972b) similarly claims that signifiers in myths are not arbitrary. This opposes Lacan's claim that signifiers are always arbitrary and changing, defined only in terms of other signifiers (see the arguments in favour of this in Benvenuto & Kennedy, 1986, and Bowie, 1969, and the arguments against in Archard,

1984).

Rycroft (1981, p.79) cites Marion Milner's hypothesis that there is an 'innate tendency to apprehend all objects that are not one's self by likening them to organs and processes which are one's self...' and that the outside world 'provides us with a stock of images which we can liken to our bodies and its processes and to which our bodies can be likened'. This last sentence shows how there is no privileged point of reference, whether it be the body or the environment, in this means of thinking. Piaget (1962) considers that this type of thought is purely assimilation to the subject's internal schemas, as opposed to accommodation to the outside environment. Metaphors are thus enabling the dreamer to think about abstract concepts in terms of the known concrete environment, and vice versa.

The crux of this position is that the work of dreams is not a simple imagined resolution of problems, with the dream being seen to be obviously functional and with no mystery pertaining to the reports. Thinking in dreams is made more complicated by the introduction of past memories, metaphors, symbols, and the symbolisation of the environment (not to mention condensation and displacement). It is also complicated by the taking of notions or objects from one realm into that of another, which is the basis of Hudson's (1985) Bric-a-Brac model of dreams. Furthermore, not only is an initial problem symbolised but the symbol is then treated as real, as standing for itself. We thus find that not only must the initial problem be solved, but the metaphor which stands in its place must be solved also. For example, in my dream (see chapter 12) of being in a submarine (which represented the analyst) on Lake Konstanz I had to solve the problem

of escaping from the vessel, which I did by means of an escape hatch. Rycroft writes that:

'... when used as a figure of speech, metaphor is used with consciousness of its nature as a substitute for direct statement, when used while dreaming, metaphor is presented as though it meant itself, and it requires the addition of waking, reflective consciousness to ascertain to what it applies. Or, alternatively, imagery in dreams fulfils a function the reverse of that fulfilled by metaphor in waking speech. Metaphor in waking speech adds to or defines more precisely and vividly a meaning already and consciously intended; imagery in dreaming lacks as yet the meaning that will turn it into metaphor.' (1981, p.71.)

Such taking metaphors literally has been shown to occur in subjects with damaged right-hand sides of the brain (Gardner and Winner, 1977). I contend that this may be related to the reported increase in right-hand hemisphere activity during REM sleep (Goldstein, Stoltzfus & Gardocki, 1972; failed replication - Antrobus, Ehrlichman & Weiner, 1978; additional support - Gordon, Frooman & Lavie, 1982; Bertini, Violani, Zoccolotti, Antonelli & Di Stefano, 1982; sceptically reviewed by Antrobus, 1984). If the right hemisphere is connected with the understanding and production of metaphors then its greater activity at this time would lead to more far-fetched metaphors. Upon waking one is in a state of functional right-hemisphere 'damage', or decrement, compared to the erstwhile REM stage, and the metaphors appear bizarre, and possibly incomprehensible

Rycroft's work has much similarity with that of Baylor and

Deslauriers (1986, 1986-7), who base their theory of dreams on metaphors conveying abstractions through concrete images, and who interpret dreams by giving their subjects extremely long periods of time to discover the metaphors for waking-life experiences in each dream image. Rycroft's theory is based on the idea that conceptual thought is aided by concrete imagery and metaphor; the former, I propose, may be present in the dreams of animals, whereas the latter would be a human extension of such images, which could then even be contributed to by language, contrary to Hunt's (1982) opposition to theories of linguistic sources of human REM dreams. Aspects of culture could then also be fitted into our mind during dreaming, except that our culture provides more efficient mechanisms for such an ordering, such as learning courses. The external culture could even affect the way that our mind in dreams is formed, as will be elaborated on in chapter 18. Of course, if the main use that adult humans have for dreaming is to obtain a better fit in storage, an elaboration of connections, then a lack of dreaming would not be deleterious, the organism would merely fail to improve as much as it could have done - but because of the importance of improving as much as possible it is predicted that the brain would be programmed to make up for any REMS deficit, as is observed. Theories that identify REMS as removing something undesirable (toxin theories as well as the unlearning theory) only explain the REM rebound effect, not the lack of deleterious psychological effects upon REM sleep deprivation. (See Dement's, 1960, finding of "anxiety, irritability, difficulty concentrating" which has been much less replicable than findings of learning and physical disability.) Vogel (1977) reports that schizophrenics are not adversely affected, and that psychotic

depressives are improved by REM sleep deprivation. Note however that Newman and Evans (1965) claimed that Kales, Hoedemaker, Jacobson & Lichtenstein's (1964) finding of no deleterious effects due to sleep deprivation was because nothing novel was introduced to the environment during the experiment, and that the subjects were confined to a single room for observation.

Barthes (1972b) claims that a dream is like a sign, which includes both latent meaning (signified) and manifest content (signifier). The signifier is not arbitrary, though, for myth, he says, is a second-order semiological system, constructed from a semiological chain which existed before it. Myth takes hold of language to form its own system, and he thus calls it a metalanguage (ibid. p.115). The original sign has many of its connotations missing and ignored; as an example he gives a Latin phrase in a textbook which becomes a sign of the correct use of language, a sign of privilege, of hard work, rather than of the original participants in the scene that the phrase describes. He states that the sign becomes 'impoverished' in being used as a signifier. But this original meaning of the sign interacts with its new signification. This interaction of concept and symbol was noted by Hall (1966), who wrote that what is important about a symbol is not that it just stands for something else, but rather why that particular symbol was chosen, and what can be said about that signifier, apart from what it stands for. For example, to symbolise a father by a General has different connotations from symbolising him as a priest. Similarly, Barthes states that: 'The relation which unites the concept of the myth to its meaning is essentially a relation of deformation.' (ibid. p.122). It is such

deformation which may be a source of bizarreness in dreams. When we are awake we note all the usual waking meanings of a sign and this clashes with the way it was used as a signifier in the dream. Barthes states that the term used in the myth is 'deprived' of its history, 'they are half-amputated, they are deprived of memory, not of existence' (ibid. p.122), and we experience something similar in dreams in their poverty of full memory and full connotations compared to waking life. (Note, however, that some forgotten individual memories may still reappear in dreams despite this.)

Rycroft states that the dreamer '...is likely to be pre-occupied with what I have called earlier his biological destiny' (1981, p.80). He goes on to say that this results in the use of body symbolism in ways that would be disconcerting in waking life (ibid. p.80). As I will elaborate on later, I consider this finding to be more to do with what his patients knew about his Freudian theories, and certainly KJ's dreams, in chapters 14-17, while completely egocentric, are more concerned with professional standing than biology, as we will see.

For Rycroft dreams concentrate on the biological and egocentric facts of life; birth, sex, injury, status, loss, and death. A dream produces metaphors which often stand halfway between the vast area of culture, or the other vast area of nature, and the circumscribed world of our biology and egos; for example, a dream I had compared worries about physical weakness to a broken motorcycle.

According to Rycroft dreams and poetry are produced because 'symbolisation is a basic human need, not a symptom produced by

conflict and repression, and ... human behaviour is a language, not a set of mechanisms for discharging tensions' (ibid. p.13). This symbolisation, however, does not result from accurate, definitive translation of each referent, but also depends upon all the other referents and symbols used, such that the message becomes synchronic, rather than diachronic. Rycroft's theory is here similar to one method of studying signs, that of Structuralism, which will now be reviewed. These theories of dreams as a language will then be compared to the non-linguistic theories of chapter 8, which hold that although parts of dreams can be taken as meaningful signs, no message is intended.

CHAPTER 12

STRUCTURALISM AND DREAMS

I intend to summarise in this chapter two revolutions in the theorising about human culture that have occurred this century. (Details of the individuals involved can be obtained from Kuper, 1986b, chapters 3 and 7.)

Leach (1982, p.16) writes that early anthropology, 'the study of primitive man', rested on the premise that 'all non-Europeans are stupid, childish, barbarous and servile by their very nature'. However, near the end of the nineteenth century sociological thinkers were claiming that the difference between 'primitive' and 'civilised' 'lay in the type of society into which the individual happened to be born' (ibid. p.22). This meant that the primitive thought was coherent and valid, but that the basic assumed propositions that inferences were drawn from were false.

From 1924 Malinowski started to teach at the LSE. He believed that the social behaviours and institutions of the primitive societies served the immediate practical needs of the individual, that is, they were all functional. Another type of this 'functionalism', that of Radcliffe-Brown, held that the institutions maintained the society as a whole.

There was thus a movement from these institutions, such as myths, being seen as irrational and childish, to being seen as solving a problem for the society, and maintaining its equilibrium. Myths would thus be used as an explanation and justification for the status quo. Demythologising was applied to the texts, including the bible, in

an effort to separate what is functional and reasonable from what is irrational. Evans-Pritchard noted that in their totemic system the Nuer 'conceptualize the animal world on the model of the social world' (Levi-Strauss, 1969, p.30), that is, as containing lineages, and thus introduced the notion of metaphor.

The study of dreams underwent a similar progression, though much later in the present century (although in the case of the Crick and Mitchison theory dreams are still held to be irrational). From being seen by Freud as a completely different way of thinking, as primary process rather than secondary process, dreams became thought of as having a problem solving function (Schatzman, 1983a & 1986; Cartwright, 1986) or at least as insightful (Hall, 1966; Fromm, 1957; Shevrin, 1986 [on subliminal perception]) and metaphorical (Rycroft, 1981).

Kuper (1979) has suggested that dreams may be seen in terms of the next anthropological revolution, that of Levi-Strauss' structuralism, and I intend now to provide some definitions of this method, and some examples of its use. (Its application has been widespread and has affected the study of history, literature, linguistics and the social sciences.)

Structural Analysis in Anthropology

The initial premise of structural anthropology was that what was most important for study in the interrelations of people in primitive cultures was not what was communicated, such as women or money, nor who made the communication, but rather the structure of the

system of communication as a whole, and the transformational differences between each structure and the structure of other cultures. For example, if caste systems are compared with totemic systems a major difference is that the former are endogamous whereas the latter are exogamous. This search for structure and transformation was first applied to kinship systems, but Levi-Strauss later applied it mainly to myths, because of their greater lack of constraint by the material surroundings. (The importance of this was that he proposed that the structure of mind can be best ascertained by studying thought when it is most independent of the outside world.)

Myths were held to be giving a message which necessitated the myth being analysed as a whole, with regard to other myths, and hence as a system of signs. The actual message was held to be unconscious, below the manifest level of the myth. Similarly, P.Cohen (1969) points out that to see myths as merely functional, or justificatory of the status quo, or explanatory does not really explain 'why the social function should be performed by myth and not by some other device'. To explain this it is necessary to examine 'the nature of mythical symbols' and 'the structure of mythical thought.' (ibid.) The actual purpose of the myth, according to structuralism, is the mediation of contradictions in a society's beliefs, which are expressed as binary distinctions, X and not-X. Cohen (ibid.) gives an example of the use of the method in analysing the story of the Tower of Babel. He suggests that there is the 'seeming paradox: if men are descendants of common ancestors they are one people; on the other hand, although all men are thought to be descended from common ancestors, they are not one people. Secondly, there is the seeming

paradox that God provides men with consciousness but denies them ultimate knowledge of his own being and whereabouts'. Although Cohen does not state that A:B::C:D in this case, he does argue that 'ideas and sentiments which are felt as irreconcilable are presented and that the tension is resolved by an event - the destruction of the Tower and the creation of permanent divisions between social groups'. Although he has doubts about the falsifiability of the method, he appraises it as directing attention to 'a central characteristic of myth, the expression of conflicting principles and attitudes', and to 'the subliminal intellect' (ibid.). However, we must remember Levi-Strauss' contention that what looks like useless dichotomising and differentiating of anything in the environment still serves a function, that of defining parts of the environment.

Barthes (1972a) stated that 'It is probably in the serious recourse to the lexicon of signification ... that we must finally see the spoken sign of structuralism.' As well as this concentration upon signs there is also the study of the position of signs one with another, and also the study of the sign as a member of an opposition. According to Sturrock structuralism 'studies relations between mutually conditioned elements of a system and not between self-contained essences. There is nothing essential or self-contained about a given word; the word "rock" let us take. That occupies a certain space, both phonetically and semantically. Phonetically it can only be defined by establishing what the limits of that space are: where the boundaries lie if it crosses which it changes from being the word "rock" to being a different sign of the language - "ruck" for instance, or "wreck", which abut on it acoustically. Semantically, we

can only delimit the meaning of the signifier "rock" by differentiating it from other signs which abut on it semantically, such as "stone", "boulder", "cliff". ... without difference there can be no meaning.' (1979, p.10.) He expands on this by taking an analogy used by Saussure: 'A piece in chess falls under the category of pawn or bishop not by virtue of what it is independently of the game, which is a carved bit of wood or ivory, but by virtue of the value invested in it by the rules of chess and by the differentiation of pawns from knights from queens and so on. We may not be conscious of this differentiability every time we move a chess piece, but it is very clear that such an "event" is wholly determined by the structure of the game in which it occurs' (1986, p.21).

It is often remarked that Jakobson's study of phonology provides proof for the structuralist notions of opposition and the meaning for individual elements provided by the overall structure. Jakobson divided phonemes into opposed pairs of 'distinctive features', such as 'voiced'/'unvoiced', and 'nasalized'/'not nasalized', finding, for example, five such oppositions in French, and three in Turkish. However, I find it doubtful that the discovery of the use of oppositions in audition, which is a simple physiological process, can tell us much about the use of oppositional and structural thinking at the level of the mind. Evidence for the latter must come from other sources.

Leach (1976, ch.13) gives examples of how differentiation is used in human culture. For example, in our culture, ordinary people engaging in lay activities wear clothes of any colour, but priests engaged in lay activities wear black, and when engaged in religious

activities wear white: also, a bride wears white, whereas a widow wears black. Similarly, 'the yellow robe and shaven head of the Buddhist monk is designedly contrasted with the white robe and partly shaven head of the Brahmin priest, and both are contrasted with the ash covered body and long hair of the Indian spirit medium.' (ibid. p.58) He proceeds to give other examples of oppositions which are used to distinguish parts of our lives, such as Noise/Silence being related to Sacred/Profane. Levi-Strauss (1977, p.137) describes the layout of some villages and the social organisation of their inhabitants: 'A circular street runs around the storehouses, with the huts of the married couples built at the outer edge. This Malinowski called the "profane" part of the village. But not only are there oppositions between central and peripheral and between sacred and profane. There are other aspects too. In the storehouses of the inner ring raw food is stored and cooking is not allowed... In the Trobriands we see, therefore, a complex system of oppositions between sacred and profane, raw and cooked, celibacy and marriage, male and female, central and peripheral.' In the Bororo village the opposition between the centre and the periphery of the village is also the opposition between men (the owners of the central men's house) and women (the owners of the encircling family huts). 'We are dealing here with a concentric structure of which the natives are fully aware, ... The central area containing the men's house and the dancing place serves as a stage for the ceremonial life, while the periphery is reserved for the domestic activities of the women...' (ibid. p.142)

Levi-Strauss analysed myths in terms of such oppositions, and gave three rules for his method (1978a, p.65):

'1) A myth must never be interpreted on one level only. No privileged explanation exists, for any myth consists in an interrelation of several explanatory levels.' [So, while from the analysis of dreams Rycroft writes that one uses the outside world's oppositions to make sense of one's own life, Levi-Strauss would emphasise that one also uses oppositions concerned with oneself in order to make sense of the outside world.]

'2) A myth must never be interpreted individually, but in its relationship to other myths which, taken together, constitute a transformation group.' Levi-Strauss states that 'each myth taken separately exists as the limited application of a pattern, which is gradually revealed by the relations of reciprocal intelligibility discerned between several myths.' (1986, p.13.) [Hall (1966) and Jung (1968) made the same point for dreams, as did Freud himself when he advocated the comparison of dreams from the same night, following work on 'dreams in pairs' conducted by Franz Alexander (in Fliess, 1950, pp.336-342).] Similarly, Leach (1969, p.22) writes that 'the novelty of the analysis ... does not lie in the facts but in the procedure. Instead of taking each myth as a thing in itself with a "meaning" peculiar to itself it is assumed, from the start, that every myth is one of a complex and that any pattern which occurs in one myth will recur, in the same or other variations, in other parts of the complex. The structure that is common to all variations becomes apparent when different versions are "superimposed" one upon the other'. However, of paramount importance are not the similarities between different texts, but their differences, so we first tabulate the changes that occur between the first long dream and the last one, because this can act as

a guide to the main oppositions involved.

'3) A group of myths must never be interpreted alone, but by reference: a) to other groups of myths; and b) to the ethnography of the societies in which they originate.' [The oppositions and their permutations on one night may relate to those on other nights, and may refer to the oppositions of one's waking life. According to Kuper (1989) Levi-Strauss is himself now emphasising point a), as if myths are a 'hall of mirrors', reflecting only each other.]

From Levi-Strauss' 'The Structural Analysis of Myth' (in Structural Anthropology, 1977) we learn that, for the analysis, invariant functions in a myth, or group of myths, are bundled together, and then compared with other such bundles. A forerunner of such work was Vladimir Propp, who classified parts of fairy tales by their motifs, such as 'interdiction', 'flight', 'lack', 'villainy'. He then found that all the tales followed the same pattern, although in some a bundle may be left out or permuted. He also claimed that the transformation of one type of tale to another type followed certain laws. Levi-Strauss applied similar procedures to the myths of the Americas, claiming that 'the proof of the analysis is in the synthesis. If the synthesis is shown to be impossible, it is because the analysis is incomplete' (1978a, p.134). However, he found that each part of a narrative had many different attribute any of which could be relevant, and it is therefore the overall context which determines which part is bundled together with what. He gives the example of eagle and owl appearing in one narrative, which would mean that the relevant opposition is day and night. Each animal has many

attributes that can be chosen to be used in the code. Boon (1972, pp.157-158) writes of frogs being popular in South American myths because they are particularly 'good to think' due to being seasonal (and hence temporally discontinuous), vocal, bridging land and water, and extendable in size.

As well as this synchronic analysis it is also necessary to follow how oppositions are permuted diachronically, both within and between myths. An example of such a permutation is given by Kuper (1986b, p.76) with regard to the naven ceremony in New Guinea. 'The ceremony involved transvesticism and other dramatic reversals of normal behaviour. For example, the mother's brother of the person being honoured dressed in grotesque female attire, offered his buttocks to his sister's son, and acted the female role in a fantastic similitude of copulation with his wife.' Kuper notes that this led Bateson to the notion of 'schismogenesis', the rule that 'oppositions are continually and dialectically heightened once begun' (ibid.). Levi-Strauss claims that this unconscious processing is constrained, that '... individual human beings (at play, in their dreams, or in moments of delirium), never create absolutely: all they can do is to choose certain combinations from a repertory of ideas which it should be possible to reconstitute.' (1964, p.60.)

Poole (1969, p.13) says that the actual analysis involves reading '... the langue and the parole [i.e. the language system and each speech act] in a given code, be it mythical, psychological, economic, social, literary or political. It is to define the signified and the signifying in a given context within these codes. It is to carry out either a synchronic study or a diachronic study of these

codes, or both if we can or if we want to, but not to confuse our modes of study. It is to learn to read off the opposition pairs in a code. Finally it is to watch carefully for position and inversion in these codes. We have thus to think and to analyse in terms of a total field of communication in the given society, or myth, or work of art we are studying. All this is possible because of the linguistic model.'

Levi-Strauss (1978b, p.24) states that he finds internal evidence for the structuralist account of myths from the recurrence of the same events in different myths around the world, despite their making up different messages ('...the same absurdity was found to reappear over and over again, then this was something that was not absolutely absurd.' *ibid.* p.11). He says that myths are thus a closed system, unlike history. Dreams similarly have a very simple repertoire, being very concerned, as Rycroft (1981) notes, with our biological functions and survival, although the evidence of chapters 14-17 in this work is more in favour of dreams being egotistically, rather than just biologically concerned. As with myths, dreams are distinguishable by the idiosyncrasies of the subject, which are introduced into what is a very stereotyped product. Levi-Strauss (*ibid.* p.9) states that the structuralist approach is 'the quest for the invariant, or for the invariant elements among superficial differences'. He uses an alternative to reductionism (or at least at the initial application of the method; eventually a relating to neurology in the case of the structure of myths and kinship is claimed) in that he looks for relationships between elements, and the thesis of Kuper's work is that the same may be done for dreams, despite the tradition this century of working out where each image

came from independently of the others. Opposing this is the functionalist approach to dreams (Hunt, 1982; Schatzman, 1986, on problem solving in sleep) which holds that the imagined environment of the dream world is simply a model of the real world, in which we can practise behaviour as if in the real world. An alternative view is to see some objects and events of the dream world as symbolic, albeit very concrete symbols, in which, as in myths, there is 'the respect for and the use of the data of the senses' (ibid. p.13), as opposed to conceptual and scientific thought. He proceeds to distinguish scientific from primitive thought in that the latter only imagines it has power over the universe; this is also true for dreams.

Examples of the Method of Analysis

As an example of the application of the method I will take 'The fate of Lot's wife' by Aycock (in Leach and Aycock, 1983). This myth has one of the recurrent themes of mythology, that of immobilisation, to explain which, he says, we must bring in the wider symbolic structure of the myth in order to discover if the immobilisation is mediating conflicting oppositions (as in The Story of Asdiwal, Levi-Strauss, 1978a, pp.146-185). He notes the following transformations in the story:

BEGINNING

END

Lot meets two male angels, who are disguised, and are strangers to him

He is seduced by two females, his daughters, who are 'disguised' by his drunkenness

The impending destruction of Sodom by God

The creation, due to the incest, of the Moabites and Ammonites

Within the walls of Sodom, a city

A cave in the hills above Zoar

A society of homosexuals, who thus cannot have children

Incestuous association, justified by the need for children

Aycock claims that Lot's wife is a mediator for these oppositions. She is turned into a pillar of salt between the two geographical locations of Sodom and Zoar - and 'the salt into which she is transformed has ... not only the connotation of sterility, but also the connotation of purity, since she cannot, by definition, participate in the abominations and impurity of either Sodom or the caves in the hills' (ibid. p.117). He further claims that this method can provide insight into other immobilisations in the bible, such as 'Noah in his ark upon Ararat, Isaac tied to the altar below Abraham's knife and the ram caught in the bushes who substitutes for him, and Jesus on the cross' (ibid. p.118). He also notes that the oppositions are also standard themes: 'excess and restraint applied to food and sexuality the city and the wilderness ...' (ibid.). In case such a method of exegesis appears contorted, Leach remarks that 'Prior to the Reformation all Christians took this [method] for granted. Not only was the whole of the bible true but it was all true in the same way.

It could be read as a synchronous story in which the different parts were internally cross-referenced. It is only during the last 150 years that a quite different attitude has come to dominate biblical scholarship. Truth is now equated with "historical truth" and since it has become apparent that large parts of the bible could not possibly be "true as history" in a strict sense the task of the scholar has been seen as that of sifting the true from the false' (ibid. pp.2-3).

With regard to Leach's comment above that the portrayal of Jesus on a cross between heaven and earth is similar to other myths of immobilisation, I note that the term 'mediator' is frequently used with regard to what the theologians call his 'work' on the cross.

Opposition		Mediated by:
Heaven	Earth	Immobilisation between the two
Good god	Evil mankind	He is treated as if evil, and as if a sacrifice, yet forgives his tormentors
Life	Death	He is killed yet resurrects - in the meantime he is in a temporary liminal place, some say on a journey to hell, others that he was in paradise.

He is said to mediate between god and man, which is made necessary by the danger of the meeting of what is sacred and what is profane. That this danger requires some liminal area for the meeting to take place is frequently observed in anthropology. The Roman Catholic church has caused a further evolution of this liminality, in that Mary and the saints are believed to intercede for the supplicant

to Jesus, who in turn mediates to god. Leach (1969, p.10) notes that 'this pattern is built into the structure of every mythical system, the myth first discriminates between gods and men and then becomes preoccupied with the relations and intermediaries which link men and gods together'. He states that such mediation between two poles of an opposition is performed by a third, 'abnormal' category, such as virgin mothers or incarnate gods. It may be suggested that bizarre dream elements will often be such mediators. They are bizarre because often the opposition cannot be reconciled - for example, our existential oppositions of death and life, freedom and security, or, in the case of myths, that between the prohibition of incest and the status of the original two humans. Leach (1969, p.22) claims that the latter problem is met in Genesis by the recurrence of incestuous and immoral relations, such as those of Lot's daughters and the men of Sodom, which makes Abraham's incest with his half-sister Sarah less onerous. Similarly, in 'The Legitimacy of Solomon' (in Leach, 1969) he notes the unresolvable contradiction in Israelite society of endogamy (to keep the community pure) versus exogamy (because of the many foreigners). An attempt at a resolution is made by the tension between stories of the downfall of kings after marrying foreign wives, versus the presence of tribes that are neither Jew nor gentile, such as the Samaritans (ibid. pp.54-55).

The Implications of Structuralism for Studying Dreams

According to Levi-Strauss' theory myths aim for the resolution of conflicting ideas. This line of thought applied to dreams predicts that a dream has a problematic beginning leading to a

final solution, but that the dream does not use the same thought processes as the waking human does. It predicts that the successive scenes are reached not by small positive or negative increments of part of a previous scene, but by 'clear-cut relationships such as contrariness, contradiction, inversion or symmetry' (Levi-Strauss, 1981).

Dreams, by analogy, would thus be concerned with the resolution and exploration of tensions, not just with their abreaction, hence there is predicted a dialectic in the narrative of dreams: the tension is not merely depicted, as if it is essential, necessary, and immutable, although some dreams will stop at this.

We therefore see that dreams are claimed to be doing more than re-presenting waking life - like myths they aid classification, and are hence constructive and re-constructive. On this issue of classification:

'It might seem that the system of differences between animal species is too powerful to match the much weaker differences between human groups. Members of the same society look alike and live in similar ways and conditions; social groups do not differ in the ways natural species do. But the point precisely is that human groups are trying through "totemic" institutions not to match two pre-existing systems of differences, but rather to build one system with the help of the other. They are trying not so much to express social differences as to create or strengthen them. In this respect the force of the animal system is never excessive; whatever aspects of it can be mapped on to the social system are welcome.' (Sperber, 1979, p.32.)

I now wish to introduce the work of Professors A.Kuper

(1979, 1983, 1986a) and A.Stone. Their joint paper (1982) analysed one dream, the 'Irma dream' of Freud, and coupled with the other analyses (of a set of dreams of a Plain's Indian and of a whole night's dreams of a dream lab subject, KJ) they provide a plausible and theoretically grounded account of how one dream image changes into the next, and therefore an account of the dream's narrative nature. They found two progressions in the former dream; the sequence of diagnostic medical rounds in a hospital (preliminary evaluation by Freud, note made of Irma's 'pale and puffy' appearance, other colleagues perform more extensive examinations, and finally the supply of a definitive diagnosis and aetiology), and also the sequence of examination from mouth to throat to upper body, lower body and finally intestines. They also found 'a movement from superficial, false and less important findings to deeper, truer, and more important findings' (Freud first notices lesions in the throat, but the final diagnosis is of infection and dysentery). They note also that the 'two sequences not only move in a coherent direction, down and deeper, they present a typical quasi-logical transformation'. An example of one such transformation they give from that dream is 'the mouth that resists voluntarily opening becomes an anus that involuntarily opens'.

In this theory the narrator is held to use the 'science of the concrete', externalising conceptual thought by the use of whatever comes to hand in the observed everyday universe. What comes to hand are not tools or signs designed especially for solving the specific problem, much as an engineer has, but rather "a collection of oddments left over from human endeavours" (Levi-Strauss, 1966, p.19) which are more akin to the tools used by a handy-man, a bodger, or, in Levi-Strauss' culture, a 'bricoleur'. There is nothing else at his disposal

to use, and the "set of tools and materials ... is always finite" (ibid. p.17). Examples of this finite set of tools are the physical oppositions present in the environment, such as Inside/Outside or Distance/Closeness, or Lower body/Upper body. I propose discovering whether Levi-Strauss' claim about the properties of these tools found in myths, that they are "permutable, ... only on the condition that they always form a [closed] system in which an alteration which affects one element automatically affects all the others" (ibid. p.20), is also applicable to any oppositions found in dreams. Note that because many oppositions may change at once this form of thinking is not a paragon of the scientific method, but still the system of classification needed (in dreams as well as myths) is very precise, often the equal of any modern taxonomy, and does obey rigorous logical laws.

An essential element of the analyses is not just that abstract thoughts are represented by concrete images, which Silberer was indicating long before Rycroft's theories, but that both operate in terms of oppositions. Boon (1985, p.169) puts it thus, '[Levi-Strauss] has praised Durkheim's emphasis on contradictions that sustain social and cultural divisions; here Durkheim foreshadowed structuralism. Standard functionalist theories consider contradictions in any system as potential obstacles to its proper functioning, which must be corrected, repaired, purged, or cured. This is a therapeutic model in which contradiction is not so much integrated as released and tensions felt by the actors thus eased. In contrast, structuralist theories consider contradiction unavoidable; this much they share with various schools of dialectic, including Hegelian and Marxist ones.

Systems, such as mythic variants, operate not despite contradiction but by means of it...' Similarly, Lacan writes of how concepts or attributes are defined as much by what they are not, as by what they are; for example, a man considering his masculinity may proceed by the contemplation of what it means to be feminine. In the same way, Levi-Strauss writes that, 'like a myth, a mask denies as much as it affirms. It is not made solely of what it says or thinks it is saying, but of what it excludes.' (1982, p.144.)

By studying dreams themselves Haskell (1986b) came to the similar conclusion that:

'... while specific imaginal [dream] content may be important, the essential mechanism of resolution is probably structural. For example, the cognitive operation of negation or contradiction transformed in the dream to imaginal action forms is the essential resolution mechanism.' He gives as an example 'turning something upside down'. The resolution is in the structure and not the content, and abstracts common mnemonic features of all content that is related to the problem. So when one problem is solved, the same occurs for many others. He suggested that 'the structure of logical relations occurring on some levels of dream imaging takes the form of an action-logic where objects, things and events are physically manipulated and move about in imaginal (symbolic) space.' (ibid.) But he proceeded to note that:

'Presumably the story presented in a dream is somehow parallel to the real-life conflict situation, and when resolution occurs in the dream story, it is thereby resolved in the psychological reality. But this does not cognitively explain how the resolution is accomplished.' (ibid.)

We must study the methods of this putative problem-resolution in dreams in detail, in order to answer how, as opposed to why, supposed resolutions occur in dreams. In the structuralist account of dreams it is predicted that, as for myths, that resolutions occur by the application of '... rules of transformation which enable us to shift from one variant to another by means of operations similar to those of algebra.' (Levi-Strauss, 1977, p.235.)

Continuing the analogy, the background information that the subjects give about themselves in the interviews thus correspond to the knowledge that an anthropologist has of the background culture of the mythmakers, or, put another way:

'Structural analysis can reveal unsuspected depths of reference and inference meaning for any particular series of myths. In order to squeeze this significant out, the anthropologist must apply his prior knowledge of the culture to his analysis. He uses inference the other way round, from the known culture to the interpretation of the obscure myth. This is how he discerns the elements of structure.'

(Douglas, 1978, p.169.)

Part of the appeal of Structural Anthropology has been that it claims to provide insight about the structure of thought, and further evidence for the validity of the project would be available if the structural analysis of dreams were as fruitful as that of myths. The aims of the project are summed up by Skinner, in 'The Return of Grand Theory in the Human Sciences':

'The study of rationality has thus come to be

a major focus of research ...' (1985, p.16).

Theoretical Problems with the Analysis

The standard criticism of the structuralist account of myths, which was taken up by van Velzen (1988) in his critique of Kuper and Stone (1982), is that the sexual and aggressive side of people is ignored. For example, Spiro (1979) reanalyses the Bororo myth which had been studied by Levi-Strauss in 'The Raw and the Cooked'. He complains that two incidents in the myth, the son's rape of his mother and the father's subsequent assault of the son, are reduced to the opposition Distance/Closeness, thus eliminating the manifest content of aggression and sex. The myth continues with the son killing his father, and the son taking revenge upon his mother and stepmothers. Levi-Strauss' overall analysis, however, relates these incidents to the origin of cooking fire and rain. Spiro remarks that this analysis 'converts all acts of violence into metaphors for nonviolent structural relationships' (ibid.). However, to claim that the myths of primitive groups cannot be concerned with intellectual puzzles and aetiological issues, as if they are stuck at an early part of mankind's history, or as if they are more in touch with their aggressive or sexual emotions than we are, is considered by many to be a nineteenth-century view of these peoples. Similarly, to claim that dreams are only concerned with sexual and aggressive wishes may be an early twentieth-century atavism.

Levi-Strauss' concern with the intellect is exemplified in his recent writing about Freud's 'The Interpretation of Dreams'. In 'The Jealous Potter' (1988) he contrasts his own relativist treatment

of mythic elements with Freud's frequent use of set translations for symbols (ibid. p.188). But such a narrow concern is itself intellectual, unlike how an interest in Freud's instinctual theory of the unconscious as opposed to Levi-Strauss' cognitive view of the unconscious would be. He has chosen as the point of interest in Freud's favourite work a very minor and cerebral part of that work.

CHAPTER 13

A COMPARISON OF THE PHENOMENOLOGICAL PREDICTIONS OF THE MAJOR THEORIES OF DREAMS

Structuralism, Psychoanalysis, and Dream Narrative

Both structuralist and Freudian analyses of dreams postulate a submerged conflict which instigates the sequence of images. In the former case the conflict is rather conceptual, for example myths of the original single human may oppose common knowledge of generation from male and female with belief in the autochthonous origin of man, whereas in the latter case the conflict is more instinctual. The two methods are similar in their activity of finding the conflicting elements. All the elements of the text are viewed out of their narrative order; for the structural analysis the syntagmatic chain becomes a synchronous table:

A - B - C - D - E - F - G becomes

A		B	
C	D		
		E	F
	G		

where elements in one column have some similarity to each other. In his essay 'The Structural Study of Myth' (1977, pp.206-231) Levi-Strauss studies the Oedipus myth, to illustrate a synchronic analysis. He finds that the first column (the overrating of blood relations) is to the second column (the underrating of blood relations) as the third column (the denial of the autochthonous origin of man) is to the fourth column (the persistence of the autochthonous origin of man).

The myth has the function of relating one unresolvable opposition to another unresolvable opposition, by means of placing them in the same syntagmatic chain. (Jakobson, 1965, stated that the failure to form such chains may be the cause of certain aphasias.) This relating of oppositions is synchronous, Levi-Strauss calls it 'paradigmatic', and does not depend upon where in the chronology of the myth the elements occur. Levi-Strauss' logical paradigmatic analysis is thus at the opposite pole to the analysis of folk-tales carried out by Propp, who found that many tales were similar in their means of progression, but with different characters substituted, or other changes made to the syntagmatic chain. Silverstone (1981) puts Greimas between the two poles. Greimas reduced the number of functions that Propp perceived in the tales, and paired them into oppositions. Some of these oppositions are then ruptured at the start of the tale, and 'the task of the narrative is to remedy the various dimensions of rupture which have been established initially' (ibid. p.94). The narrative would then mainly follow the familiar trail of the hero accepting a task, confronting the villain and ending with a marriage.

In the psychoanalytic account of the dream-chain, associations are made to each element which results in latent elements being found, which can tie together two or more temporally distinct manifest elements. Freud stated that the parts of the manifest dream are only tied together by these latent elements, for example: 'It is natural that we should lose some of our interest in the manifest dream. It is bound to be a matter of indifference to us whether it is well put together, or is broken up into a series of disconnected separate pictures... In general one must avoid seeking to explain one

part of the manifest dream by another, as though the dream had been coherently conceived and was a logically arranged narrative.' (Introductory Lectures, 1963, pp.181-182.) Both accounts therefore postulate a disjointed collection of images, neither assume a smoothly flowing narrative, they both assume a latent realm which binds together these images. This latent realm is, by definition, timeless in the Freudian account, and in the structural account can be a simple conflation or comparison of two beliefs which is then translated into a diachronous set of images. For both methods the dream is a whole piece, the later parts are presaged by the earlier ones, while the later images refer back to the earlier ones. We have a whole work with interconnecting parts, rather than just a simple one-dimensional tale.

The basis of their difference is the significance to be given to the sequence of the manifest dream. For the structuralist account the manifest plot attempts to resolve some latent conflict, which results in an extra determination for the images, in addition to the synchronous determination above. However, resolutions do occur in dreams looked at analytically, for example, a wish may be fulfilled only after a struggle between contending and opposing wishes. This presence of narrative in the Freudian account of dreams can be overlooked because of Freud's emphasis on the irrational nature of the unconscious. For example, he explained some of the gaps between dream scenes as a result of the inability of the sleeping mind to use conjunctions and logical relations: so, 'simultaneously in time' is the concrete picture used to depict 'logical connection' (1953, vol.4, p.314), whereas the relation 'just as' is depicted by similarity between dream elements (ibid. p.320), and causality is represented by either a transformation occurring before our eyes, or by having a

preliminary dream with a longer sequel (ibid. p.316). He almost ignores narrative, as shown by this elision of conjunctions, because of his emphasis on the individual elements and symbolism of dreams. (An effort from within the psychoanalytic movement to show the significance of the manifest content 'as a form of adaptation, of problem-solving' has been made by Spanjaard, 1969. In addition, from the same tradition, Mahony, 1977, studies the interrelationships of elements of the manifest content.)

However, we know that conjunctions and logical operations can be present in the thoughts of a dream character, such that, for example, in a nightmare a character may decide to climb somewhere in order to escape a lion. Now, if logic and narrative can be present within an action then they must be able to be present between actions, and between scenes, and hence be part of the process of going from one scene to another, especially in view of the way that scenes can refer one to another. We have reached the question of the presence of cause and effect in dreams and I now digress to the realm of philosophy.

Hume opposed any use of the terms 'cause' or 'effect' on the grounds that contiguity in space and time between two events, such as the cue ball in snooker hitting a red ball and the latter then moving, no matter how many times that contiguity has been noted, was not proof that the same relation would obtain in the future. He claimed that we only see separate events, and that we cannot see this supposed relation of causality between the events. A major argument against this has been that we only know we have a cue ball because of the events it can be involved in. If it is placed on the table it doesn't sink into it and it doesn't move randomly by itself (like a jumping

bean does). To even talk about a lack of causality between objects requires that we can place the objects by reference to what they do, by being able to construct a narrative about them.

Similarly, for elements to be pictured in a dream we must give them some narrative, some cause and effect, even if that is only the dreamer looking from one part of the image to another, or just knowing what the image is not. If narrative is present within an image, in order to define an element of it, then it will surely affect what the image does next, and we will then have a narrative for the whole scene. Note though, that this cause and effect does not have to always be identical to the pragmatic version seen in waking life, it can be symbolic, or even irrational.

One dream I had went as follows: 'I was running down a corridor away from my psychotherapist. I fumbled to find a key which I used to lock a door between me and her. I kept the key.' Jung reports one in which he descends by stairs below a house into deeper and deeper realms. To define these realms, these levels, as well as to define the key as something to keep a therapist away from me, requires narrative. The order in which the events occur does matter to the meaning of the elements and the overall plot, despite Freud's insistence to the contrary. Some structuralist analyses depend on classifying elements in terms of what happened to the element temporally, for example, the mother travelling downstream as opposed to the daughter travelling upstream. To look for symbols and associations, or to produce the above synchronic table, is merely the first step of the analysis, but one that does involve having one eye on the surrounding narrative of each element. In practice, both

structuralism and psychoanalysis then use these synchronic elements as a key to decode the overall narrative. To concentrate on the key alone ignores the way we give meaning to events, by constructing a narrative about them.

Both the structuralist account, and that of Freud, find resolutions in dreams. In the above dream of mine I resolved the conflict of fear of therapy versus wanting it by locking the door and yet keeping the key, so that I was the one who could choose whether to go back. (Note that neither theory predicts that resolutions will always be happy or wish-fulfilling at the manifest level. This is evidenced by Cartwright's [1974 b] finding that periods of dream sleep do not affect completion of crossword-puzzles or word-association tests, but that they do lead to more 'negative' or pessimistic solutions to a Thematic Apperception Test.) Wherever an opposition must be superseded, whether for obtaining a wish-fulfilment or to show its likeness to another opposition, narrative is necessary. Even if complex logical operations cannot be expressed in dreams we can still find time sequences, a dream may be illogical in parts but without logic and narrative at other parts those parts would not be comprehensible. For example, Freud (The Interpretation of Dreams, 1953, p.494) tells of a dream which included two simultaneous ideas, that of a marriage, and that of an arrest: but in order to define these two human activities a narrative is needed, so that the dreamer knows what is being watched. In the same way, the strange lawless behaviour of quantum particles is only revealed by the lawful and predictable activity of the measuring apparatus, and art therapy is only of value because of the surrounding structure which allows and

holds the period and medium of creativity and illogicality.

Freud considered that the 'dream-thoughts' produce a dream by the processes of displacement and condensation, with an eye to the representability of these thoughts in the eventual rebus. There is then an optional process of secondary revision, which can turn this initial product into what he called a 'well-constructed dream'. (This revision adds to the dream, whereas the other functions of the censorship are involved with omission.) He stated that (1953, *On Dreams*, pp.666-667) 'Considerations of intelligibility are what lead to this final revision of a dream. ... From the point of view of analysis, however, a dream that resembles a disordered heap of disconnected fragments is just as valuable as one that has been beautifully polished and provided with a surface'. A dream therefore appears to be logical due to this process of secondary revision; this is summed up by his statement that 'I will not deny that critical thought-activity which is not a mere repetition of material in the dream-thoughts does have a share in the formation of dreams. ...this thought-activity is not produced by the dream-thoughts but by the dream itself after it has already, in a certain sense, been completed.' (ibid. p.313) However, the evidence is that this narrative is not always produced after the 'real' dream, as if this dream-facade consists of just conjunctions added to the disjointed images. Sometimes, the narrative is an integral part of the images, and Freud says as much in his short paper 'On Dreams' (p.667): '... in the erection of a dream-facade use is not infrequently made of wishful phantasies which are present in the dream thoughts in a pre-constructed form, and are of the same character as the appropriately named "day-dreams" familiar to us in waking life'. The form of the

day-dreams is, of course, a narrative, and so we have it on Freud's authority that some dreams do contain an originally narrative aspect.

What, however, if this claim is wrong, and dreams do only have a narrative element because of confabulation in the face of these inchoate images? A waking model of this is the experiment of Gazzaniga, LeDoux and Wilson (1977). Verbal commands were presented to the left visual field of a splitbrain subject, P.S. This command was thus only perceived by the right cerebral hemisphere. Following the command he produced the response requested, and was then asked 'Why did you do that?' In trial after trial his left hemisphere, which controls speech and language, but had not seen the commands, responded in ways consistent with the information available from his behaviour. When the command was 'rub' he said 'itch', and when it was 'laugh' he said that the experimenters were funny. These responses were not said as guesses or jokes, but as facts to explain the previous behaviour: the subject honestly believed the confabulation. Similarly, LeDoux, Wilson and Gazzaniga (1979) presented two pictures simultaneously, one to each visual field. Each hemisphere then had to choose from eight pictures the one that went with the initial picture. In one case the left field item was a snow scene, and the left hand pointed to a shovel, while the right hand pointed to a chicken to match the chicken claw presented to the right visual field. When asked why he chose those items he said that he saw a chicken claw and so pointed to the chicken, and that you have to have a shovel to clean the chicken shed. This was not said in jest, the speaking left hemisphere had to account for the behaviour of the left hand and so confabulated a solution, a conjunction between the separate images. However, even if such

confabulation is the sole source of dream narrative the study of such narrative remains valid and valuable, for we are still studying a human ability, that of how scenes are made to lead one to another. Whether narrative is present from the beginning, or whether it is added when some raw material has already been produced, we are still studying how humans construct narrative. Freud called the secondary revision the first interpretation of a dream, we may thus be studying not the pure product, but rather an interpretation of it; yet it is still interesting to look for any permutations and progressions in this overlaid narrative, for that also shows how our thoughts are structured. As an analogy, I note that myths certainly take similar pure products of the outside world and lay a narrative over them, and the study of these myths similarly remains important.

Freud introduced the idea of secondary revision because he denied the presence of intellectual ability in the initial stage of dream creation. 'Everything that appears in dreams as the ostensible activity of the function of judgement is to be regarded not as an intellectual achievement of the dream-work but as belonging to the material of the dream-thoughts and as having been lifted from them into the manifest content of the dream as a ready-made structure.' (1953, p.445.) He proceeded to give evidence for this by taking areas of dream activity which do appear to involve intellectual ability, namely number calculations, speeches and judgements. He gives examples where a number or speech also occurred in waking life and said that 'as a rule, the repetition is ill-applied and interpolated into an inappropriate context, but occasionally, as in our last instances, it is so neatly employed that to begin with it may give the impression of independent intellectual ability in the dream' (ibid. p.459). He

treats numbers and speeches in dreams just as he treats objects, as standing for something else, or as a day-residue. One such dream was the following: "The dreamer was in a big courtyard in which some dead bodies were being burnt. 'I'm off,' he said, 'I can't bear the sight of it.' He then met two butcher's boys. 'Well,' he asked, 'did it taste nice?' 'No,' one of them answered, 'not a bit nice' - as though it had been human flesh." He notes that the last two speeches were taken from waking life, from a visit to their neighbours who were eating, and so were not intellectual judgements formed during the dream (ibid. pp.420-421).

Now, speeches do sometimes occur out of context in dreams, but here they fit together, and we must ask if this is simply fortuitous, or the result of secondary elaboration, or the result of thought processes at the moment the subject is woken. Freud had a rule of disregarding apparent coherence in dreams - each element must be traced back on its own account, by the use of free-association. After the text of one of his dreams which involved many acts of logic (concerning the criticism of the absurd idea that Goethe could have made a literary attack on a young acquaintance of Freud's) he stated 'Every step in this set of logical conclusions, however alike in their content and their form, could be explained in another way as having been determined by the [latent] dream-thoughts'. (ibid. p.450). Now, Freud has made us aware that a conclusion in the dream may also be present in the dream-thoughts, and thus in waking life; but not everything in a dream must stand for something else, for, in his own words, 'a cigar is sometimes just a cigar'. An act of logic in a dream could be just that, rather than an allusion to an event from waking

life. He is also leaving out his own discovery of overdetermination, that an event in a dream can be the result of numerous separate trains of thought. I am proposing that according to a Freud's overall account a seemingly intellectual activity in a dream can be the result of a waking event, and/or simultaneously of the subject thinking while in REM sleep. His later revision of the theory to include 'dreams from above' confirms this.

Freud was concerned with the source of individual dream objects and actions taken on their own, which are strung together (eventually) in a narrative. Similarly, the structuralist method removes individual elements from the sequence and asks how they arrived there, 'why is the eagle the totem for this tribe?' 'Why did Connie show K.J. a record cover?' (see chp.14.) *Neither method demands* a smooth narrative, with no sudden changes of scene, and each can subsume the possibility of the sequence being added to in order to be made more intelligible. The presence of what Freud called added 'connecting thoughts' is compatible with both theories.

I consider that Freud's dogmatism with regard to the lack of intellectual ability in dreams was due to his emphasis on the difference between waking and sleeping life, and that he overstated his case in this instance, while perfectly correct in observing that '... the dream-work is not simply more careless, more irrational, more forgetful and more incomplete than waking thought: it is completely different from it qualitatively and for that reason not immediately comparable with it'. (ibid. p.507). Dreams do have the strange activities of condensation and displacement, but they also have counterparts of waking thought. In fact, they are very similar to waking life, which is one reason for why we are so rarely surprised in

them, so rarely are we cognizant of the fact that we are dreaming.

One example of Freud's contrary wish of not wanting to completely deny the logical nature of dreaming is his criticism of those who attributed the creation of the dream to the moment of waking, especially after Silberer's experiments on hypnogogic imagery. He obviously considered the dream needed time for its production. Also, the first part of 'The Interpretation of Dreams' is critical of those who claim that the dream is a meaningless jumble of images.

Silberer worked on the transformation of waking abstract thoughts to concrete images while he was drowsy. For example, he wrote 'In the morning, at waking, while I was at a certain depth of sleep (a twilight state) and reflecting over a previous dream and in a sort of way continuing to dream it, I felt myself approaching nearer to waking consciousness but wanted to remain in the twilight state.' He then saw the following scene, 'I was stepping across a brook with one foot but drew it back again at once with the intention of remaining on this side.' (Quoted in Freud, *ibid.* p.504.) Freud agreed that this symbolisation in the dream state may occur, but stated that it is less common than secondary revision, for this provided an example of intellectual activity while dreaming which was not likely to be also a day-residue, and hence did not fit his theory. He also stated that: 'What seems to occur more frequently are cases of overdetermination, in which a part of a dream which has derived its material content from the nexus of dream-thoughts is employed to represent in addition some state of mental activity.' (*ibid.* p.505).

This statement allows me to claim that the psychoanalytic view of dreams as irrational is not contradicted, but rather is

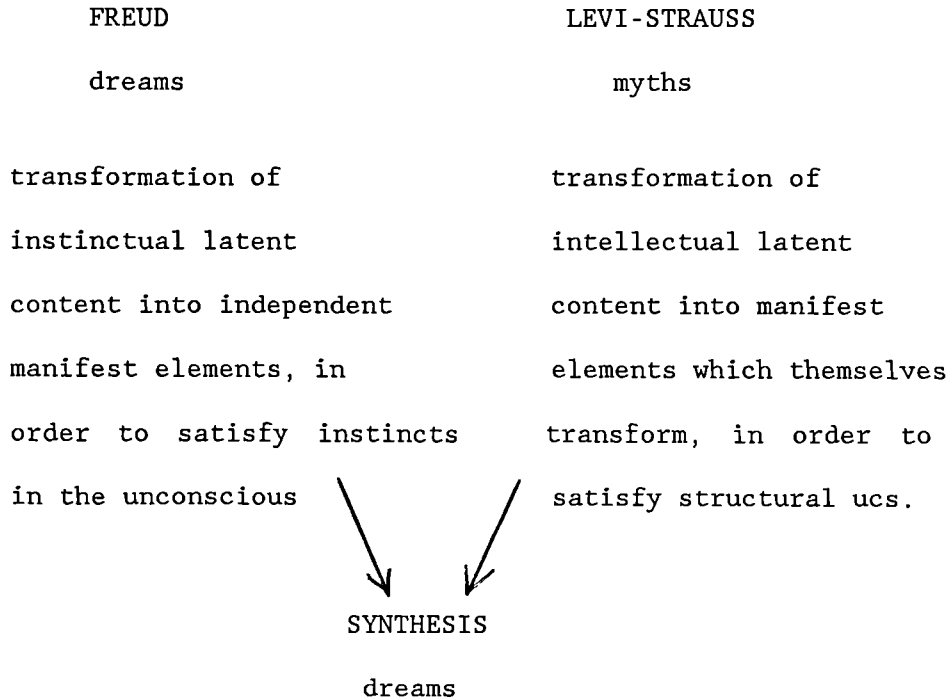
complemented by the structuralist view of their rational and cerebral function. In addition, this statement shows that both study, at least sometimes, texts in which aspects of the subject's world are represented by objects in the subject's experience, which are put to another use, in bricoleur fashion. It may be noted that Nietzsche, who used many of the concepts attributed to Freud, was a master of such concretisation of abstract thoughts, ('man is a bridge that must be overcome', 'can you not hear the grave-diggers who are burying god?'). Freud concentrated on the source of the images in the subject's life, and in the dream-day. The structuralist analysis of dreams is confronted with much more mundane objects, and concentrates on their relations one with another, and on the relations of relations, and on the source of images in terms of the other images.

Whether Badcock's thesis of the derivation of Levi-Strauss' work from Freud's is true or not (he states that the former is a cybernetic version of psychoanalysis [ibid. p.112]), the Structuralist method of dream analysis is seen to be a synthesis of the two. Levi-Strauss and Freud are compatible also in that both aim to find the hidden, unconscious determinism, which lies beneath the surface events. Levi-Strauss likens them both to the science of geology in this respect, and Freud himself drew a connection between the two fields with his statement that:

'I have long been haunted by the idea
that our studies of the content of the
neuroses might be destined to solve the
riddle of the function of myths...'

(From the letter of S. Freud
to D. Oppenheim, October 1909.)

In conclusion, the relation between these two methods of exegesis, and the recently proposed structuralist analysis of dreams may be summarised thus:



intellectual, language-based transformation of egocentric, but often consciously known, latent thoughts into manifest message which progresses mytho-logically towards a solution.

Freud, Palombo, and the Narrative of Dreams

Of relevance to the question of the narrative of dreams is the work of the psychoanalyst S.Palombo. He holds (1978) that a condensation is the meeting of two memories, one from the subject's present waking life, and one from earlier in the subject's life. Dreaming has the task of matching such memories in order to file

correctly the subject's latest experiences. The dream narrative is thus solving the problem of which part of the 'memory tree' to fit the day residue into. He states that anxiety dreams result when the new experience cannot be easily reconciled during the dream with the person's usual schemas. The dreamer wakes up due to this stimulus of anxiety, and acknowledges the dream consciously.

'Awareness of the anxiety dream in his waking state gives the dreamer an opportunity to bridge the gap with a new mediating experience which enlarges the connection between the experiences of past and present.' (ibid. p.17)

The memories form a tree-like structure, with the earlier ones, which are of greater affect, at the trunk. The search starts as close to the trunk of the tree as possible, and the path of least resistance down a branch is then followed. He believes that dreams re-affect memories, which are stored without information about affect (although no evidence for this is given).

This theory is fully in accordance with Freud's 'The Interpretation of Dreams', from which Palombo derives not only examples of what can be taken as the matching process but also the physical metaphor of the Dalton lamp. This device was used in Freud's time to compare the likenesses of members of one family by superimposing lamp projections of the photographs of two members of the family. Palombo considers that condensations in dreams are such superimpositions of two memories, with the aim of discovering a similarity between them. He claims that a greater similarity means that the superimposition in question would be less bizarre. In that case, the memory of the new event is filed in the memory system at the

place of the similar old memory. This theory accords only partly, though, with the modern view of dreams as problem solving, although no doubt in the search for solutions past actions will be reviewed. Palombo writes that dreaming may be efficient at comparing memories, but not necessarily at solving single problems. He proposes that such skilled behaviour is best undertaken while one is awake, showing a difference between his theory and the functionalist ones. The following dream, though, taken from 'The Interpretation of Dreams' (1953, pp.369-371), shows that Palombo's work is also in accordance with the structuralist analysis of dreams. (This is important, because I consider the Palombo work provides for dreams a link with the evolutionary value of dreaming, as a part of the memory processes.)

'I was running down the staircase in pursuit of a little girl who had done something to me, in order to punish her. At the foot of the stairs someone (a grown-up woman) stopped the child for me. I caught hold of her; but I don't know whether I hit her, for I suddenly found myself in the middle of the staircase copulating with the child (as it were in the air). It was not a real copulation; I was only rubbing my genitals against her external genitals, and while I did so I saw them extremely distinctly, as well as her head, which was turned upwards and sideways. During the sexual act I saw hanging above me to my left (also as it were in the air) two small paintings ... At the bottom of the smaller of these, instead of the painter's signature, I saw my own first name, as though it were intended as a birthday present for me...'

Freud notes that the subject had, on the dream-day, seen some paintings in a shop, and also heard of a servant girl who had

become pregnant on the stairs. From the structural point of view we note the opposition in the dream between large and small, shown by the two adults and the child, and also by the two paintings. However, the dreamer also remarked that the stairs in the dream 'belonged to the house where he had spent the greater part of his childhood and, in particular, where he had first made conscious acquaintance with the problems of sex'. We can thus conclude that, simultaneously with the portrayal of present problems and their solutions, the dream depicts a childhood association of the problems.

To obtain such a depiction requires a narrative, for the individual memories are themselves temporal, and also because the search itself may take time. Similarly, the depiction of resolutions in a myth analysed structurally needs a time element, and hence also needs narrative. Furthermore, definition needs a concept of what an entity is not, as part of the description of the entity, as noted by Structuralist writers, and particularly emphasised by the post-structuralist Derrida and by Lacan.

Structuralism and Symbolism in Dreams

It is a prediction of the structuralist account, and that of Rycroft, that for humans their dreams have a change in nature with time, both phylogenetically and ontogenetically, in the same way that an infant will change its cognitive functioning from sensorimotor to concrete operations to formal operations. In dreams we can play with whatever material we can use while awake, facial gestures when young, simple concrete wishes when older, and puns (the similarity between 'Konstanz' and 'constant' is an example from later in this chapter)

and language when older still. For example, simple waking functional actions performed by a young person, such as digging a hole, may have ideational attachments if performed by someone older, attachments such as burial, death, rebirth, and the earth. REM sleep may have evolved to aid consolidation of memories of concrete actions and experiences (the lack of proprioceptive and other feedback certainly argues against it being a practice mechanism for the body's benefit), and so could easily develop in the human individual to aid consolidation and elaboration of conceptual attachments to these concrete aspects of experience.

According to the structuralist account, the area of the Symbolic is analysed in the same way as the Real, that is, by its oppositional properties. But whereas all these properties are present at once in waking life, and are subservient to the exigencies of that life, the claim is that when dreaming we can concentrate on one opposition at a time (which is simultaneously compared to other oppositions, such as the differences between two tribes being likened to that between, say, the bear and the eagle). Similarly, Barthes' (1972b) essay on wrestling shows how the excessively acted movements and expressions of wrestlers show the notions of good, bad, justice and punishment in an unambiguous way. This makes wrestling so unlike other sports, which are less of a ritual. As Sturrock (1979, p.62) puts it:

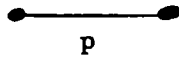
'In daily-life the signs which the world presents to us are wholly ambiguous, their meanings are many and uncertain; but for the space of an hour or two, and within the confines of the wrestling ring, the signs are utterly unequivocal.'

The same can be said for some dreams, although displacement results in great ambiguity and an obfuscation of any message present, and also it may not be apparent unless many scenes are compared what the relevant oppositions are, according to the structuralist account.

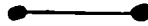
The Predictions of the Crick and Mitchison Theory

At first sight the theory seems to imply that chronic dream-rememberers will be prone to instabilities, on average, more than non-rememberers because an association or event in the dream should have been unlearned. Such a prediction accords with Crick's anti-psychoanalytic bias, in that the remembering of dreams would no longer be a virtue. In contrast to this, Singer and Schonbar (1961) found that 'high and low daydreamers differ along a dimension which might be termed self-awareness, or acceptance of inner experience', and there is no study which shows a greater psychopathology among rememberers of night dreams. Schatzman (1983b) stated that 'If their theory were true, and their advice [of not attempting to remember dreams] valid, much psychotherapeutic practice and many people's habits of recalling dreams would have to change'. However, I consider this to be a false objection to the theory. The theory certainly predicts that a non-recalling dreamer will be more stable than someone who has not dreamt, because the parasitic information remains in the latter case. But a recaller is different from someone who has not dreamt at all. On recall this person may indeed reinforce the parasitic link, undoing, according to the theory, whatever unlearning took place, but will then proceed to postulate links other than this one to try to explain the production of the parasitic link: the single association is not left

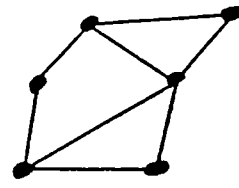
isolated but all manner of reasons, some no doubt confabulations, are put forward to provide a context, as well as the dream context, for the conflation. Crick and Mitchison (1986, pp.239[109]-240[110]) rightly state that many of these reasons will be confabulations, but they do add to the subject's knowledge of him/herself, which is beneficial, rather than a cause of "instability". The unwanted link has its existence prolonged but the overall effect is surely to cancel out that instability.



Hypothesised non-dreamer



Dreamer with damping



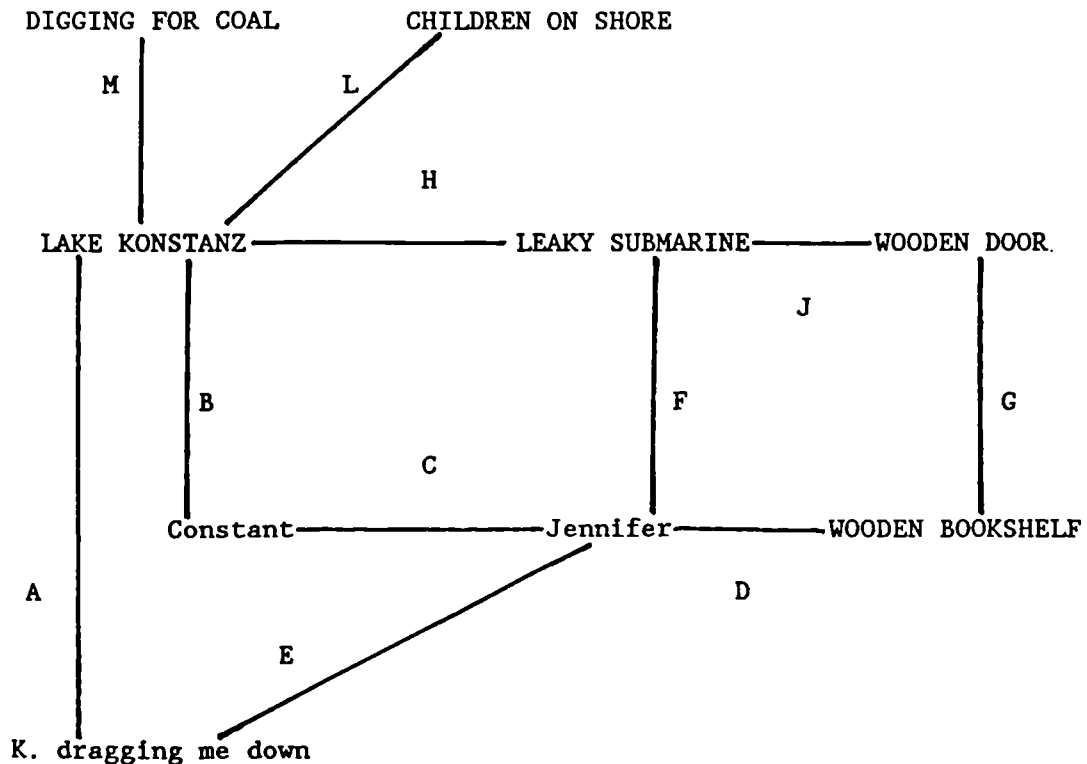
Recaller with new valid links

Instead, a real problem for the model is where bizarre links from a dream are found to be immensely enlightening, to such an extent that even if, as the theory's proponents say, the free-associations produced on waking are later confabulations and not the real causes of the dream, the cause of the enlightenment is not deserving of erasure. Experimental data are, however, needed to illustrate this possibility, and for this I repeat a dream I had while considering ending a period of analytic psychotherapy.

In short, the dream started with myself on a river or lake digging for lignite coal which I put on a barge. I then entered a small submarine which was on the lake's surface and went down the conning tower, but I was worried about water coming in, or of myself being stuck, or the submarine sinking. Below there was a wooden door and books on an old wooden bookcase. I got out by a large exit hatch and realised that the lake was Lake Konstanz in Switzerland. I then

warned some children on the shore not to approach the submarine.

Later that morning I had a session of psychotherapy. The therapist, Jennifer, had a wooden bookcase and the word 'lignite' conjured up associations of gelignite and explosive submerged material. A more major association in the dream was of Konstanz with the submarine which I feared would let in water. The word 'Konstanz' reminded me of a holiday at that lake I had had with K., a woman who at that time made me feel smothered and drowned, it also associated to 'constant', the opposite to how I felt about the therapist, whom I knew I could not keep seeing regularly. Before the dream I had never associated the two women, but I was helped immensely by doing so thereafter. Yet, according to the unlearning theory, at least one of the links H, J, or G (in the following diagram) was 'parasitic' and should have been damped down.



(Note that the parts of the actual dream are shown as capitals, with the associations to these in small letters.)

Crick and Mitchison contend that links A-F could be confabulations, and not the original reasons for the production of the dream. However, whether or not they were the causes they are still meaningful, so much so that an efficient brain would not put in danger of erasure any such links as important to its world-view as:

Jennifer must show constancy

Lake Konstanz reminds me of K.

Jennifer is possibly dragging me down as K. did

Jennifer is like a leaky submarine

Furthermore, phonologically I will always recognise the similarity between "Konstanz" and "constant", and my memory and visits to the therapist associate a wooden bookcase with her.

Given that links A-D were already in my mind, even if they didn't cause the dream, and that link E is a useful discovery, it would be most unwise of the brain to set about erasing the links H, J, L & M even if they did exist prior to the dream, because:

1) the whole structure would then be held together by fewer links,

2) H, J, L & M although not memories themselves, can hold other memories together,

and 3) in the process of evoking these supposed parasitic links many valid links are also brought up; if these are unlearned also then the system seems to be loosing its memory ability overall.

If the links H, J, L & M did not exist prior to the dream, in the same way that if they had occurred in a daydream we would not

ascribe to them prior existence, I fail to see which other link Crick and Mitchison would claim my mind would be trying to erase. I am left with two alternatives:

1) Links H, J, L & M were formed by the mind during dreaming and their expression enabled me to link Jennifer and K. to my advantage

2) All elements in the network existed before the dream, and due to their proximities false associations result. The unlearning theory holds that these are malign rather than benign.

The difference between these points is whether we can say that the links H, J, L & M aid the retention and recall of the useful links, or are a hindrance. In favour of the former option is a finding in memory research that the greater the number of connections one can imagine between elements to be remembered the greater the accuracy of recall, and the most efficient method of remembering elements is to construct a narrative involving them. (Some research suggests that to produce a bizarre narrative or picture is even more helpful in producing efficient recall, but I am tempted to believe that the extra effort and thought needed to create a bizarre image is more likely to be the cause of better recall in this case.)

Furthermore, although a Hopfield net may be assumed to hold orthogonal memories (that is, the sum of any two memory matrices multiplied together is zero) and mixed memories result when non-orthogonality is introduced, such correlativeness is the basis of thinking and learning, and must be preserved. Animals do not just

learn many single patterns, but also the connections and correlations between them, as shown in my dream above: a memory storage system is not designed for this task, although it may be designed to produce "best fit" solutions for single, independent inputs.

I conclude that for animal brains the non-orthogonality (i.e. non-independence) of memories is actually helpful for the efficiency of the overall memory, although the opposite is true for the Hopfield net. Unlearning is thus a useful algorithm for the Hopfield net, but would not be so for animal brains. On the basis of this data Crick and Mitchison are therefore wrong to base a theory of animal dreaming upon the Hopfield net analogy. In contrast, Palombo and Clark et al state that REM sleep in humans and animals has the function of assisting memory, by discovering and depicting correlations between memories, which leads to enhanced intelligence. The unlearning algorithm is useful for the efficient recall of orthogonal memories in one type of storage system, and for the priming of newly-formed reverberatory nets, but it has no counterpart in the intelligent mammalian brain, except possibly for the priming during REMS or NREMS of previously unused sets of neurones, ready for the next day's learning. This off-hand suggestion by Crick and Mitchison (1983) puts less emphasis on the functional evocation of bizarre images during REMS than does the main part of their theory. The possibility that bizarreness is an epiphenomenon of such a neural preparation would be immune to all the objections made here against the unlearning theory. Note that if such a preparatory function were true for REMS this would fit in with the decrease of REMS time with age (see chp. 1) only if it were also true that there were fewer and

fewer neurones available for new learning. Conversely, if the brain has ample neurones for the experiences of a lifetime (which is much more likely), or if previously used ones are recycled, then we would expect the amount of such preparation to stay more constant with age, as is found with NREMS time. This shows that it is possible to derive more than one theory of dreams, and more than one set of experimental predictions, from the single paradigm of neural networks. They both meet in the suggestion by Hughlings Jackson (1835-1911) that sleep fulfils the dual function of sweeping away unnecessary memories from the previous day and of consolidating or maintaining more necessary ones.

Empirical Evidence of Relevance to the Unlearning Theory

Crick and Mitchison (1983) claim that parasitic traces are the cause of recurrent dreams and obsessions, with the possibility also of causing the false associations which press upon the minds of some schizophrenics. Brown and Donderi (1986) have, in fact, reported that recurrent dreamers have a lower self-reported well-being than non-recurrent dreamers and past-recurrent dreamers, which fits in with the unlearning theory. However, much work shows that there is probably very little in common, aetiologically, between dreaming and schizophrenia (Vogel, 1968; Vogel, Barrowclough & Giesler, 1972). In favour of the unlearning theory is the result of Benson and Zarcone (1982), who found more middle-ear activity during REM sleep in schizophrenics than in normals or schizoaffective patients. Middle ear activity is a phasic event, occurring with PGO activity in dreaming subjects. However, this paper does not show any intrusions of such

phasic events into NREMS or into waking life. Similarly, Benson and Zarlone (1985) found no difference between schizophrenics and controls with regard to REM intrusion from REMS into NREMS. In favour of the theory, however, is the result of Greenberg, Pearlman, Fingar, Kantrowitz & Kawliche (1970), in which dream deprived subjects showed an increase in specific impulses or feelings as measured by a Rorschach test. However, only four subjects were used, and 'changes in ... form, movement, colour and regression yielded no consistent results.' (ibid.)

A serious problem for the Hopfield model is how the system would treat the mixed memories that result from tasks such as the spreading activation memory experiments of Grossman and Eagle (1970). It must be asked whether the unlearning mechanism would treat such false memories as parasitic. If it were to do so then the system's intelligent activity would be adversely affected, for although these experiments on spreading activation and inattention lead to errors in the lab, the system of interconnections between traces and different degrees of encoding lies at the heart of our ability to think and predict future stimuli. Collins and Quillan (1972) state that 'the locating of paths between concepts...is basic to both comprehension and recall', which implies that if one trace is activated it tends to call up a few others - they are thus correlated, unlike the memories in a Hopfield net. In the same volume Postman (1972) states 'Organizational processes were seen as critica ...because of the limited capacity of the memory system.' He notes how cuing can counteract retroactive interference, which is one of the few examples of traces being confused with each other.

At the centre of the unlearning theory is the concept of 'parasitic' information being held in the brain alongside valid elements of knowledge. Using the analogy of an associative network the latter elements correspond to data given to the memory by the programmer, the former to spurious memories which crop up on recall, often composed of a mixture of the valid memories.

The output in the computer model has its human counterpart in, say, a verbal statement, but recall effects are not part of the model. For example, slips of the tongue are not the result of mixed representations at the level of storage (Motley, 1985), and cognitive set contributes to human memory interference problems.

The interference of traces with each other was introduced as an alternative to trace decay theory to explain Ebbinghaus' (1885, 'Memory') result that more trials are needed to relearn a list of nonsense syllables after longer retention intervals. It suggests that forgetting occurs because the trace is either masked or obliterated by other traces of events, as opposed to just decreasing as a function of time. It is difficult to test the strong version of the theory, that without interference no forgetting occurs, irrespective of the time elapsed, because it is difficult to find a situation in which intervening activity can be avoided and also because any means of inhibiting activity is also likely to have other side-effects.

The similarity between Associative Interference Theory and the Network ideas which form the basis of the associative network paradigm is that the former has the following two assumptions:

- 1) that the essence of learning is the association of stimuli and responses, and

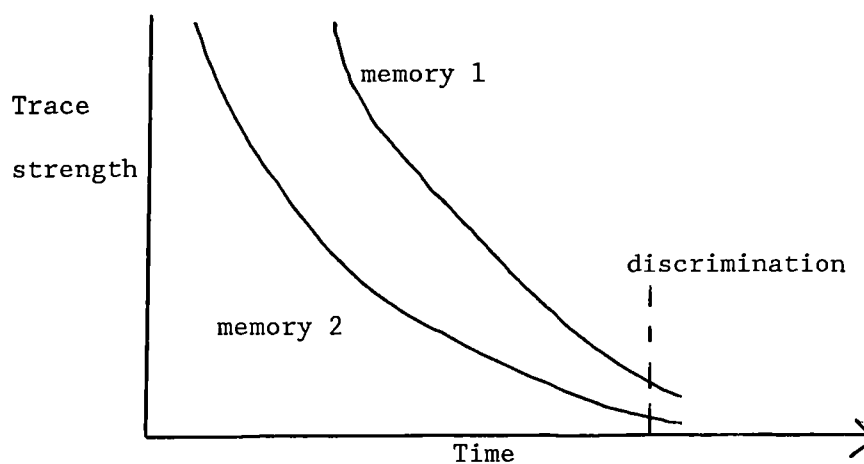
- 2) that the phenomenon of transfer of past training is basic

to the processes of learning and forgetting (that is, that past learning affects present learning).

Webb (1917) attributed RI (retroactive interference) to the active disruption of the previously learned list A-B by the new list A-C, and stated that when the A-B list was relearned there was a tendency for the stimulus A to reinstate the competing response C. But McGeoch (1932 & 1936) attempted to explain all forgetting as response competition, in which A-B does not then weaken A-C, but simply competes, and when A-C is stronger the C response is made rather than B. Note that with the Hopfield model of learning there is, on the contrary, direct interference between traces at the level of storage. Similarly, Underwood (1948 a&b) assumed that in addition to response competition there was also the unlearning of A-B associations during A-C learning.

However, when natural language was studied differences were found from those predicted in the lab (Keppel, 1968). This shows us the gap between the artificial conditions from which the principles of interference theory were derived and forgetting in everyday life. According to Baddeley (1976, p.93), 'Interference theory has difficulty demonstrating its relevance outside the rigid confines of the verbal-learning laboratory and faces increasing competition from more cognitive views of memory.' (Just as the Hopfield/Crick and Mitchison model is in competition with cognitive and linguistic views of obsessions and dreams.) He proceeds to explain the major phenomena of forgetting by a simple trace theory, in which a search process must locate the trace followed by a process of discrimination between traces/signals. RI effects can usually be avoided by cuing the subject

with the names of categories comprising the list to be recalled, when the experiment is of free-recall. This indicates that the locating of an item is the difficulty, for the item is as efficiently stored as when it was first memorised, while it is the inter-memory links that were made at that time which determine the efficiency of recall later on. This suggests that work linking dreaming to memory should concentrate on the assumption that the dream is providing new connections between memories, rather than somehow strengthening each memory independently. In paired associate learning the interference seems to occur at the levels of both trace discrimination and trace location, which suggests the idea of selective attention. Here a signal remains discernible even if the interfering signal is much stronger, as with the 'cocktail-party effect', whereas with the Hopfield model the stronger memory had an overwhelmingly distorting effect on the whole net. Baddeley (ibid. p.97) gives this graphical interpretation of interference:



Recall thus depends upon the relative strengths of traces. Note that interference is not occurring at storage, the traces are

physically independent and hence do not need the "separation of memories" that Hopfield's experiment demonstrates is useful in his artificial system. The incredible accuracy and persistence of human memory traces is shown in Sacks' (1985, chs.15, 16 & 17), Penfield and Perot (1963) and Luria (1968). The final result of all the work on human interference is that the effects are more to do with the subject's conceptual strategies than with storage interference, and it is conceptual strategies that are missing from the work of Hopfield, Feinstein & Palmer (1983). It is a change of set that results in a change in the proposed signal detection and hence an alteration in the manifest interference. With regard to this, I cite Lindsay and Norman (1977, pp.351-354), who report an experiment in which a piece of prose was given two titles, one concerning a celebration about achievement in space, the other about a day in the park. One sentence in the whole piece was comprehensible only with the former title and subjects given that title were significantly more likely to recall that sentence along with recall of the rest of the prose, than were the subjects with the other title. The Hopfield net has neither this intelligent recall activity nor a forgetting function - maybe these could eradicate parasitic traces rather than the net having to unlearn them. I conclude that interference problems in humans are at a higher level than the physical storage, and also that problems of thought such as obsessions and psychoses are also at a higher level of cognition than the semantic memory traces used as subject matter. Further evidence on the mixing of autobiographical memories at recall is given by Williams (1976). As Hopfield et al (1983) conclude, though, unlearning may be applicable to associative nets even if it is irrelevant to animals.

Crick and Mitchison claim that PGO stimulation brings to

mind the mixed memories. The PGO stimulation, however, which correlates with the eye movements, is found to correlate with the activity and vividness of the dream (see chapter 2), not with dream bizarreness. Under the unlearning theory an increase in PGO stimulation would be expected to correlate with an increase in bizarreness, with more parasitic traces being accessed and unlearned. The work on relating discontinuities, vividness and bizarreness to PGO bursts does not accord with the unlearning theory. Even when Foulkes and Pope (1973) contrasted 38 reports of REM bursts greater than 4 seconds with REM bursts of 3 seconds or less there was still no difference in bizarreness. Watson (1972) did find a significant difference between REM burst (and also PIP with no REM) and no REM/no PIP mentation with regard to bizarreness. Similarly, Rechtschaffen, Watson, Wincor, Molinari & Barta (1972) also reported an increase in bizarreness during phasic events. However, Cohen (1979, p.193) reports Watson saying that subsequent research has not been as clear-cut. Foulkes, Shepherd, Larson, Belvedere & Frost (1972) showed that preadolescent Ss could discriminate REM-phasic from REM-tonic arousals in terms of visual activities ascribed to subject as a dream character but not in terms of overall presence of visual imagery or a PVE/SCE distinction. The unlearning theory would allow visual experience and cognitive mentation during a phasic event, as long as it tended to be bizarre, but the theory has great difficulty explaining the lack of increased bizarreness and discontinuities which are found, in most studies, during phasic events.

The unlearning hypothesis must explain the dreaming that occurs between PGO bursts, for the often suggested rationalisation

that occurs in this period seems to work against the postulated unlearning that would have just taken place. Crick and Mitchison might claim that these breaks are instances of the brain being inefficient. The paradox is that if unlearning occurs all through the dream it will affect the valid associations present (which some say are more in evidence during the tonic periods), and if it is not then a connection just unlearned will be subject to rationalisations, to incorporation, which works to reinstate the connection in memory.

Molinari and Foulkes (1969) stated that the PVEs do not have to be eruptions from the unconscious, merely a more active part of the dream. Holmes' results indicate that the former is true. Yet in neither case is bizarreness the distinguishing feature. The results of Bowker and Morrison (1977) suggests that the PGO bursts are an orienting response during REM sleep, much like those during waking life, although of greater frequency. This makes the bursts much less important than Crick and Mitchison suppose and opposes any idea that they are a causal agent in dream production. If it can be assumed that PGO bursts can *result* from dream images of a particularly vivid or surprising kind, which is the opposite of Crick and Mitchison's proposal, an explanation for the result of Foulkes and Pope (1973) is produced. They found that dream vividness tested by a questionnaire did not correlate with physiological phasic events, but that scenes mentioned spontaneously as of great vividness did so correlate.

Work cited in chapter 6 showed that those people who have greater REM sleep are more creative and artistic. However, this fact cannot be used to judge the truth of the unlearning theory (that dreams are bizarre in order to reduce fantasy in waking life) because if the opposite correlation had been found, that daytime creativity is

associated with mundane REM dreams, Crick and Mitchison could reply that individuals are creative due to lack of fantasy unlearning at night! The theory is hence unfalsifiable at this point. Similarly, Holmes (1976) found that 'divergers' [creative thinkers] spent more time in REM sleep but had a lower density of REMs than did convergers [scientific, narrow thinkers]. Convergers had a longer first period of REM sleep than did divergers, and had a shorter REM sleep latency. Unfortunately these results can be read either way for the unlearning theory: convergers could be said to be so logical because of the large amounts of unlearning they obtain each night, while on the other hand it can be argued that the convergers do not need as much unlearning as those more artistically inclined. The result of Cartwright and Monroe (1968) (in which waking fantasy substitutes for REM sleep) is the opposite of what the unlearning theory would predict, Crick and Mitchison would have it that more compensation (i.e. greater REM rebound) would follow a time of greater fantasy, and that fantasy without PGO stimulation and the accompanying unlearning function could never substitute for dream sleep, which, they claim, has the function of unlearning.

The Meaningfulness of Human Dreams

A major empirical difference between top-down (Freudian, structuralist, Palombo's, Evans', Rycroft's) and bottom-up (Clark et al, Crick and Mitchison's) theories of dreaming occurs in the attribution of meaning to dreams. Trivially, it is possible to claim that any realistic images that a human produces may be made meaningful, but the question here is whether some meaning is intrinsic

to the images, and to the way they are put together, whether or not they are later interpreted. Evidence of relevance to this is seen in Verdone (1965) and Foulkes (1966). They found that dreams from later in the night, and later in each dream, referred to episodes earlier in the dreamer's life. Clearly, some explanation must be found for this pattern, which indicates that the dreams of the night have some sort of progression in what they refer to, or mean.

In an effort to control for subjects' experiences prior to dreaming Cartwright (1986) studied divorcees and related the different types of dream seen to the emotional and healing state of the dreamer. She found that dream sequences show problem-solving progress when waking dysphoric affect is moderate, and poor quality dream-work when affect levels were too high. The problem-solving dreams were characterised by longer reports, a wider time perspective (i.e. not just concentrating on the past), including the self in its marital role (rather than ignoring that role), other people being present in the dream, and by the needs of self-esteem and control being more frequent in accounting for dream behaviour. However, some of these results would be predicted by a passive theory of dreaming, which would state that dreams are only meaningful in that they randomly play-back images from a meaningful waking life. Her findings of the temporal settings of dreams would then just reflect the temporal concerns of the waking subject, that a married subject will think about the present, a depressed divorcee about the past, and a non-depressed divorcee about past, present and future. Similarly, the fact that she found that 74% of the depressed divorcees had at least one dream in which no other character appeared may be a reflection of

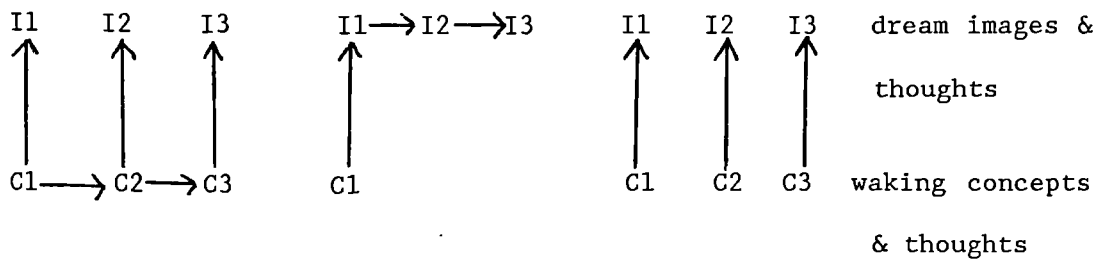
their actual waking lives, rather than of any psychopathology itself, or of any active thinking during dreams. Better evidence that dreams are not just a passive reflection and recall of waking life and fantasies, and that dreaming is definitely an active response to waking life is shown by the physiological work of Cartwright (1983). She found that EM density was positively correlated ($p=0.39$) with depression scores of divorcees, and that REM latency decreased with depression scores. It was also found that the effect of divorce on REM sleep was most severe and long-lasting 'in those for whom the life event would be expected to induce the most affective upheaval and whose traits required greater cognitive reorganisation' (1986, p.418[288]), that is, in those women who scored higher on the scale of Traditional/Liberated regarding female roles. A similar connection between REMS and problem solving was found by Greenberg and Perlman (1975). They found an increase in REMS time in the night following a challenging psychoanalytic session.

We must take care in the interpretation of this correlational data, though, for no evidence of direct causality between life events and the functional change of dream images is provided by these results.

- Relation 1) Change in environment causes depression
- Relation 2) Depression correlates with traditionality score
- Relation 3) Depression correlates with change in dream content
- Relation 4) Depression correlates with change in dream sleep physiology
- Relation 5) Change in dream sleep physiology correlates with change in dream content

Now, relation 5 is not one of causation, because REMS parameters only affect dream activity, not content (see chapter 2), and so we must find a third variable to cause them both, which is the waking experience of depression. It therefore remains possible to interpret these experiments as it being the neurophysiology of the depressed state that alters the REMS parameters (see chapter 4), and that dream content is still a mere passive reflection of waking experience. Relation 4 would then be one of direct causality, and relation 3 would be caused by a third variable, by waking life experienced in a depressed way. It is therefore necessary, in order to prove active thought is occurring during dreams, to show that some of the events occurring in dreams are not taken or translated from waking life, or that they use a different mode of thinking than waking life usually does.

The alternatives for the causes of the changes in dream images are thus (with an arrow indicating the link between cause and effect):



dream thoughts	one image	Freud's account,
passively reflecting	causes the	that of the rebus
waking thoughts	next	

A fourth possibility is that Waking Concept 1 causes the first image, and that subsequent images are the result of bad and loose thinking. This is a popular account of dreaming, and its possibility of being true tells against Hall's (1966, p.88) dogmatic fourth rule of dream interpretation, that the dream be taken as a whole rather than meaning being ascribed to each part. That images may appear for no sensible reason argues against his over-strong contention that 'nothing appears in a dream which the dreamer does not put there himself' (ibid. p.87). Such a contention also means that dreaming would then be the only method of communication known that was not subject to 'noise'. (See Campbell, 1984, for an introduction to this aspect of communication theory.)

Evidence for the active vertical (i.e. waking concept to sleeping image) transformational nature of dreams comes from Silberer (1951), Antrobus (1978), and Luria (in Eysenck, 1986, pp.130-131) who managed to show the logical transformation of waking conceptual stimuli into dream images. Haskell (1986b) proposes that abstract feature analysis is used in this metaphoric, symbolic thought. He holds that it is probably hard-wired into the brain and is similar to the mathematical function of transformation of invariance. Any one abstract meaning may thus be represented in many ways in a dream, and he links this to the concept of overdetermination. Whilst having regard for Timpanaro's (1976) warnings about the validity of arguing for a causal sequence of waking psychic thoughts to dream image (or verbal slip) from the data of a seemingly meaningful image, I contend that here we are on steadier ground than Freud was. Silberer's transformations are simple and do not rely on notions of the

unconscious. Similarly, Cartwright (1986) finds meanings in successive dreams which seem to have sufficient cause in known conscious thoughts (though obviously the mechanism of transformation is unconscious). For example, a dream of a violent cat trying to get out of a woman's arms was likened to her husband; this I consider shows a passive characteristic of dreams, viz. their ability to transform waking thoughts.

A purpose for such concretization of thought is provided by Atwood and Stolorow (1984, p.103, noted by D.P.Juda): 'When configurations of experience of self and other find symbolisation in concrete perceptual images and are thereby articulated with hallucinatory vividness, the dreamer's feeling of conviction about the validity and reality of these configurations receives a powerful reinforcement. Perceiving, after all, is believing.'

The mere transformation and translation of waking concepts, however, does not indicate the presence of active horizontal (i.e. image to image) thinking in the narrative. As an analogy, an event may be written about, and hence transformed into the printed page, and yet the only thinking performed is in this transformation, not on the page. We may contrast this to typing a problem into a computer, which usually results in more than a restatement of the physical facts in another language. Hall is thus begging the question when he claims that 'we study dreams in order to find out what people are thinking about during sleep' (1966, p.10) when the thesis of his book is simply that the 'images of dreams' may be 'pictures of our conceptions'. On his scheme it remains possible that the thinking occurs during waking life, and that the dream is just a rebus of these

thoughts.

The active meaningfulness of dreams (as against passive translation of waking life and thoughts) is indicated by Schatzman's (1986) finding that successful problem-solving dreams often end with a spontaneous awakening, which he takes to mean that the dream's work is finished and ready for viewing. However, I consider it possible that the waking may occur simply because the dream has alluded to a part of the dreamer's conscious waking life, possibly by chance, which raises questions for the sleeping mind about where the problem has come from. Work on the difficulty of maintaining lucid dreaming has suggested that such consciousness of one's mental state may be antithetical to the continuance of the dream state, except for a very few people, and so the subject wakes up. I therefore do not think that Schatzman's finding is conclusive with regard to the presence of creative horizontal thought in dreams.

An argument for active thinking during dreams is provided by Hall's observation (1966, p.28) that our dreams do not reflect a random sample of waking events; instead they select themes. For example, 'conveyance and recreational settings have a higher incidence in dreams than they do in waking life' (ibid.), and current affairs and work are rarely mentioned. Our dream activities are rarely the routine chores of life. Despite this, however, he proceeds without proof to beg the question about the meaningfulness of dreams by writing about 'one pretty reliable rule to follow, if the dream does not make sense taken at its face value one should look for a symbol which when appropriately translated will make the dream sensible' (ibid. p.98). But even irrational or accidental actions in waking life

can be rationalised in this way, and made to appear motivated. As already noted, however, Antrobus, Silberer and Luria's experiments do show that such a translation is justified, at least sometimes.

Evidence for dreams as important in themselves (as opposed to an epiphenomenon of physiological REM sleep) comes from Fiss, Ellman & Klein (1969). They showed that the need to complete an interrupted dream by mentation in waking life was quite independent of any need to have REMS itself. They showed that dreams must be completed, and not just substituted for by more REM time. Being prevented from finishing a dream was found to be more disruptive, as measured by projected anger and frustration, than if the subject was not allowed to dream at all. (However, I note that the same may be said for the physiologically necessary activities of eating and urination!)

Crick and Mitchison and the Meaningfulness of Dreams

An essential part of the unlearning hypothesis of dreams is that 'parasitic' memory traces are activated by random stimulation of the cortex. This stimulation is random in the sense of containing no information, the actual PGO bursts do not occur at random, being under the control of the cortex (Gadea-Ciria, 1976 & 1977). The unlearning theory proposes that the imagery during REM sleep is composed of 'parasitic' bizarre memory traces which may or may not be related to other traces evoked in the same dream; Crick and Mitchison leave it undecided whether the whole of the memory is stimulated at any one time or just parts thereof. According to the theory a complete dream

can hence only tell us anything original about the real world if it stimulates us, when awake, to evoke non-parasitic associations to the dream elements.

On the face of it the theory thus predicts that a dream as a whole piece of "work" will not have a meaning, and denies that some meaningful part of the dream (such as a problem or wish) could have been the stimulus for the rest of the piece. The whole dream is thus more like gurglings in the stomach (or, at most, like a disconnected revue) than a symphony; although individual sounds and associations can be found in both gurglings and symphonies only in the latter case are they exerting any formative influence to the other parts.

However, it is conceivable that a dream theory for humans based on language and thought, a theory stressing the insightfulness of dreams, could be consistent with the unlearning model if there is a tonic phase of ratiocination following each phasic PGO jolt. However, this ratiocination would be a top-down process, and to postulate it would go against the simplicity of the bottom-up approach of Crick and Mitchison. Such a ratiocination can be pictured as a random pulling out of stored files in order to break false links followed by the subject debating about why certain files have been taken out and where to return them to. Yet some of these dream images appear so overdetermined, as with Lake Konstanz in my dream mentioned earlier in this chapter, that the subject may be incredulous at the claim that the initial product was not only random but also maladaptive. However, note Hunt's, 1982, point that "information" obtained from the I-Ching and Tarot cards also appears overdetermined in many circumstances. Obviously Tarot cards do not fall into their order of play because of any meaning ascribed to them, but once they are played

'sense' can be made of their order.

I conclude that the unlearning theory can allow for short periods of narrative during dreams, in addition to the narratives needed for the definition of items in the dream as already discussed. It remains an empirical matter as to how long these narratives in dreams actually are, but we must now consider what is involved in the formation of dream narratives.

The Production of a Meaningful Narrative

The movements of a symphony may use different instruments and a different tempo, so much so that the novice does not appreciate them as coming from the same work. As each movement progresses though, there are intrusions from the initial theme of the work, some go unrecognised, some are played with different instruments, and all through there are references to other parts of the work. The initial theme is played with, distorted, repeated, dissected and combined with other themes until the final crescendo. Such a piece can be produced in two ways, corresponding to two types of dream theory:

1) The piece is written in its entirety before presentation to the audience, so the work that has gone into it may be considerably longer than the time it takes to play or be shown. D C.Dennett (1979) postulates that a dream experience on waking is due to the sudden playing of a pre-recorded dream 'cassette' in one go, it may even be played backwards from how it was originally written. Similarly, the Freudian position can allow for the primary processes to be working on the material while we are awake, with a final polishing-off and then a

presentation during sleep.

2) The piece is improvised before the audience, resulting in admiration from them at the skill and memory of the artist(s); the thinking behind the piece is simultaneous with its transmission, and a part can be repeated or harked back to, and used as a new stimulus. This corresponds in dream theories to problem-solving and computer models.

Such a harking back to earlier parts of the dream shows that the narrative is not composed of individual random selections from our memory. So, is the unlearning theory proposing that traces are chosen not quite at random, that parasitic traces with something in common are activated together? Now, surely our dreams are not composed of a collection of successive random images alone, for example, with my Konstanz dream (above), I did not see a succession of separate though semantically related scenes:

lake-coal coal-barge lake-submarine submarine-enter

inside-drowning downstairs-stuck downstairs-bookcase

not only were the scenes on the whole continuous but some actions necessitated knowledge of what had occurred previously in the dream (and sometimes in my life). For example, when I was inside the submarine I remembered that it was in a lake, after looking at the bookshelf I still searched for an exit, and once on shore I remembered how dangerous it had been and instructed children not to approach the submarine. This is more like the stream of mental processes present in waking life than separate images which are forced to fit with each

other to provide a confabulated meaning for the whole.

The stream of mental processes of waking life is partly generated by external stimuli, with thought providing connections as well as additional stimuli. In dreams the cortex is self-stimulating, one image providing the stimulus for the next in some instances of decision-making and recall of each scene, while in other instances an image just seems to appear. This sudden appearance may be explained by the new idea of PGO stimulation or by the older idea of unconscious mental processes, either way some images lay the ground for others leading us to conclude with one of the following options:

1) Some amount of thought produces some, or all, of the subsequent images,

2) Images are produced independently of each other, the brain ties together the result into a coherent plot and adds cause and effect between images.

The second option does not fit with the actual dream experience. This option claims much more than the idea of secondary elaboration does over the aspect of the independence of each image. The theory of secondary elaboration is similar but acceptable in that its workings are manifested in waking life after the dream is recalled and is thus susceptible to experimental manipulation. It claims that links may be incorporated into a dream such that once one wakes up the link appears to have occurred before the image it links did: de Saint-Denys called this method of incorporation the 'retrospective illusion' (1982, p.117) and it has recently been supported by Seligman and Yellen (1987). Winson (1985) suggests that we may register sensations at different times but consciously have an illusion of simultaneity.

This can be partly countered with the evidence of lucid dreams, which are the most extreme example of images being produced by thought, as opposed to narrative being an overlay for the images (see Green, 1968).

Now, the first option above is acceptable to the unlearning theory in that the first image produced may be a parasitic one and yet the succeeding ones can be non-parasitic. But surely this will reduce the efficiency of the proposed mechanism because non-parasitic traces will now be damped down. (Unless the unlearning mechanism is only held to be working when PGO stimulation appears, and then the mentation returns to normal learning until the next PGO burst, which leaves the theory with the problem of what happens to bizarre traces produced when PGO stimulation is not occurring.) I believe therefore that while the putative mechanism of PGO bursts and unlearning could allow for a self-stimulating cortex (as in 1 above) the mechanism would have to be backed up by a block on the brain making sense of the images, a block on the searching-for-meaning activity of the brain, which would otherwise lead to the subsequent adaptive traces being unlearned. If it has to be assumed that unlearning only takes place during a PGO burst, not during the tonic interval between them, we then have a similarity with the work of Molinari and Foulkes (1969).

Although this addition could square the unlearning theory with the symphonic, rational and narrative properties of dreams I have already mentioned in chapter 2 the doubts about there being any differences in the content of dream mentation at times of PGO stimulation and PGO quiescence. Furthermore, not only has an unproved unlearning mechanism been postulated, it also seems necessary to

restrict its activity to the time of PGO events; thus unlearning would have to be a sudden phenomenon, quickly turned on and off, in order to avoid the unlearning of non-bizarre parts of the dream. It would be easier for the brain's narrative and searching-for-meaning activity to be believed to be switched off for the whole REM period (just as muscle tone is) - but empirically that is not found. Our ability to be curious and to puzzle during dreams is claimed by C.Green, *ibid.*, to be a major precipitating factor for lucid dreaming. An objection to this point is to deny that the narrative ability of the brain can ever be switched off, but there are such times as I shall now describe.

While drowsy, at sleep onset or just after waking, a succession of images can be seen at play (for a description of which see Foulkes & Vogel, 1965, and Tart, 1969, section 2). The scenes are very simple, usually having just one object or word which suffers continual transformations - it is harder to remember the preceding images than with REM images of a similar duration. This state of mind, composed of no extensive narrative, and simple images combining, is closer to the predictions of the unlearning model than is the state of mind at stage REM. For example, Cicogna, Cavallero & Bosinelli (1986) note that the sleep-onset state, and daydreaming, refer to waking memories much more than do REM dreams.

To sum up, we have seen that the idea of 'random stimulation' is at the heart of the reverse learning model. 'The normal inputs and outputs are then disconnected and the net is given a random input. When the net has given a response, the synapses between inputs and outputs are then adjusted to reduce this association slightly.' (Crick and Mitchison, 1986). However, humans and other

animals are not simply stimulus driven. Although an input may be random, such as white noise, it does not follow that outputs will be random for complex, intelligent creatures. Obviously, a neural net is stimulus driven, and we expect a random or nonsensical output to answer a random or nonsensical input; but a mammal or bird has such a complex neural apparatus in between sense and motor organs that there is still intelligent activity in the brain even when it is sensorily deprived or randomly stimulated.

It appears that the PGO bursts are not stimulating any content of the brain, but instead allow such content to be vividly imaged. The active nature of such a process indicates that the dream images are themselves the purpose of REMS and PGO bursts, and that the images are therefore meaningful. But on this evidence we can only assert that it is pieces of dreams that are meaningful. On the evidence just reviewed we cannot say anything more than that dreams contain insightful, but separate, scenes, which are connected at most via the subject's underlying concerns. There is only a little evidence that any progression is involved in the content of one scene to the next, or one dream to the next, except inasmuch as one scene provides the starting material for the next one.

Alternative Accounts of Narrative

Seligman and Yellen (1987) claim that narrative is used to tie together separately produced dream images in order to impose a meaningful pattern upon them. As an example they cite an experiment by Barnard Karmel, in which randomly flashing lights were shown to a group of people. After a while some popular music was played and the

lights started to appear to be flashing in time to the music. The experimenter concluded that such a misperception was due to the active searching for meaning and sense which the brain was imposing upon the incoming stimuli.

Their account of the subject actively restructuring an experience is similar to Freud's statement that: 'There can be no doubt that the censoring agency, whose influence we have so far only recognised in limitation, and omissions in the dream-content, is also responsible for interpolations and additions in it.' (1953, p.489)

Freud called them 'connecting thoughts', and Seligman and Yellen also distinguish between the vivid parts of a dream and these more cerebral additions. Such an embellishment is acceptable to the dream theories of Palombo, Clark, Crick and Mitchison, structuralism, Freud and Rycroft, that we are studying. In the case of the structuralist account of dreams there is the lesson from anthropology that myths are still analysable despite minor changes and interpolations - Levi-Strauss states that this robustness makes myths very different from poems. Only Crick and Mitchison's theory demands any retrospective patching up of the dream, the others can have this patching up occurring at the same time as the images are produced, much as the constraint of finding a rhyming word will be relevant to a poet as he or she evokes the next word in a poem. Such a constraint would act much like that of Freud's 'representability' simultaneously with the other creative abilities in dream formation.

It is found that subjects woken up quickly from sleep have more bizarre dreams than those who are woken up slowly; subjects restructure the whole dream to make it accord better with common

sense. However, such a finding of the effects of return to consciousness tell us nothing about any editing which may have been occurring while the subject was completely asleep, although it does leave the possibility that whenever one wakes, and whatever the abruptness of waking, some embellishment does occur.

It is necessary to ask when exactly this interpolative activity is supposed to take place, if it is supposed to occur during sleep. With the Karmel demonstration the events to be connected occur contemporaneously, but with dreams the events are consecutive, often following each other quite smoothly. Freud states that secondary revision: 'fills in the gaps in the dream-structure with shreds and patches. As a result of its efforts, the dream loses its appearance of absurdity and disconnectedness ...' (ibid. p.490.) Such revised dreams 'appear to have a meaning, but that meaning is as far removed as possible from their true significance'. (ibid.)

We are still left with no proof that connecting thoughts are added to some putative inchoate dream, which is somehow more basic than these added links. Seligman and Yellen (ibid.) claim that the difference in vividness between connecting thoughts and 'Primary Visual Experiences' indicate that the later are somehow more original, that they are the earlier parts of the final product, but do not disprove the possibility, expanded upon in chapter 2, that all parts of the dream are as basic as each other, that some are made more vivid by their coincidence with PGO bursts, and that the only proof of active creative changes in a dream script occurs upon slow waking, that is, with the intrusion of consciousness into the actual remembrance of the dream.

If it is true that some revision can occur, even in the sleeping subject, there is still the interrelationship of various images to study empirically and to explain. If much of that interrelationship is explained by the revision, then that very mental process must be studied. We can still study whether the later images in a dream bear any relationship to the earlier images, even if that relationship is warped or hidden somewhat by the postulated revision process, and we can indeed further study whether parts of dreams are related to parts of other dreams from the same night. As a preparation for doing this I will summarise the predictions that the different theories are making.

Phenomenological Predictions

The different theories predict different relationships between the images:

Progression towards realistic resolution of ostensive waking concerns; Evans' computer theory.

Progression towards resolution of metaphorical translations of waking concerns; Rycroft, Kuper and Stone.

Presence of oppositions with their progressive permutation in arriving at this solution; Kuper and Stone.

Comparison of waking concerns to past events, possibly with a search for resolutions; Palombo.

No prediction about the presence of any progression from one dream image to the next; Freud.

Denial that any progressive mentation is present in dreams, although short narratives may be needed for the definition of the contents of images; Crick and Mitchison; Clark, Rafelski & Winston.

The theories also make different predictions about the presence of condensation in dreams:

No condensation predicted, the dream world should be as sensible as the waking world, although new adaptive programs may be being explored; Evans.

Condensation expected, and predicted to often be enlightening for the dreamer. Condensations will be between recent and distant memories; Palombo.

Condensation expected, sometimes enlightening for the dreamer, with recent/recent, distant/recent, and distant/distant memory combinations; Freud; Rycroft; Clark, Rafelski & Winston.

Condensation expected, especially at the resolution or attempted resolution of relevant oppositions; Kuper and Stone.

Bizarre, confusing, unenlightening condensations predicted; Crick and Mitchison.

Bearing these predictions in mind, we will now proceed to the study of some recorded dreams.

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THE NARRATIVE OF DREAM REPORTS

PART 2

A Thesis submitted for the degree of Doctor of Philosophy

by

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March 1989

CHAPTER 14

THE NARRATIVES OF THE DREAMS OF FOUR NIGHTS

The first part of this thesis has shown the central place that narrative holds in the experience of dreaming. That it is more common than either bizarreness or condensation means that it is usually overlooked as one of the formal attributes of dreams, or, as in Crick and Mitchison (1986), that little attempt is made to explain it once it is acknowledged. This attribute may enable us to discover the function of dreaming. Maybe it is a particularly human ability to weave the images together, maybe it is a result of our ability to speak; but whether or not narrative is present in the REM sleep activity of animals it tells us that, at least for humans, low level accounts of dreaming such as the unlearning hypothesis or brain-relaxation or the eye-muscle activation theory must explain the amount of narrative that is empirically found.

I wish to take up a suggestion of Foulkes in the following chapters, in an attempt to empirically test the predictions made by the different theories delineated in the last chapter.

Foulkes (1982a) bids dream workers to concentrate on the form of the dream and not its content. This he thinks will enable us to discover the process by which a dream is put together, and should be attempted before we aim to understand or predict the content of dreams. An example of this method was the work of Foulkes and others on REM-Active and REM-Quiescent imagery, which aimed to discover if there was more active imagery when PGO stimulation was occurring (see Molinari & Foulkes, 1969; Pivik & Foulkes, 1973; and chapter 2). Haskell (1986b) also suggests that the logical structure of dreams is

more easily and more exactly manipulatable than is their content; with respect to this he cites the work of Antrobus (1978) on the transformation of incorporated conditioned visual stimuli. This work involved conditioning the subjects to associate certain visual stimuli with certain tones. When the tones were played to subjects when asleep some aspects of the relevant visual stimuli were incorporated into the dreams, but transformations had occurred. For example, a man cutting the bark off a tree with a knife was transformed into the image of cutting a pie with a kitchen knife (ibid. p.576).

NIGHT 1: DREAMS AND ANALYSIS

The following dreams were recorded at a sleep lab in Chicago in 1973 as part of a project on changing levels of anxiety during the day and anxiety levels in dreams. There were four subjects in the study, chosen because of their exceptional recall ability. They were inducted by Professor Cartwright, had their REM dreams recorded by lab technicians, and knew the study was about daytime anxiety and dream anxiety. The subjects had to rate their anxiety on Trait/State scales at various times during the day, were asked about the content of their concerns in pre-sleep interviews, and had to rate their dreams for anxiety. The setting was that subjects would sleep in one bedroom while one technician monitored their sleep. The standard protocol for measuring sleep and REMs was used: 'Right/left EOG, central EEG referred to the opposite ear, and chin EMG. The lab protocol was to wait five minutes into the first REM before an awakening was made, ten minutes into the second REM, 15 into the third, 20 into the fourth and any subsequent REM.' (Cartwright, 1988.)

KJ's eye movements were monitored by the EOG, which can differentiate waking, sleep onset, non-REM sleep and REM sleep from each other (and even help distinguish stage 4 sleep from stage 2 in that there is a small pick-up of the slow wave sleep waves by the EOG electrodes near the eyes). Dr. Cartwright (1988) writes also that KJ was woken specifically within bursts of REMs; this taken with the set questions he was asked about the presence and reality of images show that in all cases here he was woken during REM periods of a specified duration. The EEG was used to differentiate waking from each sleep stage and from stage REM, which has a distinct waveform somewhat like wakefulness but with no alpha-waves and the presence of saw-tooth waves. The EMG registered a small drop in neck muscle tone when the subject fell asleep, and a complete loss of tone when the subject entered REM sleep.

KJ slept well on all the nights. This was remarked to him after the first night by the technician 'You really fell asleep very fast ... and you did have lots of dreams'. KJ had four REM periods on the first night, which is average, 6 on the second, 4 on the third, and 5 on the fourth, and so the indications are that he slept well and normally on those nights, especially as the REM periods were long and did not result in spontaneous awakenings on KJ's part, which does happen with worried subjects. His good first recall night indicates that he had spent the traditional one adaptation night in the lab beforehand; no mention is made in the protocols of such a night, which is the usual procedure. The presence of so much lab related imagery for the first night's recalls does accord with the lack of mention of any previous experimental (i.e. awakening) nights spent in any lab.

When woken he was asked the standard 'What was running through your mind just at the moment I called?' After the report he was asked about the emotional tone of the dream, and what distortions were present. Subjects would give associations to the material in the morning, as well as state if any memories appeared in the dreams.

Six years later the series were given to Professor Kuper as data for a theory of his which had only recently been devised.

A Summary of the Dreams, and Pre- and Post-Sleep Interviews.

KJ was one of a group who went once a month to a dream lab in Chicago. He was a graduate student. Joan Smith is a fellow graduate student; Chris is his major professor dissertation supervisor; he lives with Connie; Dr. Ros Cartwright is the department professor; the lab. assistants are technicians who run the sleep lab at night, operating the EEG, EOG and EMG equipment.

Night 1. (30-31/7/73)

Pre-sleep interview.

He has been reading some fiction and realises he is out of touch with how he was a few years back, due to his concentrating on psychology. 'I feel like I'm sacrificing all that to do what I am doing right now.' He is not disappointed about specialising in psychology, but realises how big the outside world is. 'I was just realising that in terms of my life it is just such a heavy head think all the time. Everything is psych. You know there is not someone forcing me to do it, but I feel that my head is being shaped and that is how I am looking at the world - as a clinical psychologist. Hearing my own conversation, hearing the way I look at things, how I observe

them - I guess that is what is getting me down - everything is analysed. I'm being perceived more and more as a psychologist and that is something I never wanted to be on the outside. When I'm with people I realised that all I talk about is psychology and I'm talking with other friends who are not in psychology and I'm still talking about psychology. We used to spend a lot of time with people, but we don't do that much anymore. The last year I sometimes woke up wishing that I would not be me, I'm just so tired of being me and dragging this mind around, but that is not the case at all this year.' He is also worried about not passing the prelims the second time, and now feels like he is constantly being tested. He has to present a patient the next day and is worried about his professor's reaction, as KJ has the reputation of being 'oppositional'. 'She doesn't know me but she's heard about me.' He has been using the rest of the students as a support in public arguments with the department heads. He has been wondering about going into therapy.

1st REM Awakening, 5 min. into REM, 1.40 a.m.

A feeling of pursuit with no other people involved.

2nd REM Awakening, 10 min. into REM, 3.05 a.m.

'I am in a sleep lab and kind of there's a small room in between two rooms and I'm standing there just at the moment that you called me waiting to unlock that door to go into another door inside. There's nobody in the inside room right now which surprised me because a few minutes ago there was a whole bunch of people in there and here I'd come back and it's empty now so I'm standing there looking for a

key and ... maybe there's a window where I'm standing, an outlet to the world, and I'm thinking about the ball game or the city or why it is the door is locked. As I was standing there at the door trying to unlock it as I was standing there fumbling for the key I was thinking about the ball game. I had been in this room earlier with a lot of people [who were watching the ball game]'. People had been delegated responsibility as lab assistants, KJ had been delegated responsibility too, which was connected with unlocking the door. He had come out of one bigger room and was now in the small room in between that large room and the one he wanted to get into. 'I think the person in charge was Dr. Cartwright. I don't remember seeing her there but I know that was who was in charge. In the dream itself there could very well have been an awareness that this was a sleep lab...' The room he was in 'had the feeling of - kind of like the john - with that towel rack and that continuous cloth towel.' He thought that those people who were there earlier should be there still.

3rd. REM Awakening, 15 min. into REM, 4.55 am

'This is another sleep lab dream. I got up from the sleep lab to go to the kitchen to get some ice cream ... I'm standing at the refrigerator with the freezer part open.' 'I took out of the freezer a camera...' The scene becomes like his apartment, and then - Rosemary walks in and then Roz walks in and 'asks me what I was taking pictures of ... I wasn't taking pictures ... I was carrying the camera around because of the light meter ... I didn't even know what I was doing with it on. Then the whole sleep lab crew - two or three people - went into the kitchen to make liverwurst sandwiches' and the crew have a

good time. The bed then becomes like his bedroom at home and Connie is there. She is talking to KJ and he is annoyed by it, because he wants to sleep. He was lying in the bed with his feet at the end his head is usually at. He asks her about two objects that had moved: one was like a mirror. She placed the second object over to the right side of the bed and over on the left side of the bed where the TV was she placed a mirror; 'I didn't like the position'. And then she was concerned that it would interfere with the TV aerial if she placed it too close to the TV. 'At the very end she was asking me if we couldn't go to the Italian Village [restaurant] one night ... asking me to make a commitment for us for next weekend.'

He then added another part of the same dream:

He is in the underground on the el which is dirty and dark. He gets off the train and waits for another. When a train arrives he has to decide if it is his. The conductor says which it is and KJ goes back to the waiting room. The room becomes like a lecture auditorium and someone asks 'what are you doing here?' Although KJ was waiting for a train he says he wants to buy an automobile, in order to be sarcastic. A few minutes later many people arrive and the same aggressive man starts to read out nationalities. They jump to their feet when called and go to the bottom level. Finally he asks 'who is Jewish?' KJ is annoyed and does not jump up, but just moves one step. He then starts to think he is dreaming, and then reads the professor's report on what he has just dreamt. He is confused at this because the report is so objective and clinical.

4th. Awakening, 20 min. into REM, 6.14 am

He is in bed in the lab talking to a male experimentee.

Another male brings in fruit juice, and other gifts are brought in, including a magazine. A woman brings in a political cartoon, of Nixon or Mighty Mouse, but he can't understand it and feels stupid. He feels comfortable with his companion.

After getting up he goes down a long corridor. He looks out in the street where there are people waiting at restaurants for breakfast. Professor Cartwright comes up to him and says that Chris wouldn't like him to be getting this external stimulation, but he believes that that is really her opinion. Back in the lab he finds that Chris has also slept there, as has another man, John. His room is now like a sun-porch, and he wonders whether he should take all his clothes with him or leave them there. In this sun room he is holding a black light bulb and a can of air-freshener. Looking out of a window he sees a school yard and students. Everyone he sees is coming out of one door except for a small boy who climbs through a hole - 'but that's what kids do'. A larger kid then manages to get through the same hole.

Additional recall, 6.55am.

He is in a downstairs office kissing a colleague on the cheek. Someone walks in but is pleased rather than surprised or shocked. He has his own desk.

In the post-sleep interview he relates the dream events to his present academic life as mentioned before going to sleep.

ANALYSIS

There are five obvious condensations in the above dreams.

- 1) The dream lab which was also the 'john'.
- 2) The sleep lab which was also his apartment.
- 3) The sleep lab bed which was also his bed at home.
- 4) The train station waiting-room which was also an auditorium.
- 5) The dream lab room which was also a sun-porch.

Each of these have some amount of narrative around them to define them, as Crick and Mitchison may expect.

Kuper (1983) analysed the dreams of this and the following night. He apparently found that the narrative of the first set of dreams reflected the chronology of a night spent in the lab: from leaving the lab workers to having a dream recorded, wondering whether his performance is satisfactory, not knowing whether to take his clothes with him the next morning, and finally meeting fellow workers the next day. This is not surprising: subjects in a dream lab (as opposed to being studied at home) not only sleep differently on the first night but also tend to incorporate the external happenings (worries about the experiment, procedures adopted, etc.) into their dreams. A sceptic may decide that it is predictable that someone spending a night in a dream lab for possibly the first time will dream of such an experience, and in the correct order chronologically - this may happen especially if the worried subject spends a great amount of time falling asleep after each awakening, allowing time for rumination over the attendant expected circumstances.

According to Kuper (ibid.) the subject's own conflicts, of over-involvement in psychology, and of professional status, were

present in this progression and were resolved in the last scene with KJ, a psychologist with an office, accepted by colleagues. Such a wish-fulfilment would accord with the theories of Freud and Evans.

In KJ's own words his concerns are that:

'I feel that my head is being shaped and that is how I am looking at the world - as a clinical psychologist.'

'I'm being perceived more and more as a psychologist and that is something that I never wanted to be on the outside.'

'...because of the situation I have put myself into I will continue to do it. I will continue to act this way [analysing everything] and still be frustrated.'

This dichotomy between the inside world of the department and the outside world of Chicago is depicted in the dreams of the night, as Rycroft, and Kuper and Stone, would predict. In reality, he is now mixing socially with few people except psychologists, although that wasn't so in the past.

He mentions his insecurities towards the senior staff, but that he will now confront them in private rather than in front of other students. He continually feels 'like I'm tested', and has just failed two exams.

He is wondering about whether to go into therapy. Note that in the dreams of nights 1 & 2 there is often ambiguity about whether he's the psychologist or the patient.

The first scene contains a reversal (a similar co-varying of oppositions is found in myths, and structuralists are much concerned with them in their analyses):

He was with others in the room who were watching an outside activity
is followed by

He is outside the now empty room, he is thinking of the outside activity and looks outside, it is hard to use the key to get back in.

This scene connects with his pre-sleep statement that: 'I don't even hang around with them [graduate students] very much - we don't have very many friends. We used to spend a lot of time with people, but we don't do that much anymore.' I expanded upon such recapitulatory dreams earlier in the thesis (chapter 13); they are dreams which symbolise the events of a long span of time in just a few images. This idea is somewhat different from Palombo's, in that he holds that dreams will contain real past and present memories, rather than the symbolic encapsulations of whole eras which I claim is present in this case. It does accord with Rycroft's notion of metaphorical translations of waking concerns.

In the third awakening he is outside the lab but still has on him observation equipment, much as he states that being a clinical psychologist penetrates into his everyday life. In the dream he is embarrassed when asked what he was taking pictures of. He says he's using it for a light-meter; I take that to mean to see better, to observe better, as psychology is claimed to help one to do. Meanwhile, all this argument detracts from his enjoyment of the ice-cream.

In the next scenes of this awakening he further investigates the activity of choosing, and relates it to authority. He doesn't admit to the railwayman that he's having to choose which train to take, instead he says he's waiting to buy a car.

In the fourth awakening he is told by his professor that he can read in bed but can't get stimulation from people outside. He had slept on the sun-porch, a place half inside, half outside, which accords with the structuralist notion of the search for mediators between oppositions. Earlier, gifts were brought in for him and another male subject by a male experimenter. A woman comes in and shows him a cartoon in a magazine; he doesn't understand it and feels self-conscious. However, he feels comfortable with the male companion. The magazine, which he associates with Newsweek, is a product of the outside, in that it reports news, but he associates it with doctors' offices, the inside; it is what one is supposed to be reading. (Can the cartoon be related to the children? Can we relate the adult reading [Newsweek] to the child's reading [cartoon], which is of 'a significant person, like maybe a fat characterisation of Nixon, but maybe it was mighty mouse,...'? Such speculations are now unanswerable, and some of the dream theories would bid us concentrate on the overall form of the dream, rather than the meaning of individual items of content, anyway.)

There is a greater amount of movement from room to room in this night than in the others. There are three sorts of places in the dream, the actual lab, experimenters' and psychologists' offices, and Chicago. Structurally, these differ along the following three dimensions: (As is usual in structuralist notation, a '+' indicates the first item of the opposition in question, and '-' the second item.)

	lab	offices	Chicago	sun-porch
inside/outside	+	+	-	+
psychologist/patient	-	+	-	-
equal/subordinate	-	+	-	+

The four main locations are thus defined by three oppositions. There are also many places which are in between the outside and inside, such as the corridor.

Overall he progresses thus:

inside	patient	superiors
	↓	
outside	patient	superiors
	↓	
inside	patient	colleagues
	↓	
inside	psychol.	colleagues

So, despite his stated antipathy towards being a psychologist, and the possible symbolisation in the 'john' scenes of the elimination of this part of himself (Marks, 1988), he finishes the night as a psychologist, in an office.

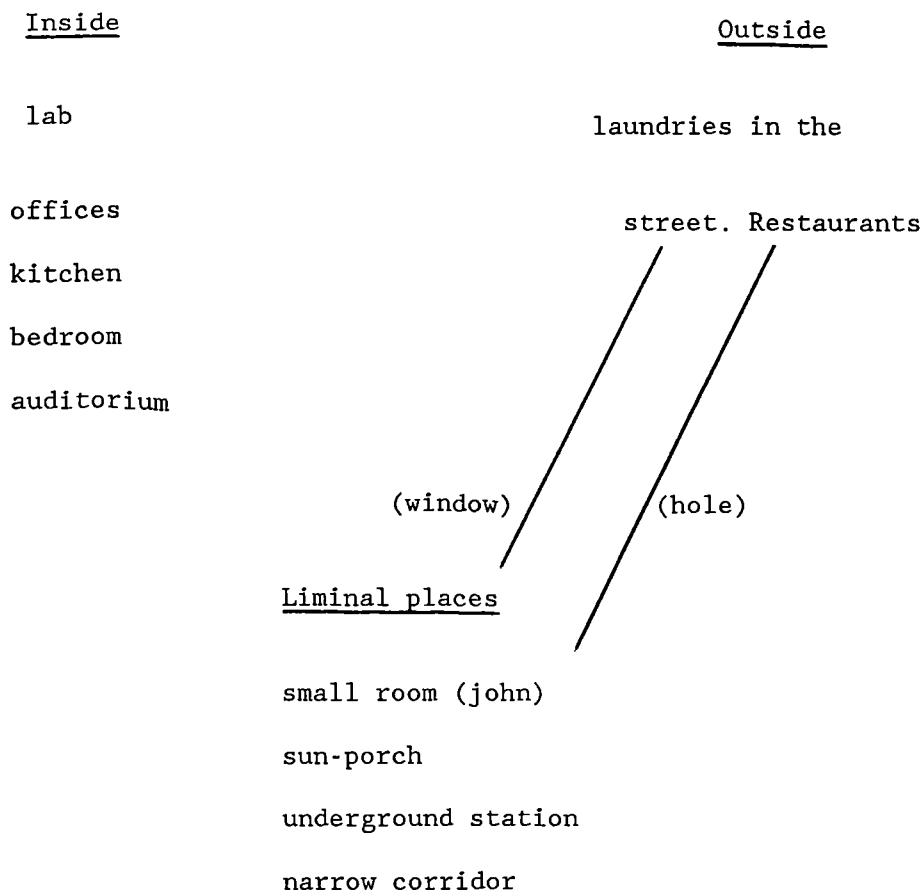
Such a change in dimensions from one scene to another was also noted by Kuper (1979), in which four settings were analysed as differing in terms of two sets of oppositions:

Green countryside versus Town
and Green countryside looking 'happy' versus
Green countryside looking 'sad' versus
Green countryside finally looking not 'so bad'.

The problem is that for any change of scene it is always possible to find some dimension on which they differ, otherwise there would not be any recognisable change. That the dimension has some aetiological significance for the change, and that it is a dimension with some further meaning, is a claim some would think far-fetched.

After the first awakening there is depicted in each dream an opening to the outside world. Awakening 2: in the small room outside the lab there is "a window - a kind of outlet to the world again". He then thinks of the ball game, and prior to this there were the technicians watching the ball game on TV in the lab. Awakening 3: In their bed-room Connie interferes with the TV aerial by means of a mirror. There is then a sub-plot with KJ in an underground station. Awakening 4: He walks through a corridor to get to a Chicago street. He goes back to his bedroom which is a sun-porch. He looks out of a window to see two kids climbing through a hole to get out of school.

He says the small room is like 'the john', a place which in real life is half inside and half outside. Also, standing at the door he describes as unpleasant (as on the fourth night he describes himself as indecisive). He says in the morning (see appendix) that the difficulty of using the key made him feel distant from the experimenters. It is not clear from the report whether he is entering the experimenters' room or the subject's room. He does say that it is his responsibility to go into that room, however, which implies that it is actually the lab.



I will now list the remaining reversals, which are part of the movement from scene to scene, and which are claimed by the structuralist account to show that a dream 'juggles the elements of an issue which engages the dreamer - not in a random way, but rather by patiently rearranging the elements of the issue, combining and recombining them' (Kuper, 1986a, pp.213-214) and that 'the mind defines a system of differences - a set of binary oppositions which can be used to specify and differentiate the items of information of which the problem is composed ... the statement of the problem is then subjected to a series of transformations, by negating, inverting, reversing or substituting its elements.' (Kuper, 1986a, p.213.)

1) He walks into kitchen with camera for light measurement.

followed by

He walks into sun-room with black light-bulb.

2) He doesn't speak and is criticised by Roz about the camera.

followed by

He criticises talkative Connie for moving the TV and mirror.

3) Connie complains about interference with the TV aerial.

followed by

Connie wants a link with the outside world (going to restaurant).

4) Technicians are eating and he wants to sleep.

followed by

Connie wants to go out to eat and he wants to sleep.

With the last opposition we can see that there is a problem of the falsifiability of this method of analysis. If one scene has a similar opposition to another then it can be counted as a confirmation of the importance of the factors involved, if it does not have a similar opposition, then it can be counted as a transformation, a permutation of the previous scene. The only answer to this is to collect more examples of the reversals, in order to discover if such a stepwise mytho-logic is being used. This approach finds support in Mary Douglas' essay 'The Meaning of Myth', in which she takes issue with some of Levi-Strauss' purported reversals, but also claims (1978, p.160) that the importance of reversals to meaning is undeniable in some myths, such as the story of Asdiwal (in Levi-Strauss, 1978a),

where successive oppositions of height are finally resolved with the hero immobilised half-way up a mountain, and where some quite bizarre scenes are analysed in terms of being the opposite of an earlier, more sensible, scene. Another reversal found by Levi-Strauss (1977) involved tribes that showed familiarity between father and son yet formal respect between uncle and nephew, which mirrored others in which the father represented family authority while uncles were treated with familiarity.

One task in this and the next three chapters is to perform a structural analysis on the dreams of each night, so that Kuper and Stone's theory can be compared to the others.

Finally, for this night, I note incidents which are similar to those in night 3. Connie 'waits on' KJ in this night, whereas in night 3 she appears as a 'maid' from a TV series. This night he waits for a train and must decide whether to catch the A or B, whereas on night 3 he has to decide about catching a bus. Although these last two points may not be significant they illustrate the importance of *comparison* between scenes, rather than the taking of associations to individual elements.

CHAPTER 15

NIGHT TWO: DREAMS AND ANALYSIS

In the pre-sleep interview recorded four weeks after the first night he told of having to complete an overdue paper for his professor, that he had been reading about Transactional Analysis, and that he had been reading of a baseball player who was in the wrong league for his ability.

1st. Awakening.

He sees 'a wagon', it has 'four wheels' with one axle connecting them like on a train, with a little cartoon man next to each one.

2nd. Awakening.

He sees a sketchy scene from Treasure Island.

3rd. Awakening.

He is experimenting on a man to test the man's skills about making judgements about his state of mind. He is then in the suburbs where the man works.

4th. Awakening.

A review of the last dream. He was 'writing a theme, my account of this person who was making the judgements', but it could have been about someone else. He writes a paragraph on the aetiology of his behaviour - asking was the guy retarded or just socially deprived?

5th. Awakening.

He is telling a young person how to behave in a certain way, 'in order to achieve my or our ends' but 'he didn't know without me telling him'. He is outside that person's house, the man's mother is indoors. The second time they are there they go through the back door but 'it was trickier this time' - KJ was inside having prepared a script for the young man who was talking to his mother. KJ could see the man's sister through another window. The mother questioned KJ about 'a date' with the young man. She was pleased about it and asked when he could visit them again. This made KJ flustered. KJ was trying to get permission for the young man to be out of the house. There was some advanced planning for both of these visits. On the second visit it was raining.

Awakening.

He is going through a turnstile with his bookbag in order to get inside a department store and there's one stand for bathroom or kitchen utensils or appliances and he was looking for one in particular. He gives the bookbag to the cashier or this guy sitting in a booth, who is an older guy, maybe the owner of the store. He then walks up a set of 'strange' steps but can't get further than the eighth for then he would have to turn 180 degrees to continue going up the other steps, which appears impossible. He stood there for a while and there were people on the set of steps above him and there were other people on his steps so he figured it was possible. The old man then said that he can go up, and he then realised how to do it. He found that it was 'just a matter of turning' and went up the steps. He

was still looking for that same kitchen or bathroom utensil or appliance, with the help of the older man. He was looking for that upstairs but didn't find it and then decided to look in the toy section for something else, for a particular toy. He had a sense the toy was round.

Next, he was involved with some 'heavy problem solving' on the second or third floor of a house or apartment building. He was in a room with two other males and was 'getting an image of a circle', which was connected with 'evaluating or assessing' a patient. They discuss the correctness of his interpretation of the patient.

Next, KJ is in a room cleaning up. Connie, who initially was crying and had a distorted voice, comes walking in holding a record cover. The picture on the record cover was in black and white and was of a baby, or something to do with gentleness, or with families.

They discuss a man who lives down the street who has lied about where he came from, and also about his job. They decide he is schizophrenic.

[In the original text the following is written now:

'4th (?) Awakening, 6:50, about 10 min. into REM.']

On interview he said that in the room on the third floor 'we were sitting on the floor in kind of an old place and spinning something - a gyroscope, ... spinning, ... there was a narrow metal shaft, a vertical pin or something and I was spinning something on it.' The other men had also been spinning something around on this little pinhead on the floor. 'It seems we were making up a story to go along with this little toy or whatever it was, it seems as if we were

giving it human characteristics, describing a person that this little thing was.' There was a difference of opinion and they were seeing experimentally what this little thing could do. KJ describes it that: 'the first time we ran this thing I had it hooked up so there was a little something that was on top, above the spinning part that smoked and then some more people came in and I was demonstrating my point or something. Now I put whatever it was that was smoking and it seems as if it was a ... cigarette butt ... on the cylinder but below the spinning thing and when it was done this way then that convinced me that it was much more effective in demonstrating my point.' These other people had been in another room and now they came in to see what KJ had done. He says '...that spindle thing seems to be on a much higher level than usual functioning', later he says that it is like a propeller, with the ascending smoke driving it round.

In the morning interview he was asked whether the dreams tied in with the pre-sleep interview. He replied that they did in terms of his completing patient reports, which involve history, symptoms and so forth. He stated that the first dream and the second dream seem to relate a lot to hypnogogic experimentation which he was also attempting on these nights.

ANALYSIS

I can only find two condensations in the course of this night.

1) The second or third floor of a 'house or apartment building' which was also part of the department store.

2) The record cover which was 'something to do with gentleness, or with families'.

The former was embedded in much narrative, whereas the second one wasn't.

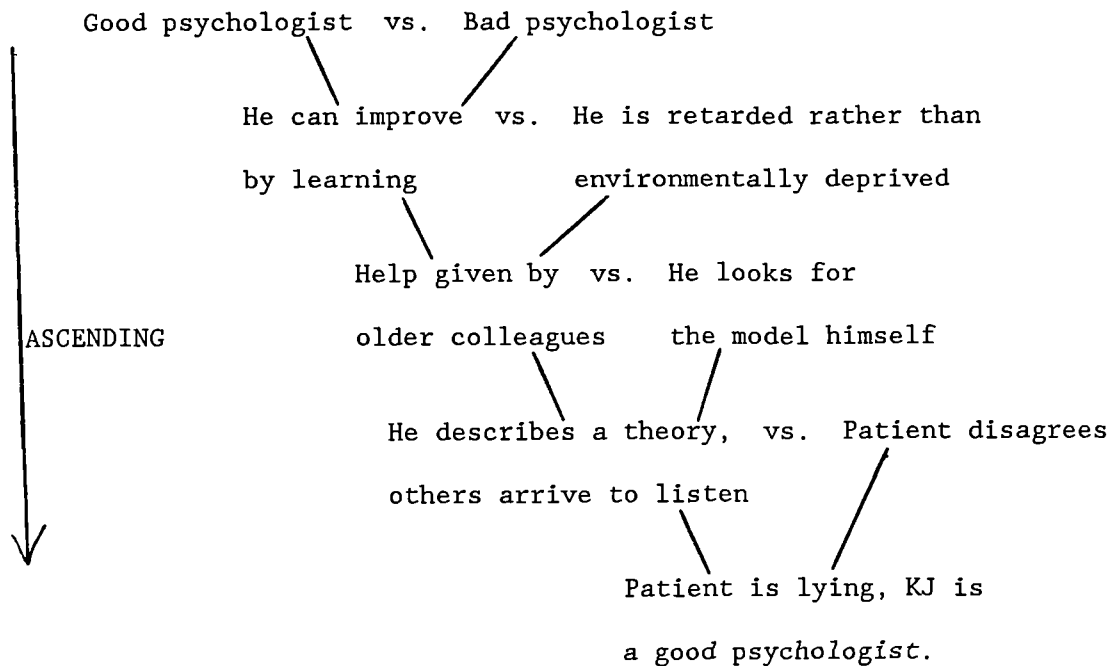
KJ starts off as an observer of a man doing hypnagogic experiments, KJ himself had previously been such a subject. Next comes a dream in which he is recapitulating what occurred in the last dream and he makes an initial diagnostic assessment of aetiology (whether the patient is retarded or socially deprived). He writes a theme on this patient. The next dream has a different patient but we note there that KJ's relationship to him is of the next level of psychological testing, in which the subject's behaviour is now manipulated. KJ is giving him orders concerning what to do at the patient's mother's apartment. There KJ is observed by the sister and questioned by the mother. He becomes submissive and flustered at this, not wanting to lie about how much he can do. Another visit is planned: he had arrived in the rain. I consider that this dream shows some of the problems met with in hospital out-patient work; arranging home visits and being watched and questioned by relatives who want the best and most frequent treatment to be given.

We can read the next awakening as showing the next step in

the formalities of patient care. He is involved with 'heavy problem-solving' on the second or third floor; he has an interpretation of some patient and they all make up a story about a spinning toy, giving it 'human characteristics' over which there is a difference of opinion. This 'spindle thing' is on a 'higher level than usual functioning'. With his girlfriend, he then diagnoses a man who lives down the street. I interpret these last scenes as portraying the later aspects of patient diagnosis, the case conferences which occur in hospitals to give medical professionals the chance to theorise about a patient in his or her absence, above the everyday level of the ward both literally and also in terms of explanations for behaviour being 'higher' than what is observed. This new model, which is like a gyroscope, was found with the help of an old, authoritative man, who is the owner of the whole building. Finally, he and Connie see through the lies of the paranoid schizophrenic and the case is finished. In the dream he was clearing up a room when Connie arrived, which is an apt picture. The happy ending and use of metaphors accord with Freud's theory, and with Rycroft's.

Nothing in the texts has had to be distorted to find this progression in the dream series, and no scenes have had to be excluded. Such a movement through the night is reminiscent not only of the progressive chronology found in the first night but also of Kuper and Stone's (1982) interpretation of Freud's Irma dream, which showed two progressions in that dream. It is also similar to Propp's analysis of folk tales, which showed an initial conflict, followed by a journey, aid given by another character, a battle or fight, and finally a resolution in the form of the finding of treasure or a marriage.

Onto the psychological assessment sequence, (the melodic line of the dream series), is placed the dialectical argument concerning his worth as a psychologist (the harmony), starting with the initial opposition:



Note that the initial thesis in each step is opposed by its antithesis. The synthesis is the result, the compromise, between the two. (Although Kuper and Stone's analysis, and mine here, both find a dialectical argument as well as simple progressions it remains a possibility that this is a consequence of the medical content of these particular dreams, rather than an intrinsic style of all dreams. Freud was dreaming of a medical examination, and KJ of treating patients, both of which are logical, stepwise, argumentative activities. However, if this is the explanation for the form of the dream then we must assume a great dependence of dream mentation on waking styles of

thought, which I consider doubtful.)

The key used for the transformation of his mental concepts into physical terms is:

Up:Down :: Model:Behaviour,
and Up:Down :: Psychologist:Patient.

Such a key to translation fits in with Rycroft's and with the structuralist view of dreams.

With regard to this depiction of concepts in terms of the physical environment, Leach (1982, p.147) notes that according to a member of a primitive tribe cosmologies will control present social life, 'the anthropologist must regard the ancestral cosmos as an imaginary projection of present experience...' Similarly, KJ's experiences are being externalised and thought about in terms of the dream environment.

Note that in the first night a woman shows him a magazine picture which he couldn't understand, and this made him feel stupid, whereas in the second night Connie's picture is shown when he is a successful psychologist. It is late on in the night when we see that it is KJ who works on the model, he no longer needs help; those who come in only do so 'to see what I had done'. The importance of the opposition Up/Down to this resolution may explain the curious way that KJ proves his point to the others - he places a roach underneath a propeller so that the rising smoke causes it to rotate. This image and that of a black and white photo of a mother or baby may also be related to the very first brief awakening, in which KJ sees four

wheels with a little cartoon man next to each one. Whether it is KJ's memory of that first awakening, or that that dream is unconsciously transformed as if it was never conscious, we can see that the later awakening does not merely include, translate, or show again, that earlier scene. The scene is transformed progressively, as if the dreamer had an aim in mind.

The first and second lines of the dialectical argument are both stated in the dream as applying to the old patient, at first as to whether he is competent enough to assess a mental state and next as to whether his problem is due to deprivation or retardation. The next dream involves a young patient; similarly, in the third dream he looks firstly for an old appliance, and then for a (young) children's object. However, unlike this permuting of Old/Young, the opposition Male/Female is not important in this dream - neither sex has a monopoly of any trait.

Of equal importance to the oppositions Old/Young and Up/Down is that of Revolving/Static, which may be related to KJ's 'original problem' (see Levi-Strauss 'The Structural Study of Myth', 1977, p.216) of who is performing, who is evaluating, of whether he is the patient or the psychologist. This is transformed into a symbolic 'derivative problem' of ascending vs. revolving. It is this derivative problem that is resolved in the final scene by the presence of the record cover, a stationary cover of that which rotates - the picture on the cover also encapsulates the Transactional Analysis concept of PAC, while simultaneously KJ resolves the original problem by showing himself as a successful evaluator and psychologist.

Throughout, there is an emphasis on stages, on floor levels, which connects with:

1) his worries about which sleep stages he can maintain, REMS vs. hypnogogic awakenings,

and 2) the levels of Parent, Adult, Child used in Transactional Analysis. He behaves as a child when at ground level with the woman, is next guided upstairs by an old man while looking for an adult implement, and ends up on the third floor teaching old men. This parent-like image is then followed by Connie showing him the 'family', or 'child' picture,

and 3) his pre-sleep banter about baseball players being in the wrong league for their ability.

Despite these changing activities and levels I suggest that KJ is a psychologist throughout this series, although at one point needing to receive instruction from an older man (colleague?) and although reverting to a passive role with respect to the patient's mother as a way of ignoring her demand (which is, in fact, one of his own real life coping mechanisms).

So, the night progresses thus:

Cartoon men on the end of axles.

Original problem depicted (three awakenings).

Under instruction from an old man, he, a human, revolves and starts to ascend.

Upstairs, an old man helps him to find a 'round' toy.

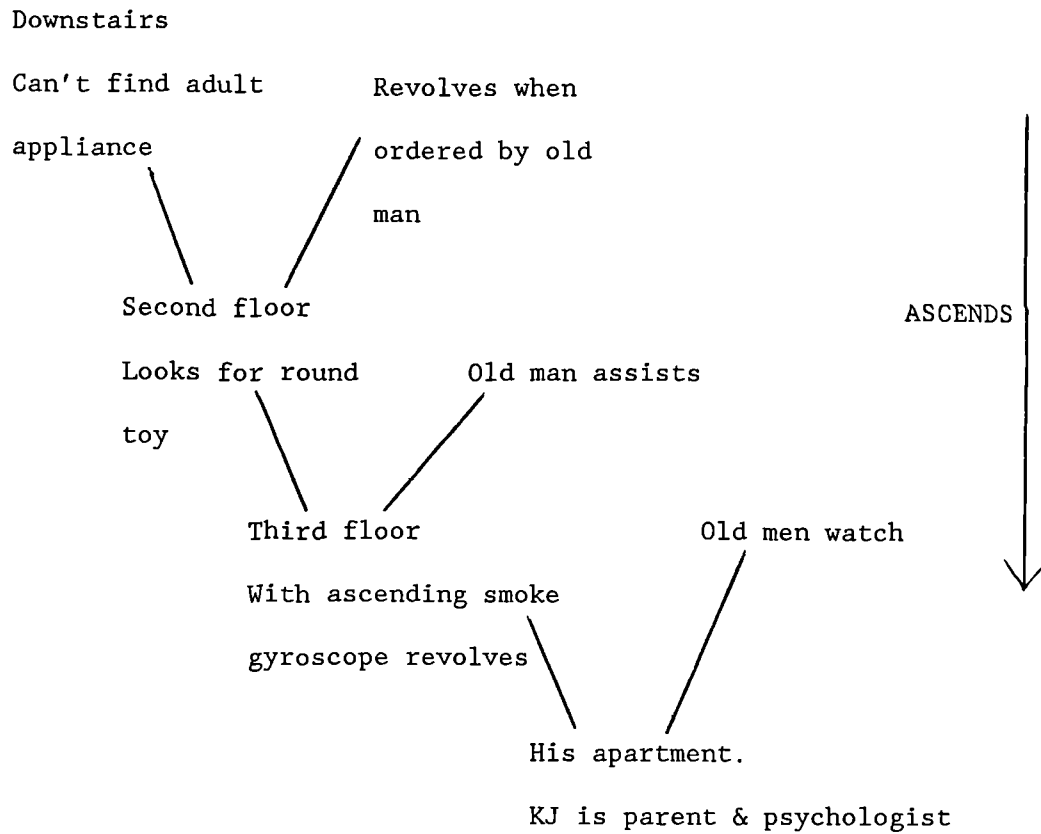
He makes smoke ascend, to instruct old men on how the

propeller (now given human characteristics), revolves.

Childlike, or inferior, Connie (she cries, then is a maid) shows him a record cover with 'baby', 'gentle', 'family', 'mother' characteristics.

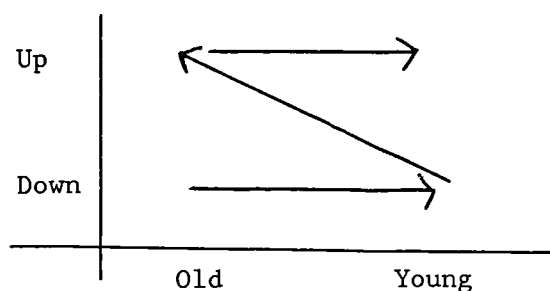
In this scheme the structuralist claim would be that the record cover is the resolution, it contains that which revolves; the night ends with he and Connie summing up a person with psychiatric illness, and simultaneously 'clearing up'. According to Crick and Mitchison's theory the cover, as it is an overdetermined image, would be a parasitic memory, rather than the product of a long series of creative thought.

Note that the order in which revolving and ascending occurs differentiates him from the model of the patient: he revolves and then ascends, whereas the model revolves because of the ascending smoke. We see that KJ is different from the patient because KJ evaluates and ascends (in status); it is his job that makes him different from the patients! KJ evaluates the patient and thus performs and is given status, whereas the patient must perform ('I was telling him how to behave.') and is then evaluated. It is this discrimination, this difference, which solves KJ's original problem of whether he is the psychologist or the patient, and he then goes on to solve the problem of whether he is a good or bad psychologist.



The dominant theme throughout the night is his professional competence, can he produce a viable model of the patient's behaviour? There is also the bureaucracy of professional relations, that is, dealing with family, seeing himself in what the patient does, and dealing with colleagues. In the pre-sleep interview one of his main concerns had, in fact, been finishing a paper for his teacher, and reading T.A. and Gestalt theories. Getting work done and seniority both crop up in the night. In the post-sleep interview he says the dreams were concerned with patient evaluation, and the main opposition in the dream series is thus good psychologist/bad psychologist. In addition there are two physical oppositions by which he attempts to help solve this difference, old/young, and up/down. It is the ostensive importance of these oppositions that suggests that the

application of Evans' account to KJ's success in these dreams may be ignoring some of the evidence, although KJ's activities do fit into the 'practising programs' scheme. After the first two brief awakenings, the importance of which will be shown later, the plot concerns an old patient (most of KJ's patients are old), then a young patient, then the young psychologist has help from older colleagues upstairs, then lastly he is upstairs proving his theory.



(Again, it can be remarked that if one scene takes place downstairs then the next can only either be there again, or upstairs. In the former case a structuralist would look for another opposition, and in the latter case claim that one had been found! However, it may be claimed that with a whole series of dreams such ad hoc analysis is not possible.)

These two physical oppositions form the setting for the scenes, pace Hunt who considers the setting to be only that, with no symbolic function, although the environment can have such a function in human waking life. (See chapter 8 in Structural Anthropology vol.1 about the dual organisation of tribal camps.)

The Up/Down opposition divides the characters into two groups, patients and senior psychologists, leaving the one other

player, KJ, moving between scenes. Height is not mentioned in the final scene, possibly that aspect has been resolved, for he is successful, and yet with family rather than with colleagues. Age, however, still figures in that a picture of a baby or mother is shown to him. The structuralist claim is that we find abrupt oppositions in the dream between two scenes because they are a means of solving the problem of defining areas of KJ's life. Similarly, Leach notes that 'it has become increasingly apparent that neighbouring small-scale communities, even when they are lumped together under the same "tribal" label, are just as likely to be sharply contrasted as they are to be very much the same. The contrast may be a significant feature of the overall pattern' (1982, p.142). For example, in the fifth awakening the following oppositions occur:

	OUTSIDE	becomes	INSIDE
Parent	KJ		Mother
Adult	Mother		Sister
Child	Patient		KJ & Patient

As was shown in chapter 12 in the analysis of the myth of Sodom, we can most easily discover if there are any relevant oppositions by comparing first to last scenes. If we do that for this night of dreams we find there is a change from distorted people on the end of axles to a distorted Connie (both literally, in the way he reports her image to look, and in that she is crying) who brings him a record cover. The record cover is the final mediator, it neither ascends nor revolves but is connected intimately with each because of

its cover (depicting Parent Adult Child) and its contents, which can revolve.

What is important to a structuralist analysis is not to concentrate upon ascending itself, but rather ascending in relation to remaining at ground level, and then this opposition in relation to the opposition revolving/static. Similarly, Levi-Strauss (1977, p. 46) states (about the avunculate):

'The error of traditional anthropology, like that of traditional linguistics, was to consider the terms, and not the relations between the terms.' Sperber puts it thus: 'If relationships between items are considered, then shared or contrasted features stand out as the basis for symbolic associations. The greater the number of items related, the fewer the features which are likely to play a role: one should study not symbols but symbolic systems.' (1979, p.30.)

Applicable to the oppositions that KJ appears to be using is Levi-Strauss' statement that 'the elements of mythical thought ... lie half-way between percepts and concepts' (1966,p.18). They are obviously concrete, but they "resemble concepts in their powers of reference" (ibid.). Note, however, that there is a small difference between KJ's use of the oppositions up/down and revolving/static to externalise his thinking, and his use of the opposition inside Chicago/outside in countryside in the next night. The latter is a literal depiction of his worries, he is wondering whether to leave that city, whereas the first opposition is metaphorical, and the second one is almost an arbitrary signifier. That the link between a signifier and what it signifies is arbitrary was a crucial premise of

Saussure's theory of language. Rycroft would predict the utilisation of just metaphorical symbols, whereas for the unlearning theory the more bizarre the metaphor the more urgently must it be unlearned. By contrast, Kuper (1987) states that a recent tendency in Levi-Strauss' work is to claim that myths are not necessarily engaged with problems from everyday life, but rather 'reflect each other', thus allowing for this toying with almost ungrounded signifiers.

The use of the concrete opposition ascending/descending to facilitate thinking about the abstract notion of status is not entirely arbitrary, as some signs are. Systems can be envisaged in which it is the physically lowest member who has the greatest authority, for example, the devil in medieval Christian cosmology is in hell while his minions are on earth, above, but elevation is still important. Similarly, spinning/static is not entirely arbitrary in its use as a representation of performing the science of psychology, for the science is connected with the phrase and activity of 'spinning a story', and many would say that much of psychology (as with sociobiology) is simply the production of just-so stories. It is the patient whose ascending (i.e. Parent Adult Child) aspect is examined, leading to the spinning of a story, the writing of an explanatory report, while it is KJ's spinning of a story which results in his increase in status and altitude. Each of these oppositions is thus in Leach's (1976 p.12) terminology an example of a 'natural index', rather than a 'symbol', which is completely arbitrary. Leach states that myths, totems and rituals use 'metaphoric condensations' of elements from different contexts, such as comparing the difference between human groups to the difference between two animal species. He

says this is needed because "to think clearly we must externalise the concepts, akin to using pencil and paper." (ibid. p.37). Similarly, Levi-Strauss considers that totems are chosen not because they are 'good to eat', but because they are 'good to think'.

So, I conclude this chapter by noting that in dreams we are finding a whole environment full of messages, many of which are symbolic, and are manipulated in terms of oppositions. Of relevance to this is Levi-Strauss' (1966, p.267) comment that:

'The idea that the universe of primitives (or supposedly such) consists principally in messages is not new. But until recently a negative value was attributed to what was wrongly taken to be a distinctive characteristic, as though this difference between the universe of the primitives and our own contained the explanation of their mental and technological inferiority, when what it does is rather to put them on a par with modern theorists of documentation.'

That the messages in dreams are so simple, and composed of simple, abrupt oppositions, should come as no surprise, if we note also the single-minded and naive way that the dream characters act.

CHAPTER 16

NIGHT THREE: DREAMS AND ANALYSIS

Pre-sleep interview: he complains that he has much more work to do, and that he's 'still up in the air' about arrangements for his practicum. He is in charge of a course but has not officially been delegated the responsibility by Benton. His clothes are all stained from the rain. He complains about a baseball commentator whose game statistics KJ doesn't agree with.

Hypnagogic Awakening.

He sees 'a couple of jet planes', 'something to do with international relations'; they are stationary, like a picture in a book.

1st REM Awakening. 1.45am, 5 mins. into REM.

He is outside a town getting a drink.

2nd REM Awakening. 3.45am, 10 mins. into REM.

He is in a car with his mother, they pull up into a cul-de-sac at a summer resort. It isn't a good place to park, 'we didn't park within the lines'. As they get out there are people around, at a sort of buffet, and he looks for an attractive woman there, although they are all older. He wonders if it is appropriate to 'check out the scene' in this way. The buffet is happening in a lodge, and the food is supplies for an ocean-going voyage, which are somehow 'stolen' goods. The food is mainly caramel, with nuts. His mother's friends are there next, and she asks him if he wants to talk with them. He says 'no' but they still speak, telling him that he is on the wrong course and at the wrong university. He starts to feel

unsure of himself when one couple say that with his course options he may end up not wanting to go back to school. One of their sons used to be in his class and then went to a different school.

He is then on a bench at the resort with his parents and feels that he is in the wrong school, and that he should just walk into Harvard or Yale. He thinks of Colleen, as if she was able to do that.

Lastly, he is eating the caramel, with marshmallows and walnuts.

3rd Awakening

With Connie he is travelling by car on back roads, through familiar areas. They are in conflict about the route, 'whether we could travel over water'. Connie was saying that it was physically impossible for them to travel over the water. 'We sort of decided by testing it out. I think that's why we went one direction, then the other, then went back then continued on our way. ... But then once we got underway ... we just buzzed along in the car.' They see a small pond with grey, dead logs in it, all stripped of their bark. They could see the bottom. The pond is at an angle with the logs at the bottom like a dam. They are at the top of the pond. They are then with others in the car, driving downhill. Somehow they turn back but carry on the same way. As they travel downhill in the midst of the lakes they make fun of him in a joky way, which he would prefer them not to do. He is now a passenger. One of them is sad due to not visiting Otis airforce base as usual, and KJ is amused as 'it was no big deal', or maybe 'because she was so accustomed to going to Cape Cod [where the

base is] every summer'.

They are then flying through the air towards a town that looked like Chicago. He was the leader as they were being 'sucked through the air'. Like a roller-coaster they swooped down, landing at a bank where they asked the president for \$10 million. They walk down the bank steps with the president and his employees and start to laugh. He thinks of marketing coloured pancake batter with the money.

4th Awakening. 6.45am. 20mins. into REM.

KJ is alone on a motorbike, looking for a place to park on a small city street at an intersection. The intersection is at the bottom of a hill, he is driving down and sees no spaces on the right side of the road. On the left side there are two spaces, he takes one and five other cars try to dash into the other space. 'The person who did get the space was not the person who was first to the spot, the person who had come up from the direction I had come from, from the direction behind me had tried to park and he was a young, little bit longish haired person ... he parked his car ... not between the two lines'. When he gets out of the car he sees that something is wrong, gets back in, and parks within the lines. KJ starts to realise that this is a dream and knows he will be woken up soon to relate it. KJ thinks it strange that the meters allow so much space for each car.

He is talking to an old Wooster friend, Bob, about his experiences in graduate school in the dream lab. Bob had dropped out many years ago; he had a letter for KJ. They are then lying down next to a fireplace and Bob changes into Craz. Although he hadn't seen Craz in a year Craz just gives him a perfunctory 'hi' and starts to transact business, about \$10 for some dope. The receipt is scrawled on

a piece of paper, which is somehow also a cheque made out to someone else, with Craz having the intention of turning the money over to KJ. KJ is confused at this, and is also annoyed at Craz talking business when they have only just met again. Craz says 'I'm really glad to see you' in a cold way that wasn't convincing. They argue over the balance of the money, because KJ will be left owing him money for the deal - Craz says this is not possible to rearrange the deal because he has not got the dope on him, which surprises KJ. At this point Craz becomes Bob.

He is at Washington University and sees Connie's old roommate with a Wooster friend of his. He runs after her and the scene is like at Junior High school, and he remembers having to decide at that time which bus to take home to save money. Down a corridor he sees someone who looks like her from the back, but it is a man, her brother. He is told that she is at Mandolin hall, which is not part of the university.

Dream told on waking up:

He is with a young mother and her five kids. They are all retarded and he is talking to her about how to take care of the kids. He is sad because he has been friendly with the kids. He walks onto a porch and sees them, maybe all boys, looking over some railings. Their backs were stained and KJ knows they have been like this for days. He is sad because the mother had irresponsibly not bathed them.

He is then at an outdoor concert with Bob or Craz. The kids were close by and two of them come up to say goodbye. 'We assured them that the next time we were by we'd stop by ... I kind of shook hands' with the little kid. They did not expect such an adult courtesy from

the kid, that he would come over alone to where they were standing. KJ then explains to Craz or Bob who the kid was.

ANALYSIS

I have found six obvious condensations on this night.

- 1) The food at the buffet which is also supplies for a ship.
- 2) Bob, who changes into Craz.
- 3) The receipt for the dope, which is also a cheque.
- 4) Craz, who changes into Bob.
- 5) The scene at Washington University, which is also like Junior High school.
- 6) Someone who looks like Connie's old roommate, but who is actually the roommate's brother.

There are certainly some other bizarre happenings, such as flying through the air, but these cannot be classed as 'condensations' according to Freud's use of the term, nor as 'mixed memories', as defined by Crick and Mitchison.

In order to pick out any relevant metaphors or progressions, as required by Rycroft's theory, and that of Kuper and Stone, I will now compare the first long awakening to the last awakening and material from waking up.

2nd Awakening	4th Awakening and Waking up
Car parked above beach in cul-de-sac.	Motorcycle parked at bottom of hill.
His mother is present.	Kids' bad mother is there.
Disrespect from mother's friends	Respect from mother's child.
Old people present.	Children present.
They criticise his schooling.	He gives psychological advice to the mother, 'how to take care of the kids'.
He admires fellow-student Colleen.	He is respected by drop-out Bob.

The dream between these two is also midway in certain respects concerning its plot:

He is a passenger in a car that doesn't park; it is travelling a long way between familiar locations associated with his schooling.

As the car descends a steep hill there is joky criticism from his friends but he isn't angry. He then travels a long way in the sky, then goes down, and then descends the bank steps.

The next awakening, the fourth, has him riding alone, again downhill, but now he can park correctly, whereas the 'longish haired person' does not do so at first. He is critical of his friend Craz for

impoliteness, whereas in the 2nd awakening he was the silent victim of impoliteness; furthermore, the dream just before waking up has a kid being polite to him. The last dream certainly shows a simple wish-fulfilment, which would accord with both Freud and Evans.

We can now compare the second and fourth/last dreams, and then the third and fourth/last dreams, to obtain the following code:

Criticised : Admired :: Above : Below
and Ribbed : Admired :: Descending : Low

Here, an internal comparison, personal to KJ, is related to a physical comparison, or opposition, which is one of the objectives, in Levi-Strauss' view, of myths. Similarly, in 'The Story of Asdiwal' (1978a, p.162), Levi-Strauss notes that 'the hero goes from east to west, then returns from west to east. This return journey is modulated by another one, from the south to the north and then from the north to the south'. He notes that this movement in the myth corresponds to actual movements made by the tribe during the year, and is related to the economic and social aspects of the tribe. In this case, for KJ, being above is related to criticism, it is safer to be lower down, just as KJ had complained in the pre-sleep interview of having too much responsibility. This use of the metaphor of altitude accords with Rycroft and with Kuper and Stone.

Comparing the first, albeit hypnogogic awakening to the last scene there is a change from planes being above ('up in the air', as he describes a prospective interview with a supervisor), with the land below and a concern with international relations, to equal relations with a child at ground level. But it is not simply a case of KJ

progressively changing level, there is also the question of the position of those whom he is involved with: his superiors moan, he cannot find a suitable woman among all the old women at the buffet, a peer sells him dope, there is no great antagonism with other peers and, finally, a child is friendly. But, while he is 'going down' in the world, using a motorcycle rather than a car, and also attending a concert, he is still a psychologist - it is the other actors in the scenes who change in social status, and change in their ways of treating him.

So, the argument running through the night can be tabulated thus:

Initial Opposition	Second Opposition	Third Opposition
Responsibility of college	Responsible for journey & responsible in the air, but enjoys it	Carefree, with drug-addict & drop-out
		Inferior's pleasantries
	Peers' joky ribbing	
Superiors' complaints		
HIGH	DESCENDING	LOW
(above beach)	(in air, on road, lake & steps)	(ground level)

Similarly, in 'The Story of Asdiwal', Levi-Strauss notes the presence of the oppositions Heaven/Earth (east), Earth (west)/Subterranean world, and finally, Peak/Valley. The latter opposition is resolved when the hero is trapped halfway up the mountain because he forgot his snow-shoes (Structural Anthropology, vol.2, p.163). See chapter 12 for other examples from mythology of immobilisation signifying the mediation of an insoluble opposition.

Under the structuralist account, the sloping lake could be a mediator in the second opposition, for at the same time it is high and low, symbolising the ability to be both responsible and less responsible at the same time. Note his complaint in the pre-sleep interview about the statisticians who were studying the performance of a baseball star and finding him not quite up to the mark. This complaint about those who, quite literally, remain on the side-lines may be related to KJ's problem of responsibility versus the lack of it, and the criticism involved. We can thus concur with Clement, who states:

'As always in myths there are two opposing dangers: the danger of too much and the danger of not enough, the danger of excess and the danger of lack.' (1983, p.135.)

There is thus the opposition Up/Down as a correlate of this. The first awakening has the single image of planes in the air, with the accompanying idea of "international relations" an area of great responsibility. The sloping lake and its position next to hills emphasises the transition from up to down, and then one of the people

they are travelling with mentions her holidays near the Cape Cod airforce base.

This night of dreams gives us an example of the superiority of a structural, as opposed to a solely functional (problem-solving) evaluation of dreams, as put forward by Evans. What possible use to KJ's waking life could be the scene of him flying through the air? Such an action can solve no waking problems in a realistic way, but it fits in well with the oppositions high:low and high:descending. Similarly, the anthropologist Firth found that 'As far as the majority of animal totem species is concerned the economic interest in them is not of a pronounced type' (1930-31, p.297), and that animals and vegetables which are important to the society are not always accorded equal importance in the myths and rituals of the society. In the same way, Levi-Strauss tabulates different foods of the Tikopia with regard to the labour needed to grow them, the complexity of the ritual intended to make them flourish, the complexity of the harvest rites, and the religious importance of the clans which control each kind of food. He concludes that the 'table does not correspond with the totemic system, since the number of plants in it is greater; the yam, which is controlled by the highest clan, and the ritual of which, both for its cultivation and for its harvest, is also the most complex, occupies the last place in importance as food and the second in labour demanded. The "non-totemic" banana tree and sago palm are objects of more important ritual, both to raise them and to gather their fruits, than are the breadfruit tree and the coconut palm, both of which are nevertheless "totemic"...' (1969, p.136). He notes (ibid. p.96) that for the Tikopia it is the inedible fish, insects and reptiles that are associated with supernatural beings; Firth suggests that this is

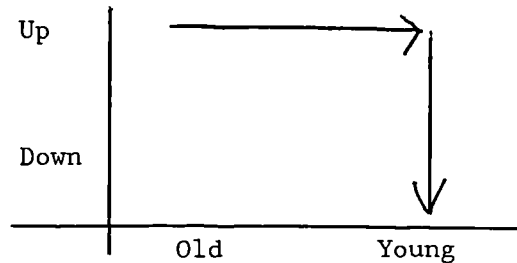
because 'creatures which are unfit for human consumption are not of the normal order of nature...', and hence can be used in the classification of supernatural elements. They are used not because of any function they may have for the tribe's subsistence, but rather for the function of classification.

In addition to the High/Low opposition there is the distinction between Young/Old, which gives the following correlations:

Criticised:Admired :: Old:Young

and Ribbed:Admired :: Peers:Young

which is more in keeping with the flying scene (when KJ is high, not criticised, and carefree) than the previous two equations I produced. Overall, his environment, both physical and social, changes thus during the night:



The notion of 'the wrong place' occurs early in the night. He is in the wrong place to meet a young woman, he worries he is at the wrong college, there isn't a good place to park in the cul-de-sac, and he is advised not to travel along the dirt roads, nor across the lake (by Connie, who thus shows concern and responsibility). Later, a 'long-haired man' who was not the first at a parking space is nevertheless the first person to park there, yet then parked in the

wrong place, not between the lines. KJ himself is accused by old people of possibly ending up not wanting to go back to college. (Note that in the dreams of the first night he was in the wrong place in the auditorium, and when not able to eat with the lab technicians.) The idea of 'the wrong place' has been translated quite literally into dream images. Professor Alan Stone (1986) has noted the incestuous imagery connected with his mother and the cul-de-sac which is 'not a good place to park', and Adam Kuper has commented that the very scene is typical of American adolescent dating. There are also homosexual images across the nights. All of this would be ignored in a structuralist analysis which concentrates upon the formal oppositions of the dreams, and would lack emphasis on such deep emotional meanings behind the dream, which would need the subject's free-associations in order to be explored (this is a common criticism of the structuralist technique). The lack of associations with KJ's past also makes it difficult to evaluate Palombo's hypothesis. Phenomenological methods which would bear on this are discussed in the postscript to the thesis.

As well as people changing place there are also the transformations of Bob into Craz and of Nancy into a man which took place in the second scene of the dream reported on the 4th awakening. These are meaningless condensations according to Crick and Mitchison, and so we need to discover if there is any importance attached to these sex differences. The only people friendly to him are males, although some are critical. Females are either a paragon of academic excellence, critical (the wives, and Connie saying he can't travel across the water) or, in the last scene, irresponsible. In all cases

they are extreme, unlike the homely men he meets. It may be claimed, therefore, that there is some message in the dreams behind these sex differences.

The initial opposition of responsibility and complaints may be made more abstract by relating it to the opposition Giving/Taking, which is certainly indicated as being of importance by the number of transactions between people in the different scenes. For example, in the penultimate scene KJ has an all too brief exchange of pleasantries with Craz, and is then annoyed that they then only talk of money and a cheque.

There is also the opposition of Inside town/Outside town; while in the first night there was Inside lab/Outside in Chicago, and we will see that on the last night he is in town all along, seemingly working out the implications of the workplace's confinement rather than wanting to be elsewhere.

According to the structuralist theory, other reversals which permute these oppositions through the night are:

- 1) the change from old, overconcerned mother in the initial scenes to young, unconcerned mother in the final scene.
- 2) on narrow roads and hills outside town he is in a car, whereas on narrow roads and hills inside town he is on a motorcycle. This juxtaposes outside/inside with constrained/free.
- 3) the change from responsible married people in the initial scenes to less responsible younger people in later scenes, some of whom change sex.

It is possible to categorise these actors in the scenes thus:

	Overappropriate / Appropriate / Inappropriate	
	(In place)	(Out of place)
His mother	Colleen	Craz
Old people	Bob	Young mother
	Kids	KJ
	KJ (finally)	

As in the fourth night there is the aspect of looking for/out, and the opposition inside/outside. He's in the wrong place because of what he wants to look for. According to the next night's interview he had been considering leaving Chicago (in the dream "Connie was saying 'no, it's a physical impossibility'"). Unlike the last night this night has the aspect of not wanting to stay, whereas in night 4 it's being inside that's the problem, although he resolves that by judging it to be safer. On night 3 he sees the need for responsibility, and on night 4 the need to be within the institution. These changes are no doubt due to his waking thoughts, though, rather than an effect of dream mentation.

We can summarise the remaining progressions as follows:

- 1) During the night there is a change from having a drink outside town-
to cold buffet food, which is probably stolen
to investing in selling uncooked food
to buying dope.

This is a declining standard of food, progressing from cultural to natural, an opposition that Levi-Strauss considers important in myths. He considers the opposition so important that he merits Rousseau as the first ethnologist, by virtue of his attempts to find a basis in nature for culture (Structural Anthropology, vol. 2, p.34.). This change in the nature of food is partly connected with the opposition Give/Take, from stolen food he moves to investing in selling food to buying illegal 'food'. Such an obviously intellectual concern with the naturalness of 'food' is typically a feature of Levi-Strauss' analyses. The dope is only a 'food' metaphorically speaking, and yet attention is drawn to it as part of a possible sequence because of the illicit nature of the previous real foods mentioned.

2) There is the following decrease in constraints as the night goes on:

Respectable married couples (friends of mother)	Carefree peers	Mother's children, he mentions they are all retarded and dirty
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(The dirty children are possibly a reference to KJ's comment in the pre-sleep interview that due to the rain his clothes had stained and the colours had run.)

Such a progression easily fits in with a simple Freudian wish-fulfilment model.

3) The lack of constraint with regard to the position of the cars during the end of the night compared to earlier:

So, we have found oppositions and progressions within awakenings, as well as between them. This is important, for without the former this would only be evidence of progressions between one dream report to the next dream, rather than from scene to scene. Remember that the subject has to be awakened to tell us of the dream, and progressions from report to report could thus be an experimental artefact. With the results of between awakening permutations, we may have introduced a new day-residue, that is, the previous report, into each subsequent dream, whereas we see now that within one awakening we find a progression of scenes, so it may be possible to extrapolate from this to claim that between non-awakened dreams there is also a progression. Still, at the very least it may be claimed that this work shows the permuting of oppositions from a dream report by the next dream. That the permutations advance to a resolution, and that they are based on the waking life of KJ is also found. However, on this point, a complete sceptic about dream research may claim that KJ had such problem-solving, waking-life reflecting dreams because the experimental set-up (of pre-sleep interview and post-sleep study of the connections between the dreams and waking-life) led him to believe in this type of dream. In the same way, analysts having Freudian analysis have Freudian dreams, and those with Jungian analysts dream of archetypes. I answer to this that it is proven that dreams can incorporate pieces of knowledge from waking-life, such as knowledge of what the analyst wants to hear involving Freudian symbols, but that this incorporation of conscious contents into the dream process is quite different from the subject changing the form of the whole night's dreams by deliberate and conscious intention. (Haskell, 1986

makes the similar point that 'expectations and demand characteristics should not be an influence upon structure. It may be assumed that logical structure is perhaps wired-in neurologically ... and/or that it is relatively impervious to experience...') The evidence appears that the form of dreams shown here, of progression of one dream to the next (and one scene to the next) with the use of dialectical arguments and logical permutations of oppositions, is caused by the unconscious processing of the mind, although the prospective contents of the dreams are known to a great extent by the conscious mind.

CHAPTER 17

NIGHT FOUR: DREAMS AND ANALYSIS

In his pre-sleep interview KJ complained about not having done enough work for a class the next day, and that there were conflicts with a colleague, Benton - 'I have to do exactly what he wants and it's very hard to fit into his structure of things'. He was also finding it hard to work at home each weekend. He has decided to remain in Chicago, which Connie agrees with.

1st. Awakening.

No recall.

2nd. Awakening, 1.30am, 5 min. into REM.

He had just ordered a pizza at a grocery store or restaurant, and then went to a magazine rack to look at the new Playboy magazine. He ordered that issue, and the man went off to wrap it, but then the place became like a pizza parlor, and the man went to put it in the oven. While the pizza was cooking KJ realized that it was an issue that he had already seen, and didn't want it. So he went up to the man, who had gray hair and was old, but he was busy and didn't help. KJ asked him to pull the pizza out of the oven, but the man was playing with a doll's face that was made out of soft styrofoam; he was cutting the face with a sharp point and KJ realized that if he was not careful the little doll's head would be ripped. Then he began taking care of someone else's pizza putting something on it. In the meantime a young boy, maybe eight years old, was serving someone else. KJ was still waiting for the older person and asked him if he could take the pizza out of the oven. He said no, that it was

too late, that 'you have to have it done all the way, or not done at all', for he can't 'do it half-way'. So KJ was disappointed and resigned that he would have to eat it anyway, and would then wait until next month, when the next issue of Playboy came out. He walked over to tell Connie that he couldn't take out the pizza, and that they would have a different kind next month.

Upon questioning he stated that there was a distortion in 'the magazine switching from Playboy to a pizza', and that the six year old looked older than that, 'he looked like a ten year old, but he said he was six years old'.

He then reported these other two segments:

The experimenter was coming into the room with some long scissors to fix some of the wires, but KJ was curious and confused as to what they would use scissors for. He played with them in his right hand, but they were very hard to open and close.

He then added a segment which preceded the pizza sequence: He was in an apartment house, living on the third floor. Although this was the top floor somehow there was someone living above him. He didn't like the man who lived upstairs, because somehow he was annoying KJ. At one point KJ was out on the back porch, clearing off all the snow into a hole in the floor to get rid of it all. He had a sense of clearing it off and making it clean. Then, there was an airplane flying just under a cover of clouds, and 'the cover of clouds represented this other guy'. The airplane was trying to go as high as it could, up to the bottom edge of these clouds, and KJ could hear some hard scraping sounds of the top of the wing against the bottom of

the clouds. He felt good that the plane was taking off the bottom edge of the clouds; Connie came out onto the back porch and was not pleased with what was happening.

3rd. REM Awakening, 4.35am.

He was standing around outside on the grass playing catch with a football with some others, some of whom were opponents. He had just arrived on the scene, but after one or two balls was ready to go. He then heard an ambulance siren in the background and was worried if the police were coming. He did not want to take the risk of staying and so started packing up his stuff into a bag in order to get on a bike and go, but the straps were tangled up into the front wheel.

4th REM Awakening, 5.54am.

KJ is standing in an unfurnished apartment which has many windows. He is looking out and is with his brother and mother. There are several windows close together on the right, but there's only one window over to the left. He points out to his mother that the trees in the left hand window were now growing and somehow were different than they had been, for they were alive and growing. His mother was sceptical of that, so he watched those trees for awhile, for a few minutes, and pointed out to her how in fact the tree was alive, and changing, how it had gradually started moving and growing. She saw his point. They then went down the steps and were outside on the grass, where they were with his brother and Connie; there was an exchange of gifts at this time. He gave his brother a sealed envelope and KJ was pleased to see him opening it. KJ had never seen him open a birthday card before, and he calls it a pleasant scene. But his brother then added up what he had received, and gave them a ten dollar bill in

exchange. KJ was returning to the apartment, and at the doorway that was on the ground floor there was an envelope, and there was another birthday card, and he opened it up. This gave him some kind of reaffirmation of being a good person,

KJ is going to the third floor of his apartment but finds that it's not his apartment, because it's laid out differently. There's a woman there, who smiles at him very pleasantly, and says that she's waiting for the lady inside to let her in, and yet the doorway is open. KJ found it strange that she should be standing there and waiting when the door is open. She explained to him that she was going in to see this lady's beautiful furniture. He then decided to look at the furniture also, but found that most of the place was junk, with lots of mattresses. There were lots of people in there, like a big party, but he doesn't know them. He was following around the lady of the house and noticed a young 'weird' guy who has 'got a lot of kids', and was mentioning the triple mattress. KJ leaves, possibly with the 'weird guy', and sees a picture of him. Next, he was on his motorcycle and the same fellow was walking down the street, he thinks that this guy was responsible for the wires being off his ears in the lab.

KJ then gets on his bike and does a U-turn. He is driving up a hill, on a motorcycle, in fairly heavy traffic. His bike and a 'little red car' with a woman in it both overturn. He tries to fix the bike himself. His friend Steve starts talking about how the guy was weird, and then complains about how difficult it is to take photos of KJ.

Lastly, KJ is in a V.A. cafeteria located down on a boat

dock, like a pier for fishing. He is with friends and they go into an old, long, flat building and he feels uncomfortable. There is a cafeteria with different frozen foods and cameras behind glass. Then they obtain some strange food from a can. They walk all the way back down to the end of this long cafeteria, where there are some strangers. Then he sees a submarine and a ship at sea. The ship is long, and the submarine is in it's hold, The scene changes to the sub being way down in the water and the ship finally getting the hold door open by opening up in half, and trying to take in the submarine. It was as if it had a place for storing it. The ship missed the first time, and so it had to do it again. The method of opening was like that of a transport plane.

5th. REM Awakening, 6.50am.

He is outside in the sun with some young people.

In the next scene he sees a train which is running on the ground level; it's not elevated but has tracks in the middle of the road. 'There was this little automated vehicle running on the tracks, that was very peculiar. It had a tiny two wheel thing in the front, that didn't have any depth or height, it was as if a Ford with two wheels. And that had attached to it kind of a trailing little car, with a little compartment on it, it wasn't a car, it was some kind of a wagon.' He pulls out a pear and cleans it off on his shirt. He is then walking up the street, and sees some young Spanish kids. He is a little alarmed at seeing them, uncertain of what they're going to do, although they are very young kids. KJ stands up against the buildings, in kind of a passageway, waiting for them to go by, and the surroundings become a living room; he starts talking to people in

there. He doesn't manage to finish with them, but goes out to the street, back out to the sidewalk, to see where these other kids were, and they weren't in sight. He had expected to see them pass by, but somehow they had disappeared. He then walks through an old long hallway in an old industrial factory, he enters a long twisting hallway which was somehow a short cut out to the alleyway where he parked his motorcycle earlier. At the exit door the motorcycle is in a different position from where they parked it. Some of the instruments and the handle-bars are damaged, but he can fix them.

Next, he was sitting around with others in an apartment. His professor was looking for an industrial job for him, about which he was not pleased. A stranger was there who one person said lived in an apartment in Chicago, while one person said he knew him across the street, and that he's a student there. KJ then comforts a secretary who is very emotional and who then becomes an older woman. Steve then starts talking to KJ, who asks him not to interrupt. Steve then asks KJ a question that puts him on the defensive. KJ finishes with the secretary and for a time is centre of the conversation.

Morning Interview:

The experimenter says that he did have to enter the room before KJ's dream about the scissors. KJ continues:

'As I was recounting that to you I was thinking about all the Freudian implications. Cutting off my penis or castration or something like that.'

About the dream with the snow and the airplane KJ said that 'it made sense to me that I didn't like him, but there were more

things that happened in the dream because I knew I felt okay about not liking and it made sense to me because he did or he was something. I was very grateful when that plane did his thing with the top wings. There was a very large scratching sound like he was scraping off the bottom layer of this guy that is represented by a cloud. It was kind of like a narrow space in the sky. The wings were like on top of the plane. I'm having problems dealing with Benton these days and so the first thing that comes to my mind is that it could be him...'

When asked to relate the dreams to his pre-sleep interview he stated that the anxious parts of the dreams reminded him of how he functions best with some amount of anxiety in waking life. The experimenter commented that he was resolving problems in the dreams better as the night went on.

ANALYSIS

I have found three condensations during this night.

- 1) The grocery store that becomes a pizza parlor.
- 2) The Playboy that is a pizza.
- 3) The cloud that is somehow a man whom KJ does not like.

His concerns were 'finding all these things to do instead [of his work]', deciding to remain in Chicago, and only having cleaned up his desk when he had a paper to do instead. In the first scene there is an allusion to the problem of whether he is assertive or not: similarly, the pizza, constrained by the oven, is also a 'Playboy', albeit one that is old and out of date. The sexual significance of this is further underlined by the juxtaposition which then occurs:

Old Pizza-guy cuts a dolls face,

followed by

The technician coming in to cut the wires attached to KJ's head.

KJ mentions at interview the worries about castration that this latter incident caused him.

In the interview before the first night he commented that in becoming a clinical psychologist 'I feel that my head is being shaped'. Even participating in this experiment of dream recall must have been for him a further example of being 'shaped', of getting deeper into psychology. (Note that 'shaping' is a technical term in psychology meaning to reinforce behaviours which progressively approximate to the experimenter's desired goal.) Each of the first three scenes involve a sharp object, with KJ being passive; each of

the sharp objects is harming something - the plane's pointed wings, a pointed object cutting a face which could result in the head being ripped, and lastly the scissors. Simultaneously, there is confinement, first caused by the clouds, then by the oven and the unhelpful owner, and lastly by being on a bed in a room. Maybe the notion of confinement can explain why the scissors are not easy to open, an otherwise arbitrary and pointless inclusion. Connie complains about him in both scenes 1 and 2, further underlining his lack of power in the face of the confinements. The pizza scene fits in with Evans' view, whereas the scene with the scraping plane wing accords with Freud's wish-fulfilment theory and with Rycroft.

In the structuralist account, the initial scene contains the first reversal in the dream series: he starts at the bottom of the tenement clearing away a white substance (snow) downwards; next a plane above the tenement is scraping at a white substance (clouds) above it. The cloud cover is constraining the plane while earlier the snow is constrained by the hole in the ground and by the broom. We note also that the previous day he had been 'clearing away' work on his desk, enabling him to 'find stuff I was looking for', whereas now such clearing away more resembles confinement.

Scenes 4-7 depict him not wanting to stay, not fitting in. Four reversals occur:

Outside, his brother opens a card,

is followed by

Inside a doorway KJ opens a card.

(note that the third night showed a preoccupation with giving and receiving.)

KJ doesn't fit into the photos but fits in at the lady's flat despite weird furnishings,

is followed by

A strange guy is in a photo but doesn't fit in at the flat (for he is weird).

KJ wants to leave the field but is prevented physically,

is followed by

A lady is outside the room, wanting to enter, although the door is open (i.e. she is not prevented physically)

He is among strangers in a room where furniture is being sold,

is followed by

He is with colleagues in a furnished apartment (final scene).

In scene 5 he sees a group of trees outside that are growing and changing, he also has a pleasant time outside. We must bear this in mind for when the outside world is represented as dangerous in the penultimate scene.

Sexual overtones are present in the fourth awakening, scene 6. He first meets a pleasant woman outside the apartment, she wants to look at old mattresses and cribs inside; next there is a 'weird' man inside who has many children and talks of triple mattresses: however, KJ wonders if he himself is the weird guy. His motorcycle then crashes when he does a U-turn and a woman's car overturns. Somehow, KJ says, the weird guy was responsible for the electrode being off, which implies that KJ is himself responsible for this, which he links with his own castration.

As well as the apartment with lots of old furniture being sold there is the apartment which is empty but that has windows, through which he can see growing trees (although his mother is initially sceptical of this). That there is then a family scene of the giving of birthday cards shows the dichotomy in his life of home versus work, the choice between which he mentioned in the first night as a source of friction between him and Connie.

Scenes 8 and 9 show large containers, scene 10 has an idyllic outside setting and with scenes 11 and 12 KJ is safe, moving around but inside buildings. At first glance the change in his fortunes over the night would fit in with any theory of dreams involving problem-solving or wish-fulfilment, as shown by the comparison of the initial scenes with the last ones:

EARLIER SCENES

LATER SCENES

Anger at man upstairs.

With colleagues in apartment

Confusion at what experimenter is doing and non-assertive towards pizza-seller.

Deals with Steve and with the emotional secretary, and gets a job.

In pizza-parlour, misjudges the age of the man's kid assistant.

He knows how to avoid the kids.

He doesn't know what the scissors are for.

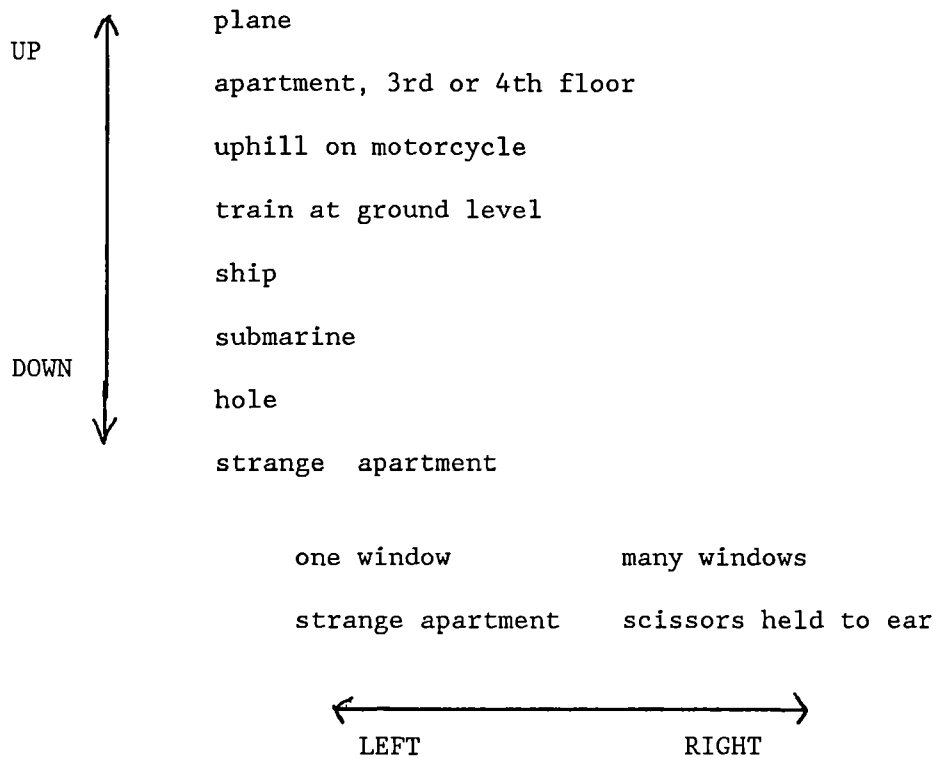
He can fix the motorbike.

Certainly this successful change accords with Evans, Rycroft and the structuralist theory, and with Freud in that there is an undisguised wish-fulfilment.

This change is related to his statement in the post-sleep interview that the dreams show him becoming more at peace with the department, and not fighting the confinements there, which is just like his own history at the place. However, he also says that the last dream is 'negative' and has more anxious elements, and likewise there is certainly no progression in the attributes of the vehicles in the sense of a continual improvement:

- Awakening 1) he condones what an independent plane is doing
- 2) no vehicles
 - 3) his bicycle is stationary with straps tangled to it
 - 4) he has an accident on the motorbike, and the ship has to attempt twice to recapture the submarine
 - 5) he knows how to mend the motorbike and sees an automatic vehicle on tracks.

There is, however, a logical progression of the vehicles when considered in terms of 'confinement', and this notion encompasses most of the other aspects of the night's scenes, and also does not leave us having to ignore the above six reversals as inexplicable or chance events. The progression involves the permuting and final resolution of physical oppositions during the night, as a concrete picture of the resolution of his own personal conflict, that of hating the confines of the department, as epitomised by his relations with Benton. The physical oppositions are Up/Down, Inside/Outside, and, less importantly, Sharp/Blunt and Left/Right.



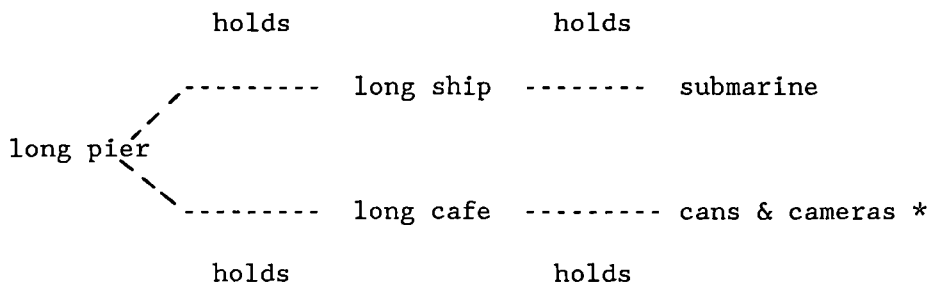
Furthermore, during the night he produced a series of confining structures:

Cloud cover - oven - hole - field - straps - photo - apartment

can for food - ship's hold - train's compartment - apartment

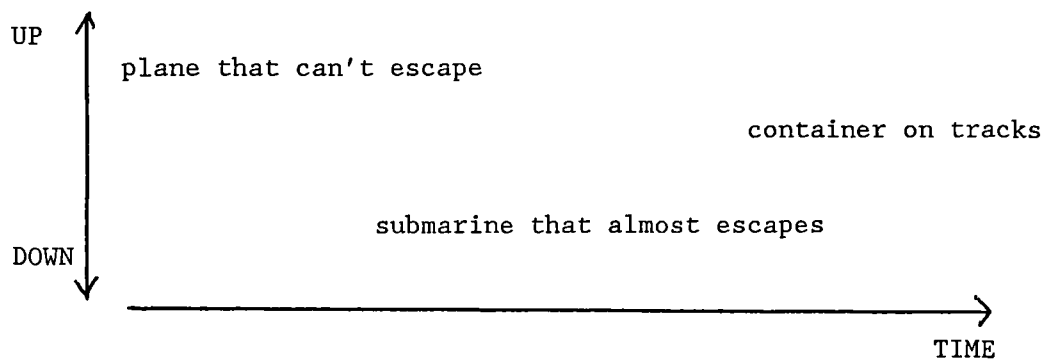
which are all relevant to the Inside/Outside opposition.

Some of the containers are themselves contained:



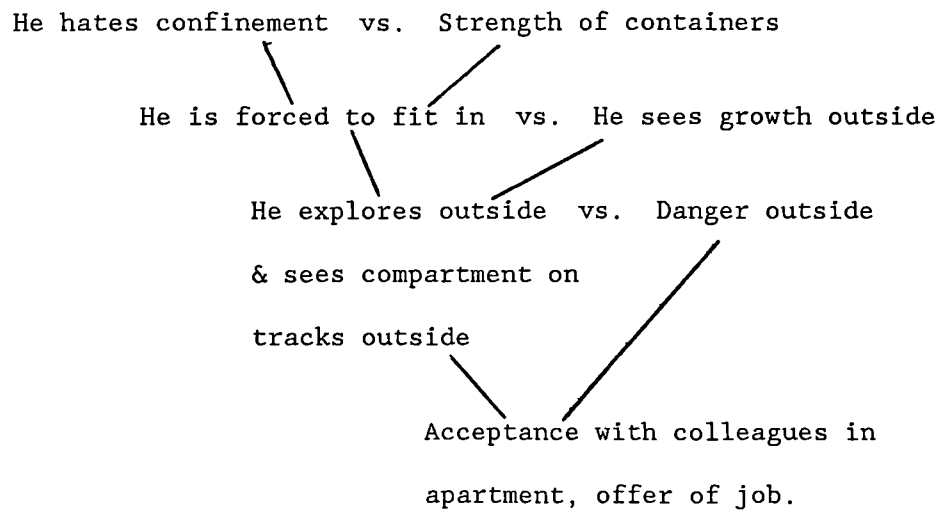
(* which hold food and photos, which each occur elsewhere in the night.)

These containers are at various levels, the plane and the submarine both attempt escape from an object at a different altitude, but such distinctions of height are not present in the final scenes. The penultimate scene resolves the oppositions Up/Down and Inside/Outside by involving an automated vehicle 'that didn't have any depth or height', with a 'trailing little car with a little compartment on it' running on tracks. (Note that tracks confine that which moves outside.) There is thus an increase in movement as the scenes progress, much of it within containers or confining places, until we end with the moving container.



There is evidence that there are two personal oppositions that are being resolved simultaneously with the resolution of the physical oppositions: these are Being contained/Freely moving, and Fighting back/Accepting the situation. According to the structuralist account the scenes can be seen to progress as an argument, a temporary resolution being found at each step until we reach the final scene. Just before the final scene he shows no desire to be outside, for in

order to escape the freely moving kids outside KJ enters a passageway that becomes a living room, and the advantage of being inside is recognised.



We note that the keys to the transformation of abstract concepts to the concrete environment depicted in this dialectical argument are:

Above:Below :: Aggressive:Submissive

and Inside:Outside :: Constriction:Growth

The concrete elements depict the abstract concepts (as Rycroft emphasises) and change stepwise in the following way towards restatements of the initial problem, and a final resolution (in accordance with the claims of structuralism):

Initial Opposition Second O. Third O. Mediator Fourth O. Mediat.

Confinement &
frustration

Clouds

Ship

Safety

Train

Apartment

Danger

Sub

Plane

Freedom and growth

Both the concrete oppositions and the abstract oppositions resolve themselves simultaneously. He is finally neither aggressive like the plane nor submissive like the snow and, possibly, the submarine. He is confined with his colleagues and is the centre of attention. He remarks in the post-sleep interview that he started off feeling frustrated at the department when he arrived there but is more 'detached' and accepting of it now. KJ also says that this gradual acceptance occurs daily in that, 'as the day goes on I rejoice about the good things and forget the bad'. The night's progression thus simultaneously mimics both his long- and short-term history at the department, which fits in with Freud's concept of overdetermination. Maybe this change in the perception of authority is depicted in the change from sharp shaping instruments to the blunter ship and straps, and to the final acceptance and being 'on the tracks'. Such a final picture is reminiscent of the common phrase of being 'on the rails',

or 'on the right track'.

It is also necessary to note the changes in the opposition Young/Old, because this has occurred previously on nights 2 and 3. KJ misjudges the age of the kid assistant in the pizza parlour, and in the last scene a secretary appears older when she becomes emotional. This opposition is not as important here as in the previous nights, though.

In the last scene there appears a man who either lives in an apartment across the street or lives outside Chicago. (KJ mentions that at one point '...the new guy came in, and mentioned the other peoples' apartment'.) This is relevant to KJ's situation. In real life they have decided to remain in Chicago, just as earlier in the night KJ has to tell Connie that the pizza can't be taken out of the oven. Note that in the first night Connie wanted him to go out (i.e. away from work) to an Italian restaurant, and here he finds that the pizza is stuck in the oven!

This use of concrete imagery simultaneously with the abstract concepts may be compared to the following summary of part of Wittgenstein's work 'On Certainty', cited by Hunt (1986), which also illustrates Levi-Strauss' contention that in the comparison of oppositions, there is no privileged perspective:

'Wittgenstein emphasises the immense difficulties and relativities of real observation: *it is never pure but always more or less influenced by the various pictures we bring along with us. We know something only in relation to something else. In ordinary thinking and science we treat everything as fixed and finished when it never is in order to use it as a perspective or view for the thing we*

wish to question. Contrary to widespread assumption, the metaphoric vehicle is not necessarily better known than its referent.'

I conclude that the texts of this night again show the stepwise progression towards a wish-fulfilling solution, and also the comparing of existential oppositions to physical oppositions as a means of resolution. On the fourth night that KJ had his dreams recorded in the lab a much greater variety of content occurred than in the previous three nights. This diversity belied the fact that a logical progression was present in the series, just as in the others, resulting in a resolution of his main concern that night of 'having to do exactly what [Benton] wants and it's very hard to fit into his structure of things'. Similarly, de Saint-Denys noted that for his dreams 'At first sight nothing could be more incoherent than this series of images. Yet nothing could be more logically connected, once one has grasped the link between the ideas.' (1982, p.129.)

CHAPTER 18

COMMENTARY ON THE METHODOLOGY OF THIS STUDY

In this chapter I wish to compare the epistemology of the structuralist project to that of psychoanalysis, and also to justify the application of the structuralist method to dream texts. Problems with the data collection methodology are explored and then the results of a replication of the analysis of the fourth night by five independent judges are described.

The Falsifiability of Structuralist and Psychoanalytic Analyses

A comparison between these two theories is useful because of the various warnings that a critical and mischievous history of psychoanalysis can provide for us. For example, Timpanaro (1976, p.78) writes:

'One patient told Groddeck that he had read a book in which mention was made of the sea. Groddeck's comment is: "The patient has an unresolved Oedipus complex, and he is a fool not to have realised in fact that by means of the association Meer = la mere he was speaking of himself" (Carteggio Freud-Groddeck, Milan, 1943, p.69). One should note that the patient was German: his unconscious, nonetheless, made its confession in French!'

Similarly, E. Jones (1958), in his biography of Freud, relates a story about one of the earliest analysts, Stekel. Stekel eventually left the movement having shown a marked lack of intellectual conscience and honesty, after earlier being acclaimed for his intuitive grasp of symbolism. Jones writes that:

'In a paper [Stekel] wrote on the psychological significance people's surnames have for them, even in the choice of career and other interests, he cited a huge number of patients whose names had profoundly influenced their lives. When Freud asked him how he could bring himself to publish the names of so many of his patients he answered with a reassuring smile: "They are all made up", a fact which somewhat detracted from the evidential value of the material.' (1958, vol.2, p.153.)

Wittgenstein made a criticism of psychoanalytic interpretation along the same lines when he remarked that, using the 'logic' of free-association, one can start with any of a collection of objects on a table and find that they are all connected in a pattern. (In: Wollheim and Hopkins [eds.], 1982, p.8.) Freud himself mentioned this problem in 'The Psychopathology of Everyday Life' (SE, vol.VI, 1953, p.250 n.2), concerning the evidence of experiments with associations from numbers. Schneider had found that he and his subjects were able to produce associations to numbers that were chosen at random; the associations gave the appearance of having determined the choice of the presented number. Freud accepted that these results could apply equally to word association, but concluded that experiments on presented items give us no knowledge about the cause of words which arise spontaneously.

Another philosopher, Ernest Gellner, notes that psychoanalysis remains to a great extent untestable because not only the unconscious processes but also the very cure are defined and interpreted by the analyst (1985, p.176). Even the initial reasons for entering analysis can be re-interpreted over time.

Freud claimed to have found a message in neurotic symptoms,

dreams, and parapraxes, but there is the problem of proving this in that the external sign and the interpretation of the internal mental state can be unfairly manipulated by the analyst as part of any 'proof'. S. Timpanaro (1976) has a different objection to the notion of psychoanalytic interpretation: he writes that even Freudian explanations for slips of the tongue (even for most critics an acceptable part of the Freudian corpus) cannot be checked. He accepts that pre-conscious thoughts and concerns may intrude into one's speech, but uses his knowledge of the degeneracy of written texts through the centuries to show other reasons for the elision of letters and whole words, and for the mistaking of one word for another. Most important among these effects is 'banalisation', that is, '...the substitution of one word by another whose meaning is actually or apparently the same, but whose usage is more familiar to the copyist' (ibid. p.21).

As an example he gives the case of the omission of the word 'aliquis' (Latin - someone) in a Latin quotation by a young man whom Freud met on a train. Freud proceeded to gather free-associations from the man (not so 'free' complains Timpanaro) which resulted in him finding the 'cause' of the slip, that the man was worried about his girlfriend's possible pregnancy. The story is written in full at the beginning of Freud's 'Psychopathology of Everyday Life'. Timpanaro notes, however, that not only is the meaning of the quotation barely changed by the omission, but that the phrase is then more in accord with Latin grammar. He then shows that all of the six words in the phrase can be similarly connected with the notion of pregnancy, just as 'aliquis' was associated to fluid and the abortion via the name of

a murdered child-saint. For example, 'exoriare' means 'arising' in the passage, but can also mean 'birth' (ibid. p.44). In fact, Freud does note that one word was emphasised in the quote ('exoriare'), and derives two routes by which this is connected with the concern over the pregnancy. Timpanaro comments that (ibid. p.47):

'The curious thing is that Freud sees this profusion of competing explanations as confirmation of his method's validity, without ever asking himself whether this superabundance, this unlimited supply of explanations might not be an indication of the weakness of his construction. ... a particular explanation that claims to be scientific, must not be such as to elude all forms of controls.'

Jung (1968) makes the similar point that 'if you are riding in a Hungarian or Russian train and look at the strange signs in the strange language, you can associate all your complexes. You only have to let yourself go and you naturally drift into your complexes.'

Similarly, Piaget (1971) points out that it is sometimes difficult to know whether a structure is imposed on the content of a text or is there already.

Timpanaro then likens the dubious connections that Freud made between a known slip and a known mental concern to medieval etymology (ibid. p.77). An example of this was 'a wood (lucus) is so called because it gives no light (lux).' This free use of negation in constructing a connection resolved any problems recalcitrant to the method of subtracting or adding letters, and 'even in the eighteenth century critics spoke ironically, and rightly so, of this omnipotence (and thus immunity to proof or disproof) of etymology...' (ibid.). Freud wrote an essay called 'Negation' in 1915 which left him with a

similar power.

His argument also applies to the work of Palombo in so far as the latter deems some dream events to stand for real memories, and hence needs free-association to retrieve these real memories. It is the argument of this thesis that it is the structure of the dream, rather than its content, that is usually determined by the unconscious, and little use of KJ's associations is made, save for the clarification and definition of the actual dream images and scenes. Note, however, that we do need to know of KJ's general waking concerns, just as the application of the method to ethnographic data does require some knowledge of what the content items mean to the society in question, for we must know what is the relevant opposition for each item, for example, what does an eagle mean for this culture in this context, *that it is high or that it is not a scavenger?*

Freudian interpretation of slips and associations is often criticised for its unrepeatability, and hence its falling out of the domain of science. On the contrary, structural analysis, and work on symbolism, relies on 'bundles' of the particular relation in question. As has been shown, the dominant representations of KJ's main concerns for each night are repeated in dream after dream. Similarly, Hall (1966) advocated interpreting one dream with the aid of others in order to find why a particular symbol was used; Cartwright (1986) found a similar repetition in the dreams of divorcees - one had different aggressive men in various situations. Scientific rigour would, however, allow an inference to be drawn from one instance of a representation if we could be certain about the cause of the symbol, that is, if we knew what the waking stimulus was with certainty. Such exactness was cited by Eysenck (1986, p.131) from an experiment by

Luria. Luria read frightening scenes to hypnotised subjects who were told to forget the scene upon waking. They later went to sleep but were frequently found to dream of a similar scene, but with alterations by means of symbolism, e.g. a rapist was changed to someone who was snatching a handbag. (The question of whether the interpretation of a dream gives us any clue as to its means of production was tackled by this experiment, but is often ignored, for example, Hermans (1987) relates the dreamer's waking life 'valuations' to the 'valuations' of a dream, but only after the subject has chosen the dream on the basis of its relevance anyway.)

Lagrand justifies the vagueness of psychoanalysis, and its recalcitrance to falsification, as being signs of a science in its youth. Timpanaro notes that this is an excuse for a gross individualisation for all psychic occurrences, such that generalisations cannot be made. He says this leads to a tendency 'to self-conservation of the theories rather than their creative advancement' (1976, p.216). Such problems are present to a much lesser degree in my work because direct and repeated representations of concepts are found, rather than individualised single events. (It is true, however, that the dream as a whole is a single event, and that it is not possible to draw general conclusions from one dream, or from one subject. However, this individual level of analysis is the only way to discover the reason for dreams, and needs to be repeated for many dreams and many subjects, rather than altered.)

I suggest that the structuralist analysis of dreams does not have these problem with falsification that psychoanalysis does because both the initial problem and the state of the mind are both to some

extent conscious and public, in that both are common-sense texts supplied by the subject.

	<u>Psychoanalysis</u>	<u>Structuralism</u>
Waking behaviour	symptoms,	dream text
is related to	dream reports	
Structure of Thought	psychodynamics,	problems,
	instincts	conceptual
		oppositions
		of the subject

Gellner (ibid.) mentions the vagueness in psychoanalytic explanations: '... in one very important sense, the point about psychoanalytical depth inquiry into individual minds is not that it is too rigid but, on the contrary, that in a special sense it is extremely and indeed excessively open and corrigible. Roughly speaking, psychoanalysis maintains that all surface data are suspect and unreliable, and many or indeed most depth data (i.e. analytically secured data) are also suspect.' Crews (1986) makes the similar point about speculative Grand Theory in the human sciences, by stating 'Of course such bogus experiments succeed every time. All they prove is that any thematic stencil will make its own pattern stand out'.

Such cannot be said of the work on KJ's dreams, in that only a couple of problems are noted each night, and so the question of how many concrete oppositions exist in the dream is not 'excessively open'. Any problem with falsification must therefore only arise in the relating of day-problems to concrete oppositional images. I have managed to relate KJ's most obvious problems of the day to the most

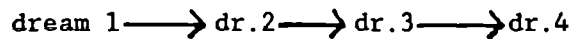
obvious oppositions in the dreams, even though finding the latter can take weeks of work. The dynamics of the oppositions are considerably more simple than the host of hydraulic activities that psychodynamics is said to engage in, although this simplicity is picked upon by Jenkins (1979) in his scorning of the idea of a structuralist unconscious as being vague, contentless and trivial.

Apart from this simplicity of the structuralist project there is the essential superiority that the dream text has over symptoms, and even over the texts of myths. This consists in that the latter two products change with each telling, for they are observed by the conscious subject as they change over time (for example, the progressions of the hysterical symptoms of Anna O. after their initial occurrence). The reports of dreams, however, change as a result of not being told, as a function of speed of waking up. The dream is a whole, a piece, before it is looked at and related. The relating is like a mechanical translation of what had just been seen. Furthermore, less scouring through the subject's life is needed in the search for a connection between dream text oppositions and the problems of waking life than is often the case for the interpretation of symptoms. This area of research on the subject's psyche is thus more circumscribed than that of psychoanalysis (although what may be written about the rituals and prohibitions of a whole society is great in both theoretical systems).

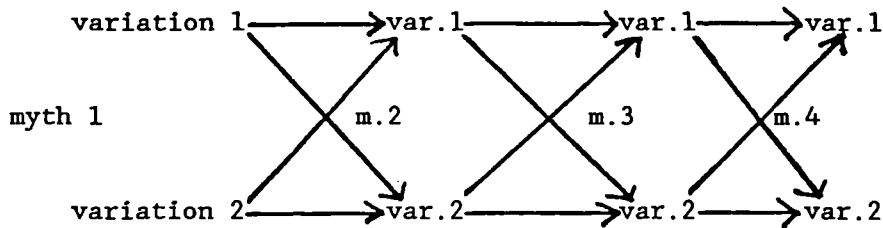
Applying Structuralist Analysis to Dreams

A myth changes in the telling, both geographically and temporally, and Levi-Strauss aims to attribute these changes to the

proposed mytho-logic. But if we study one series of texts it is heartening to know that the leeway or variation within each version of a text can be ignored, that we can study the following transformations:



rather than confuse matters with the simultaneous variance of each piece, as with the mythological data:



This greater simplicity of the dream data is a result of the text being so close to the dream experience itself. In a way the subject matter is purer because of the lack of intrusion from consciousness (assuming the subject was woken abruptly), because each dream is usually only related once, and because there are no external constraints on the movement of the dream, save for the incorporated day-events, unlike the case of variations of myths, which may be the result of many impersonal exigencies, such as a change in the society's means of production or sustenance. (Similarly, there are many external influences on kinship systems, on which the structuralist method is also applied.) Because of the importance of this lack of consciousness in all these cases I would hesitate to apply this method, or the psychoanalytic method, to lucid dreams.

I have noted above differences in the production of dreams

from that of myths, which in fact ease the application of the method to the former. However, it may be said that such differences should lead to the conclusion that the method is inapplicable to dreams. Dreams, after all, are a private and unrepeated event, unlike myths and rituals.

I disagree with this objection for many reasons. Like Freud, Levi-Strauss is aiming to relate various cultural phenomena to nature. In studying Australian totemic systems and primitive kinship patterns he is studying groups that are in the midst of the natural world. Kinship is intimately connected with sex and group survival, and totemic identity is closely connected with the surrounding natural events and classifications. (This is in contrast with life in Europe where kinship is not always obligatorily connected with progeny, and its relation to the survival of the nation can be ignored by individuals. Identity is also connected with choices of consumption and production, as much as with a correlation with natural attributes.) I contend that dreaming, as an endogenous function of the brain, is where we again find ourselves concerned with nature, with emotional and biological existence, and also with the intellectual problem of classification, which is the starting point for culture.

Badcock (1975, p.65) notes that kinship is a system of communication of women between intermarrying groups of men, that totemism is a language of one's social structure and its groups, and that myth is a system of signs in which the mind finds its place in nature, and communicates with the outside world. I add that ritual appears to be a language of the hierarchies and structure within a group (for example, with the priest at one end of the church and the picture of Jesus or Mary smiling down from above the people). These

are all languages, in that reciprocal communication, be it of women, status, group position, or cosmological concepts is taking place. I suggest that dreaming is also a language, a representation of the self, and its biological, social and emotional destiny, to the self.

This analysis fits in with Levi-Strauss' division of language between code and message, langue and parole, which he obtained from Jakobson. Badcock suggests that Levi-Strauss used the former as an emphasis on the functional whole (as with Durkheim), and the latter as an emphasis on the possibilities of changing that whole (as with Marx). Similarly, I have found a code in the dreams I have analysed; for example, in the second night that KJ spent in the sleep lab after mentioning his worries about his worth as a psychologist his physical position in the environment of the dream followed the simple code:

up:down :: psychologist:patient

But there were also the events and changes of the dreams, changes which used this basic code to construct a message, a message that could eventually even alter the code, as shown by the absence of that opposition in the last scene.

It may also be said that the results of the structuralist approach to dreams are not as stunning as was the interpretation that Levi-Strauss gave to the Oedipus myth. This is because of the concentration on form which this analysis has undertaken, and also because, in this study, the problems in K.J.'s mind are more mundane than the features of the Oedipus myth which endear it to us.

The Reality of the Oppositions

The questions remain, however, whether these oppositions are repeated because we have woken the subject, who then sleeps after speaking of the opposition in question, and whether independent judges would obtain the same analysis. The second point will be addressed after the next section. With regard to the first point I note that the idea of a dream taking up and permuting a waking opposition is just as important theoretically as the ideal finding of a dream transforming the oppositions of a previous undisturbed dream: in both cases dreams are shown to be a type of thinking. I would not take the path of the post-Structuralist writer Derrida in claiming that as the author (dreamer) is not completely in charge of the text then the critic (interpreter) has an equal role to play in the construction of its meaning. I maintain that a 'transcendental signified' is present in the dream experience itself, and that we must beware that, as Sturrock states: 'Structuralism and post-Structuralism can both lead to hyperactivity in the reader by encouraging him or her to be abnormally attentive to each moment of a text, knowing as we now do that everything in it means, and means to excess.' (1986, p.151).

Methodological Problems with Multiple Awakening Studies

There are three problems with the experimental method used.

1) The subject was woken at the end of each REM period, so we are really studying only the first dream of a period of sleep. The subject's report becomes a day residue for the next dream, which is obviously unlike the situation of a normal night's sleep. At best we

must assume that the report is forgotten during the succeeding period of NREM sleep, and the elusiveness of dreams even after reporting when awake does give evidence for this. At worst, we must admit to studying only the initial transformations of day residues which occur in one dream; although this is itself significant information about the differences and similarities between waking and dream cognition.

I will answer this methodological problem with the following points:

a) We find we are not dealing with a whole series of what turn out to be first REM periods. The dreams which K.J. gives us become longer and more vivid all through the night, just as occurs if a subject is allowed to sleep and dream normally.

b) Verdone (1965) conducted an experiment to relate time of awakening during the night to age regressive content of the dream. He found that early dreams have recent memories and that dreams from later in the night had more memories from early in life. This was found despite his regimen being that the dreamer was awakened many times each night. The temporal age of dream content carried on progressing despite the awakenings.

c) Dreams that are recalled are usually forgotten within minutes unless actively repeated. It is quite possible that the information recalled by K.J. is largely forgotten during the intervening period of NREM sleep. However, the texts do indicate that, with prompting, K.J. could recall many of the nights' dreams in the morning.

d) If the experimental paradigm is largely different from a normal night's sleep and any progressions between dreams that we find

are an artefact of the regimen, we are still studying an important phenomenon. Like Silberer, we are then studying the transformation of waking thoughts into dream thoughts, and then the transformation of thoughts within a dream, but, unfortunately, not the transformations that would normally occur, unknown to the outside world, between uninterrupted dreams. We have, however, been using dreams to study the type of transformations which are also found in the unconstrained activity of myth-making, because dreams are held to be similarly unconstrained by the outside world. The regimen used in this experiment is certainly aimed at examples of unconstrained thought, though not at a normal night's sleep, and the finding of such transformations and progressions here would bode well for the theory behind the original application of structuralism to myths. After all, myth-making is itself partly conscious, the myths are known even when not being told, and we must not decry finding the same mythological activity in a different paradigm, just because the paradigm is not exactly the one we would like ideally.

2) In taking reports of the experience of dreaming, care must be exercised in assessing artefacts of the procedure used. For example, Cicogna, Cavallero & Bosinelli (1982) found awakening reports to differ from morning, 3 day and 1 week reports, especially concerning restructuring of the material and a decrease in 'interactive' as opposed to 'associative' sentences. The former were sentences of the report related to motivation, the latter were related to cognition. They also note that spontaneously recalled dreams may be better structured than interrupted ones, which they attribute to secondary revision. However, Belicki and Bowers (1982) found that

pre-sleep instructions to pay attention to a particular dream content were more efficacious than post-sleep instructions, which they concluded were insufficient to account for dream report changes following pre-sleep instructions. Foulkes (1966) showed that subjects interrupted at the early stages of a dream gave more mundane reports than those woken later on, and similarly whether the awakening was abrupt or gradual is important, the former leading to the more bizarre imagery (Goodenough, Lewis, Shapiro, Jaret & Sleser, 1965). Of greater interest to this study are the findings of Rechtschaffen (1964) and Fiss (1969) that repeated interruptions of REM sleep heightened the degree of continuity between dream themes. This is an important point in that, of necessity, research on series of dreams must involve waking the subject during each dream. Note, however, that the subject KJ in the empirical part of this thesis was only awakened once per REM period, rather than repeatedly, and so the results obtained here can still be claimed as intrinsic to the dream, rather than to the regimen used.

Furthermore, that we are studying a subject in the lab rather than at home will affect the content of dreams. Hartmann (1984) reports that chronic nightmare sufferers have less frightening dreams when in the lab. Early studies showed a difference between home and lab dreams, although Weisz and Foulkes (1970) dispute them. Lastly, Austin (1971) found that convergers (defined as someone who is "...substantially better at the intelligence test than ... at the open-ended tests." Hudson, 1966, p.55) reported on 65% of REMS awakenings as remembering dreaming whereas divergers reported some recall on 95% of REM awakenings with the former giving shorter reports. So, the subject's personality will affect the type of reports

we obtain.

3) There is the problem of the experimental set-up and expectations for KJ in this instance. KJ did sleep well but also had an emotional and professional involvement with the very department that he was at that moment a subject in. In addition, although the experiment was about anxiety levels, leading to such comments as 'so you think there was an underlying tone of anxiety throughout all your dreams' from the technician, there is the problem of experimenter bias and subject expectations. For example, at one point the technician does ask how the dreams tie in with the pre-sleep interview. This introduces two issues:

a) how ideal the situation was for KJ, in that he does have problems with the department (describing himself as 'oppositional') and must hand in an overdue report to Professor Cartwright, who is in overall charge of the sleep project, after the second night.

b) whether there were expectations for a particular result by KJ or by the experimenters.

The first point would only lead to problems if KJ found it difficult to sleep or dream normally, or if he censored his dreams to make them more acceptable. The evidence about his ability to sleep has been addressed earlier. Evidence against the second possibility is provided by his reporting on the first night kissing a colleague, the issue of anti-Semitism, and the issue of Ros's lost tape-recorder; on the third night admitting worries about being in the wrong school; and his honest talking about drugs and his aggressive fantasy about Benton on the fourth night.

The presence of specific concerns, even though their source lies with the university, does make the task of analysis easier. Much work on problem-solving in dreams has used intellectual problems (Schatzman, 1983; Lewin & Glaubman, 1975) or emotional problems of no relevance to the dreamer (Cartwright, 1974): the stress of various situations in KJ's life does increase the ecological validity of the present study of resolutions in dreams.

Point (b) is the more important in that given KJ is sleeping and dreaming normally the actual dreams he does have may be influenced by his own or the experimenter's expectations. Although the application of structural anthropology to the dreams was only suggested many years later it is the case that the subjects and experimenters did expect there to be some relation between waking life and the dreams. There are a number of points to be made with regard to this this:

- 1) the major and quantitative part of the experiment was about anxiety levels in waking life and in the dreams, not about specific resolutions of problems.

- 2) KJ was asked about many things following his dreams. Their emotional content; his associations to them; his degree of participation in the scenes; and the presence of real memories, among others. The variety of theories which, if interested, he could have guessed that the experimenters were checking was thus vast. KJ was a naive subject but did, no doubt, have greater knowledge of dream theories than most people. This would, however, if anything, have increased the difficulty in having any single expectation about the experiment: does he have compensatory dreams for his anxiety level, or

wishes fulfilled in each dream, or memories cropping up in each dream, etc.?

The prompts that the experimenter gave at the end of some of the nights, to sum the dreams up and to provide an interpretation, did not really go further than the common folk knowledge that dreams are related to our everyday lives: it would be very difficult to find anyone, especially someone with good dream recall, who does not believe this or consider it a possibility. The work of Cartwright (1986) and Schechter, Schmeider and Staal (1965) shows that any variation in dream mentation style is an unconscious consequence of waking cognitive style and emotional life, rather than any thoughts about the form of dreams one should have, or temporary expectations. Singer (1981, pp. 68-71) makes the corresponding point that the three styles of day-dreaming (anxious-distractible, guilty-negative and positive-vivid) correlate with long-standing personality traits. The dismal lack of replication of reports of the solving of intellectual problems in sleep, to be expanded upon in the next chapter, shows the difficulty of producing short-term changes in the content of dreams, let alone their form.

3) As is usual, KJ did not treat a dream report as a new day residue input for the next REM period. The connections of metaphors between different awakenings that I have found often took a long time for the author and independent judges to uncover: as is usual in sleep lab experimentation the subject does not have time to analyse each dream before the next episode. The correspondence between each dream and waking life does indicate that waking life is a greater influence on each dream than is the preceding dream, and that the modifications produced by the previous REM's mentation are oblique and certainly

not obvious to the dreamer. There is almost no intrusion of the manifest content of each dream into the next, and when he does compare dreams it is on the level of the literal actions that he is performing, rather than the diverse and recherche metaphors that I have found.

4) It is known that long-standing expectations of subjects can gradually affect the content of dreams; for example, the introduction of Freudian or Jungian imagery by analysands. In a recent replication of incorporation experiments Fonagy and Ennis (1988) deliberately did not tell subjects that names would be played to them during sleep in case the subjects then introduced lots of named characters into the dreams. This evidence, however, is on a totally different and much more manifest level than the characteristics of dreams that I have found. Subjects in psychoanalysis do alter their manifest dream content over time, but this is greatly different from a sleep lab subject recently inducted into the lab changing the form of his dreams, especially at the level of metaphors and their manipulation. Griffin and Foulkes (1977) showed that for 29 subjects, over 10 nights, it was not possible to consciously manipulate their dreams by pre-sleep deliberation.

The Reliability And Validity of the Structural Analysis of Dreams

The structuralist analysis of the four nights of dreams was performed by one author. Prior to this Kuper (1983) analysed the first two nights' dreams. He emphasised the oppositions Subject vs. Psychologist, and also Inferior vs. Superior, as I did, but also spotted Male vs. Female, (ibid. p.173), which I considered

unimportant. This shows the necessity of addressing the issue of reliability of the analyses.

Reliability

There are several claims being made by the structuralist account of the phenomenology of dreams. There are physical and abstract oppositions which differ from night to night, but which are continuously invoked during each night; there are dialectical progressions through the night along one or more dimensions, and there are minor reversals during the scenes of each night.

A check of reliability aims to ascertain whether well-trained analysts can obtain the same results for all these findings. Obviously the presence of the major oppositions and the accompanying progression are more important than the plethora of minor reversals (although Haskell, 1986b, stresses the latter) in that the former are claimed to tie the whole night together in a meaningful way.

However, for the method to be deemed valuable there must also be a test of the validity of the analysis. The use of a standard dream dictionary, for example, may result in reliability of interpretation, but does not guarantee that the interpretation is valid. Similarly, if dreams are used for predicting the future we would assess their interpretations as invalid, even if the method was reliably used, or the products of the method reliably obtained. A reliable method for the computer analysis of components and relations in 135 Ge myths was developed by Maranda (1972), and yet the validity of the resulting analysis of the predominant relations must still be assessed. Reliability is tested by direct replication, in which the

variable remain the same. In order to test validity there must be a systematic replication in which variables such as setting, subject, experimenter, etc., are changed in order to determine generality, and to discover exceptions.

Validity

This refers to the presence of a connection between the agreed analysis and the waking concerns of the subject. Oppositions and progressions found must be shown to relate to waking concerns. To test validity would entail swapping the concerns of one night with those of another, and attempting to make sense of the analysis of one night in terms of the concerns of the other night. Experimentally this is achieved either by giving judges one set of dreams and a choice of concerns, or by giving them one concern and a choice of a few series of dreams. The latter type of method was used by Kramer, Roth and Cisco (1976) who found that although individual dreams could not be connected with waking concerns 'the judges were able to match a night's dreams to their presumed circumstances of occurrence at a highly significant level' (ibid. p.316). The validity of the finding of a progression can be tested for by analysing for the presence of a progression in one series of dreams, and then altering the order of the dreams and reanalysing. If a new progression, or even the same one, is found, then this is evidence that the presence of a progression is a common and unenlightening artifact of the experimental procedure, and is in reality insignificant. Validity can also be assessed by inserting a dream from another series into a whole series from another night, in order to discover whether the same

oppositions can be 'found' in the inserted dream, which would again show the results of the method to be largely artifactual.

Reliability is checked simply by giving the same texts to independent judges and finding if they agree on the basic oppositions and progressions. I propose concentrating on this aspect of assessment of the work, rather than the question of validity, because:

1) without reliable analyses we are in no position to check validity,

and 2) there is already a large body of work showing that individual dreams (Kramer, Hlasny, Jacobs and Roth, 1976) and dream series (Kramer, Whitman, Baldrige and Lansky, 1964; Kramer, Roth and Cisco, 1977) can be reliably related to daytime concerns by independent judges. The latter paper shows that judges could correctly sort sets of night dreams according to their 'circumstances of occurrence', although the same could not be done for single dreams. They postulated that this difference between individual dreams and series arose either because more useful information resulted from having the many dreams, or because each dream could highlight what was important in the other dreams, that it was partly 'the result of reducing non-specific information and highlighting recognizable, useful information.' This is precisely the claim of the structuralist technique, that a comparison of one dream with another will provide information about what is important in each dream and what parts can lead to a valid comparison with waking concerns.

Before providing data about the application of the method to dream texts by different judges mention must be made of the independent use of the same methodology by the Jivaro Achuar of

Equador. Descola (1988) found that among this people there is a specific method of dream analysis which is used for predicting the future. He notes that:

'... the rule of interpretation mainly consists ... in an inversion between the apparent content of the dream and the message it portends, in terms of the nature/culture axis: the attributes and behaviour of animals forbode specific human deeds, while human acts announce the actions of particular animals. For example, a dream of charging peccaries will be interpreted as the presage of a skirmish with enemy warriors, while a man dreaming of sexual intercourse with a woman is thus warned of a possible snakebite.' (1988, p.8.)

Other dreams are reduced to an elementary form which 'reduces the content of the dream to a single image that can be submitted to a general formula of inversion or transposition: the attributes of natural beings are translatable into human behaviour, while cultural activities are the register in which relations to animals are played out. The interpretation of ... dreams is thus strictly metaphorical.' (1988, pp.11-12.)

However, such use of metaphor is not by the noting of simple one-to-one correspondences.

'... they seem to differ markedly from the usual techniques of symbolic correspondence apparently *common to many archaic societies*. The predictive content of these dreams is revealed through a double and probably simultaneous process: the selection of a short sequence and a systematic inversion or transposition of its signified. The Achuar, like several other amazonian societies, make use of a simple principle of conversion that presupposes a correspondence

between fields of practice and sets of notions usually held to be irreconcilable: humans and animals, up and down, aquatic and aerial, male tasks and female tasks. However, the conversion process is applied here less to the content of the symbols interconnected by the sequence selected for gloss, than to the relation it expresses; being of a purely logical character, this relation lends itself easily to the operations of permutation by homology, inversion or symmetry from which the augural message springs. These permutations seem to be grounded in an elementary grammar with a probably finite set of rules.' (1988, pp.13-14.)

He goes on to note (ibid. p.21) that this system of interpretation is not only normative, but can also generate an infinite number of statements. The method is thus more reliably applied than are particular interpretations reliably obtained, for any relation within the dream can be chosen as significant, and have the method of exegesis applied to it. This is then an account of dream interpretation rather than dream production.

Production must be investigated by:

dream 1 \longrightarrow dream 2 comparisons,
as opposed to dream \longrightarrow interpretation studies,

simply because any activity can lead to associations of affect or memories, although the affects or memories were not necessarily encoded into the activity when it was produced.

The way in which the interpretations described by Descola occurs, though, does provide evidence that the type of thinking described by Levi-Strauss (passim.) and Kuper (ibid.) is not peculiar to those authors accounts.

'... instead of attributing a constant signification to

dream symbols, they emphasize the logical operations through which symbols are connected; it is not the metaphorization of dream objects that holds a divinatory value, but the metaphorization of their relations.' (Descola, 1988, p.25.)

Taking this evidence in addition to the work of Silberer it is therefore postulated that metaphorisation of relations could occur in going from waking concerns to dreams, and the extent of this must be empirically discovered. A dream itself is then the interpretation of a waking 'story' and contains an encoded memory much as speech does, as opposed to the warning of Foulkes (1985, p.192) that 'intentional meanings are not the only meanings events can have'. He is warning that, for example, the 'meaning' of raised blood levels in urine is not an intended sign, but can still be read as a sign: similarly, Foulkes gives the example of the hidden meanings and 'unintentional behaviors' (ibid.) that can be present in a politician's speech.

However, even if a dream does not have an intended message, even if a dream is not like an 'unopened letter' (Fromm, 1957), the way in which it is formed and the ways in which it is interpreted can provide evidence about types of cognition. We will now test the reliability of the application of the structuralist method of analysis, a method which makes claims about both the formation and interpretation of dreams.

Experiment to Test Reliability

Four judges were obtained from an undergraduate psychology methods course. Only one judge had any familiarity with structural

anthropology. It was explained that they would spend approximately 20 hours on this project, which would entail learning the method and applying it to night 4. They were given copies of Levi-Strauss' paper 'the Structural Analysis of Myth'; Kuper (1986); Kuper and Stone (1982); my analysis of nights 2 and 3; and the complete text of KJ's night 4 dreams, which meant that they had to devise their own precis rather than be guided by mine. They were then given the following instructions:

PROJECT ON THE STRUCTURALIST ANALYSIS OF DREAM SERIES

1) In this project you will apply the structuralist method of analysis to one night of dreams, having read two illustrative analyses of the previous series provided by the same subject, KJ, a psychology student.

2) *In a sense there is no single correct answer in this analysis.* Whatever you end up with at the end of the project is valid, it shows what an independant analysis arrives at in the time available, even if it is less than, or different from, other analyses.

3) It will be necessary to talk to me and to each other about what the analysis entails, but you should not divulge what you have found of the analysis of the last night's dreams.

4) Levi-Strauss claims that in myths there is a central concern of the mythmakers which can be expressed as an opposition, such as over-rating of blood relations versus under-rating of blood-relations, or endogamy versus exogamy. This can appear in the myth

directly, as well as in the form of a derived opposition, which can be a physical metaphor for it, such as up versus down, old versus young. The relevant oppositions can be found by comparing the beginning and end of the myth/dream series. For example, on night 2 the opposition up/down is important in many of the dreams of the night, as is revolving/static. Such oppositions are synchronic (i.e. their temporal position in the series is unimportant) and one needs to be imaginative to spot what the relevant physical opposition is.

5) He also predicts that the diachronic (i.e. temporal) movement of the text is dialectical. One scene (thesis) is followed by another scene which on one or more dimensions is opposed to it (antithesis), resulting in a further scene which is a combination and resolution of these two (synthesis), and which then produces its own antithesis. For example, in night two he is given help by an older colleague in looking for an adult appliance. Next, he looks for a child's object himself (antithesis). Next, he shows the workings of a spinning toy to his colleagues (synthesis). The oppositions which are relevant are young/old and acting on his own versus being helped.

6) Whether you come up with the same oppositions and progressions in the series is a measure of the reliability of the method. Whether this can then be related to KJ's concerns of the day is a test of the method's validity, which is a different question entirely. On the second night his major concerns were his position as a student vis-a-vis older colleagues, and the Parent-Adult-Child theory of transactional analysis, which fits in with the physical oppositions used in the dreams.

7) I should be in Brunel everyday of the week if help is needed.

Judge 1

This judge, who was conversant with structuralist analysis, found the following opposition:

passive : active :: old : new.

She derived it from such elements as the football and drugs episode, which was an "old" scene; the old furniture; the rusty scissors; the industrial part of town (old, she postulates); trees 'alive and growing'; Piper cub aeroplane (presumably new). These she relates to KJ's increasing assertiveness across the night:

'For KJ the old is related to being passive, there is less discomfort by staying with what is familiar. This could be seen in the pre-sleep interview, when to do his work would mean to "stay with the pain" whereas he could "rejoice about the good things" if he just "killed time".

She states that the initial problem of:

KJ cannot assert himself KJ can assert himself

is initially resolved by: 'The plane cuts the bottom edge off the man/clouds, Connie tells him to stop what he is doing.'

She spots the following two parts of a dialectical argument:

'KJ tries to do a U-turn but he and a woman in a car overturn' versus 'KJ sees the trees alive and growing and convinces his mother of the interrelationship with the trees'.

and 'KJ is afraid of the young kids and hides' versus 'KJ finds his way through twisted hallways and takes what he wants'.

She notes that overall 'he cannot solve his problems with Benton, with his work, or with Connie by getting someone or something to do the work for him; by going back (U-turn); by passively following a woman's lead; by rushing around them; by taking what he wants without communicating what he is doing; by hiding; or by allowing them to organise his life. He has to stand up to Benton, his work and Connie and "hassle it back and forth".' 'The dream's resolution is a compromise: both active ("Stands up to Steve") and passive ("Listens to Carol") play a positive part in the solution to KJ's waking-life problems.'

This judge did mention another opposition, that of male:female as being related to change:no change. Such an interpretation was based on the opposition of Connie to his liking for the plane's activity, and his mother's lack of recognition of the trees, but it does ignore the obstreporous older male in the first awakening, and helpful Ros in the last one. This illustrates that it is not possible to force any opposition to fit in with the dream data.

Judge 2

This judge found the following oppositions:

1. A. Prospective Immediate
 B. Active versus Passive
 C. Aims Needs
2. A. Intra Inter
 B. Internal versus External
 C. Stationary Moving
3. Ignorance versus Knowledge

He relates 1A and 1C and 2C to KJ's lack of ability to get down to hard work, and also states:

'Active versus passive refer respectively (or appear to) to the concern he feels that he is being dominated by his superior Benton, and his ability to steer a relatively autonomous course in terms of action.'

He later notes the following:

- | 'Passive | Active |
|--|--|
| (1) unsuccessful at assertion
in Pizza Parlour/News store | (1) listened to and
expounding at the |
| (2) angry with man upstairs
but passive | political banquet

(2) phoned up
(3) talked to by Carol
(4) center of conversation
in apartment
(5) in escaping from the
children |

(6) moving through warehouse

(7) afraid of the children

but active.'

He also wrote:

"2A. Intra versus Inter (defined by his movement in space relative to particular environments) seem respectively to refer to a) a lack of autonomy in his experience of control over outcomes (also pertinent to the active versus passive opposition) and perhaps an awareness that habituated programs of action are inhibiting change and b) (Inter) where freedom of movement physically in the dream, indicates a mastery over situations in real life. With the further implication that he possesses the ability to cause changes that conform to his requirements from life."

Following my instructions in the handout to compare the first and last dreams he wrote:

"An analysis of the oppositions between the first and the last dream

FIRST:

LAST:

Stationary

Moving

Remaining within the same
environment:

(1) Little automated vehicle
(2) KJ walking

(1) In bed

(3) Moves into passageway to

hide

(2) In pizza parlour/news store (4) Moving along hallway in old

(3) In apartment

industrial building

(5) In a rush to go somewhere

while talking to Connie

(6) The bike had moved

(7) The Latin children magically
disappear

Mostly intra environmental
sequences

Mostly interenvironmental
sequences."

This judge then derived a long dialectical argument in which there is a continual swapping between external and internal loci. He writes that outside has a 'sense of space and exposure', and also the 'access to other environments', but which later has an '"out on the streets" atmosphere suggested by threatening children', to inside someone else's living room, to a final scene of 'reconciliation of the idea of being inside as purposive but unproductive with the idea of inside and productive.' [I had also written of the Fourth opposition of the night being Safety versus Danger, with its mediation being the apartment.]

As an example of another dialectical change that this judge found, I will now transcribe his account of a 'movement between active and passive'.

'A: PASSIVE:

B: ACTIVE:

Apartment scene,
direct action taken
scissors scene
action possible

Makes effort, action taken but
attempts to change pizza order
and rejection of copy of Play-
boy ultimately fail to create
the kinds of changes he is
looking for

C. ACTIVE AND PASSIVE:

Active in field physically, passive socially
but engaged (socially). Possession of transport,
active in trying to get away but still nothing
created in accordance with overt wishes.'

He proceeds to write:

'These three scenes provide an escalation of activity. In the first he takes no action, in the second he does but it is unsuccessful, and in the third there is a sense in which both outcomes (non-action, action without outcome) are accounted for while at the same time augmented somewhat. There seems far more will at work in scene C.'

This author then proceeds to give many examples of KJ's increasing competence over the night.

'Ignorance

- (1) over impossibility of changing order
- (2) of what the scissors are for
- (3) of how his floor is the top floor but there's someone above him
- (4) and of what the sirens mean in the field scene

Knowledge

- (1) In political banquet KJ is portrayed possessing information that is of interest to others
- (2) has knowledge of his environment during warehouse scene

- (3) plays the role of wise interpreter in relationship with Carol
- (4) KJ sees himself as wrongly represented by Steve and thus in some sense is less knowledgeable than KJ'

He goes on to note the following reversal:

'Age change

- (1) Child is perceived as younger than he says he is
- (2) Carol becomes an older woman'

He also notes KJ's increasing assertiveness with regards Connie.

Judge 3

This judge used a symbolic analysis to show the importance of control/depletion and the difficulty of any change occurring between them, that is, there is a problem with achieving control, for it can't be obtained at one go. She hence shows that such control must be progressively obtained through the night.

"KJ vents his anger with Benton and is depleted and unable to go forward (incident in pizza parlour). Feelings of lack of control and passivity (experimenter incident) and anxiety (playing catch with two footballs and ambulance/police). Considering the implications of changing his course/or job aim, having to go into strange areas of study with new people, take in new information. KJ trying to distance himself from these possible choices. By allowing Mother to question his perception and the incident of money/brother he is ruminating upon what effect this might have with his peers/family and financial circumstances Fear of failure (return to child status - latin

children) and how any changes might affect Connie (not giving her information she might want). His worked over bike, the twisted route he takes both represented change, which might be difficult, but his argument with Steve and his control of the outcome, allow him some sense of choice, of continuity, of control."

She spotted the following two codes at work:

Confused : Resolute :: Directional : Turning

and Apart : Involved :: Vast : Specific
 (with people) (spacially)

The latter correlation captures much of my finding that involvement with other people is restricting him. The former correlation does involve the passivity-inability : activity-competence dimension (noticed by myself and by this judge in her symbolic analysis) that KJ is complaining of with regards Benton. Objectively the physical opposition of directional : turning that she uses does not seem a useful description of the first scenes, but its similarity to the notion of (spacially) free : constrained should be noted.

Judge 4

This judge concentrated on the aeroplane scene at first.

"Within this segment it seems as if there are clear oppositions in terms of up/down. The Subject is on a lower level than the person upstairs and lower than the clouds. Resolution and satisfaction are both achieved by S managing to ascend to a higher

level, with perhaps S taking on the manifestation of the small aeroplane.

<u>down</u>	<u>up</u>	<u>mediator</u>
S	Clouds	plane
	(Benton)	

It seems as if the resolution lies in the functions of the plane. The plane is used to do something to the clouds which could be said to represent Benton. The satisfaction which S feels with this scraping may be an indication of reaching nearly the same level as Benton and somehow exercising his control through the plane on the output of the cloud (Benton's work instructions)."

This judge proceeds to note that the sweeping and the scraping are both 'lateral movements'.

lateral movements

sweeping

scraping

result

snow goes down	possible change in snow (?)
(Benton's work/ work gets done)	(S's determination of type/ form of work)
(mundane)	(more interesting)
unhappy	satisfied

He notes an inversion in the Pizza scene on the same awakening:

"The only other binary oppositions which appear within this segment appear to be young and old: the old man ('grey hair') and the young boy. However, there also seems to be an inversion of the characteristics of the two - the old man playing with a (toy) doll and the young boy serving at the counter (an 'adult' job)."

He finishes by noting that through the night:

"There may also be an interesting opposition of inside and out with the boundaries between the two shifting continuously."

Judge 5

This judge found the following changes between the first and last reports:

"2nd Awakening	5th Awakening
(1) Man telling KJ he had to have pizza	KJ telling Steve R. not to interrupt
(2) Young boy	Older woman
(3) Doll with sharp edges	Chris' soft pants
(4) Man playing with doll	KJ listening to emotional talk from Carol
(5) KJ resigned to man's decision re. pizza	KJ as centre of conversation
(6) man living upstairs	woman living downstairs
(7) aeroplane above	train at ground level
(8) clearing snow	sitting out in sunshine."

She notes that there is a "passive/active opposition, resolved when KJ talks with Carol in the last awakening..."

This judge writes that in the pizza scene KJ "accepts the assistant's authority", that there is a "mid-way" dream of the football scene in which he is "concerned with authority", and the last apartment scene in which "KJ is himself exerting authority". She proceeds to write that "this progression is similarly expressed in relation to the metaphor of altitude ... the cloud, representing the man living upstairs whom KJ is annoyed with, is scraped underneath by the top of the aeroplane's wings ..." She notes that the night starts off with KJ's annoyance at a man who lives above him, that he is later on the same landing as the woman who owns the flat, 'quick to assert to her that he is not the woman owner's husband', and that finally he comforts Carol, 'the secretary from downstairs'.

Comparison with my analysis

I discovered the following concrete metaphors in the fourth night:

Above : Below :: Aggressive : Submissive
and Inside : Outside :: Constriction : Growth

Judge 1 found, amongst others, the oppositions Active (or assertive) : Passive, and change, growth:no change, which was related to New:Old.

Judge 2 found the abstract opposition Active : Passive, and also the concrete oppositions 'Intra, Internal, Stationary' : 'Inter, External, Moving'.

Judge 3 found the abstract oppositions Confused : Resolute, and Control : Passivity; in addition there was the concrete opposition of (spacially) Vast : Specific.

Judge 4 noted the concrete oppositions Inside : Outside, and Up : Down.

Judge 5 found the correlation Up : Down :: Exerting authority : Under authority. This judge noted that the resolution of this question of authority occurred when KJ was comforting Carol. Similarly, I had written 'Both the concrete oppositions and the abstract oppositions resolve themselves simultaneously. He is finally neither aggressive like the plane nor submissive like the snow, and, possibly, the submarine. He is confined with his colleagues and is the centre of attention.'

In the table on the next page there is a summary of the work by this author and by the independent judges on the fourth night, as well as the one analysis by Kuper and Stone; the analyses of KJ's night's 1&2 by Kuper; and the present author's initial analysis of four dreams of subject LK, also from the Chicago sleep lab. Although there is the confounding variable of four different subjects being used, it is evident that there is smaller variability in oppositions found across the judges used for the fourth night than there is (1) across subjects and (2) across the four nights of the one subject KJ.

LK	KJ: Night 1	Night 2	Night 3	Night 4	Analyst
(1988)	Inside dept.:Chicago outside	Up:Down	Criticised:Admired	Above:Below	This author
	Psychologist:Patient	Psychologist:Patient	Above:Below	Aggressive:Submissive	
(Inferior)		Spinning:Static	Old:Young	Inside:Outside	
Shown Kindness:				Constriction:Growth	
Suffering				Passive:Active	Judge 1
				Change, Growth:Old, no change	
				Passive:Active	Judge 2
				Stationary:Moving	
				Internal:External	
				Ignorance:KnowLedge	
				(spatially) Vast:Specific	Judge 3
				Apart:Involved	
				Confused:Resolute	
				Up:Down	Judge 4
				Inside:Outside	
				Up:Down	Judge 5
				Active:Passive	
	Inside lab.:Chicago outside	Inferior:Superior			
	Male:Female	Male:Female	Imma (1982)		
	Psychologist:Subject	Psychologist:Subject	Head:Abdomen		Adam Kuper
			Iatrogenic:Caused by patient		(& Alan Stone)
			Physiology:Psychology		
Plain's Indian (1979)					
Countryside:Town					
Managing others:Being managed					
Actors:Patients					

Summary of evidence used by each analyst.

An asterisk indicates that a piece of evidence used by myself was also used by the independent judge in the context of the same opposition. Writing in the judges column indicates that they used evidence that I had not spotted.

This author	Above : Below	
	Judge 4 up : down	Judge 5 up : down
plane (man upstairs)	*	*
apartment, 3rd or 4th floor		*
uphill on motorcycle		
train at ground level		*
motorcycle on hill		*
ship		*
submarine		*
hole		
strange apartment		
	secretary from downstairs	
	whom he comforts	

Inside : Outside

This author	Judge 2	Judge 3
	Internal:	(spacially)
	External	Vast:Specific
In pizza parlour	*	no evidence
Pizza in oven		Judge 4
In field with football	*	no evidence
Outside: brother opens card		
Inside: KJ opens card		
Inside lady's flat	*	
KJ doesn't fit into photos		
Lady outside wants to come in		
KJ outside on m/c	*	
Trees outside	*	
Idyllic outdoor political setting	*	
Inside restaurant on peer	*	
Train's compartment		
Outside there is danger	*	
In the apartment	*	

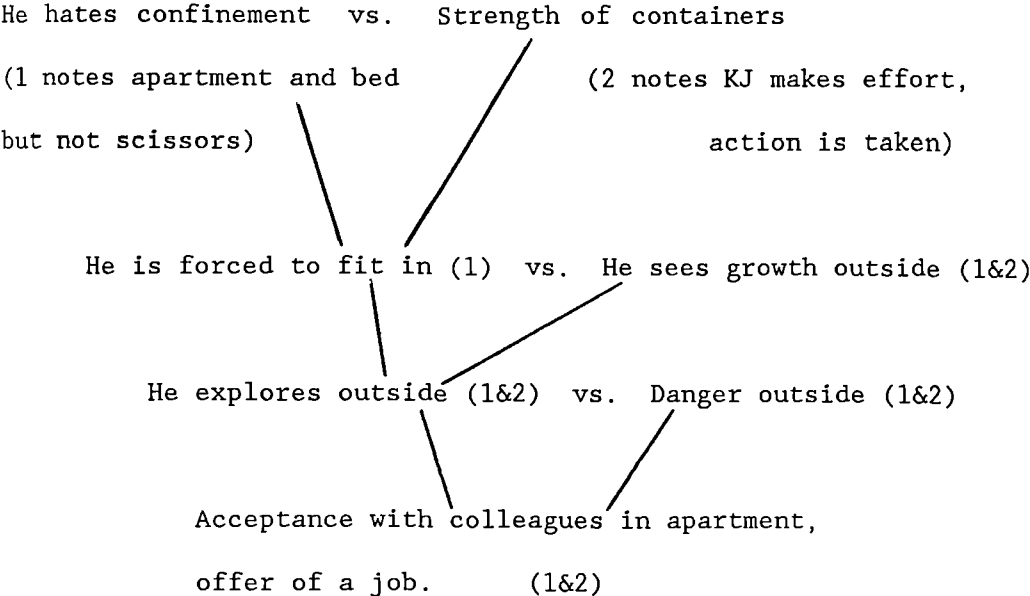
Constriction : Growth

This author	Judge 1	Judge 2
	No change:Change	Stationary:
	Old:New	Moving
		Intra:Inter
Pizza kept in oven		
Cloud; hole		
Can't leave field	Field is an 'old' scene	
In bed	Old scissors (I'd noted they were hard to open)	*
Lady outside wants to enter	Old furniture	
Sees trees outside growing	*	
Car does U-turn		
Ship catches submarine		
Idyllic outside setting	*	
Moving train (& compartment)		*
Dangerous kids outside	Afraid of kids in 'old' part of town	
Moving inside buildings	*	*
	gets through twisted hallways	
Given job by people in apartment	*	
	but he doesn't want the industrial job	

Aggressive : Submissive

This author	Judge 1	Judge 2	Judge 3	Judge 5
		active:passive		active:passive
Non-assertive to pizza seller	*	*	*	*
Confused about scissors & experimenter	*	*	*	
Plane asserts itself but fails (anger at man above)	*	*		*
	Connie disapproves			
In field, fails to escape	*	*	*	'scene concerned with authority'
	he does U-turn, car overturns	convinces mother		Steve is critical
Rides m/c outside		*		
Submarine vs. ship				
		active at banquet		
		moves through warehouse		
Afraid of but can avoid kids	*	*		
Can fix motorcycle	*	uses short cut		
Deals with Steve & secretary	*	*	*	*
	dealing with secretary			
	resolves the opposition			

Two of the judges attempted to find some parts of a dialectic argument. In the following diagram, taken from the last chapter, the numbers in parentheses indicate that the judge in question had noted that part of the argument.



Judge 2 summarises this resolution as 'phone call enquiring as to plans suggests external locus, as does presence of many people hence reconciliation of the idea of being inside as purposive but unproductive with the ideas of inside and productive.'

The following reversals were spotted by the judges:

Judge 2 noted that overall KJ interacts with single people at the start, and groups near the end. He spotted 'child is perceived as younger than he says he is' whereas 'Carol becomes an older woman'. Also, 'airplane is up and in the air' whereas the 'trolley is on rails and travels along the ground'.

Judge 3 mentions that he is angry with someone above

(Benton) and concerned with someone below (Carol), and confused in the pizza parlour as opposed to being firm about the interruption from Steve.

Judge 4 notes that early in the night he is fearful/apprehensive about an old man, and fearful/apprehensive about Latin kids later on. This judge also spotted 'the old man playing with a (toy) doll and the young boy serving at the counter (an 'adult'job).'

Judge 5 spotted the change from 'man living upstairs' to 'woman {secretary} living downstairs', and suggested that KJ seeing the trees grow outside may 'reflect KJ's concern about time-wasting and not getting any work done here.'

I conclude that it was possible, in a short time, to teach the method to subjects who had had, with one exception, almost no knowledge of it. Not only did they derive oppositions similar or identical to those found by myself, but the evidence they gave for the oppositions overlapped greatly with mine. Many reversals that I had noted were also found by the judges, as were large parts of the overall dialectical argument.

It may be remarked that some of the oppositions are sufficiently vague that they could be found in any text. However:

(1) The basic theme of the fourth night, noted by all judges, that there is increased successfully assertive activity and movement across the night is not so vague that it could be applied in reverse to the night.

(2) The assertion:submission abstract opposition and its corresponding physical counterpart of constriction:growth, are certainly

inapplicable to nights two and three, as well as to the Irma dream analysis.

(3) There are a multitude of other oppositions which these can be differentiated from, such as far:near; fast:slow; long:short. It is not the case that there are a few vague oppositions which can be read into any text.

Conclusion

I concluded at the start of this section that the structuralist method is more falsifiable than the psychoanalytic method. I then showed that its application to dreams is as justifiable as its application to kinship networks, rituals and myths. From chapter 13 I also conclude that the results of a progression within the manifest dream are not in conflict with the work of Freud on the origin of each separate dream image. From an examination of the regimen used and the question of experimenter bias I also conclude that the progressions found are not artefacts of the particular regimen of awakenings used: that a regimen of multiple awakenings is used, however, is unavoidable. The study of multiple awakenings is the closest we can come to studying the interrelationship between dreams.

I then showed that not only can the structuralist methodology be taught to naive subjects, but that its application by independent judges to a dream series from one night led to results very similar to mine.

CHAPTER 19

CONCLUSIONS

Summary and Discussion of Results

The initial description of seven theories of dreams showed that much of the empirical evidence that we have about the REM state (chapters 1, 2, 4, & 5) can be used to support almost any of them. For example, the evidence from chapter 2 that the physiology of the REM state has correlations with some factors of the experience of dreaming does not prove or disprove whether that experience is epiphenomenal or has itself some purpose. Similarly, while chapters 5 and 6 showed that the REM state is functional with regards memory and creativity there was only the possibility that dreams play an active part in memory and creativity also. It was therefore necessary to obtain predictions about the phenomenology of the experience which could be used to judge the theories.

One such prediction concerns the degree to which dreaming is discontinuous with waking concerns. As noted in chapter 3 philosophy in centuries past divided into two extreme schools over this, with the addition of a compromise school by Freud. All the theories stated, such as those of Palombo, Clark, Evans, Rycroft, and Kuper and Stone, as well as the physiological theories (described in chapter 4) and the first theory derived from neural nets, that of Crick and Mitchison, can support the notion of a continuity between waking thoughts and that of dreams. The empirical research of the last four chapters has supported the continuity theory, first mooted by Leibnitz, in finding an interrelationship between waking and dreaming life with regard to

their content.

The theories make predictions about the type of thought present, as described at the end of chapter 13. Evans predicts that the type of thought will be much as in waking life; physiological theories (e.g. the sentinel theory in chapter 1) can allow an independent simultaneous dream world and hence make no prediction about its form or content; the other theories have their own unique predictions about how the form of dreams differs from that of waking thought.

Palombo's theory could not be checked because information was not taken about the presence of KJ's memories within the dreams. With our data it is only possible to investigate how each scene is related to other ones thematically, although for a full account of the subject it will eventually be necessary to determine 'the ways in which mnemonic activation and thematic planning interact in dream formation. The implicit idea is that "What happens next?" in a dream depends partly on what memories then are in a state of activation and partly on the *narrative* requirements that what happens next must be some sort of dramatic continuation of what happened last.' (Foulkes, 1985, p.157.) An account of why some memories are involved will be needed in the future, and Palombo provides one speculation about this, and yet the progressions that are seen in each of the four nights go beyond the predictions of Palombo's theory. Certainly there are parts of the dreams of KJ which KJ states derive from experiences from long before, yet to state that this means that it is for information-processing purposes that these are juxtaposed with recent memories is quite speculative. In addition, although some of the people involved

dated from his past he recognised very little of the dream features as being real memories. The presence of so many metaphors in the dreams also points to the dreams being creative acts rather than the running together of actual memories. It may even be suggested that the high figure reported by Palombo (1984a) for dreams containing actual memories may be partly due to experimenter bias, because the subjects were his psychoanalytic patients, and were instructed to search their memories for sources of their dreams.

One strength of this theory, however, is that Palombo (1978) considers that such a rational activity as problem-solving is solely part of waking life. The evidence for its occurrence in dreams is often poor, which has led to papers that support it either being very verbose with little empirical content [Roberts, 1985], or just having the repetition of anecdotes from earlier studies [Schatzman, 1986]. One exception is the paper by Dave (1979), in which one subject after rational-cognitive therapy solved a problem in his life, whereas nine did so after having a relevant hypnotic dream.

It would not be fair to cite the presence of such long plots in the four series of dreams as evidence against Palombo, because to do so would rely on a naive view of how memories are made or stored (it would rely on depicting them as quick snapshots rather than as interconnected schemes), and also because as a psychoanalyst he does allow for the secondary revision of the dream material. The memory system would no doubt also require the use of narrative for its exploration. The strength of Palombo's theory is that it addresses the issue of why there is such a mixture of memories within each dream. In common with Freud's account of old wishes deriving aid from new events for the aim of representation, this has the advantage over simplistic

theories of the chronological coding and storage of memories, such as used by Verdone (1965). A weakness of the theory, however, is its unfalsifiability: even if REM sleep is found to aid storage of memories it is difficult to prove that the mixture of memories in dreams has any input into this. This argument is similar to that between Paivio's dual-coding hypothesis and propositional theories. Given that dreams do provide a juxtaposition of temporally distinct memories, the question is whether they exist in order to do that.

The theory of Clark, Winston & Rafelski (1984) and Clark, Rafelski & Winston (1985) also uses the idea of memory-matching, but here memories which are of similar ages can be compared. The first weakness of the theory of 'positive learning', however, is whether any explanation is being provided by their notion of an 'decreased beta', that is, increased stochastic neural firing, to account for the mnemonic activation present during dreams. Evidence for stochastic neural firing in waking life is provided by Pritchard (1961) and by Warren (1961), who played a word or phrase repeatedly and found that the subjects would hear illusory changes, which are explained as due to habituation occurring. It is possible that dreaming creates a similar effect as with the Warren experiment, not by habituation of a neural pattern but by a decrease in beta (a measure of the randomness in neural firing) leading to that pattern being drifted away from, towards a looser association. This is termed 'beta joggling' by Clark et al (1985) and although it could be the neural basis of the thought joggling and lateral thinking mentioned in chapter 6, this remains a circular argument unless physiological evidence of the changed activation algorithms of the nerve cells is provided.

Again it must be noted that KJ did not remark upon an unduly large number of real memories being present in his dreams. Also, how is the scene of the aeroplane in night four to be described? As a symbol standing for a real life experience? Once such questions are asked and the symbolic or metaphorical aspects of dreams are given their full weight, following the evidence of the repeated and congruent metaphors shown here, it must be asked what type of thought is happening? Such links between scenes were noted as long as a century ago by de Saint-Denis (1982 edition), who termed them 'abstractions'.

The repeated metaphors found argue against the Evans computer theory to an even greater extent. That theory's emphasis on action and programs is congruent with the narrative aspect of dreams, and with their frequent mundanity, and yet the repetition of the same relations and referents in such physically dissimilar scenes produces a problem. Furthermore, much of what KJ saw in the dreams was innocuous, and yet the Evans theory marks much of the contents out for erasure. Very few realistic resolutions occurred, possibly because so many of the scenes are so short. Ostensively each image did not use the same scheme or programme as a previous image, but often did provide a resolution at a metaphorical level for previous scenes. These resolutions, however, were often not realistic; for example, the record cover on night 2, or meeting the children at the end of night 3, or the train on night 4.

Despite Crick and Mitchison's emphasis on bizarreness and erasure the mundanity of so many of the scenes stands out (e.g. the

giving of presents, the football game, the open-air political meeting). The juxtaposition of many of the scenes looks incongruous, and yet there was so little that was bizarre within any of the scenes. One strange aspect was that so many of the scenes seemed to symbolise the same referent as the adjoining scenes, or to refer to its opposite; this was much more evident than the bizarre condensations predicted by Crick and Mitchison.

Hopfield, Feinstein and Palmer (1983) have shown that one model of memory needs an unlearning process to keep it free of false information, but it does not follow, even if long-term memory is also based on associative networks, that a similar method of cleaning is needed; maybe thought can keep the memory clean or at least ensure that the postulated false traces are never accessed anyway, for they would need to fit in with the overall logical system in order to be accessed. The evidence that the mixing of human memories does not occur at the level of storage was reviewed in chapter 13.

In chapter 4 the work on the catecholamine hypothesis was used to illustrate the proposition that some physiological theories of REM sleep predict that dream mentation has a sharp dichotomy with waking mentation. A corollary of this is that it is pointless to eradicate or unlearn fantasies during REM sleep because with normal levels of catecholamines the brain can adequately perform this task during waking life anyway. The unlearning hypothesis is thus analogous to punishing someone's behaviour when all that is really needed is to remove them to another situation, where that behaviour would not then occur. In addition, many experiments reported in chapter 5 can only be interpreted as showing that REMS aids the consolidation of memory

traces, or makes ones that already exist (and show no interference problems) less fragile. For example, Segal, Disterhoff & Olds (1972) showed that hippocampal theta rhythm, which is an integral part of REM sleep, is also associated with learning in adult life, thus showing a similarity between the two states with regard to their physiology. Work on protein synthesis also shows the similarity between REM sleep and normal learning. Lambrey-Sakai (1972) reported that REM deprivation in rats impaired the incorporation of amino-acids into brain proteins, thus learning is itself disrupted by REM sleep deprivation: under the unlearning theory it would be predicted that amino-acids would not be taken up anyway during REM sleep, when unlearning is supposed to be happening.

Ontogenetic data, as reviewed in chapter 1, opposes the unlearning theory because at the same time in life as there is little in memory storage there is the greatest amount of REM sleep, although Crick and Mitchison (1983) do suggest that unlearning could be a preparation for future learning in the fetus.

Dreaming may aid the storage of memories by increasing the number of interconnections between memories - this obviously is an aid to retrieval as well as to intelligent thinking. Work on associative nets is not yet concerned with interconnections between many different memories, it is concerned with inputting many separate memories onto one network. The function of dreaming then may be working on a higher level than simply aiding storage and consolidation. The importance of interconnections between memories is that with each increase in encoding used there are then more cues which will allow recall of that memory. Memories are thus made stronger by having more interconnections with other memories, whereas in the Hopfield net

strength is related to the neural connection weights of that one memory. Animal memory is not akin to the Hopfield state space (see ch.7) with its different sizes (strengths) of troughs (traces), rather it is composed of troughs of indeterminate depths but with various numbers of interconnections between them. The unlearning theory ignores the adaptiveness of memories being correlated, and the contribution this makes to intelligence and creativity.

The other main weakness of the Crick and Mitchison account follows from the work reviewed in chapter 2. The PGO bursts are found to correlate with vividness and not with bizarreness, and are possibly not the cause, but a consequence of, vivid images.

As was shown earlier the presence of a plot is only a problem for a naive application of the Hopfield net to human memory; Foulkes (1982b) gives evidence that the ability to form dream plots is only achieved with the maturation of concrete operations in the child, and proposed that there is a basic mechanism for dreams with a maturing narrative ability laid on top. However, the prediction from the Hopfield work would surely be that plots would be short, only long enough to provide definition for the content of the images. A qualitative account of the length of the scenes has been given in chapters 14-17; Rechtschaffen (1978) has noted that they are considerably longer than day-dream scenes in waking life. Both the Clark and Hopfield theories are contradicted by this finding. They are in a similar position to Hobson, who states 'activation synthesis has not yet attempted to account for the thematic-narrative constancies of dreaming in any systematic way.' (1988, p.271.)

The great strength of the Hopfield/Crick and Mitchison

theory is that it accounts for the difficulty we have in ascribing meaning to dreams. Dreams have to be interpreted because the meaning is not apparent. Not only do these interpretations differ but once a dream is interpreted we usually say 'this is what it *must* have meant', rather than 'this is what it *did* mean'. Even when an intention is found it must often be the result of evidence picked up from all over the dream, rather than from the end of the dream; dreams usually appear more meandering than interpretable sentences.

As shown earlier the psychoanalytic account of dreams does allow for the presence of narrative amongst the disjointed scenes, and its reliance on symbolism is obvious. The strength of the Rycroft account is in its emphasis on the presence and importance of metaphors in dreams. For Lakoff and Johnson metaphor 'unites reason and imagination. Reason, at the very least, involves categorization, entailment, and inference. Imagination, in one of its many aspects, involves seeing one kind of thing in terms of another kind of thing - what we have called metaphorical thought.' (1980, p.193.) However, the data provide a problem for psychoanalysis, and also for Rycroft's reformist account, in the presence of a continual exploration of oppositions from one scene to the next. For example, the changes noted from the first report on night three to the last report show a move from 'older people criticise his schooling' to 'he gives schooling advice to a mother'.

A progressive wish-fulfilment was shown for the four nights, whereas for Freud a wish-fulfilment is not an end result but rather one of the ubiquitous latent thoughts which would pervade many parts of the dream. For Freud the parts of the dream were interconnected,

but by their relation to dream thoughts rather than by manifest aspects of the dream itself, as evidenced by the dream data here.

In the light of the predictions made at the end of chapter 13 with regard to the relationships between the images and with regard to the presence of bizarre or condensed images, it is necessary to conclude that the structuralist theory of Kuper and Stone does explain the features of the data which are present. Metaphors were found to a great extent, contrary to the predictions of Clark et al, Crick and Mitchison, and Evans, and not only were the metaphors grouped in terms of oppositions, which goes beyond Freud and Rycroft's predictions, they also progressed dialectically. With regard to the predictions about bizarre condensations, only some of the theories could be tested. Due to the lack of information about memories present in the dreams Palombo's prediction of the mixture of recent and distant memories could not be tested. In addition, KJ most often seemed puzzled by the condensations. They seem to have no place in Evans' theory, which is hence contradicted. That they could sometimes be connected with foregoing events (e.g. the record cover in night 2) contradicts Crick and Mitchison's account that dreams start with condensations, but allows for no real differentiation between the theories of Kuper and Stone, Clark et al, Freud or Rycroft, because of the lack of data with regards memory combinations present.

One weakness of the structuralist account is often held to be its unreliability and dependence upon the personality of the interpreter. However, according to Boon, structuralism does make specific and falsifiable claims. 'Another sort of criticism of Levi-Strauss centers on his discovery procedures. While it has been

suggested that Levi-Strauss fails to make these procedures clear, I would counter that he makes them so clear as to leave us incredulous before their simplicity' (Boon, 1972, p.128). The method is certainly clear enough to have been taught to 5 undergraduates in a matter of hours. Boon shows how one structural analysis can indeed be better than another one; in the case of an Omarakana village geographically dichotomised by the opposition Male/Female he shows how the dichotomy Free-sex/Regulated sex is more accurate (ibid. p.127). It does remain a problem, however, that there were some differences between the author's account and that of the independent judges, and yet we are attempting to discover just some of the rules involved in the production of very complex imagery which cannot be related to simple contemporaneous inputs to the subject. The possible theoretical importance of reversals, for example, has been noted by Haskell (1986b) and by Foulkes (1985), and we should certainly be on the wrong track if we did not experience difficulties and disagreements in identifying them in practice.

Dreaming Mentation

The permutation of oppositions and their progression through the night have been shown to be on the surface of the dream and can be recognised. This has not been appreciated before because of the necessity of taking reports of all dreams through the night, the necessity of using reporters who can remember many scenes from one dream, and the necessity of concentrating upon the form of the text itself, rather than attempting to 'demythologise' it by making it as sensible as possible, or taking numerous associations which lead us

away from the dream. Only a few associations of the subject have been used in this study. I have taken literally the common belief that dreams are a form of thinking, and so have used the surface text to test this assumption. For if one wants to discover the presence of directed thought in waking life one does look for syllogisms, for the exploration of alternatives, of counterfactuals and extreme cases. These are found in KJ's dreams and betoken a sophisticated level of thought - similar to the 'sophisticated use of language' which Archard (1984) claims is so surprising when found in the supposedly pleasure-seeking and primary-process using Freudian unconscious.

'I do not apply the method of free-association because my goal is not to know the [patient's] complexes; I want to know what the dream is.' Jung (1968)

Such a use of associations can lead to convoluted arguments which detract from the text, although it has its therapeutic uses. For example, Hall (1966) reports a patient's dream in which he was punished by his father for breaking windows - rather than interpret this as an example of disobedience and rebelling against authority Hall interpreted it as punishment for the unconscious wish to penetrate the mother. Similarly, Foulkes (1978, *passim*) relies greatly on associations, although I consider this to be due to the dream example that he uses, Freud's 'Botanical Monograph', which has all the hallmarks of a short NREM or hypnogogic event.

What I have found to be unconscious in dreams is not a reified unconscious mind, but rather an unconscious process of 1) transformation of concepts into concrete terms, which is as much

unconscious as much of the processes of mental arithmetic, creative incubation, and the sudden recall of memories, and 2) the transformation of these concepts and concrete terms by means of their constituent oppositions. For example, on night 4 KJ compared the freedom to develop which he would find outside the department and outside Chicago to trees that he could see outside through a window, but later depicted the dangers of being outside.

A dream is therefore a mostly unconscious processing of mainly conscious and preconscious (ignored rather than repressed) concepts. The most simple proof of this is in fact the phenomenon of Freudian dreams itself, with their imagery of underground tunnels and erectile constructions. The patient unconsciously forms these from conscious knowledge of Freudian psychology, whereas a Jungian patient forms archetypal images from the unconscious processing of what the patient is rewarded and cued for in therapy sessions, and from general knowledge of Jung. This exemplifies the malleability of dreams by conscious knowledge. The dream is such a surprise because of the unconscious processing of this knowledge, not because it draws from memories and instincts which belong to a completely unknown part of the mind.

It is because I have likened KJ's dreams to his waking conscious thoughts, as he did, and shown that many of the details are comprehensible in terms of these thoughts, that it is possible to link dreams with incubation and creativity, as in chapter 6. Creative thought is believed to require a period of accumulation of facts, after which the issues are mulled over or, quite literally, slept on - I wish to emphasise the pre-conscious or conscious nature of the

elements that are worked on, in contrast to the unconscious nature of the actual processing. Similarly, a painter will be conscious of the model, and of the model's environment, and of the paints and canvas, but then creates a painting in a partly unconscious manner. Foulkes provides evidence that, once started, there is a drive towards the completion of the processing, such that 'on awakening midway during REM periods, laboratory subjects often say things like "It wasn't finished yet" about the dream they have reported, even though they profess not to know the specific semantic intentions underlying what they have dreamed already, or that would have guided the dream to its completion' (1982a, p.180). It has already been noted that there is more unease amongst subjects awakened from the middle of dreams than from those not allowed to even start a dream. On this urge to carry forward the thinking being performed Rechtschaffen (1978, p.102) writes that 'there is a definite chronological march of theoretically connected material, which probably proceeds without significant detours for longer periods of time than most spontaneous waking thoughts... Perhaps the single-mindedness of thematic coherence is possible because attenuated reflectiveness and imagination prevents interruption by competing thought streams'.

It must be stressed, however, that a solution may not be obtained, there may be no diachronic progression but rather only a synchronic restatement of the problem, such as with the first three scenes of KJ's fourth night. Similarly, Kramer, Whitman, Baldrige & Lansky (1964) claim that some nights show a thematic progression from dream to dream, with alternation between disturbing and resolving dreams, while others just have a repetitive restatement of the original problem.

Evidence for the meaningfulness of dreams is seen in those that 'recapitulate' symbolically a large part of the dreamers life. I use this word because of its evocation of an old, but now discredited, theory of embryology, which held that each fetus quickly goes through all the forms of its evolutionary ancestors. This type of dream shows more than the symbolism of part of someone's life, but rather gives an overview. I will give four examples of this special kind of symbolism, which must surely be showing a greater amount of thinking than the simple vertical symbolic transformations written about by Silberer.

1) In KJ's first night of dreams, written out in full in chapter 14, he tells of a night in the sleep lab. Early on he is in a room full of experimenters, he leaves the room, and when he comes back it is empty. This is also how he describes his long term relationship with people at the university, that he started there going out with them for much of the time, and now rarely does so.

2) On the last night (chapter 17) the first dreams show great frustration at constrictions, which are later accepted (in the form of a moving train). This, in fact, recapitulates his long term history at the department.

3) In my 'Konstanz' dream (cited earlier in chapter 13) I start digging up explosive material from a lake by myself. I then enter a submarine but worry that it will descend in the lake and that I will not be able to escape. I leave the submarine, stand on the shore, advise others not to enter it, and finally ask a young boy to

help me retrieve some of the material. This dream clearly encompasses over a year of my life, with its worries of whether to start, and later finish, psychotherapy.

4) In my 'Natasha' dream I start in a karate class, with all its attendant bodily activities, and then enter a library. I later leave the library and the dream finishes with me kissing the neck of a friend. This dream, as well as showing the internal dialectic of the body versus the intellect, does review my life history of normal adolescence turning to over-intellectual scholar, and returning to a compromise between the two.

Palombo's theory (of the matching of past memories with recent events) certainly accords with this idea of a symbolic recapitulation. (It is also possible that dreams such as these will still show, as much as any other dreams, the Structuralist claim of 'clear cut relationships such as contrariness, contradiction, inversion or symmetry' rather than 'small positive or negative increments' [Levi-Strauss 1981]. This is because only a few of the supposed oppositions of the dreamer's life will be held to be emphasised in any one recapitulatory dream.) This idea has similarities with Kohut's (1977) notion of 'self-state dreams', which portray in vivid, symbolic terms the current state of the dreamer's self but without a time dimension involved.

With humans, the advent of the realm of the symbolic leads to changes in waking and sleeping thought. Metaphor and metonymy can now exist in waking and sleeping thought, with the disadvantage that in the latter case they are taken to be real. This leads to no feeling

of incongruity while dreaming (except when it prompts a lucid dream), but does on awakening. We may postulate that the dreams of animals are never bizarre (unless a form of condensation occurs) because they do not use symbolism and metaphors. Metaphor and metonymy become part of waking memories and thought, and waking behaviour also becomes part of this symbolic system. So, whereas a male stag will fight for territory, the human male's territory acquires symbolic value, extending way beyond the specific uses to which it is put. This symbolic realm also invades sleeping thought, where it is taken as real. The environment of a dream can thus change suddenly for it is not just the background to the dream events but is simultaneously a symbol which can be discarded. Thus, in the Konstanz dream I travelled instantaneously from inside the submarine to the shore, without noticing any journey, because I was actually exchanging one symbol for another.

In this thesis the notion of the signifier being permanently available for new uses has been illustrated. This relies on the multitudinous properties of each object, such as, for example, the submarine. KJ used the property of the submarine that it voyages at a lower level than a ship - I used its properties of being a container, and possibly sinking. This follows from Rycroft ridiculing the idea of producing a list of sexual symbols because there is 'no reason to suppose that there are any objects which could not be used by someone somewhere to construct a sexual metaphor' (1981, p.79).

It has been shown that the properties of an object or concept are intimately connected with the properties it does not have, with what it symbolises a lack of. We do not just find a logic of abstracted properties in dreams, but rather a binary logic of

abstracted properties. However, it is a peculiarity of the dream state that alternatives cannot be held in mind at the same time, the 'single-mindedness of dreams' means that 'these alternatives seemed to occur sequentially one at a time' (Rechtschaffen, 1978, p.102). (Lucid dreams may be an exception to this rule that while dreaming one cannot imagine alternative situations.) When one alternative is given the others are still present, as shown by the high use of opposites in word association tests. Conversely, when we focus on one attribute we downplay others: 'every description will highlight, downplay, and hide - for example: ... I've invited a renowned cellist to our dinner party. ... I've invited a lesbian to our dinner party... Though the same person may fit all of these descriptions, each description highlights different aspects of the person.' (Lakoff & Johnson, 1980, p.163.)

The discussion of the importance of what an item is not brings us to the presence of dialectical arguments in dreams. A connection between dialectics and metaphor has been noted by Heilbroner, who relates the two to the unconscious and the preconscious. '... much "creative" thought hinges on the possibility of discovering analogies, linkages, syntheses and the like between hitherto separated entities. This mental act of "leaping" from one thought to another has an obvious analogue to the idea of relationship, so central to dialectical philosophy. ... dialectics is at bottom an effort to systematise, or to translate into the realm of manageable, communicable thought, certain unconscious or preconscious modes [e.g. ambivalence] of apprehending reality, especially social reality.' (1980, p.56.)

Of relevance to this finding of oppositions and dialectical thought in cognitive psychology is the work on reversal theory and personality in motivational psychology. Michael Apter has suggested that humans are not always motivated by the desire to restore homeostasis, but that we may show reversals between pairs of bistable states, such as the reversal of the relaxation-anxiety continuum with the boredom-excitement continuum (Apter and Rushton, 1981).

We now come to an empirical result concerning these oppositions which could not have been known in advance. Whereas a scientist ostensibly and consciously works by the changing of one variable at a time, we see in this thesis, and also in Levi-Strauss' results, that in dreams and myths two or more oppositions vary simultaneously. In fact, Levi-Strauss claims that the variance of one opposition leads to the simultaneous permutation of all oppositions in the system. This breaks the rules of scientific reasoning by means of formal operations.

The use of reversals of oppositions has also been noted by Foulkes, who writes:

'Another seeming peculiarity of dream experience is the way in which dream imagery seems to portray reversals of what we take to be our standard waking conceptions. The traditional interpretation of such reversals is that they are motivated, but there may be a less complex and more empirically justifiable explanation. Semantic memory research suggests that, in the featural and semantic analysis of certain concepts, we may code directly what a concept's opposite is or what a concept specifically is not. Thus, the time a human takes to verify, in a reaction-time experiment, a proposition such as "a whale

is not a fish" may be less than the verification time for "a whale is not a bird", precisely because one relationship has been taught, and encoded, directly, while the other has been left to inference' (1982, p.178).

In showing the presence of mytho-logic in human dreams I have shown it not to be limited to the waking thoughts of primitive peoples - for some reason it is used by each and every human, and has time set aside for it. Work should now be done on providing evidence from waking life for the use in creative thinking of dividing the world into oppositions (as in de Bono's PO function of aiming for the opposite of what was intended), the comparison of oppositions in metaphors, and the search for mediators and resolutions, as in many a detective novel. I have arrived at this result because of the comparison of dreams with myths. Kracke (1987, p.52) recommends the same project because 'myths are obviously a highly developed art form, an "oral literature" ... which can attain great subtlety and complexity of structure and thought. If dreams and myths partake of the same fundamental kind of image-based thinking then the type of thought process characteristic of dreams is capable of high development, and of the expression and elaboration of complex and subtle ideas. Dream thinking, or primary process, is not merely a degenerate, regressive form of adult logical thought, but is rather a distinct form of thinking, ... as valid as logical, categorical thought, but appropriate for different kinds of problems.'

Haskell (1986b) makes the similar point that:

"The identification of an array or group of operational structures could increase our current understanding of

logical and psycho-logical development and function. Such research may yield several forms of cognition not readily apparent in waking thought, and inform us about the basic structure(s) of cognition."

It would be a mistake, however, to see this type of thought as completely outside our usual waking thinking. Lakoff & Johnson (1980) write that much of our thinking is not based upon the dictionary definitions of concepts and objects, but upon metaphorical thought.

'... if you look in a dictionary under "love", you find entities that mention affection, fondness, devotion, infatuation, and even sexual desire, but there is no mention of the way in which we comprehend love by means of metaphors like LOVE IS A JOURNEY, LOVE IS WAR, etc. If we take expressions like "Look how far we've come" or "Where are we now?" there would be no way to tell from a standard dictionary or any other standard account of meaning that these expressions are normal ways of talking about the experience of love in our culture.' (ibid. p.115) 'This suggests that understanding takes place in terms of entire domains of experience and not in terms of isolated concepts.' (ibid. p.117.)

They note that the use of metaphor is so pervasive that it is often overlooked, for example:

'Your reasons *came through* to us.
It's difficult to *put* my ideas *into* words.
Try to *pack* more thought into *fewer* words.
His words *carry* little meaning.

Your words seem *hollow*.' (Lakoff and Johnson, 1980, p.11.)

The particular metaphors that are used are based upon our physical experience of seeing the world and having a body. For example, 'What's coming up this week' uses the physical basis that 'Normally our eyes look in the direction in which we typically move (ahead, forward). As an object approaches a person ... the object appears larger. Since the ground is perceived as being fixed, the top of the object appears to be moving upward in the person's field of vision.' (ibid. p.16.)

Other uses of the concretization 'up' occur in such statements as 'things are looking up', which is based upon the correlation: Good : Bad :: Up : Down.

'He is *High-minded*' and 'That was a *low* trick.' are based upon the correlation: Virtue : Depravity :: Up : Down. This latter one is part of the same network of metaphors as:

High status : Low status :: Up : Down, as well as:

Rational : Emotional :: Up : Down.

The latter correlation is the basis for such statements as:

'He couldn't *rise* above his emotions' and '... I *raised* it back up to the *rational* plane.' (Examples taken from ibid. pp.16-17.)

Even the use of rising or falling intonation in sentences ('Will you ever learn?') follows a pattern of use which does convey added information about the speaker's knowledge and intent.

These examples show that it is difficult to differentiate the physical from the cultural basis of a metaphor, and that many of the metaphors are linked together within a culture. The metaphors used

may also change across cultures; it is easy to imagine that for some cultures ACTIVE IS DOWN whereas PASSIVE IS UP, and Lakoff and Johnson (ibid. p.161) note that the Hausus speak of the nearest part to us of, say, a boulder, as its *back*, rather than its front, as we would say.

It must be emphasised, however, that there is an experiential basis to these metaphors due to our experience with physical objects, and that this enables us to view 'events, activities, emotions, ideas, etc., as entities and substances' (ibid. p.25) and hence quantify and reason about them. Asch (cited in Billow's [1977] review of the psychological literature on metaphor) has performed inter-cultural work on the basis of metaphors common to different cultures. For example, the morpheme for *straight* means honest, righteousness, and correct understanding in Chinese, Old Testament Hebrew, and Homeric Greek (ibid. p.84).

The metaphors can become more complicated however, in that there may be many attributes in common between the metaphor and referent. Each may have similarities of structure, as in the metaphor ARGUMENT IS WAR, although 'the structure is partial because only selected elements of the concept WAR are used.' (Lakoff & Johnson, 1980, p.84.)

They note that enlightenment can result from the use of some metaphors. For example, the phrase 'the solution of my problems' (ibid. p.143) can lead to thinking about problems in terms of a chemical which can dissolve them, but that they can also precipitate out again. 'Much of cultural change arises from the introduction of new metaphorical concepts and the loss of old ones. For example, the Westernization of cultures throughout the world is partly a matter of

introducing the TIME IS MONEY metaphor into those cultures.' (ibid. p.145.) Note, however, the cross-cultural work of Asch showing the use of the same metaphors in some different cultures (Billow, 1977).

The Function of Dreaming

The features described in this chapter provide an answer to the first question posed in the introduction to the effect that dreams have meaning as whole pieces, rather than being collections of separate scenes. The second question is answered with a functionalist-type discovery that dreams are the product of high level symbolic brain activity, rather than the epiphenomenon of a functional physiological process. However, a third question now results: given that the dreams are meaningful, do they have a function as well?

In the four empirical chapters we have seen a multitude of metaphorical images, coupled with the solving of minor problems in the dreams. It would be possible to tie the production of metaphors to the biological necessity of increased connections between similar memories, and the active discovery of such similarities. This would be important because Rycroft's idea of dreams as thinking that occurs at night provides them with no biological function. The function would then be that it is the metaphor that will bridge two present concerns, or a present concern and an earlier memory. For example, in the above Konstanz dream (chp.13) the psychotherapist (present) was being connected to my mother (past) via the imag of the submarine. (Not only is the submarine a womb-like container but the waters of the lake are reminiscent of birth.) Memories are present in dreams and can be a fertile source of lateral and creative thinking, by putting past

experience at the service of present needs and problems.

This hypothesis of the phenomenology of dreams can then be related to the natural history of dreaming. Experimentally we know that during REM sleep animals practise behaviour programs, and elaborate and consolidate memories (both within and between different chronological sources). This needs some amount of narrative ability, possibly commensurate with the animal's degree of independence from fixed action responses. These animals thus live in the realms of the Real and the Imaginary (to use Lacan's terminology) during waking life, with many mammals using the hippocampus to produce cognitive maps of the environment (O'Keefe & Nadel, 1978) and with primates able, in addition to imaging the world, to put themselves on such cognitive maps (Gallup, 1977). Humphrey (1980) suggests that dreams, as well as play and parental manipulation, have the effect of providing opportunities for introspection, and hence the ability to form such dream images would provide an evolutionary and functional advantage to higher species.

However, such a speculation seems unfalsifiable in that the contribution of the dream images to our self-image is difficult to measure, and just as difficult to separate from the contribution of our self-image and introspection to our dreams. Given that dreams are not only fleeting, usually unknown, and certainly present in an altered state of mind (which works against recall in the waking state), it could be argued that their actual contribution to our information-processing is quite doubtful.

Therefore, that we have found them to be meaningful, as well as showing active and recombinative thought, does not entail that they have to be purposeful as well. For example, sugar in the blood

can be read as a sign of diabetes but is not caused by the need to produce that sign. Similarly, that a metaphor is enlightening does not mean that to produce enlightenment was its purpose. Any enlightenment can result from a subsequent exploration of a metaphor, irrespective of why or how it was produced initially. The reason that dreams have been thought of as purposeful, as against the apparent superfluousness of day dreams, is that the physiological state accompanying dreaming is pre-programmed, whereas boredom or automatic activity, the usual accompaniments for day dreaming, do not show a drive for regular occurrence.

Antrobus' (1977) paper 'The Dream as Metaphor: An Information-Processing and Learning Model' may thus be divided into two independent parts, for dreams may produce metaphors without having any learning or information-processing function at all. Antrobus writes, somewhat tautologously, that 'since the context of the original event may be available less often during REM sleep than during wakefulness or other sleep stages, metaphors should be constructed more frequently in that sleep stage.' (ibid. p.333.) However, this lack of context is not the only reason for the prevalence of metaphors in dreams. Lakoff and Johnson (ibid. p.3) write that 'metaphor is pervasive in everyday life, not just in language but in thought and action.' It appears to be more prevalent in dreams because, rather than being *spoken*, the metaphors are *seen*. This occurs because the scenes are hallucinations rather than real, and so UP and DOWN, for example, can be seen as well as thought of. Yet the amount of metaphor is possibly no greater than in waking life. Antrobus is correct to see metaphor as the use of memories out of

context, but the striking attribute of dreams is the vividness of the metaphors and not their prevalence in comparison with waking life.

There is a common theme between:

- (1) this conclusion derived from combining the work of Antrobus and Lakoff and Johnson,
- and (2) the empirical part of this thesis showing similarities between waking and dreaming mentation contents,
- and (3) the empirical part of this thesis showing that REM dreams have a logical structure, indicating active goal-directed thought,
- and (4) the kinship between waking daydreams and night dreaming on the level of form, as shown by the following two studies.

Foulkes and Fleisher (1975) studied subjects in relaxed wakefulness as a control for measurements of sleep mentation. Despite taking steps to remove any expectation from the subjects' minds that their experiences would be dream-like, they found that 19% of reports were described as hallucinatory (that is, the images were thought to be real when they were happening), and 25% were classed as regressive, which included bizarre or fragmentary images. For 15% of reports there was no reality content at all, 'the subject is not controlling his thoughts, he is not aware he is in the laboratory, and his mentation is hallucinatory' (ibid. p.69). Such mentation obviously did not last nearly as long as it does during REM dreams. I must be emphasised that day dreams should not immediately be cast as 'regressive': The uses of the 'stream of consciousness' during waking life to summon up memories and its role in working memory are both adaptive, although

the 90-minute bizarreness cycle of day dreaming (Kripke and Sonnenschein, 1978) may not be.

Reinsel, Wollman and Antrobus (1986) postulated that 'the long thematic sequences of REM sleep, in contrast to waking, are achieved, in part, because of the high perceptual thresholds of that state, which prevent the disruption of mentation sequences by external stimuli.' (ibid. p.259.) They collected mentation reports from three groups of subjects. The waking with [auditory] stimulation group had many Topic Units and a high Total [word] Recall Count, a waking without stimulation group had less of each, and that the REM sleep condition had even less of each again, in an extrapolatory manner. (The latter authors do beg the question, though, of whether noise is the only disruptant of ongoing mentation, and, of course, the stages of non-REM sleep also have high perceptual thresholds, although not the same cortical activation as in the REM state.)

The continuity between dreams and waking cognition is emphasised in both cases. Horne has gone so far as to say:

'We might even begin to query whether REM sleep really is a state of sleep, or a peculiar form of wakefulness within sleep.' (1988, p.289.)

The conclusion from all this is that dreams are not a special type of thinking which has to have a special mechanism as an explanation, be it unlearning or the comparison of memories. Dreams appear to be further along the same continuum of use of concrete metaphor and imagery as daydreams, evidence for this being provided by the existence of the intermediate cases of hypnogogic imagery (Vogel,

Foulkes & Trosman, 1966), lucid dreaming, and non-REM dreaming. (In the latter case, non-REM dream reports don't show any less moment-to-moment continuity than do REM dreams; Foulkes and Schmidt, 1983.) Dreaming may simply be what the mind does when the brain is in REM sleep, just as day-dreaming occurs when we are bored, and hypnagogic imagery when we are drifting off to sleep. Dream images cause other images to arise, even in the next dream period, but they may not have any function or lasting effect, unless, like with day-dreams, we consciously pay attention and remember a particular part of one. There must be at least a short-term effect of having had one particular dream or scene, however, in order for the next dream or scene to follow on from it. The empirical evidence of this thesis cannot differentiate between this proposal, that dream images have no lasting effect unless consciously remembered, and the possibility described in chapter 5 that unconscious information-processing with a long-term effect is occurring.

Evidence provided by Singer illustrates this proposition that individual images may be meaningful but themselves take no part in information-processing: he shows (1981, pp.77 & 81) that day-dreaming may keep us alert during monotonous tasks. If this is said to be one function of day-dreaming it exemplifies the proposal that the individual images may be functionless while the activity as a whole, or its physiological counterpart, is functional. This is similar to a conclusion about myths which is a recent extrapolation by Levi-Strauss of his earlier theorising:

'... myths operate, as it were, in a hall of mirrors, but ... they reflect only each other. This implies that myths - and dreams - are not mechanisms for communicating messages in a secret language.

They are best understood as modes of thinking, or perhaps more precisely, reflection.' (Kuper, 1989, p.31.)

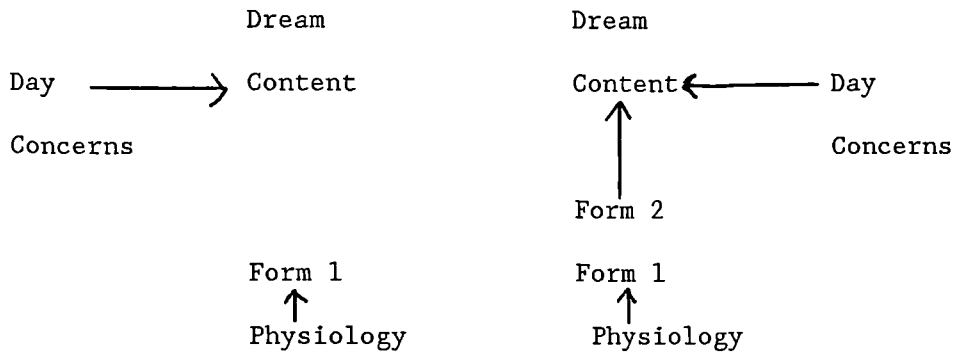
From this conclusion it is possible to provide some solution to the tension between physiology and psychology which has pervaded this thesis, the study of which first conferred respectability on the subject of dream research. The elements of dreams appear now to be based upon (1) each other, and (2) the linguistic metaphors, live and dead, present in the dreamer's culture, and so hopes of tying the images down to physiology look misguided. Tying the images up to psychology and cultural presuppositions, however, may be quite fruitful.

The Physiological Basis of Dream Cognition

This thesis started with an analysis of research connecting the physiology of REM sleep to the phenomenology of the accompanying dream. To be precise, it was the form of the dream experience that was important; for example, number of scenes, number of characters, temporal age of incorporated memories, vividness of imagery, amount of physical movement, etc. Despite the hopes of Hobson and McCarley (1977), who aimed to tie specific activities in dreams, such as flying, with isomorphic physiological conditions, the physiological work could only be related to overall properties of the imagery, and not to specific thoughts and images themselves.

In order to provide more empirical evidence about the activity of dreaming the content of four nights of dreams were then analysed. This was found to bring us back to the original question of form, because it was found that the content of the dreams was

following a concretizing and dialectical argument, which constrained the actual content that was included in the dreams. Rather than content being a random filler of the frames of the dream, it was shown to be constrained not only by the content of the waking concerns of the subject, but by a particular method of thinking.



(Arrows denote some degree of correlation, which must still be determined.) Form 1 is the collection of dream properties stated in chapters one and two, whereas form 2 is the collection of additional dream properties found in the four dreams of KJ; that is, concretization, progressive movement, and dialectical argumentation. It is necessary to note, however, that for some subjects there may sometimes, or even always, not be this effect of form on content. That it has been shown in the case of KJ is rather an important falsification of the theories that deny active thought during REM sleep completely.

To find this active thinking some components of dream cognition had to be analysed, just as Freud took apart the content of dreams to find condensation and displacement. Similarly, concerning the history of cognitive science, Luria writes that 'the acceptance of thinking as a once-and-for-all indivisible act, which can be described

by subjective methods and which cannot be broken down into its components, was a retrograde step compared with associationism, closing the door to its scientific investigation.' (1973, p.325.)

This introduction of a second type of form to the characterisation of dreams is important because it leads us out of the false content versus process dilemma proposed by Foulkes (1985, pp.196-204), which he uses to advocate the study of dreaming as opposed to dream content. He starts by noting that the use of associations to the images may or may not tell us of their sources (ibid. p.196) and adds that our ignorance of the sources is further added to in that 'little dream variation seems to be explained by the manipulation or observation of waking variables' (ibid. p.198), and that 'once we acknowledge that the sources of dreams are mnemonic rather than behavioral ... the prediction of dream content becomes much more complex.' (ibid.) He wittily sums this up as 'this is not like predicting what you'll consciously think the first time you see Paris; this is trying to predict what you'll consciously think, period, when you're not intentionally regulating your own conscious thought.' (ibid. p.200.)

He takes this as evidence that 'since it seems that the activation of mnemonic elements during dreaming and their selection for dream processing is random and arbitrary, it's not likely that the particular content of our dreams - in and of themselves - serve any adaptive function.' (ibid.) He then states that the visual form, (for example, the presence of some elements in dreams as parallel to some of waking life, and some as not parallel) means that there is some predictability about the characteristics of all dreams, and that the

reasons for these formal properties must be discovered. He then emphasises processes rather than content, dreaming rather than dreams. However, this thesis has shown that another form, or processing, is involved in dreaming, that is, the use of concrete oppositional metaphors, with their progressive and dialectical argumentation. Although we are then unable to predict content, we may be able to predict the types of content to some extent.

Foulkes makes the point that from a knowledge of form (e.g. the presence of long past and recent memories) we can construct possible functions of dreaming (e.g. 'the integration of recent evocative memories with older evocative memories', *ibid.* p.202), with the emphasis that these are just possibilities. Similarly, it must be emphasised that to discover concrete oppositional metaphorisation in dreams does not prove that that activity is their function - that may rather be one way that the mind works when it is not functioning purposefully. That this is functional also remains only a possibility.

Unconscious abilities to engage in concretization and to derive dialectical arguments were found, but there is no reason to expect that they have a physiological basis simply because they seem to hold irrespective of content in this case. Although Luria (1973, p.340) analyses the form of various mental activities (i.e. operations, teleological programming, final checking) and connects these types of activities with brain physiology, the functions he uses are much grosser and broader than those of concretization and dialectical argumentation.

This psychological activity cannot then answer Leach's question 'in what way is the Culture of Homo sapiens inseparable from the Nature of humanity' (1970, p.112.) In other words, how are our

ways of thinking, our cultural methods of classification and calculation, for example, which seem to deny our physical nature and set us apart from the animals, actually a product of our brain's physical nature. Leach proceeds to propose that, regarding the use of binary features, 'I can see no reason to believe that they are human universals' (ibid. p.113).

Some parts of the form of dreams have known physiological correlates, such as dream vividness, and a bridging law may be proposed. There is no certainty for a physiological basis for, say, Verdone's (1965) result, although some proposal would be within the bounds of speculation. However, results such as that of concretization are even further from the reach of physiology and of bridging laws. Such a conclusion, that mental events are explicable in terms of other mental events, just as physical events cause physical events, is in line with the functionalist approach that 'all kinds of physically different things could have human software' (Fodor, 1981, p.118). Dream research is thus left in much the same position as studies on the stream of consciousness when it comes to the inadequacy of current studies to draw any parallel between physiology and mentation content. This conclusion is further reinforced by evidence mentioned earlier about the similarity of dreams to waking day-dreams. Even if REM sleep is eventually explained by non-information-processing theories such as that of catecholamine repletion, or brain excitation reduction, as described in chapter 4, or the sentinel hypothesis dreams could still show a faithful, if pointless, representation of waking life. This conclusion does not then go as far as the denial by Bannister (1968) of any connection between physiology and psychology, but is

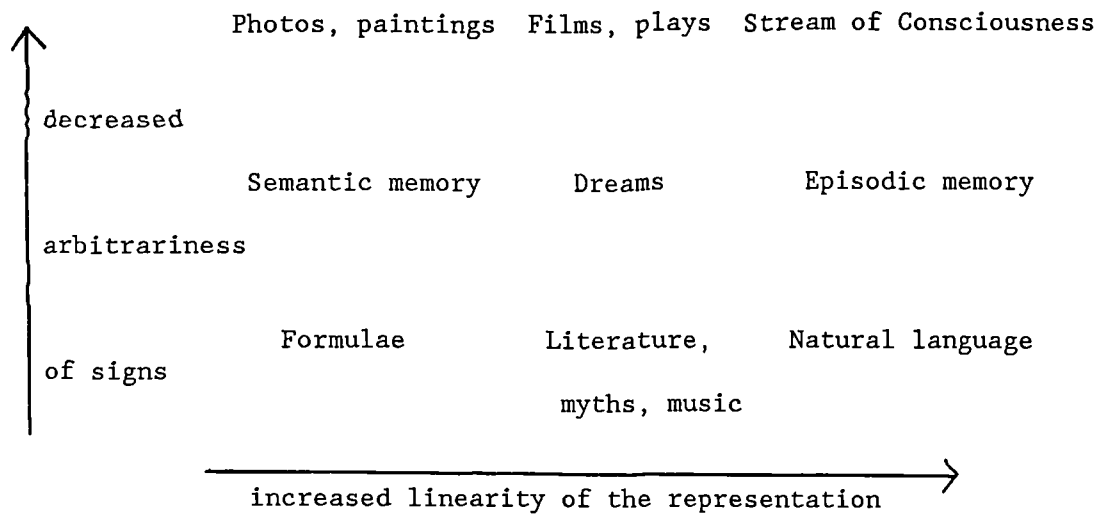
similar to Skinner's (1950) claim that physiology is irrelevant to psychology in the construction of psychological laws. Theories of dreaming are in the same position of the search for relevant variables as was learning theory in the 1950s.

'There seems to be no *a priori* reason why a complete account [of animal learning] is not possible without appeal to theoretical processes in other dimensional systems.' (ibid. p.215.)

Any explanations of the content of dreams will therefore need an account of the use of signs, and a comparison with other sign systems, to which we now proceed.

Dreams and Other Human Languages

Whatever the function of REM sleep in animals, for us dreams are just one of many human representations of the world. They can be differentiated from the other human representations along two dimensions. Firstly, the linearity of the product, the presence of time in its portrayal, whether it has a beginning and end or whether it leads onto what is represented next. Secondly, the arbitrariness of the link between sign and referent - is it a convention or is it constrained by what is represented? (These links would be connotative or denotative.) This latter distinction of sign and referent is well known in philosophy, but should not be confused with de Saussure's differentiation of signified and signifier, the first of which is acoustic, the second semantic, while both of them are mental items.



(This use of the dichotomies arbitrary/nonarbitrary and diachronic/synchronic in fact illustrates a central structuralist thesis, that it is useful, and possibly necessary, when considering a concept, to also consider its opposite.)

The first column lists representations that are summaries, extractions from a larger amount of experience.

Following the discovery that elements of a dream constantly refer to, amplify, permute, repeat or presage other elements, as occurs in poems, symphonies and plays, dreams can be put in the second column, which lists representations that are whole pieces. Although related in time they are constrained by beginning and end.

The third column consists of the bases of human culture, those which make us different from animals: yet these are resident within the person, as opposed to being a tool or artefact, like books or photographs.

The horizontal ranks are differentiated in that the bottom rank contains what Peirce called 'symbols', which have no natural link with their content (even in the case of onomatopoeic words), the

middle rank has 'indices', which have natural motivation but are open to interpretation, and the top rank has 'icons', which are each found to refer 'to the object that it denotes merely by virtue of characters of its own...' (Peirce, 1978, p.143).

All members of the above chart are language systems in the sense of being representations of the outside, and personal, worlds. Even memory and consciousness are to some extent users of symbolism, of signs, despite their felt immanence. Formulae have components which represent measurable factors in the world, with some valid symbols being absent from any particular formula, and such symbols also appearing in other formulae which then elaborate their definition and attributes. Episodic memory similarly uses signs, which are stylised representations of events. The actual event no longer exists but leaves its mark in the brain. Each component of episodic memory, however, is not an uninterpreted snapshot. Usually they must be reconstructed, partly with the use of deduction. Episodic memory leaves out much of what was present at the time of the referred-to-event, we can imagine putting new elements in (think of your breakfast table this morning - add five milk bottles to it), and it has elements which are interpreted beforehand and which can be summoned up. The analogy with spoken sentences, and hence with language, is apparent.

Structuralism is the study of signs in relation to other signs, and in relation to what each sign does not refer to, and it is these signs, and the rules by which they are put together, that constitutes a language. We note that, in the above chart, dreams are found between four separate pairs of languages. This positioning forms the basis for four *theories* of dreaming:

1) Semantic memory - Dreaming - Episodic memory

Evans' (1983) computer theory proposed that at night we practise day-time routines, eliminating unnecessary parts and making the routine more automatic. Such a practising is entailed in the transition from episodic to semantic memory, to make the former more general. Dreams can also take a semantic fact (e.g. this is what my house looks like) and build an episode around it. Dreams show us episodes, or events, which are based on semantic, general knowledge, and on events of the dream-day.

This activity can be related to another Structuralist distinction, that of langue and parole, that is, language as a whole system and each individual speech act. Each of these cannot exist without the other - language cannot be studied apart from individual speech episodes, and individual speech acts cannot occur without knowledge of part of the community's whole language system. Now, individuals in the language community are each dependent on the language as a whole, but do have the effect collectively by means of many speeches of slowly changing the language over time. The former are instances of, and dependent upon, the latter, but do have the effect of incremental changes over time. This interrelation and dependence of parole and langue is paralleled by theories of dreams which claim that the single event or episode of having a dream affects the subject's personality and more long-term schemes. Much work has been done on the consolidation of memories during REM sleep (Li & Shao, 1981; Pearlman, 1983; Palombo, 1976) and on the possible forming of new connections between memories, resulting in deeper encoding. (See chapters 5 & 8.) Such hypotheses of dreams having some

information-processing effect on the dreamer do provide an evolutionary rationale for them, whether the hypotheses are true or not, but the problem of evaluating these theories is glaring. The crux of the problem has been elaborated earlier in this chapter, and in chapter 13, with respect to Cartwright's (1986) paper showing a correlation between types of dreams and waking life personality and personality changes. It may be impossible ever to evaluate whether it is the waking personality and events that cause the dream, or whether the dream can have any reciprocal effect on waking life.

2) Films, plays - Dreams - Poetry, symphonies

Hudson's (1985) description of dreams shows their resemblance to these contrasting examples of artistic pieces. He sees the dream as a meaningful whole which is played to an audience of one. 'As a metaphor, the cinema has deep attractions. It enables us to distinguish clearly between the film studio, the world of preparation and construction, and what happens in the spectator's mind once the film in its finished state has hit the screen - the screen itself constituting the boundary or interface between one world and the other. On this analogy, Freud's dream theory is seen as a director's theory; a question of scenarios, shooting scripts, and footage left on the cutting-room floor...' (ibid. p.154)

3) Photos, painting - Dreams - Natural language

Finding itself between these two gives the dream its features of puns and condensation. Dreams are a mixture of direct

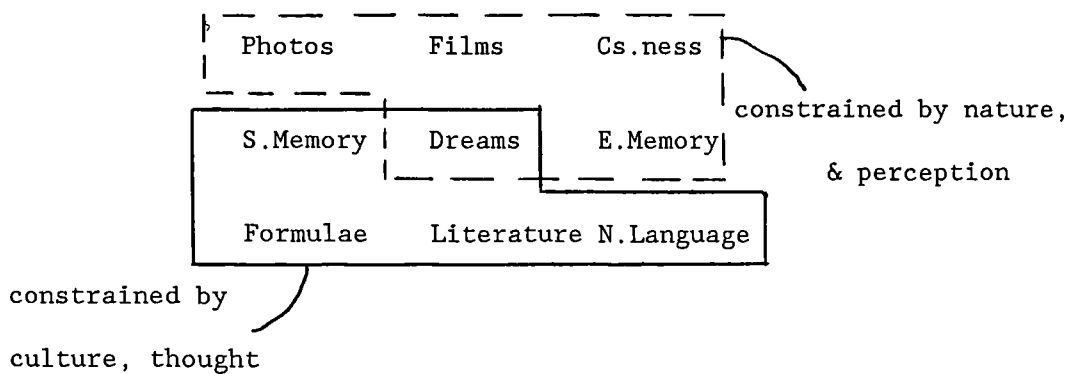
representations and corrupted arbitrary representations. For example, the use of the pun 'Lake Konstanz' - 'constant' in my dream mentioned in chapter 12. An event can be translated into language which is then manipulated, the result is then translated back and replayed as a picture of events. Freud catalogued many examples of such manipulation, for example the botanical monograph dream. Note that photographs and paintings are examples of one-way communication, while natural language is mostly a two-way communication; dreams are somehow in between, from oneself to oneself.

4) Formulae - Dreaming - Stream of Consciousness

That whole areas of experience can be related to other areas, that this relation can be succinctly expressed, and that this expression may be reduced to an algebraic relation (such as $A/\text{not } A = B/\text{not } B$) was studied by Levi-Strauss in his application of Structuralism to anthropology and mythology. He claimed that elements of the world cannot be thought about except in terms of their opposites (e.g. plenitude thought of in terms of hunger), and also that each opposition can be thought about in terms of other oppositions, whether geographical, natural, cultural, or whatever. Whereas in the case of formulae it is obvious that signification is being used, it is less obvious in some dream, and is rarely recognised in the apparently immanent experience of consciousness. The post-structuralist writer Derrida has written of the illusion of believing that presence precedes signification, which he says has dominated Western philosophy for two thousand years. He says that it is writing that first gives us an inkling of the mistake of believing

that spoken sequences of words, or sequences of thoughts, are capable of abstraction from time - for it is writing that can be more permanent than, and detached from, its author. Sturrock writes of this view: 'We cannot be fully "present" even to ourselves in so far as we must of necessity commune with ourselves in a system of signs that is not ours alone but a social institution. "Hearing ourselves speak" is the illusory model of intimacy and immediacy which Derrida suggests has enabled us conveniently to ignore the true nature of signs. It is a model which shortens the circuit of communication so much that it may no longer appear as a circuit...' (1986, p.143).

The eight language systems around dreaming in the diagram are each mainly constrained by either nature or culture, perception or thought.



All nine are language systems in that they contain a selection of the total number of possible signs, and use this selection to represent real or imagined events of waking life. For all four of the above pairs, where the dream is between two language systems, the dream is a meeting place for culture and nature, and for thought and perception. It achieves this by having its feet in both camps, by being at the same time perception and thought. In dreaming

we think what we see, and see our thoughts, both at the same time. Similarly, de Saint-Denys (1982 edition, p.34) noted that: 'the image connected with each idea appears as soon as the idea arises. ... The image of the dream is to the idea which calls it forth exactly what the image of the magic lantern is to the lighted glass-plate which produces it.'

This positioning of dreams with respect to other languages says nothing about why this is so, or about the truth or falsity of the above four types of theory which can be related to this positioning. I am placing it amongst other examples of narrative and representation and emphasising that dreaming has a narrative aspect, the study of which, as well as the application of Levi-Strauss' theory of mythic narratives, may then tell us why dreams have a narrative.

POSTSCRIPT - SUGGESTIONS FOR FUTURE RESEARCH

As well as the attempted replication of the present content-analytic study with different subjects I suggest finding further evidence for the transformational, narrative and functional aspects of dreams by the following quantitative work.

After each dream period subjects will be woken and a complete report on the dream will be obtained. In the morning the subject should be asked to associate to each thematic unit (Cicogna, Cavallero & Bosinelli, 1986) with instructions to pay attention to any memories that may have been incorporated, either into the foreground or the background of the scenes. The theoretical background of the methodology of using post-dream associations in order to discover pre-dream sources of the dream is described by Cavallero and Cicogna (1984). The search for memories provoked by single incidents is described by Rubin, Wetzler & Nebes (1986, pp.202-203) in work on recall of autobiographical memory across the lifespan. The subject will rate the date of the episodic-memories associations and also group the associations according to present concerns that they may be relevant to. Within each concern group the associations will be rated by being placed in order of decreasing relevance to the particular concern.

The concern-relevance order will then be compared by ANOVA to the chronological order of the thematic units which provoked the associations. The information-processing paradigm would predict either a preponderance of concern-related associations at the start or at the end of the night's dreaming. The associations can be divided into strict episodes, abstract self-references, and semantic traces (after

Cicogna, Cavallero & Bosinelli, 1986) in order to discover if episodic or semantic associations are produced by dreams from a particular time of night, with the assumption that this will provide evidence as to whether particular dream periods have differential access to semantic as opposed to episodic memories, or vice versa.

There has been found a progressive resolution of problems in dreams (for example, Verdone, 1965; work cited by Cartwright, 1977; this thesis) through the night and I hence predict either an increase of relevant memories through the dreams of the night, or the inclusion of progressively earlier memories - either of which will indicate the information-processing ability of dream images, as opposed to information-processing being afforded by the REM state alone. With the associations for each dream listed together the subject concerned will then rate which associations are similar to other associations. If similar associations are produced more often by temporally close thematic units and scenes than by distant ones this will be evidence that memory sources used during dreams are not activated at random. Obviously this hypothesis relies completely on the assumption of Cavallero and Cicogna (1984) that dream associations provide information about the sources of a dream.

When analysed closely the result of Verdone (1965) relies greatly on the difference in memory dates between the contents of the first and second REMPs, with little change between the second and subsequent ones. Furthermore, the regimen of waking subjects 5 or 12 minutes after the start of the REMPs could have caused REM deprivation, and hence enhancement of dream vividness, which itself

could have given rise to more remote memories being accessed. For this experiment it will therefore be necessary to wake subjects as near to the end of a REM period as possible.

In addition to the above comparison of age of memories across dreams I suggest comparing the memories present within REM dreams with those present in day-dreams. The methodology for the collection of such reports is given in Foulkes and Fleisher (1975). As reviewed in the last chapter, the topographical and formal regressions found in dream images are also present in day-dreams. The next task is to find any similarity or difference between temporal regression of REM and day-dreams. The work of Battaglia, Cavallero & Cicogna (1987) on the presence of day-residues, recent-residues and remote-residues in sleep onset mentation and REM dreams can be summarised thus:

<u>Occurrence</u>	<u>SO</u>	<u>REM</u>
Frequent	Day-, Recent-,	Recent-,
Less frequent	Remote-,	Remote-, Day-.

By extrapolation I predict that for day-dreams the frequency of occurrence of the three types of temporally referring associations will be:

Day-residues > Recent-residues > Remote-residues.

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APPENDIX I

NATURE (1983), vol. 304 pp. 158-159

'Unlearning' has a stabilizing effect in collective memories

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Crick and Mitchison¹ have presented a hypothesis for the functional role of dream sleep involving an 'unlearning' process. We have independently carried out mathematical and computer modelling of learning and 'unlearning' in a collective neural network of 30-1,000 neurones. The model network has a content-addressable memory or 'associative memory' which allows it to learn and store many memories. A particular memory can be evoked in its entirety when the network is stimulated by any adequate-sized subpart of the information of that memory². But different memories of the same size are not equally easy to recall. Also, when memories are learned, spurious memories are also created and can also be evoked. Applying an 'unlearning' process, similar to the learning processes but with a reversed sign and starting from a noise input, enhances the performance of the network in accessing real memories and in minimizing spurious ones. Although our model was not motivated by higher nervous function, our system displays behaviours which are strikingly parallel to those needed for the hypothesized role of 'unlearning' in rapid eye movement (REM) sleep.

In the most symmetric form of collective memory in our dynamic neural network², each neurone, j , has two states, and is described by a variable $\mu_j = \pm 1$. The instantaneous state of the system of N neurones can be thought of as an N -dimensional vector having components μ_i of size 1. The neurones are interconnected by a network of synapses, with a synaptic strength T_{ij} from neurone j to neurone i . The instantaneous input to neurone i is

$$\text{input to } i = \sum_{j=1}^N T_{ij} \mu_j$$

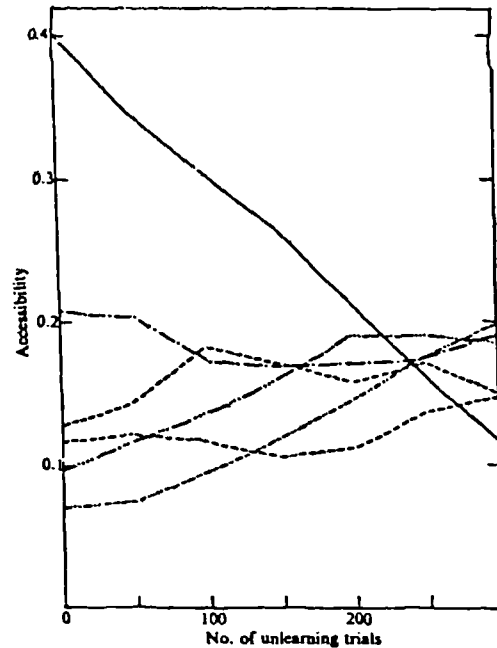


Fig. 1 The fraction of random starting states which leads to particle memories (accessibility). The five dashed lines are the five nominal memories. The solid line is the total accessibility of all spurious memories. In these trials ϵ was set at 0.01.

where μ_j is the present state (± 1) of neurone j . The neural state of the system changes in time under the following algorithm. Each neurone i interrogates itself at random in time, but at a mean rate W , and readjusts its state, setting $\mu_i = \pm 1$ according to whether the input to i at that moment is greater or less than zero. The neurones act asynchronously.

This algorithm defines the time evolution of the state of the system. For any symmetric connection matrix, there are stable states of the network of neurones, in which each neurone is either 'on' and has an input ≥ 0 or 'off' and has an input < 0 . These stable states will not change in time. Starting from any arbitrary initial state, the system reaches a stable state and ceases to evolve in a time of $\sim 3/W$.

The stable states of the system can be arbitrarily assigned by an appropriate choice of T_{ij} . Suppose n different N -dimensional state vectors

$$\mu_i^s, i=1, s=1 \text{ to } n \leq 0.25N$$

are to be stable states of the system. If these state vectors are sufficiently different, and if the synaptic connection matrix T_{ij} is given by

$$T_{ij} = \sum_s \mu_i^s \mu_j^s; T_{ii} = 0$$

$$i \neq j$$

then the states μ^s will be stable states of the system.

This network now functions as an associative memory. If started from an initial state which resembles somewhat state μ^1 and which resembles other μ^s ($s \neq 1$) very little, the state will evolve to the state μ^1 . The states μ^s are evokable memories, and the system correctly reconstructs an entire memory from any initial partial information, as long as the partial information was sufficient to identify a single memory. Detailed properties of the collective operation of this network have been described previously².

The form of the T_{ij} matrix can be described as an incremental learning rule. To learn a new memory μ^{new} , increment T_{ij} by

$$\text{learn } \mu^{\text{new}} \Delta T_{ij} = \mu_i^{\text{new}} \mu_j^{\text{new}}$$

In biology or in circuits, this would be done by placing the system in state μ^{new} —for example, driven by external inputs—and enabling a learning process that allows all T_{ij} to increment. The information needed by each synapse is local—the increment for synapse ij does not depend on the global structure of the new state or past memories, but only on μ_i^{new} and μ_j^{old} .

Under this algorithm, when random starting states are chosen, some stored memories are much more accessible than others, that is, considerably larger numbers of randomly chosen initial states lead to some memories than to others. This is a vagary of the particular set of memories which have been learned. It occurred to us that it would be possible to reduce this unevenness of access (which can be intuitively described as the "50% of all stimuli remind me of sex" problem) by 'unlearning'.

Specific unlearning was implemented by choosing starting states at random; when a final equilibrium state μ^f was reached it was weakly unlearned by the incremental change

$$\text{unlearn } \mu^f \Delta T_{ij} = -\epsilon \mu_i^f \mu_j^f, 0 < \epsilon < 1$$

Figure 1 illustrates the effect of unlearning on the accessibility of five stored memories in a set of 32 neurones. Accessibility is quantitatively defined as the fraction of random initial states leading to a particular final stable state or group of states. The unevenness of the lines is due in part to statistical noise in the simulation. The accessibility of the nominal assigned memories initially ranges over a factor of 3, but converges with unlearning to a spread of only a factor of 1.4. Thus the accessibility is much more uniform (or in Crick-Mitchison terms, the relative stability of the modes made more uniform) after specific unlearning, and the system will have functionally improved recall.

In our model the storage of a set of assigned memories in T_{ij} also produces a set of spurious stable states which were not inserted as memory states. One of the strong effects of unremembering is to reduce the total accessibility of spurious states, as shown by the solid line in Fig. 1.

The qualitative reason for the success of unlearning comes from the behaviour of the 'energy' E , defined for any state μ as

$$E = -\sum_{i,j} T_{ij} \mu_i \mu_j$$

The change of neural state with time according to the asynchronous algorithm monotonically decreases E until a final stable state is reached—either a stored memory or a spurious memory. Any stable state μ^m has, for a given T_{ij} , an energy E^m . There is a strong tendency for the states having the deepest energy valleys to collect from the largest number of random starting states, that is, deep valleys are also broad. When a final state μ^f is unlearned, its energy E^f is specifically raised and its valley of collection diminished relative to other states. While this argument indicates why accessibility of stored memories should be made more nearly even by unlearning, only a detailed analysis shows why the spurious states should be so sensitive to it. Too much unlearning will ultimately destroy the stored memories.

We have identified a class of spurious states, which in their most elementary form have their origin in triples. As an example on 16 neurones

Memory 1	+++ +----		+ + - + - + - -
Memory 2	+++ +----		- - + - + - + +
Memory 3	+ + - - + - - -		+ - - + + - - +
Spurious memory	+++ +----		+ - - + + - - +

The stability of the spurious memory is enhanced if the first half of memory 3 is weakly correlated with memories 1 and 2. Mathematical analysis of the statistical stability of such spurious states shows that they are typically less stable than the assigned memories, and that the stability will also depend on correlations with other memories. The nature of these spurious states can be described by analogy in terms of higher level function by

the example

Memory 1	Walter, white
Memory 2	Walter, black
Memory 3	Harold, grey
Spurious memory	Walter, grey

where grey is taken as a category equally resembling black and white. This spurious state is more stable when 'Harold' and 'Walter' have a significant correlation—perhaps 'Harold' and 'Harry'. These particular spurious states are not simply transitive logical associations of the form $A \leftrightarrow B, B \leftrightarrow C; \rightarrow A \leftrightarrow C$. They are truly spurious 'illogical' associations, but perhaps 'plausible' as they come from correlations in the structure of memories.

In our simple system, unlearning improves memory function both by the equalization of accessibility and the suppression of spurious memories. We asked whether other simple algorithmic changes such as clipping the T_{ij} matrix or a threshold effect produce an equivalent improvement in memory performance. These two do not, presumably because they lack the essential element of the present scheme, that is, the feedback via the algorithm of information about the accessibility of particular states. We believe the results found will be insensitive to whether the state component values are taken as 0 and 1 or ± 1 .

The REM sleep hypothesis of Crick and Mitchison¹ refers to higher level processing. Our example illustrates that from a mathematical viewpoint the general idea could work as they described. If the Crick-Mitchison hypothesis is correct, one might ask about correlations between the structure of the spurious linkages in modelling and the strange associations present in dreams.

We thank F. Crick and D. Willshaw for discussions. This work was supported in part by NSF grant DMR-8107494 and by the System Development Foundation.

Received 31 December 1982; accepted 15 May 1983.

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APPENDIX 2

THE FULL TEXTS OF KJ'S FOUR NIGHTS' DREAMS

KJ was one of a group who went once a month to a dream lab in Chicago. He was a graduate student. Joan Smith is a fellow graduate student; Chris is his major professor dissertation supervisor; he lives with Connie; Ros is the department professor.

NIGHT 1. (30-31/7/73)

Pre-sleep interview.

E. I would like to talk a little bit about what kind of thoughts are going through your mind now - just before you are to go to sleep.

S. What am I thinking about ?

E. Yes.

S. I'm thinking about clinical psychology and whether.... I would really like to get out of. There's this scenery by Tom Wald and stuff that I was just thinking about how I got so turned on by reading about Tom Wald. Reading that I've been out of touch with since a few years ago. When I get into some fiction I really enjoy it. I don't take the time to do that at all. I was just kind of thinking that there are ways to do it and I know that I would enjoy it. I feel like I'm sacrificing all that to do what I am doing right now. The longer I stay in it the harder it is to get out of it. I use all of the potential that is there. That's what I've been thinking about.

E. Are you feeling kind of sad or disappointed ?

S. Not necessarily, just kind of looking over everything and seeing how big the world is and how small the cut off is. It's kind of a reconsideration, an uncertainty, but not necessarily a disappointment. Not regret or that I made a mistake, just that there is all that to do out there, and I have to keep this in mind.

E. So you want to find a place for it among all the other things so that it doesn't get lost.

S. Oh yes, because I never decided to give it up. Do you want to know what else I was thinking of ?

E. Yes.

S. I'm a little concerned about tomorrow. In class I to present [sic] my patient and that should be an interesting scene with my professor there although I don't have that much anxiety about it. My professor, she's really flakey and I don't want to do anything to appear that I am more oppositional than I am. She'll pick right up on that. She doesn't know me but she's heard about me. Everything I do kind of funnels up the channel. So I have already eliminated some of the things that I was going to do realising that she's going to read them this way, even though I don't believe in the the way is effective at all.

E. Do you feel that she is going to be overly critical and that you don't have the freedom to present the patient as you would like to.

S. No, I was just realising that in terms of my life it is just such a heavy head think all the time. Everything is psych. You know there is not someone forcing me to do it, but I feel that my head is being shaped and that is how I am looking at the world - as a clinical psychologist. Hearing my own conversation, hearing the way I look at things, how I observe them - I guess that is what is getting me down - everything is analyzed. I appreciate things, I see the beauty of it, but then I analyze it. I'm not satisfied with just appreciating the beauty. I'm imposing all this structure on myself. And sometimes I kind of get out of myself and look back in and say fine you can have that, but rather than 95% let's cut it back to about 50% off the job - on the job you can be 95% and be excellent, but let's cut it ... because ... not never wanted to be on the outside. I don't want to be the role in all social relationships as the psychologist. When I'm with people, I realized that all I talk about is psychology and I'm talking with other friends who are not in psychology and I'm still talking about psychology. I sometimes think, gee sometimes I ought to talk about something other than psychology, but that's what always comes to mind particularly all I hang around with is graduate students in psychology. I don't even hang around with them very much - we don't have very many friends. We used to spend a lot of time with people, but we don't do that much anymore. The last year I sometimes woke up wishing that I would not be me, I'm just so tired of

being me and dragging this mind around, but that is not the case at all this year.

E. Well, have you been thinking about how you can modify your behavior ?

S. Yes, I just want to kind of keep it in mind.

E. Are these just passing thoughts or are they serious ?

S. It may not be serious enough to do anything about, because of the situation I have put myself into I suspect that I will continue to do it. I will continue to act this way and still be frustrated. I think I look forward to a time - since reading Tom Wald I've been wondering that if that time is ever going to come, it's going to be longer than I expected. It seems like the longer I stay in it the more tunnel revision that is going to come and I'm never going to get out of it. The question is what am I going to do about it which is pretty much characteristic of me and not making decisions. Thinking up the options, but never actually deciding which way to go, so I remain frustrated I experience a lot of frustration here because I decided I wanted the paper, but I don't want to put up with all the crap.

The other think [sic] that really isn't going through my mind right now is the whole situation within the department and not passing the prelims the second time and that really affected my self-concept and really aware of constantly being tested. I think the two big people who are head of clinical are not too fond of me and it really has affected me. Even I don't know in a lot of respects to them I don't identify with them as clinicians. The fact that they are in power and that they are controlling my life, it's really been a big decision for me to make as to whether I am going to do what they want and stay here and get the degree or am I going to break away and take a rest. It was really hard and sort of painful to go through with it. So I made the decision to stop acting out so much and not to confront people in public and to consult with them in private. One of my own insecurities was to use the rest of the students as a support so that I felt that I had more strength by confronting the professor in class and to get the students against the professor instead of going to his office privately and talking to him about my feelings which probably would have produced more change, but I think it was the group support I was looking for. After I made my decision I felt much better about accepting the stuff. I was getting nowhere the other way. The painful part is feeling like I'm tested and just this kind of paranoia - wondering what does the professor think or has he turned against me - especially in these clinical meetings where these two biggies are involved. I've been thinking that there must be something wrong with me since I didn't pass the prelims the second time. I'm as good as everybody else and just a kind of fear of becoming associated with failure. Am I going to go through another year and fail it again in the spring or be failed on it. The standards are made higher and higher each time I go through it. So I've been super depressed this week. I've been questioning, is life in clinical psychology going to be this way, will I really have to change my behavior in order to get along with people, or is it just this particular situation and a couple of particular people here ? It's been really kind of frightening. Thinking here you've been going along so well. In the fall you were just feeling like the highest you have ever been in your life. You know just feeling super self-confident and now since the winter and all this work in my head and not keeping up with it and falling behind. I've been wondering if there is something wrong with me and have very seriously been thinking within the last week about going into therapy and kind of looking at it and finding out. I used to really accept my own evaluation of things and now I'm questioning myself and my evaluations which is really scary. But since last thursday and friday I've been feeling much better. But monday, tuesday and wednesday I was really depressed and I'm not usually that way at all. One day I might be depressed but that's all. But that's not on my mind tonight. Filling out that weekly think made me realize that monday I was depressed. Tuesday I was depressed. Wednesday I was depressed. I thought Ken this has been three days in a row that you have been depressed. You've never been depressed this long.

E. Is that about it now ?

S. I can talk forever.

E. Okay, then I'll say goodnight now.

1st REM Awakening, 5 min. into REM, 1.40 a.m.

S. I don't have a clear picture but it seems like some kind of pursuit - kind of slow, persevering kind of pursuit, more just kind of the feeling of pursuit.

Upon questioning KJ said that no other persons were involved.

2nd REM Awakening, 10 min. into REM, 3.05 a.m.

S Again I don't have anything very clear, but what I have is kind of an image of a person - oh, oh, another sleep lab dream. The part I remember now is: I am in a sleep lab and kind of there's a small room inbetween two rooms and I'm standing there just at the moment that you called me waiting to unlock that door to go into another door inside. There's nobody in the inside room right now which surprised me because a few minutes ago there was a whole bunch of people in there and here I'd come back and it's empty now so I'm standing there looking for a key and thinking things like maybe there's a window where I'm standing and I'm thinking about the ball game or the city or why it is the door is locked or something like that. There's a little bit more I think. As I was standing there at the door trying to unlock it - you know, looking for the right key, I think there was a window - kind of an outlet to the world again. I think as I was standing there fumbling for the key I was thinking about the ball game. Now a little bit earlier when I think I had been in the room I'm trying to get into with a whole lot of people, I think everybody was watching the ball game or some people were watching the ball game, something like that. I had been in this room earlier with a lot of people and - I'm just on the tip of remembering some more stuff with that. I don't remember the sequence, but I know that there was a feeling of delegated responsibility associated with there being lab assistants in the dream - kind of like a direct tie to what's happening here.

E. Try and concentrate just on what happened in the dream and save the associations for the morning, OK ?

S. This was in the dream too, people had been delegated responsibility as lab assistants.

E. Were you one of these people ?

S. Not I, some of the other people in the dream. No, didn't recognize any of the other people. I was somehow a participant, but I knew that I wasn't a dele... oh, wait, I think I was a person who was delegated responsibility too - yes, standing there at the doorway, trying to unlock it was a sense of not just being a participant, but I had some responsibility. What had happened earlier, I was thinking about what had happened in the room earlier and how it was different from right there now where like I'm all alone like in the whole situation there coming out of one bigger room and then being in this kind of small room inbetween where I'm standing and then going into this other room that I'm trying to go into. So there was a sense that I was one of those people with responsibility. It was very much like the sleep lab responsibility even in the dream but I don't remember it specifically being - I think the person in charge - yeh - was Dr. Cartwright. I don't remember seeing her there but I know that was who was in charge. In the dream itself there could very well have been an awareness that this was a sleep lab, I'm pretty sure there was but I couldn't absolutely say that there was.

Upon further questioning he stated that as he was standing there trying to get into the door the environment was white, 'it was a solid color', 'it also had the feeling of - kind of like the john - with that towel rack and that continuous cloth towel. In a sense that was what the key - I think the key was kind of like the key on those towel things. The room I was standing in kind of had that quality like the john. As I was standing there either I was wondering why I was having difficulty unlocking the door or why everyone else wasn't there - I might have been reading a note that was on a wall, on the doorway that I was trying to get into. That suggested to me that those people who were there earlier should be there still.' He goes on to say that 'there were other people in the early part of the dream but those are the other people I don't recognize as being familiar.' Finally, he remarks that 'standing there at the door, was unpleasant.'

3rd. REM Awakening, 15 min. into REM, 4.55 am

S. This is another sleep lab dream. I got up from the sleep lab to go to the kitchen to get some ice cream because my mouth was real dry and I'm standing at the refrigerator with the freezer part open and I go through a couple of ice cream bars and then I go through a fudgesicle and all the time the refrigerator door's open. Then also, I guess I also took out of the freezer a camera and I have a camera around my neck. Then I go on - this is like in my apartment now - and I go into one of the other rooms and I'm walking around there and I'm not sure what I'm doing there. I walk around there for a few minutes and then - Rosemary walks in and then Roz walks in and asks me what I was taking pictures of and I said something like I wasn't taking pictures that I was carrying the camera around because of the light meter - or mumbled some kind of thing that I didn't even understand - because I didn't even know what I was doing with it on. Then the whole sleep lab crew - two or three people - went into the kitchen to make liverwurst sandwiches and you're all having a real good time making liverwurst sandwiches and when you guys all came back I went back into the bed which was like my bedroom at home and Connie (my girlfriend) is there now and she was with me

when I was up talking to me about something and I was annoyed by it, I didn't want to talk I just wanted to go back to sleep. Then I went back into the bedroom. Lets see there was a - there were two objects I was concerned with having moved. I was lying in the bed with my feet at the end my head is usually at - in my bed at home. I asked her - I was looking for a place to put these two objects. One was like a mirror and the other - I'm not sure, a small dresser or a barrel or maybe a TV or something, at any rate, she placed the object that I can't remember over to my right side of the bed and over on the left side of the bed where the TV was she placed a mirror and I didn't like the position and she was talking to me about this and that and I didn't want to talk to her or anything, I just wanted her to go out - I wanted to go back to sleep and she put the mirror in one place and I said why don't you just lean it up against the wall over there and then she was concerned about it would interfere with the TV if she placed it too close to the TV - it would interfere with the aerials - the antennae on the TV and so she stuck it over on the left side and asked me - I don't remember what it was, she wanted something from me and I didn't want to hassle with her, but at the very end she was asking me if we couldn't go to the Italian Village one night, she was kind of looking forward to that like I wasn't talking with her or didn't want to spend any time with her so she was kind of like asking me to make a commitment for us for next weekend, next Saturday night or something to spend time with her like going to the Italian Village for dinner or something.

When asked if any distortions were present he replied 'Connie was making arrangements for going to the Italian Village, that seemed like a distortion, even in the dream, as soon as she said it it didn't sound right, it was as if she was kind of scheduling an appointment which didn't seem right at all - kind of me fitting her into my schedule - that didn't make sense. The other distortion - just with not knowing what I was doing with the camera. I felt somehow guilty or conspicuous or something like that when everybody came pouring out of the room and I was standing there with a camera and I didn't know why I had it on and someone asking me what were you taking pictures of and I wasn't taking pictures of anything - I didn't know what I was doing - kind of felt like I was caught with the goods but I didn't know what I had done.

When asked about his affect during the dream he stated that it was 'Real pleasant eating the ice cream but after everybody came out and started making noise and stuff then it was unpleasant and I wanted to go back in there and fall asleep.'

He then added another part of the same dream: S. This is much more weird. I'm in the underground on the e1 and the e1 comes trucking in and it's like an oval shaped track - pretty large, and I'd just come from the opposite side of the oval on a train and I get off the train and it's real shitty like the e1 is and dark and dirty and ugly, I get off that train and I'm going to be standing there waiting for the next train to come - you know, I don't walk through the tunnel or anything, I just stand there in the same space waiting for the next train and while I'm standing there one train comes but it's not my train - some people get on, some people get off - nothing of consequence it doesn't seem and -- there's really a lot missing from this dream, I've only got pieces of it -- and I go up some steps into like a waiting room - like a train depot and I'm waiting for the next train. Oh, before I did that I was trying to think of which train I was waiting for -- was it an A train or was it a B train? I had to think for a minute which it was that I wanted and and that other train, when it came along was an A train and the engineer or conductor called it out and I remembered having to decide - hm, do I want the A train or B train and so the A train came but I was waiting for the B train, and then I went back up to this waiting room type thing and I went and sat down ... oh, oh, the place that I sat down on was tiers of concrete or something it wasn't stairs, it was like a stadium or something, but no backs on the stairs, just concrete, and I was sitting on one of the top tiers and some guy came along who acted as if he worked there and he was young and maybe wearing a CTA uniform or something and stood down there below me by the newsstand or new rack [sic] or something and he, in a real nasty kind of tone, I guess kind of an accusatory tone said 'What the hell are you doing here?' I felt very, on the one hand, confused as to why he shouldn't know what I was doing there because obviously I was waiting for a train but I decided to be very facetious in responding to him and I said 'I'm waiting - I came here to buy an automobile' in kind of a sarcastic or obnoxious way to tell him I'm waiting for a train - like what the hell do you think I'm doing? This is where you wait for a train and that's what I'm doing here and he was somewhat taken aback by that and then I think realised that of course that's what I was doing was waiting for a train. Then a few minutes later there was a whole mess [sic] of people sitting on these tiers with me - I don't know if tiers is the right word, large steps that you'd sit on - all these people are sitting there waiting for the e1 now and this guy was still there and he addressed a question -

he was still kind of nasty or very confronting I think - and I was still sitting on like the highest step - not the highest but the next to the last row and everybody else was in front of me so I could see everyone else and I don't remember the context, what preceded it, but he said - he started like calling out nationalities of people to see who everyone was and asking them to come forward - like you'd jump to your feet and come right down to the bottom level there as he called it out and it was really kind of confronting like 'All right, who's Polish?' - 'OK, who's Italian?' and he went through like three of those and didn't get me in any of those categories and like everybody else had been called and then he said 'OK, who's Jewish?' and that was me and I just kind of bounced down one step and remained seated. Again, I was kind of really angry and really annoyed at his whole attitude and his whole approach in a passive-aggressive - kind of coming down one step, but I wouldn't comply with him fully. I was coming down to -- getting up and going down one step to acknowledge that I was a Jew and I don't know why he was doing it or what the context was and so I slid down that one step. As I recall, I was surprised that he picked me up as being a Jew because I was the only one that looked like I was a Jew, nobody else did to me and it seems he had kind of a smug smile when calling out the nationalities, you know, like getting everybody, there were maybe ten people and I was surprised at that and it seemed like he had a real smug, kind of complacent smile - knowing that I was Jewish or something. Except, after that happened, what was going through my mind was, gee, here I am dreaming that I haven't been woken up to give this report and then what I thought of next was that here was Roz again and I saw her sheet and on her sheet were like - in type - was what had just occurred between me and this train guy in the train station. I read the list and it was just kind of a matter-of-fact, objective reporting of what happened and that the other guy called the names and people stood up and he called for the Jew and Ken slid down into the next lower thing there. It didn't have any of my kind of annotation or stuff like that, that I'm used to seeing on my dream records, it was just kind of objective, what she thought as the observer happened. Now I'm really confused as to whether I had this dream - this dream occurred before the other long one I just told you about with the sleep lab - but I'm not sure whether I actually woke up and thought oh, hm, I just had a dream and they didn't wake me or whether, you know, I dreamt the whole thing. I think that's mostly what I remember.

He added next: S. 'This one started out really neutral and then got really emotional - I was really angry at this guy - very emotional.'

'The only person I recognized was Dr. Cartwright. After the appearance of this guy - after I was reflecting on my experience of having the dream and not being awakened.

'At the point when Dr. Cartwright was there - don't know if I was asleep or awake. I couldn't understand why that was because I thought it was definitely REM.'

E. Is there any more you can recall?

S. There was just a flash of being on an el. I don't know if it was before I got to the station or if I got back on one later. I think I was going home - I'm not sure.

4th. Awakening, 20 min. into REM, 6.14 am

S. I was getting up from the lab in the morning - I was playing with a black light bulb at the moment you called me and I had just knocked over a spray mist refresher onto the floor. What the dream's all about is -- I think I had woken up from the dream and I was in a sleep laboratory although the setting was different and I woke up from the dream and I went down to the end of a narrow corridor wearing my pajamas or lab coat or something and having all the works on my head and stood there at the edge of the doorway and it was like Clark St. up on the north side and there was a laundry at the end of this hallway and across the street there was a large laundry and down the street to the left there were people lined up at an outdoor kind of like restaurants for breakfast. It was sunny over there and then and then to the north, walking down the sidewalk were lots of people on their way to work and I was disappointed that it was morning already and there I was kind of standing there, not remembering having gotten out of bed, just remembering having walked down this kind of hallway and then Dr. Cartwright again, she's just everywhere, comes along and kind of ushers me back to the sleep lab saying 'Chris won't like you if you do this' and I didn't understand why she was telling me that Chris wouldn't like it - I figured that she didn't like it - she seemed kind of annoyed that I had gone out there - it was a stimulation part of the thing - so I asked her - I shouldn't be getting outside stimulation, it wasn't allowed - I asked her if there was a difference between reading before I went to bed and my standing there looking at the people and she said there was. So there I was back in the lab but it was physically different. There was Chris talking away with a bunch of you sleep lab people working on him and then - like he'd slept in the lab that night - and then I walked by the hallway to another room

and there was John with his door partly open and he was getting up. Then I go into the room where I was in and again it's kind of like my apartment - like there's a dining room and a sun porch and that's where I had slept. Herb was there and he was getting dressed to go out - he was just waking up and gathering up his stuff and he had on his pants and pajama tops and I was kind of walking around the room alone and looking out the window and there were lots of people walking down the street and everybody had a winter coat on and it wasn't real cold winter, but fall. As I looked out and saw that I thought to myself that I'd better wear a jacket to school to be warm enough on the motorcycle. Then I was deciding how to get myself ready and it seemed at the time that I was thinking that I wasn't satisfied with how I had done it the last time I had been in the lab so I was deciding whether I should gather up all my stuff and then get dressed, or get dressed first and end up having to walk back to the lab several times. I was watching Herb to see what he had done and so I guess I gathered up my stuff or something - I put on all my clothes and then after I had got dressed completely I realized that maybe I didn't want to have my shirt on because they'd get the collodion all over it and everything else and that I'd probably have to take off my shirt again. Then I walked into the sun room and was holding this very small, odd shaped light bulb that had been for a black light or something and I was wondering if it would work for my tail light on my motorcycle which was broken and I looked at it and realized that it wouldn't. Then I walked into the front room holding this and knocked over a can of air freshener. I was also looking out this window - there was a kind of an old school yard and an old school building and there were two sets of double doors that push out from the inside and as I was watching some students - the double door on the right was closed and there was a whole a foot and a half square on the other half of the right hand set of doors and everybody was coming out of the left hand door except as I was standing there watching a small child climbs through this door. It struck me as real weird that someone would go through all the effort of climbing up that high instead of going out the other door, but I just figured well, that's what kids do, do something just because it's hard to do or for the novelty or something. This was a real small kid and I was surprised at how well he had maneuvered that and then there was a much larger kid, this time like he almost walked through, like he'd just stepped over the wood through the hole and the hole was quite a lot bigger now so this kid didn't have to squeeze through or anything, just stepped on through. Then I said oh, that's how the other kid got through because the hole was so much bigger - there's a distortion there.

Earlier in the dream, I think before this whole sequence began that I'm telling you about - I was in a sleep lab on the bed talking to my companion, whoever that was - that is, it was another male who was in the sleep lab but I don't recognize it as being John or Herb and I had just complained about being thirsty again and someone had brought in fruit juice and I hadn't drunk it but I was talking to whoever my companion was and lo and behold in walks another one of the people from the lab and this time it was a male who walked in with one of those large cans of, I think, apricot orange juice. He had overheard me through the microphone and I felt kind of bad because I had already had this other can of juice someone had brought me earlier. I expressed my appreciation for that and he went back out and then it seemed like there was a whole series of gifts where someone from the sleep lab would walk in and give me a magazine - one magazine, I guess it was Newsweek. And then another time one woman from the lab, who seemed familiar, walked in and opened the magazine to a page with a full-size cartoon drawing -- a drawing of a significant person, like maybe a fat characterization of Nixon, but maybe it was Mighty Mouse, I don't know, just a familiar face taking up a whole page. There was no caption. I was thinking hm... I don't get it... maybe this shows I'm not all that smart. I might have finally gotten it but I don't know. Anyway, I didn't think it was very funny and I didn't know why it was being pointed out to me. The magazine didn't have a name on the cover, it was just like a weekly news magazine or something so I assumed it was Newsweek, I don't know why - I don't read Newsweek, or any other weekly news magazine. The cartoon made me feel really self-conscious and self-deprecating... I couldn't even see the point of why the person showed it to me. The room was hot and my mouth dry; my companion agreed and I felt comfortable with him.

Upon questioning he remarks that Clark Street looked very different, that the episode with Dr. Cartwright was unpleasant and that the rest of the dream was 'less unpleasant, probably even neutral.'

Additional recall to this dream, 6.55 am

S. Another part of the same dream just came back to me. I'm in my office downstairs and Joan Smith was there and I went up to her and embraced her and kissed her on the cheek. She was sitting at another guy's desk which is just exactly opposite mine in the office so that it would be like the desk I got up from and her desk were lengthwise at opposite ends of the room. It seems that after I embraced her someone walked

in and said something - like about this display of affection being very curious or something like that. The person who walked in wasn't upset or shocked or anything like that - just kind of - like surprised, but also a sense of pleasure at seeing it.

E. Did you feel this?

S. No, the person who walked in -- well, yeh, I felt that way too, very happy and I wanted to express my affection - I felt real good and Joan felt real good but the person who walked in was kind of surprised but it wasn't a rejecting or shocked kind of thing. It was pleasing for them as well. It seems as though it was a woman as opposed to a man, I'm not sure whether it was someone older or younger - like a student or faculty kind of thing. Really not sure who it was.

KJ's Interpretation of his Dreams.

1st. Awakening: uncertain, perhaps some representation of hecticness, tension of present life style and present concerns.

2nd. Awakening: In this dream I seem to be longing for the familiar experience of the lab, from the winter sleep course. Perhaps looking for the familiar faces inside the little room, of the people from the class; they were there earlier, I report, refers to last time in the sleep lab. Also now in the dream I am on the outside, as if wanting to be more in control, have my hands in the experimenters' room, putting electrodes on others, watching the machines. As dreamer I am curious as to what is going on inside that little room where the experimenters are; wanting to be the subject, but also wanting to be the experimenter, or else feel closer to them. Responsibility issue seems to represent my lack of responsibility because I am only the subject, the confusion stems from my strong sense of responsibility and my concern over being able to perform - perform via my dreams. My not having the right key, or not being able to get the key to fit the door also reflects a sense of distance, being kept out of the experimenters' room, formerly having the key to the lab during the winter, being closer to R.C. than now. Smallness of room I am standing in may be the psychologically small room I am sleeping in in the lab versus the large size (psychologically) of the experimenters' room.

3rd. Awakening: (more loose strings and uncertainty in this interpretation.) I may be making the sleep lab more comfortable by making it like my apartment. All I make of the ice cream scene is my thirst that night in the lab. Leaving the refrigerator door open is something Connie does a lot while preparing food and that annoys me. I may have held it open in the dream to cool off, as I was also hot in the lab. Camera may be some symbolism of imagery, permanent record of vision, such as a record of a dream - the tape. Also tape recorder/camera were associated in theft from car of Connie's camera and R.C.'s tape recorder. My guilt about having the camera in the dream - my concern about R.C.'s reaction to tape-recorder theft? The laughter and giggling of the lab crew leaving their room and entering the kitchen; entering my private domain of my dreams; my concern over their being strangers, not feeling terribly comfortable, and in the dream as in the lab, annoyed at the noise of the lab crew, giggling, occasional laughter early in the evening, accompanied by my own performance anxiety and difficulty falling asleep. Livenwurst sandwiches - something I have never eaten? The conflict with Connie seems to be representative of the difficulties in our relationship, very much the case in the dream of her wanting to deal it out, discuss it, and me being tired, not wanting to talk, or deal with it. Connie is asking me in the dream, as she is asking me in our relationship, to commit time strictly to her, so that she's not always last. The bed is reversed, perhaps suggests the distance I feel compared to before. Concern with objects again seems to be the relationship between us, vis-a-vis objects I place in the way, or her continual efforts to please me, improve relationship, help me with school by taking care of smaller objects (mirror and other unidentified object). I don't see how all various elements relate into a coherent dream.

3rd. Awakening, second part:

S. Which route do I want to take in life, in school, seems to be the theme here. How in the dream I am confronting the problem of waiting; my direction (my train) is not here yet, so I have to wait for the right train to come in. In a very real sense I am waiting for significant changes in school to occur in the near future. 'What the hell are you doing here?' Perhaps a part of myself asking me the question; me becoming defensive, obnoxious, refusing to deal with myself to resolve answer and feel good about it, so I refuse to deal with it, acting indignant. Or young man may be ominous, global image of department, which I

no longer see as old as I used to. The department asking me what I'm doing here, perhaps my attribution that they don't see my view at all, that they don't recognize that I am waiting for a train; perhaps my acknowledgement in my dream that they don't consider my performance satisfactory, and see me acting as if I am in a holding pattern, neither on the A train or the B train. I wanted the young man to be taken aback by my reply, but I don't think he really was, probably just wrote me off; again my expectation that others see my position, see what I'm doing and accept it. Also wanting to be left alone by the train master, if that's who he is, as I want to be left alone by masters of the department. On the top step I am above the young man, as I often feel above the masters here at Circle, on a different level but still in their train station. I am the most distant from the train master even after other people, who must be other students, are seated on the uncomfortable concrete tiers (a la Circle). The other students jump when the master calls; while I respond slowly, deciding what to do, finally conceding to fall into line. I won't come down all the way, I won't leave completely my step, but I will come a little way. I'll bitterly offer some compromise to the department but I try my best to make my trip work. Adding of other people to the tiers may be my giving myself the support of other students, perhaps only to find out that they are willing to step forward and comply fully with the master. My surprise that he recognises me as a Jew, sounds terribly much like a recent experience I had with one of the 'masters' who surprised me by seeing things in me that I thought were hidden. Furthermore, us both being Jews, perhaps I felt I should have received better treatment from another Jew. Finally I turn to see R.C. watching over me, observing what's going on, but only recording it behaviorally, my surprise to see just a straight account of the interaction. Situation with R.C. seems to reflect my concern with R.C. as protective figure, motherly or otherwise, and my seeing her less interested [in my] relationship with master, but perhaps more as research subject.

4th. Awakening S. This dream seems to strike on two levels. The first seems to be my anticipation of the morning in the sleep lab, waking up early, being dissatisfied with my night's sleep, with my performance in the lab. On another level it may be again tapping the academic conflict of which way to go, concern for what's going on inside, versus what's going on outside; outside the department, outside in the city of Chicago. My walking outside to Clark St. because of my complaints of not being able to fall asleep fits very closely with my real experience in the lab, having breakfast, but in the dream the concern for getting dressed expediently - very much a concern for me that morning because of an early appointment. The efforts by the lab crew to accommodate me in the dream, much as I appreciated experimenters' efforts in the lab with the cup of water, carefully putting on electrodes, general nice treatment and attention. Along the other level of analysis, R.C. and Chris are both my closest advisors. R.C. seems to be speaking for herself and Chris in encouraging me to attend a little more to what's going on inside the department; spend less time for the present out on the streets and more time inside attending to school. The people outside wearing coats may reflect my concern for the Fall, my heavy load in the department, a lot to carry. Furthermore I am in my real life position of standing at the window of our apartment looking out at people, while I take breaks from my work. The two boys who climb through the window are choosing different routes to get out of the school. They, as I am trying, are not choosing the familiar, easy route. The first boy has a difficult time, suggesting the first deviant has a difficult time, but the opening widens for the next boy. If the boys are me, which I presume they are, the suggestion is that if I stick with one route, or if I persevere, it becomes easier to get out that other door. Or, that as I look at the problem a little longer, the square of the opening, (the squareness of the department, the limitedness) becomes less limited, with more room to permit deviants to have access. To extend my ambivalence in interpretation, I could also suggest that the children exiting the school in the dream are the students graduating, that most come out one way, but still there are a few that do not fit the norm. In that sense I may be willing to remain here at Circle as long as I can look to the future and see myself not becoming engulfed, or broken, but that I can at least crawl out or climb out the way I want. To me Newsweek is something that one is supposed to read, that is often very interesting to read, but which I read only in doctor's offices, etc. The experience with the cartoon in the magazine suggests my feelings of insecurity, inferiority in regards to my problems passing prelims. My high expectation of myself, yet my discrepant performance - I figure I should be able to understand the cartoon, I figure I should be able to pass the prelim, yet I fail in both tasks. This failure in the dream and in life is of tremendous concern to me as I challenge my self-concept, my sense of competence, wonder if I have what it takes.

Situation with Joan Smith is curious; I don't know at what point it occurred in the sequence. She and I kibbutz occasionally, making passes at each other. Relationship to dream is unclear.

Upon further interviewing he said that all the dreams 'seem to relate to my own anxiety about performing ... The fact that I couldn't sleep. I woke up prematurely and just started walking around and stuff like all that leading to nothing - just lying awake business is not for me. Also my concern with all the noise, all the giggling and I was being sensitive to it because I wasn't falling asleep.'

E. You were actually hearing the giggling or you were dreaming?

S. When I was awake I heard the giggling and when I was dreaming, I also heard the giggling. When everyone was pouring out of the room which ever it was into the kitchen and getting their stuff like that making liverwurst sandwiches and stuff like that.

E. So that was also a dream, your not being able to fall asleep. The ice cream was related to just that you weren't able to go to sleep.

S. I was thirsty. I am not sure why I was standing there with the refrigerator door open...

E. I think right after you had the ice cream you took a camera out of the freezer.

S. I don't recall taking it out of the freezer, but I remember having it around my neck when all of you came out and I felt kind of guilty having it but I knew that I hadn't done anything and yet I still felt guilty about having it and I didn't take any pictures. ... Each time I woke up I pulled the blanket further and further down. It seemed to get hotter and stuffier as the night went on. Connie very often leaves the refrigerator door open in the apartment when she's preparing food and she doesn't like to have to keep opening it...

S. It seems that you were all going into the kitchen to make liverwurst sandwiches and I wanted to go back to sleep or something. I was eating ice cream for quite a long time. I had three different ice creams. The first time I had a - the last thing I had was a fudgecycle that was on a stick that had the paper all shitty on it and soft and hard to handle. There were two kinds of ice cream before that, but I don't remember which kind they were, like ice cream on a stick kind of thing. It seemed like fudgecycles except that when I got to the freezer I knew this was different from the others. They were all real good. ... Then when I went into the bedroom Connie either followed me in or she was in there already or we went in there together. I was lying down. The bed was at the other end of the room and I was at usually is the foot [sic] of the bed and there was the same space that we have on the wall side of our bed, but there was more on the right side and for some reason the way these two objects were placed was somewhat important which she was trying to do this for me. I was lying down and she was in a sense waiting on me. The first object I thought was being achieved, but then I thought it was not. When she got to the mirror I suggested that why doesn't she, the television was against the wall, just lean it up against the television and she was concerned that it would interfere with the reception or the antennas or something. I would have agreed earlier about it, you know, but who's watching TV? I didn't and I just said okay and she stood them up closer. Say I was lying here and she put them here to the left of my head.

E. The TV was a different object. She had already placed something already over this side of the bed which I thought was the TV until I realised it was the TV over here. Logically, it might have been another TV. And the last part of the dream was her asking me in a kind of way as if she didn't see me for a week ... 'do I get to see you next week? How about us going out to eat together to the Italian Village?' ... We never did go to eat there, it's too expensive. It's just struck me surprisingly in the dream, asking me in that kind of way. ... it certainly is not representative of how we relate. It was in a sense formal, like she was anticipating with excitement which ties in. It is not that unnatural. This summer I have been staying at home a lot. I wanted to get work done, but I haven't gotten any work done so we haven't gone out to have a good time and yet I stayed home and didn't get the work done. So in that sense she does want me to get my shit together better so that we can decide when we will go out ... But the way she said it was very strange.

E. Do you have any idea of what is important about moving the objects or her doing it? You said it was important to leave them where they were.

S. Yeah. I was thinking after I went back, the mirror that sounds real significant particularly since I am narcissistic . . you know it wasn't like I was there looking at myself or even in a position so that I could look at myself ... It was facing this way, but if I looked into the mirror it would be into that corner of the room ...

S. The two hypnagogic things. I felt a little guilty about asking Roz so that I can do that and then not having anything. I felt guilty and then kind of a failure. The failure being the first real dream.

E. Just a point of reference. You really fell asleep very fast ... and you did have lots of

dreams...

S. Yeah, I realized that I should look at myself and not at others. I get very high expectations of myself.

S. [The guy at the station] was really arrogant. The type of person that makes me really angry. ... I felt self-conscious as a Jew ... You know [anti-semitism] was my projection of my own concern. ... He just started calling out nationalities and I never expected him to get mine.

NIGHT 2

E. What are the thoughts going through your mind as you about to fall asleep?

S. Dr. Cartwright's paper - getting it done this week from a course in the winter quarter.

I guess that I'm pleased that I'm more relaxed. Last month I was really concerned with performance, whether I was going to be able to fall asleep and dream. ... I was thinking about a book I was just reading. Transactional Analysis and Gestalt, a think about my convictions. ... This book is really exciting. ... I was thinking about Henry Aaron who is on the bottom of the National League in terms of home runs...

E. He's in the wrong league. ... Okay. Good night.

1st. Awakening.

S. I'm not sure, I have a vague image of, maybe a wagon, but probably more like four wheels, maybe having one axle connecting them like on a train, maybe a little cartoon man next to each one. I'm not sure if that's what there but when I think about it that's what I get.

2nd. Awakening.

S. Might have been a sketchy scene in Treasure Island or something but I really don't remember what was going on there, just a brief scene.

3rd. Awakening.

S. I was thinking ... it was as if I were an experimenter or clinician and in the situation I'm describing I was, you know, a clinician for this man and the man - it's really hard to describe what I want to say - it keeps going away - in the dream I'm thinking about this man and how competent his skills are in making judgements about - oh, probably the state people were in when they said something - there was like a visual image in my mind - I was driving like in the suburbs by an open garage and it was as if that was where this guy worked. And I was thinking of whether or not this guy would understand what one of these things like understanding a thought - as coming from the appropriate mental state of the person. In my mind I was trying to describe, it was almost testing this guy - is this guy OK to continue doing this, can he discriminate? This was like a sample in a way to see if he could do the task that was assigned.

Upon interview, KJ said that he was 'mentally an active participant, but not visually', that the scene was 'very unemotional', and that 'there was another person I was examining this guy with'.

4th. Awakening.

S. What was was a review of the last dream. I was going through, kind of categorically, as if I was writing a theme, my account of this person who was making the judgements - or it might have been another person, and deciding how much sense it made. Specifically that such and such a person was - the memory keeps flowing in and out - I was writing a paragraph on the etiology of his behavior - the specifics of it - it escapes me now. Was this guy in fact retarded or was he ... just social deprivation or somethin', you know, just failure to learn the social (?) skills. There's more to the dream, earlier, but I don't know if I can remember it.

On interview he said he was 'reviewing mental description of this guy, not writing - no visual imagery ... unemotional'.

5th. Awakening.

S. I was standing on a sidewalk and I was telling this tall slender guy, young person, and this was like his house and his mother was inside, I was telling him how to behave. I don't remember why I was telling him how to behave, but I know I was telling him to behave in a certain way, you know, in order to achieve my or our ends. There was a sense that we weren't working so much as a pair because I had to tell him, he didn't know without me telling him. Just as you woke me what had occurred, later on we had gone back

into the apartment, his mother's apartment, a second time we had gone into the back door and again I had explained to him what I had wanted him to do. It was trickier this time, he rang the bell or something and he was standing there talking to his mother and while he was doing that I was kind of back away on the steps or back porch or something and off to the left, like inside the apartment. I could see his sister or someone else through another window, kind of watching what was going on and I was part of the script that we had prepared - it would involve the mother questioning me so at the appropriate time I came up and answered questions and the mother asked me - I guess it kind of like a date or some kind of arrangements - I think it was more like a date - it seemed like a homosexual kind of thing where she asked me - she expressed her pleasure that I was taking her son out or something and - like I was taking him out right now, right at this moment and then she asked me about the next time, as if well, I guess you'll be coming by again very soon - and that kind of threw a (?) confused me. And now I was no longer like the strategist or planner, I became a submissive, kind of flustered little boy standing there responding to her and it was very kind of infantile in answering the questions and just kind of stumbling and trying to come up with some kind of answer that wouldn't be a lie - you know, like I'd be back tuesday, or wednesday or next saturday or whatever but which would continue to create the impression that I wanted which somehow seemed to get this other guy clearance or something for not having to be around or something. I'm not clear exactly what I'm trying to get. The second occasion that we went to his mother's house strikes me that it's damp outside, I'm standing on some brick floor and there's a sense of light rain or drizzle or just dampness. Again, there was earlier planning for the first and the second times, but I don't right now remember what it was.

Awakening.

Oh, I had just said this particular person was paranoid schizophrenic - let's see, who was it? I don't know. Let's see, in this situation there's two people in it. Oh, I know. I'm in a room cleaning up or something, I'm not sure what and Connie comes walking in holding a record cover. She was cleaning up the living room and had this record cover. The picture on the record cover was in black and white and was of a very gentle, I think it was a baby on the record cover, I think was what it is or, if not a baby, something that feels very family but I'm not sure if a mother or not. Except then she no longer is crying, now she is like a maid in a TV situation comedy and I'm no longer me participating, but I'm me observing and she says, oh, you know about so and so who moved in down the street, well he said he's from somewhere in New Hampshire, well he's not and you know that he said he worked at so and so, well he doesn't and he says that people are here who are out to get him or something - well maybe I still am me because I say - this is kind of a family joke, a joke between me and Connie, paranoid schizophrenic and I'll tell you what that means. That's what was happening when you called me. When I paused then it was because more of the dream was coming back to me but it's flowed away again. Some time before what I described to you I'm involved in some kind of heavy problem solving thing and it seemed to be taking place on the second or third floor of a house or apartment building - it seems that at one point we left the second floor and went up to the third and I'm in this room with two other males and I keep getting an image of a circle. I'm not sure if that's what the dream was, I think I'm not getting what I want - the image is the feeling of a circle once again, it sounds like me evaluating [on my] own, either evaluating or assessing, again, it seems to be a patient or else I'm describing or discussing with these other two guys the correctness of my interpretation of some patient or something at the end and still another part of the dream - I'm walking through an area - sort of walking through a store just to take a short cut or to come to the other side of it. This is a large kind of schlocky department store and I'm carrying my green bookbag and first I'm outside the area, you have to go through a little turnstile or something to get into the store. On the right just adjacent to it there's one stand or a ??? or a bathroom or kitchen utensils or appliances and I'm looking for one particular one, I don't know what it was. I looked a long time for it too and I don't remember. I decide to go in the store so I give the cashier or this guy sitting in a booth, and he's an older guy, older type person - owner of the store - give him my bookbag and he's got that around his shoulder sitting there hanging onto that and I walk up this set of steps which were very strange steps but I walk up like eight stairs, but then what you'd have to do would be turn 180 degrees to continue going up the other steps but it was as if there was no available way of making, it was as if my top step was parallel to the next step, yet my step went up south and the next step went up north and there was no landing on which to turn to reverse your action (?) and I stood there for a while and there were people on the set of steps above me and there were other people on my steps so I figured it was possible, and the guy said just go up those steps and I'm looking at him, how the hell can I get up these steps and then I stood there and stood there and finally I realize how to do it. It seems one step appeared, maybe a landing one step wide or I just turned the corner, at any rate, it became easier

and it was just a matter of turning and I went up the steps and walked around a little bit. I was looking for - I was still looking for that same kitchen or bathroom utensil or appliance. I have the idea that it was some kind of thing that sticks on the wall, but it's not like a soap dish or toilet paper holder that sticks on the wall because I saw an aluminum rack and said that wasn't what I wanted. I have the sense of a brush, but I don't think it was a brush either. At any rate I was looking for that upstairs and it gets a little fuzzy what happened next but at any rate I finish looking for that and didn't find it and then decided why don't I look in the toy section for something else, like there was a particular toy there I was looking for. I have a sense the toy was round, I have the image of, earlier image of - it seems as if I had, when I was in the toy section, or at one stage in this schlocky department store, that another manager type, older person was assisting me finding what I was looking for. The part that's missing, I don't remember coming down the steps, I think I remember, no I don't remember how I ever left that place, maybe I never did, maybe that was the upstairs of the other part that I felt. The part that is missing is what the function was of what was going on upstairs in that room with the sense of evaluation or assessment of what I thought already or what I'd seen in a situation or something. Maybe I'll get that later, that's all for now.

On interview he said that in that room 'we were sitting on the floor in kind of an old place and spinning something - a gyroscope, no a need... no, oh wow, spinning, let's see there was a narrow metal shaft, a vertical pin or something and I was spinning something on it - what happened, I think I walked into this room and there were these other two guys sitting on the floor I think with this little pin or something with a vertical axle or something. They were spinning something around on this little pinhead on the floor. It seems we were making up a story to go along with this little toy or whatever it was, it seems as if we were giving it human characteristics, describing a person that this little thing was. There was a difference of opinion and we were kind of like seeing experimentally what this little thing could do. So he said it was one thing and I said no it was, oh gosh, I don't know what I said it was. At any rate the first time we ran this thing I had it hooked up so there was a little something that was on top, above the spinning part that smoked and then some more people came in and I was demonstrating my point or something. Now I put whatever it was that was smoking and it seems as if it was a you know cigarette butt or roach or something on the cylinder but below the spinning thing and when it was done this way then that convinced me that it was much more effective in demonstrating my point. These other people who came in, I don't recognize any of them but they had been in this other room engaged in some kind of activity and they had been there when I had arrived and now they came in to see what I had done rather than working on it. ... and what were the characteristics I was attributing to this thing? I don't know. I think this part just preceded the part where Connie came in with the record cover and now present me [sic] with still yet another patient - about this guy who lived down the street, I think that was the sequence. There seems to be a distortion when Connie came in - in her voice, and maybe like all of her became like a nervous...' '...that spindle thing seems to be on a much higher level than usual functioning ... Upstairs with spindle thing was highly emotional the department store was mildly emotional and the situation with the record cover was mildly emotional. Pleasant, very pleasant.'

4th. (?) Awakening, 6:50, about 10 min. into REM

No recall or image.

In the morning interview he was asked whether the dreams tied in with the pre-sleep interview. He replied:

S. Yeah, in terms of the papers that I have been completing have been patient reports and the paper that I am doing for Roz is a therapy report about a patient the therapy paper less so than the papers that I have been working on which have been piecing together, you know, like history, symptoms and so forth. The first dream and the second dream seem to relate a lot to the hypnogogic attempts. The first dream when I woke up seemed to be exactly what I was doing with the hypnogogic stuff.

E. The first one about the wagon?

S. No, no, not the content of the hypnogogic, just me trying to remember hypnogogic and - can you tell me what the first dream was?

E. Yes, the first dream was 'I was thinking ... that he was assigned.'

S. Yeah, that's right. It makes sense to me. Me trying to figure out - well, here I don't remember being woken up during the hypnogogic and is it because we don't have the stage right. You know, am I in the right stage to be in the hypnogogic. Yeah, I was an experimenter or clinician in the sense of experimenting to see if I could develop the hypnogogic and me not being able to tell how competent his

skills are and he's making a judgement about what state people are in and me waking up and not knowing whether - the discrimination was extremely difficult in the hypnogogic to differentiate between all the images that were going through my mind which I presumed was when I was still awake but which preceded in fact the image that was there. You know, was that what I was doing when you called me or was that what I was thinking before. I don't know. Is that clear now?

E. Yes. With your second dream you started out saying it was a review of the last dream. You also said you were writing a theme about your account of the judgement of this person.

S. I said I was writing a theme?

E. Yes.

S. Oh, it was actually in my mind that I was writing it. ... It seems like when I first woke up that it seemed to me to be a continuation of my evaluation of my evaluation of my evaluation. After I gave that first dream and then when I was going back to sleep I was thinking about what that meant and whether it was in fact just in symbolic form of my experience with the hypnogogic... It may be working through a patient which it very much sounds like, but it seems like it was the same guy again.

E. Does the guy appear to be familiar to you?

S. No, it was like an older person. The only person that would be familiar would be my patient. There is no particular patient, it's just that all my patients are older people.

...

E. Why do you think you had to take this [infantile] role [with the mother]?

S. Sometimes I will behave submissively rather than make a confrontation and I'll be very submissive ... Do you know Transactional Analysis? I'll kind of drop out of the adult and move into the child's role and put the other person into the parent and relate that way so that everything is perceived as a demand from mother. ... It was a device to get him out of the house ... and I was not in fact - I don't think I was going to be doing something with him or doing anything and yet she was very enthusiastic like 'Oh, how wonderful, you will be taking him out on tuesday and wednesday and I'll be seeing you saturday', and me being evasive because that wasn't the case ... earlier in the dream ... I knew why I was doing what I was doing and we were in it together. He wasn't my victim or anything. Throughout the dream this was the strategy to use and I was dominant in the relationship.

S. [In the third dream] I was upstairs in this room and there was one room with a lot of guys doing something. Like playing some kind of game or doing some kind of task and then I went into another where there was one guy or two other guys and I think there were two kinds of tasks that we were working on and one of them was this little metal spindle kind of gyroscope,... but not a great big round thing like a gyroscope. It had the feeling of another patient evaluation where this was a patient and we all got different ideas as to what is going on with him and I am demonstrating this one problem. I don't think I had something coming in, I learned by being there. I was experimenting with it and I was saying 'this is what he is all about' and then someone came in and they weren't sure that it was it and then it was in a sense like a roach that was on this pin that was smoking ... when some of the other people came in from the other room and I was demonstrating to them and I thought that it will really work if I put the roach underneath so that the smoke coming up will cause - sort of like a propeller - it will make the propeller work. It worked.

E. So pretty much all of your dreams are dealing with patient evaluation.

S. It seems that way.

Night 3 (24/9/73)

E. I would like you to talk a little about the things that are on your mind now.

S. The stuff that is going to be coming up next quarter. I'm going to be busier this quarter more so than any other quarter. I said that last spring, but this quarter is even more so. I'm just kind of reviewing the things that are coming up. Tomorrow I have an interview with a therapy supervisor for my practicum this fall and that's still up in the air. I'm thinking about my courses and the various things involved with my Masters. I still have another incomplete that I didn't do this summer. Connie and I are in a real switch. Today she stayed home and I went to school. Usually I'm home when she goes out to work. What I have really been thinking about a lot is that my discussion sections take a lot of responsibility and that I was in charge - not being delegated the responsibility, but I guess Benton just expected me to do it. Very annoying, especially since three sections were not covered today. I just take a lot of pride in what I do in my sections and I think you have a responsibility to the students and I resent the fact that that kind of screwed me and that's what I was doing when I was calling - I was trying to get together people and to find out which T.A.s were going to take which hours and I think this should have been taken care of long ago. I was thinking about my clothes which are all stained with the rain. Tonight I was wearing my leather jacket, a tan sweater, then a white muslin sport shirt and then a blue pullover - the layered look. I took off my coat and my sweater was all green and brown and I assumed it was from my leather coat. Then I took that off and my white shirt was green and brown. So then I thought it was a green jersey that I had on that hasn't been washed yet and I thought that it was dying it instead of my leather jacket. My pants will still probably be soaked and I have class all day tomorrow.

E. If they are still wet tomorrow maybe you can use the drier to finish drying them in the morning.

S. Okay, that is a good idea. Then I was thinking about what I was thinking about the last time that I was here [about the performance of baseball players and their performance statistics].

E. Okay, good night.

1st. Hypnagogic Awakening, 12.02 am.

S. A couple of yet planes - I don't know - and something to do with international relations. Just before that I was conscious of thinking about something international, something to do with Vietnam or S.E. Asia, and that was just before and I was aware of that, of having that kind of imagery. Then the next thing was kind of yet planes. I don't have a picture of them flying over the sky or anything, just kind of stationary, kind of - I don't know, like a picture on a page or something, you know, they kind of represent some aspect of international relations or something. That's all.

1st. REM Awakening, 1.45 am, 5 min. into REM.

S. Let's see. I'm not sure, maybe being outside of town to get a drink or something. Being outside of town.

2nd. REM Awakening, 3.45 am, 10 min. into REM.

S. I think I was pulling some walnuts out of a - topping. There was this big piece of pastry that kind of ... oh, what did it look like ... back and forth and I was pulling nuts and caramel out of it. You know, like on a big sheet and as I went along the piece, you know, from left and there would be a description of - written - of what was being added at each point. Here was an interesting bit with some walnuts, pecans and caramel and there was also another one. This one had marshmallows and cherries and something, whatever and it was this description that was going on this long type thing and you know I'd been

doing that for quite some time and ... on this thing ... it was of a, this pastry, or whatever it was, was for a former occasion that I had come on and the rest of the dream I guess was about this former occasion. Let's see. I was ... this place is a resort ... I was sitting ... I think a summer resort place that was not at all familiar physically. Let's see what's going on here. Let me try to retrace ... I can't ... Let me sort of work... Just prior to this thing with this camel pastry sheet I was sitting at a table, kind of a picnic bench deal with my parents, including my father and let's see, I had just made some kind of tremendous insight in regards to school. I was sitting on that bench and was thinking to myself - oh my god, I hope I don't repress this ... I think it had something to do with being, for some reason, deciding I was absolutely in the wrong place ..., or maybe I wasn't in school and ... the insight was that my god, maybe I should walk into a school like Harvard or Yale and just walk in and talk to them in order to get in, but it's more complex than that. Associated with this is like also at the table I think - it seems to be Colleen. I'll tell you later who Colleen is and it was as if she was about to do this and I thought if she could do it then maybe I, then maybe it was the most, it was the smartest way for me to do it. This isn't exactly right but I'm getting there. The general, alright the general gist was just some kind of incredible insight I got, that seems to be a distortion, although I can't really grasp what it was. I was sitting there silently, after I'd come upon this ... it was like silence at a table, and it was kind of growing and I, I felt an urge to scream, just to scream out, but I didn't do it. Oh, let me go back in the dream a bit now. Wow. This was again, you know, a summer resort type place and I had pulled up to this place, I think with my mother and gotten out of the car, all right, no, let me think. We pulled up and we were looking for a parking space and it was a small, circular end-of-the-road kind of thing, end of the driveway and then we had to reverse direction in a small circle there at the end, and there wasn't a good place to park - we didn't park within the lines, we just pulled the car to a stop and before us, I guess, was a big cabin, big lodge, I guess, or that kind of thing, I guess a lodge and down below where we couldn't see it was, was like the beach area. We got out of the car and were kind of surveying the area. Oh, far out, I've got it now. And my mother kept, all right, we got out of the car and there was just this, you know, all these people around, and there were lots and lots of my mother's friends and my mother asked me... there's Mr. and Mrs. Talbert, would you like to talk to... would you like me to introduce you to Mr. and Mrs. Talbert? And I said, you know, I said 'no' and these, both of the people mentioned are people I know, are friends of my mother's and that - and, you know, I had no desire whatsoever to talk to them and then I talked to the Gladers, my mother asked if I wanted to talk to the Gladers: no. And then Mr. Talbert all of a sudden is standing there opposite me so I shake, I kind of hesitantly shake hands with him. It wasn't at all comfortable, it didn't feel good at all. But the gist of the thing was - why had I decided to go into -- to go to a - a two years masters program at Washington Univ. rather than... and then planning on stopping after that, though I would be able latter on, should I decide to, to return for a Ph.D. rather than going straight into another program, kind of like at Harvard or something. Maybe at Harvard, I don't know where else - and going straight through to get the Ph.D.. And I was having, it was, I was having to explain it to everybody there, that was kind of the situation and it was very uncomfortable and I didn't want to have to do that particularly Mr. Glazier, who - whose son used to be a friend of mine and went to University of Rochester. Rochester, No? Where the hell did Lang (?) go to school? I don't know. Rochester is tied in there, his wife goes there now, I don't know if he used to go there, I don't know. At any rate, she, I finally ran into Mrs. Glazier and she asks me with just such surprise and, really, opposing my decision, you know, why did you decide to do this program and I explained to her how that I want to stop after two years -- and go out and try it or something and have the option of going back and she kind of, her point of view is that if, if I stop then I'm never going to want to go back and standing there kind of feeling, you know, I'm not actually sure of myself and my decision and wondering if I really will go back to school. I think that's why I didn't want to have to explain it to people. Also it's - part of this whole scene here - no, maybe a little bit earlier, maybe when we had just parked and gotten out of the car, I was kind of sizing up the situation here, just seeing if it was appropriate somehow and it seems appropriate in a sense because, looking for a woman -- I was looking for an attractive woman or something -- for what? It was all older women, so there weren't any young people and it was as if it was a party or something and I was kind of checking out the scene there with my mother. I remember, you know, not finding anybody there, you know, that I found attractive or something particularly to start out there one woman who, you know, for some reason, her face stood out and she wasn't at all attractive and had kind of short grayish hair and it was just kind of plain and unattractive looking and I - her face is very clear to me. It's not a familiar face. Then it seems we were kind of walking around, inside of this lodge, or whatever, and you know, I was trying to decide if it

was appropriate or not and - oh, let's see if I can see - there's a real sense of bizarreness here - a distortion of - kind of, I don't know where this is - laid out visually, on a chart or diagram or something, was like five days of - of what - there were some - there were supplies, which included food I guess, which had been stolen, or taken away from the people whose it was and it was kind of, you know, visually, it was kind of, say we're looking at an 8 1/2 times 11 and we're looking at it so the long way is vertical and there'd be a six paragraphs, or six series of sentences, you know, maybe numbered, in which there was no elaboration other than just an item -- a listing, itemization of the, you know, these items - the goods - some of them were food, others were - I'm not sure exactly, they had the sense of being supplies, you know, it like on an ocean-going ship, it was, you know, an old one, I think in the 1800s it was crossing the ocean -- those sense of supplies were included and it was like a real bad thing like these, it had been taken. I'm not sure who they were taken from or by whom they were taken or exactly how they were laid, there's a sense of there - of it - of there having been a buffet or something -- I'm not sure but I was just really shocked and very sad to see all these things had been gone or taken, whatever. I think it was here, at this point, that I was just when I first began describing the dream of seeing like a cookie sheet with this essing (?), essing back and forth, kind of caramel and whatever it was pastry -- it was very flat, it wasn't thick like a doughnut, it was pretty, it was pretty flat and it wasn't all caramel, even though I'm describing it as if it were all caramel, the description that I read along of it was a little caramel here, the whole thing looked like caramel, but there were only special ones that had said caramel, let me go into a description of this thing more elaborately ... as I said, it was flat, basically caramel covered and the only reason I knew there were nuts in that thing was because there was a little dark coloration and the description said there was a nut underneath and as I read along, I read along quite a long time, in fact I think I was reading it backwards, I think I started at the bottom of the sheet and was going maybe from right to left instead of from left to right, maybe I didn't know which way I was doing it, but not until I had got to the top S curve or whatever did I, I taste it and reach, you know, reaching in with my left hand, my finger and my thumb and it was very difficult to pull it out because it was really, kind of, very very gooey, crunchy caramel or whatever. I don't... I don't remember actually getting into it -- ever actually getting it into my mouth. For some reason, there's a TV guide gist to this or a flavour to this, as if the description that I was reading was a TV guide description of this piece of food like, like the TV guide has a description of a newspaper, of a TV show, it was kind of a TV guide-ness sense to it.

Upon further questioning he said:

S. Yes, I remember walking around, it seems like I walked around inside the lodge and this, I think this was the buffet sense, it seems like there was food set up on the various tables - you know, like picnic tables in size - I think this was what was there. There had been a social gathering thing outside but I think I was also inside checking out this place. It seems I was checking it out for me, not for my mother -- I was checking it out for me. Yeh, the visual thing, it seems at the end of the dream, at the end of the dream it was hard to describe, we were kind of sitting on a picnic bench - we were, my mother was there and I think my father was there, I'm not sure who else was there and we were...

I think I've told you all the distortions. Yeh, the distortion about that I was at Washington University not here and that my mother was going to introduce me to these people that I already know.

3rd. Awakening

S. We were piling out of the -- we had just arrived, me and several friends, we had just arrived by flying through the air, at a bank, maybe in Detroit, or somewhere on the east coast to Chicago in this kind of fantasy dream, we were just sucked through the air and I was being carried by someone else - I was kind of the lead person in our - I guess - you can't call it a squadron, we were all kind of flying in one group but I was kind of like being in a sense, you know - front shirt - and it was terrifically exciting and frightening too. As we were swooping down, to land in front of this bank president's (?), in front of the bank, you know, like a roller coaster kind of thing it was for me and we just went inside the -- we saw the bank president and we went inside and told him we wanted to borrow \$10 million and we're standing there for

a little while waiting, I guess, for him to get together and we started walking down the steps, as this bank president, as this bank president and then four other bank officials and as we're walking down the steps I'm kind of wondering why it is that we're borrowing \$10 million, and while we're standing there I guess I laughed - began to laugh a little bit, I just thought this whole thing was so absurd. As we're walking down the steps, I don't know where to the basement or whatever from the bank, I started thinking now what are we going to do with \$10 million and what I thought of was that I was _ well the first thing that passed through my mind was marketing identical pancake batter to, I don't know, Aunt Jemima or someone, and just bringing identical stuff as that and just packaging it in a different - in a different box and doing a tremendous promotional campaign and decided we'd have to do something to make it look or taste a little bit different I thought that we would put some kind of food coloring into it to make it a little different in color. Now what happened before this whole thing - this trip - I think we're leaving from the East Coast to home and we're in a car and in the car are Bennett, Connie and me and I guess two other friends, I'm not sure right now who they are but we're in a real gay mood, I guess real happy to be going and we took off - kind of via one of - I guess we started from Wooster, my home, and went through a lot of familiar areas and we go up through these dirt roads and things and it was very unrealistic, it was like - place to place travel was very brief and we didn't go through a whole lot of things, there were a lot of sights that in a dream struck me as being very familiar, of my childhood, like places that I knew very well but I think of them, it seems like they are familiar. We would approach one sort of dirt road off to the side and Connie would ask me if the road through Paxton, a dirt road up through here wasn't a scenic route that would be, you know, along our destination, and I would say no, it's just kind of a dirt road that goes up into the woods and that would be kind of strange, you know, that Connie would ask me about the kind of small, dirt road, which didn't seem at all, you know, on route you know, we weren't going by highways or anything we were kind of doing the back roads around Wooster. Let's see, where were we on our way to? I guess, Denver, was someplace we were on our way to (?) and, oh, let's see now, earlier in the dream it seems like it was just me and Connie. Let's see, after that we didn't take that turn-off to Paxton then before us was a kind of a small pond that was just like it appeared, in the dream anyway, it was identical as it was, as I thought it had been in my childhood, except for the fact that there were many dead logs dispersed through this pond in which I could [see] straight through to the bottom of this pond. In fact, the pond was kind of at an angle, it wasn't flat, it was at an angle and the logs were, you know, along the bottom of this small pond - lined up sort of, we were kind of at the top of the pond and it was going downhill away from us - the logs were kind of horizontal, were horizontal to our perspective, our angle, and they were serving a damming kind of a function, they were kind of damming the pond - they were all very stripped of their bark, they were very gray. Then we were, I think after that we went down a hill and I guess there were like five of us in a car at this time - Bennett and Connie and I and two others and we drove again through some, again, some kind of small town family kind of a place on our journey to the west and then we turned right back around and went back to where we came from but then somehow continued along our way. We were - at one point I know we were going down a very steep hill and I was, let's see, I was passenger and there were all these lakes, these nice lakes along the way but my whole position was very peculiar in the group, let me figure out what my position was. Kind of like I was the expense of joking and kibbutzing, I was the object of some kidding. What was it about exactly? I had, something that I had done was the reason that I, that they were kind of kibbutzing me and making me feel -- I wasn't angry but I was -- I guess I would prefer kind of not being the object, or - of the joking and things. I don't remember exactly what we were joking about. Let's see, oh yeh, at one point we were going down a long steep hill and this pine and it was wooded all around us and great big lake and as we approached this lake one of the people in the car says that they were really sad because they hadn't been to Otis airforce base all this summer long - you know, as if this was something they did every summer, looking forward to every summer and it was as if huge light was what she was refer -- I think it was a she -- was referring to as Otis airforce base, which is, you know, an airforce base in Cape Cod and I thought that was very, I kind of laughed to myself and thinking in the dream that she making more of it than it was worth or it was no big deal that she didn't get to go, because see we were going now and - - or the fact that she lived in N.Y. and this was in Cape Cod and was really far away... I'm not sure if I was laughing because of -- because she was so accustomed to going to Cape Cod every summer or something, or going there often -- not exactly sure, I don't remember a lot of details that happened along this journey but I guess earlier, the part that was really kind of seeking out the route -- I remember discussing, kind of, with Connie which way we would go. There was some, you know, kind of major kind of conflict which was - has something to do with our main route. I don't know the exact nature of the conflict - of which way we

would go, whether we could go - whether we could travel over water, or whether we had to go by land or it seems like there's some kind of fantasy quality to it. And I guess we sort of decided by kind of testing it out. I think that's why we went one direction, then the other, then went back then continued on our way, it was kind of a testing which route would be best. But then once we got underway then I don't know, we just buzzed along in the car. But then at the end of this thing here where I began describing the dream, you know, there we were flying in the air and it was if we came upon a town that at first glance looked like Chicago, particularly seeing the Hancock tower but then as I look again, kind of open my eyes, it wasn't a very clear vision, it was, foggy - I couldn't see too clearly - I realized that -- I was thinking gee, we haven't gone far enough to be at Chicago yet, this must be Detroit or something and I looked again and saw it really wasn't the Hancock Building, it was much smaller - light colored building that resembled the architecture of the Hancock and then it made sense that we were that far and that's when we just really kind of swooped right down into the street to borrow -- to go to the bank to borrow the \$10 million.

His answers to questions indicated that there were: 'some other places on route very early, islands, ponds, woody type places around Wooster ... the logs in the pond, they were very gray..., the pond was completely transparent - we flew, what looked like Chicago wasn't Chicago, I guess we drove across the water, ..., kind of doing things with the car that you can't really do. ... when we were deciding if we could make it, you know, Connie was saying, no we can't go that way - you know, a physical impossibility - and yet we somehow did. ... I was a participant, but in a passive role, like when I was being carried - I don't remember the other two people in the car - I think one was a girl, it could have changed. There were a lot of people standing on the bank when we arrived. One was a policeman, or a bank guard standing there, near the bank president. ... Pleasant, except for the very end - as we swooped down that was very unpleasant, very scary.

4th Awakening, 20 min. into REM, 6.45 am.

S. I was, I think, at Washington University or something. I think I was at Washington University again and I was standing - let's see ... Earlier in the -- let's see... right then when you called me I was standing inside of a foyer or something of the student union building of Washington University and I saw Connie's old roommate standing there and I was talking with a former Wooster friend of mine and I called out to Nancy and she went out the door so I took off after her and I was running because she was real far away and as I was running off after her to say hello and stuff I was passing by all these young people on the walkway and that was very much like the feeling of junior high, some people were smoking kind of surreptitiously and - or like college, yeh, like college, and while I was running -- see where they were going to get on the buses for reduced fare bus ticket that had been in junior high (???) and as I was running after Nancy thinking how I, I guess how I used to decide whether it was worthwhile to take the bus home - save the money and take the bus home or take a regular bus and get home otherwise (?) -- something like this and, you know like, I was sure Nancy had gone down this main road, this main walkway except I couldn't find her and then I saw, up ahead I saw a tall girl, Nancy is tall, and it looked like Nancy from the back - with short hair, her hair was cut shorter when I saw her in the lounge there for a moment and she was walking holding hands with a guy and as I run up and get close to her and saying hi, Dell (?) which is her last name, what we call her she turns around and it's a man and he starts answering me and it's as if I immediately know it isn't that Dell, it's her brother. I don't know her brother, she doesn't have a brother, this guy didn't look anything like her and I was real surprised and asked her where Nancy was and he said she probably went over to Mandolin Hall and I was real disappointed because I figured now I won't be able to find her because I didn't know where really to look and I knew where Mandolin Hall was even though that's not really a building at Washington University. -- But that's kind of how the dream ended right there. But earlier in the dream before I saw Nancy, oh, my goodness, all right, we'll get another segment done. I was talking to an old Wooster friend of mine named Bob and I hadn't seen him in several years and oh, Crass (?) was in this dream too. I was telling Bob I guess about my experiences in graduate school or something in the last couple of years... telling him about my experiences in the dream lab. That was probably what we were talking about. He was back in school again -- now it's taking place in Wooster and he was in Wooster again on Christmas vacation and it was kind of strange, you know, the fact that we were in Wooster again and the

fact that he's been out of school for many, many years. He dropped out long ago and now he was home on Christmas break. He had a letter with him that he had sent to me and kind of it had just arrived to me, or he had mailed, and yet, you know, he had it in his hand and he gave me the letter and I read the letter and you know, was just surprised that he had written to me and I don't know what the letter said or anything. But it was while I was talking with him -- it seems like it was in a room where we were kind of lying down very casually and maybe there was a fireplace going or something when I saw Nancy. I think Bob changed to another friend of mine, Craz (?) and again it seems like I was in another segment of the dream that I'll get to in a minute. Craz comes along and he gives me a very perfunctory hi though I haven't seen him in a year and immediately, like, starts transacting business with me and takes out this little folder or something and on a little crumpled up piece of paper he's handing me a receipt a receipt, I guess, for \$10 or something and on it he's got scrawled in real small handwriting that's very difficult to read, scratched out, it's real cryptic, something - this, oh, it was like this check - gaz - you know it was a check for \$10 and it was made out to someone else and then at the bottom of this check, you know, he had written how he was the authorized agent of - or whatever else and he was turning over these funds to me, Ken Jacobs, instead of the person named on the check. It was real confusing, you know, on the little note it said to see above, or whatever and there was nothing above - there was no explanatory note above like he had indicated. So I'm looking at this thing getting real confused, sort of. Then, I guess the first thing I said to him was - you know, kind of facetiously, you know, hi. You know, I was really, you know, stressing, kind of real annoyance, you know, I hadn't seen him in a year and it's really good to see you and here you just come in and just give me a very brief hi and then start talking business matter we have. Oh, the business matter was for dope. This \$10 was what I had given them or something to buy some dope and he says to me, you know, yeh, I'm real glad to see you too, except he said it, you know, in such a cold way that it wasn't at all convincing and I challenged him on it and he assured me that it really was good to see me. Yet in his behavior, his behavior was very discrepant from that. So then, you know, I suggested, why doesn't - why don't I just give you the remainder of the money - the balance - rather than you giving me back this money and then me still owing you the more money and he said because he didn't have the stuff yet, which made sense at the time although it surprised me because I thought, you know, he would have it with him. I think it was about this time that he became Bob and was no longer Craz. All right. All right, back to an earlier segment. I think very early in this dream I was on my motorcycle alone and I'm looking for a place to park on a small kind of city street that was at the intersection - the street that I was actually on was kind of - was a hill and I was at the bottom of the hill which is where the intersection was and I was driving down this road toward the intersection and saw no spaces on the right side of the road. Then on the left side of the road, of the street, there were two spaces by a parking meter and I pulled over into, you know, the first of the two leaving the second space open ahead of me and as I pulled in there were like five other cars all jockeying positions for this space ahead of me and that was very distorted in the sense they weren't all lined up and they weren't all coming from the same direction and in fact, you know, it didn't look as if they were trying to get into this space until they actually did it. Then, you know, everybody tried to dash into this space and the person who actually did get the space was not the person who was first to the spot, the person who had come up from the direction I had come from, from the direction behind me had tried to park and he was a young, little bit longish haired person and he parked his car and got out and where he parked his car, again comes a distortion, not between the two lines, by the meter, but way up ahead, close to another car who had left, really a tremendous amount of space so that, you know, any big car could have easily have fit in and I thought that was strange that the, the meters would be set up in such a way that you know there would be so much space between cars. And when he got out of the car and looked how he had parked he thought there was something wrong and got back in and backed up into the you know, in between the lines more, and then I stood there and locked up my bike and as I was locking up my bike I thought to myself, Ken this is a dream. It certainly feels one hundred percent realistic. You know here you are locking your bike up. And you know I looked around and everything was perfectly clear, perfectly realistic. There were no distortions visually and I decided wait and see you'll be woken up soon and you'll be talking about this dream and retelling it as a dream. And I just kind of filed that away, even though I could feel as though it was a dream, my mind just said, 'Hey, this is a dream'.

Remainder of dream told after getting up:

S. I was with a family, a kind of a young mother and maybe her five kids and like the kids were all retarded or something to varying degrees and it was a pretty long segment with them though I don't remember all of it - all the details of it. It was kind of me talking to the mother or maybe there was a father there too, no I don't think there was a father you know, about how the kid is and how to take care of the kids and things like that I was real sad about the situation because I had got to be real friendly with the kids and all and I think Connie was there at this time now and kind of like at the end I was walking onto kind of an open back porch and there on the back porch were all the kids standing they were little kids I think from age three to age twelve or something and I think they were all boys? Maybe they were all boys and they were standing there on this small little back porch looking over the railing and all of 'em were all discolored, kind of as if their entire backs were green, grass stained and brown grass stained and I was really puzzled, I think, just really upset at the fact that, you know, for some reason I knew that they had been this way for days, you know, their mother hadn't bathed them at all and was real irresponsible and just not taking care of the kids, bathing the kids and I was real sad about that. I think that was the last scene with the kids and then later when I was talking with Bob or Craz then the - it was kind of like, sort of like, sitting at an outdoor concert and these people with their kids were somewhat close by and the smaller kids came up to the two of us and kind of, you know, fondly, said goodbye to us and we assured them that the next time we were by we'd stop by and see 'em again. I kind of shook hands with 'em, let's see, it was a little kid - there was something funny about the way we shook hands - you know something weird. Both - we were both very touched that the kid came up to say goodbye - we never expected him -- the adult kind of courtesy to say goodbye to someone - to come over alone to where we were standing to say goodbye to us and that kind of interrupted us talking with Bob or Craz whoever it was. That, I think I briefly explained to whoever it was, Bob or Craz, you know, who the kid was and what had just gone on with them. I think that's it.

NIGHT 4

Pre-Sleep Interview:

E. What are the things going on in your mind now?

S. Really thinking about my 101 class tomorrow. I don't have that prepared yet, the reading and all the other stuff that I have to do. I most certainly will dream about that tonight. At night, I often dream about my 101 sections. A lot more conflicts have arisen in terms of that in working with Benton. I thought I was going to be able to do my own thing. I have to do exactly what he wants and it's very hard to fit into his structure of things and work with material that really doesn't interest me too much. So I'm really super frustrated. A lot of stuff has been going on this past week that has been associated with that. Let's see, what else. And there is always the work thing. Night after night - I'm even getting more hung up on it now - not being able to - it's really a battle.

E. Are you just not doing it or...

S. Yeah, I just stay at home don't go out and I just find other things to do and there are the books sitting open. If it was reading that I had to do I could handle that, but it's the writing - putting it down on paper and committing myself. I'm kind of developing a phobia by not doing it - I just find all these things to do instead. I don't even understand myself why I do it. Just in terms of my life - an overall picture - I think I've decided to stay here for sure - following this whole weekend experience, the lab. All the things Ron, Chris and I dealt with - that's not absolutely for sure, but I'll have to see how it's going to be. It's going to be pretty good. I just spoke to Ron tonight for two and a half hours about it - doing O.D.

E. What is O.D.?

S. Organizational development. I myself might get into that - so I may be taking a practicum - an O.D. practicum and a therapy practicum. Wow. Let's see, that's about all. I guess having talked that over with Connie the other night, I kind of got that straightened out where we are. She's been - as much as I want to go I've been very ambivalent because there are more resources here in Chicago. Whereas for her there is nothing at all, except me. So it's okay with her if I want to leave, because she has no real desires to stay here, but when I told her where things were at - she agreed that it would make a lot of sense to stay.

E. So it felt very good to talk it out.

...

E. How have you been feeling for most of the day today?

S. Oh, extremely guilt ridden. Moderately depressed. Today has been the worst day of the week. It usually is. Monday, usually is because I do a little bit of work during the week and then say, well, I'll do it during the week-end and I do none during the week-end. I kill a lot of time Sunday getting ready to do my work and then finally around ten o'clock I'll sit down to do my work and usually wind up sleeping only three or four hours Sunday. Last night I managed not to do any work at all. I didn't leave the apartment from - all day. I looked at all the things that I had to do, cleaned up my desk which hadn't been cleaned in a long time and found stuff that I was looking for. The main thing that I had to do was a paper that I didn't do and I stayed up until 1.00 am not doing it. So I felt - as well as being tired - as a piece of shit. I'm going to have to discover why I am able to maintain it until I forget about it. I know that I'm in a pretty good mood. On my regretful thing - I'm not aware of being particularly regretful at this moment. I know this morning like - poor - very regretful. As the day goes on I rejoice about the good things and forget the bad - then I get down and I think what the hell until something else happens and I bounce right back. I don't let it stay with me. If I would stay with the pain and be depressed for a week then I would do the work because it would be so painful. I don't discipline myself. I work strictly when I feel like it. That's all.

E. Okay - good night.

1st. Awakening.

No recall.

2nd. Awakening, 1.30am, 5 min. into REM.

E. What was running through your mind just at the moment I called?

S. I had just ordered a pizza at a, (pause) I was in a kind of a grocery store-restaurant deal, and, ah, I went to a magazine rack, ah ... I went to the magazine rack to look at the new Playboy. And I was telling Connie, and, ah, the news clerk came over, and I kinda like ordered that one, that issue. And so he took it, and like went off like to wrap it, or ah, or something, but then it became like a pizza parlor, and it was - and he went off and stuck it in the oven. Ah, ... while, and while in a sense it was cooking, this pizza was cooking, ah, I became aware that it was an issue that I had already seen, and didn't want it - it wasn't the new issue. So I go up to the -- next to the man, and he was kind of an older man, with gray hair, and I was standing there, like waiting for him to help me -- busy with what he's doing -- ask him if he can't pull the pizza out of the oven, I don't want it. And I stand there for quite a while, ah, I don't rush up and tell him right away. Um, I'm looking and I see him playing with a...um... this kind of doll - doll's face, that's made out of soft styrofoam, that's cut out of, ah ... and the styrofoam's cut out with something with kind of sharp little edges, little points. And if you miss up one little point, you also blow it, the little doll's head is kinda ripped. It was pretty cute, I thought. And then he began, you know, taking care of someone else's pizza, putting something on it. And also in the meantime, ah, there was a young boy there, a fellow, maybe eight years old or ten years old, something like that, a boy also behind this low counter, and another customer on the other side. He said -- you know, like waiting to order a pizza -- and he said, 'Well I guess I'm ...', something to the effect that he was here before -- this is the customer -- when he was here before didn't he get from this young fellow? from this, this six year old. And he mentioned something like that, this six year old. And the six year old questioned said '... um, you just ordered your drinks from me last time, you ordered - and you ordered the pizza from the other guy'. So the other guy, you know, agreed, 'You're right'. A little pause and then went and did his order. But it seems as if now, you know, the man, this older person that I'm waiting for, was now making the pizza, putting something on it. But after all this had occurred, then finally I stopped working for a moment, and I said, I asked him if he could take mine out of the oven. Um, I paid my dollar already already, but I, you know, told him I didn't want it now, asked him if he could take it out. And he said no, that it was too late, you have to have it done all the way, or not done at all, he can't, you know, do it half-way. So I was disappointed, and resigned that ah ... that I was gonna eat it, eat it anyway, if it was -- probably have another, and that we, you know, would have one pizza and we wouldn't put off having one until like next month, when the next month's issue of Playboy came out. (Pause) I guess I had just -- Anyway, I was walking over to tell Connie that he couldn't take it out of the oven now, and after just like going through the natural process, standing there alone and deciding whether, you know, well I guess we'd have to eat this pizza, and then next month we would have another one of -- It was as if, you know, this was like a special combination of pizza and although we liked this, we preferred the - this other kind of pizza, but if we hadn't ordered what we're waiting for next month, well then we'll have this special combination pizza anyway, and then, and who knows, um, what will happen? We'll have the other kind next month, and maybe it'll be a while anyway. But if it'll be awhile, we'll be ready for another pizza by then anyway.

Upon questioning he stated that there was a distortion in 'the magazine switching from Playboy to a pizza', that the six year old looked older than that, 'he looked like a ten year old, but he said he was six years old'. The only people in the dream were KJ, Connie, the older person, the little boy, and another customer.

He then reported these other two segments:

S. It tended to be a different kind of thing, like, ah, you were coming into the room here, to fix some of my wires, and you brought a scissors with you, and ah, a long pointy scissors, and you came in on the right side of my bed, and you were working on the thing -- on the whatever it was there, and I, you

know, was curious, because I was confused as to why you had brought a scissors in, what you would use a scissors for. Ah, and I picked it up, and I, decided to play with it in my right hand, and it was very diff... it was very hard to open and close. And then I looked down to see if, you know, if there was a screw that held it, and that made it tight. And I thought there was, I saw it could be loosened, and it should be loosened. It was real stiff. Ah... and I was thinking, how strange, you know, how could you use the scissors to fix whatever you were going to fix. You can't just cut a wire, that's not ... and I think that's all the segment I remember about.

He then added:

S. All right. This segment, this segment seems to have preceded the - the pizza, ... I was like in a tenement, in an apartment house. And I was kind of living on the third floor and like this was the top floor, yet somehow there was someone living above me. And for some reason I didn't like this - this guy who lived upstairs. Um, or he was annoying to me, or kinda something. I'm not too clear on the details, but like at one point in the segment, it seemed like I was out on my back porch, ah, maybe clearing off all the snow, like you know, as if there was a hole in my floor or something, on my back porch, and I was pushing all the snow towards -- you know, kinda a simple job of just getting rid of all the snow, or if it was some other things, you know, a sense of clearing off and making it clean. Um, that kind of a sense of - except I was angry at this guy upstairs. You know, there's - it's - I've forgotten a lot of the details from it, but I know that at one point there was a sense of like a Piper Cub airplane flying ... as if it was out of my view, it was flying just under a cover of clouds, and the cover of clouds represented this other guy. And in flying, that airplane was trying to go as high as it could, up to the edge, up to the bottom edge of these clouds, and as it kept flying, you know, this short distance, you know, it scr... I could hear some hard scraping sounds of the top of the wing against, you know, the bottom of the clouds. And hearing it was, you know, a good feeling, because it, you know, it meant that the plane was flying close and was like taking off the bottom edge of the clouds, and that was very satisfactory, that's what I wanted it to do, that was my intention. And then - somehow take off that bottom edge... And, Connie came out, I guess, onto the back porch, um, to kind of like find out why - what I was doing, and why. And I'm not sure of the interaction here, but it seems as if she was confused as to why I was doing it, and was, ah, kind of suggesting that I not. Yeah, I think that's all.

3rd. REM Awakening, 4.35am.

The scene was about ... it seems to be organized around, centered around... I was standing around outside on the grass and we're playing catch with a football. Running around, doing that. And also -- I also saw other people there, from ah -- there just seemed to be a lot of them around, that sort of people. Ah, it seems like there also were opposing ... Um, and I had just arrived on the scene, recently, and I played catch with them for a little while, and then, after one or two balls, I was ready to go on, and wanted to go. Um, you know that dream experience, in the last few moments, few minutes, I was experience- um, you know, experiencing hearing an ambulance -- I was hearing a siren in the background, and me being concerned whether they were, whether the police were coming, and I understand that I should - you know, that I shouldn't see that, and not take the risk of staying there, hanging around. Like I'm packing up my stuff into my tote bag, to get on my bike and go. And there were two footballs there, and it kinda set me back because they were only passing around one, somehow. And then my yellow - what do you call them? - straps, you know, but you want to strap things to the seat with, and they were all tangled up into the front wheel, and something else they were in kinda of a pattern. Just as I woke up, I was still playing with those things, just as I was trying - trying to do it real fast, and getting nervous about it...

Upon questioning he said that the experience was mildly emotional, pleasant.

4th REM Awakening, 5.54am.

S. I was driving up a hill, at the - on a motorcycle, in fairly heavy traffic. And ... ah ... to meet a train, um, kind of a highway, and kinda fell off that in doing so. I kind of cut off somewhere in turning around quickly on a undivided highway. And ah, a little red car with a woman in it, and she ... but looked peeved when I um, when I did it, and kinda in the process, ah... I don't know, it seems both of us overturned somewhere. As I was trying to accelerate up this hill, on the gas and it misfired, and sort of

a friend of mine, Steve, who is a photographer, and he's trying to make the point that ah, that he's doing the -- that he had a lot of experience with me where photographically I had -- when he was on the camera, and for a photographer, I had some things that were -- that made it difficult for him, or inconvenient for him, I don't know. I'm not too sure what it is, but somehow he was the picture-taker at my confirmation, and, some other kind of things which, you know, didn't happen all the time that I knew him. What happened earlier, just before I was planning on coming here, was ah (sighs) I'm returning somewhere, going up to the third floor of my apartment, and when I get to the third floor, I find that it - it's not my apartment, only it's laid out differently, out there in the hallway, and that there's a woman there, and she smiles at me very pleasantly, and says that she's waiting for the lady inside to let her in, or something. And the doorway is open -- I see that the doorway is open. So (sighs) and I think that I find that strange, that she should be standing there and waiting when the door is open. And she explained to me that she was going in to see this lady's beautiful furniture, or something. So I tell her that I - that it was in the wrong apartment, that I'm not really her husband or whatever, that I don't live there. And - and I start down the stairs. And then I decide, oh wait a minute, this person is going in there to look at the furniture, and I really enjoy looking at peoples' old furniture and old style, why don't I think of asking these people to take a look too? So, the woman's on the stairs, and she and a young person, and there's this one short, real heavy antique table in the front as you walk in. But the rest of the place is like all junk, and there's lots and lots of people in there... Only like a big party. And I'm just following around the lady of the - of the house, and this woman who was out on the landing, the front landing, the front hallway, I think. And ah, I found out it was all junk furniture, cribs and babies' cribs, you know, for taller- and double mattresses, and triple mattresses, it was a terrible disappointment, looking at all that furniture like that. So we're walking around the house, and there's a number of people there, but from the look of things she showed them each room, from the room we were standing in it just looked like a huge party, it looked like a Saturday night party, with everybody the woman knows there. And, and I was kinda standing in the kitchen, and looking into the other side of the room, and seeing lots and lots and lots of people. Um... you know, I guess the person who was interested in buying some of these things, you know, like friends, and so forth, was no longer the woman who was in the front hall, but was now this - this guy, a young guy, he seems kinda weird, just like the stuff he's interested - you know, the Danish stuff, and I know that he's got a lot of kids, and he's mentioning the triple mattress, and so forth, which makes me think he's kinda weird. (pause) So I'm leaving there... I'm leaving there... (pause) So I-I leave there, I think, with this guy? with this strange guy? ... um ... I don't know. There's a picture there of this strange guy, but I tend to be more of an observer. Could there be someone else who went with this strange guy, and then had problems with him also... However, I'm not - I'm not sure who it is, whether it's me, or I'm observing someone else, but ah, I'm leaving there, and ... (pause) ah ... I don't - I - I guess - there's a gap in my dream, but then just - just before the scene that I began with on - on the motorcycle, um, I'm back on the motorcycle, and ah, and then the same fellow was walking down the street, and somehow it - it, you know, it made plain the meaning of ah, your right, this guy is weird. Um, in a sense the evidence for it was the fact that my right ear electrode was off again. And you know somehow this guy was responsible for it. That was just before I got on the bike and pulled out and did that U-turn I told you about before. He had a bike, and was -- or I was trying to fix my bike myself, when I - there was a green wire that went to - behind my right ear, and I was trying to fix that -- fix the elastic part to get it back on ... um ... And that - that's when, you know, it seemed like when Steve began talking to me, either my voice or actually talking, he starts out with talking with this guy, how he wa- how Steve was right about this guy being weird, and then he was talking about how I did all kinds of things when he was taking pictures that made it harder for him to take pictures. I'm not sure. All right. Then a couple other things from earlier in the dream. And one of the ... the last... I think it was supposed to be a V.A. cafeteria, and it's located down on some kind of a boat dock, like for shipping, like a pier. And it's a strange hour of the day, and I suppose we're down there. I went down there with lots of people. Some friends, I'm not sure who. Um, maybe Cliff, maybe someone else. Ah ... and it's strange being there, down by the shipping pier. And we go into this old, long, flat building and I'm feeling uncomfortable doing it. And way down at the end, there was some kind of cafeteria there. And, ah, we went down there, and in the showcase, you know, the different foods like behind the glass were all these little sort of frozen foods displayed -- were all these camera lenses. ... some fictitious brand, some camera that I'd never seen. Ah, and they were -- and going in I had some kind of an expectation of it being quite ..., only I heard that they were real cheap there, or something. I go in there, and there are all these strange - strange brands of cameras. So I'm looking, and pleased with that. Then we get our

food, or something, and ah, I don't know what that was -- it was strange food, or it wasn't real food, or whatever. Funny, it was some kind of a can - or was a --- (tape runs out).

... Um, some kind of funny looking food on a - on one piece of round, rye - or something that was, you know, only on one piece of bread. I'm not sure. The food was strange to me. Um, but I guess we paid for it, I'm not sure. Then ah, we lay the change on the counter, rush around the cashier, and then we walk all the way back down to the end of this long sort of cafeteria, and then a couple of strange- strangers were there. And - let's see - who were they? I'm not sure. Oh, what they're tied into, it seems, is another whole thing that got them all together, but um ... there's kind of a submarine thing in here, and I'm observing some ship at sea, and ... I don't know ... um, but anyway, I don't know how it came about, but this ship kind of long, and the submarine that it had kind of like in it's hold, and the whole - whole piling went way way back, uh, kind of like the guy in the Yellow Submarine, ah, ah, I forget his name, Yul? -- Oh, I thought it was Yul. O.K. But the, um, the Lonely Heart's Club man, that old guy. But at any rate, I tend to be a - a distant observer of - of this, you know, the submarine having torn away from the main ship, or - or some god damn thing. And I know like in the distance, you know, it's kind of, or whatever the ship's doing, you know, retaining the smaller sub in. The scene of, you know, the sub being way down, in the water, or something. I don't know, still is missing. But then the ship finally got the door open somehow. It seems like kind of this ship kinda opened up in half, and tried to take in the submarine. You know, it seemed like it had a place for storing. But rather than the submarine see this ship split in half to kinda take in the submarine, kind of like ah the freight, or jet transport, that opens up, you know, the doors and - a huge door, and tanks and that drive into it, that kind of thing. And it the - the ship missed the first time, and it didn't do it properly the first time, and, so it had to do it again. So. Maybe this following that thing, that we went down to that cafeteria, somehow in the dream -- but I was just the observer of the submarine and the ship scene, whereas I was an active participant in the cafeteria episode. Anyway. All right. And then there was another whole segment somewhere else, which seems to have preceded the ah the apartment scene, you know, where I was going in the apartment. And that is, ah, where I remember the beginning, I'm standing in a apartment, probably the third floor, or the fourth floor, something like that, an apartment that, I don't think it's furnished, and it's got a lot of windows, and I'm standing there looking out. And I guess I'm there with my brother and my mother. And there's several windows close together on the right, but there's only one window over to the left. And I kinda point out to my mother, at first, I guess, that the tree? or the trees, the green tree? no, that isn't - I didn't notice the green leaves and stuff on the trees, that the trees in the left hand window? wash what? having some, or were now growing? or somehow were different than they had been, and were, you know, alive and growing. And my mother was skeptical of that, so I watched those trees for awhile, for a few minutes, and pointed out to her how in fact the tree was alive, and changing, whatever. Um, you know, it had gradually started moving, started growing, and then one began, I believe, ah, growing in the window, and that was probably the time where I was going to - where I just ah, where it somehow certified my thing, and she saw my point. And see that, at the time, you know that would involve something that was a mystery, growing on a, I think, some kind of point, I was illustrating it, to the tree growing - to the interrelationship with the trees. Um, but it seems that then we went down the steps, and we were outside on the grass, and now, it- it seems that there was four of us, I think four was my brother, and my mother, and Connie and I, and, there was an exchange of gifts at this time. I had given my brother, you know, a sealed envelope reminding him of his birthday party, or something like that, and he was in the process of opening that at the time, and that was gratifying to me, somehow. At the time of the dream, I was thinking, wow, he's opening it right here and now, outside. That was a strange feeling, for me, because I've never seen him open a birthday card before, and it - it was a very unique and pleasant scene, we were on the grass, and opening my letter, and that. Um, and it seems as if I had all - as if I had received previously - maybe not previously, but sometime, you know sometime previously, a birthday card or something from him. I don't know. Then, it seems like Connie had also given him something? some gift, already. And then it was as if - the strange part was, all right, he had gotten some gift, in a letter, it seems, and he had sent - he had made some kind of, somehow, added up what he had gotten. And then, he just gave me? or maybe Connie gave him then? or he gave my mother, or something, I don't know who, ten dollars, a ten dollar bill which was somehow, you know, in exchange for part of what he got. He wasn't giving it all back, he gave most of it back, and the ten dollars was for two people. I don't know. Somebody added it wrong or something. Ah, so I was leaving this scene - that was a very brief outdoor scene - and I was returning to the apartment, as I returned to the apartment on the doorway that was on the ground floor - there was an

envelope, and there was another birthday card, and I opened it up, and it seemed to be a card that I'd been watching Steve - I'm not sure - but you know, opening it - as if we were both familiar with the dream. It looked like some kind of familiar birthday card. And I experienced that as some kind of reaffirmation of my being a good person, something about giving him a birthday card, or something on that order. And now I went up the stairs, and this is the apartment where that other story took place, that, you know, where it was not exactly my apartment, where my apartment was like one door, you know, north, and whoever was actually west, west of this one, and ... of that apartment, and the whole story of what happened there.

Upon being asked whether there was any distortion in the way familiar people or objects were represented, he said:

S. Ah, yeah. I think it was actually when they occurred. Let me just kind of run through them. Distortions, they were the stills. The photographer, he was making the point about how I had done whatever it is that I was doing now before, and he pointed out a pattern, and yet I - it's strange where he could have come from because I was driving a motorcycle at the time, and yet he's a passenger.

Upon being asked if he was an active participant in the scenes, he replied:

S. All except for the situation that had the submarine in it, the ship. Other than that, I was an active participant.

5th. REM Awakening, 6.50am.

S. A bunch of people were sitting around, in what seemed like, I was sitting around in an apartment. I just then asked... Cartwright was looking for an industrial job for me? And I was asking them why. I was asking... Chris? and Ron? Why Cartwright was looking for an industrial job for me. I guess that's- before that Diane answered the phone? And it was Ron, and she was trying to find out if my schedule for when I was going to be seeing, you know, for this industrial client. I didn't understand that because it didn't even sound plausible. I don't know, it was confusing. (pause) We were just sitting around in that - in the living room scene, and, we did that for awhile, I guess, ... there was a stranger here who- did he know other people here or not? Anyway, I didn't know him, and he said hello. One person told me he didn't live in an apartment here in Chicago, and one person said he knew him across the street, he's a student here, and two other people were in the building over here on the other side. It's real strange. Chris was somewhere, and Dave and ... said that he had handed in a paper on ... for school, and he crumpled up the rough draft of that paper, ... I just get a feeling that a whole hodge-podge of things that happened in this room here, ... And Chris is changing his pants, putting these white, soft pants on - changing his pants. Earlier in this apartment I was talking about something to Carol, the secretary from downstairs, and I hadn't seen her in awhile, she'd been away, and she came in, it seems I was sitting at a table across from her, and she was talking, and she was into some real heavy emotional stuff. I don't remember what it was, but she was being real emotional. But then she became an older woman, I guess. She became an older woman. Ah, and someone else walked by, and kinda looked in on what was going on. But she continued, and she was really very emotionally involved, and crying, when she talked about what it was. And I had been, I guess I'd been talking to Steve Reise before I began talking with Carol, and he went into another room, and started to talk to someone else, and then he came back, and while I was still talking to Carol, listening to her, he started talking to me. So I turned to him, and asked him to hold onto it, that I was talking to Carol, don't interrupt me. And he said something about that we were, in fact, talking before.

E. Do you remember...

S. No I didn't. I think he wanted me to. And we kinda got up, and hassled it back and forth. Ah, I think something about perception checking. And he asked me a question that put me on the defensive when he actually asked me the question, to show that, um, the way he asked me the question contributed to me feeling defensive in answering it. It kinda seemed like he was drawing to the question in answering me. It was like contributing some blame to me for really misunderstanding, for not knowing and stuff, all the blame... So,

then he went back to what he was doing, and guess I finished with Carol. And that seems to bring me up to the whole scene happening in the whole living room, with all these people -- something was going on. For a time I was kinda the center for the conversation. Oh! I didn't include some scenes -- well just before the scene when the new guy came in, and mentioned the other peoples' apartment, and so forth. Earlier in the dream I was outside, and interacting with some people, I'm not sure who, but..., I'm talking with some people, and we're talking at a political - some kind of a political banquet. I don't know if they were people - young people from Alternatives, or from what exactly. But I was interacting with, ah, outside, in the sun, and I was sitting at a table, talking, with some people. And then there's another scene, like a street scene, by a, kinda like down by Wabash, except no, because it's - the train is running on the ground level, it's not the elevated, it's all tracks in the middle of the road, and there's no ... for children. And I was walking along here, with someone and I have my lunchbag with me, and I have a bunch of pears in it, and some apples, and I pull out a pear, clean it off on my shirt, and then I get distracted. Anyway, I put back my pear, I don't know which pear it is, the pear I'm holding is very soft, and somehow I didn't want that one. So eventually I find a pear, but the only pear that seems... And then walking up the street, as I walk away, I see a whole bunch of, ah, I guess young Spanish, Latin kids. I'm a little alarmed at seeing them. I'm kinda afraid, uncertain of what they're going to do, although they are very young kids. And I stood up against the buildings, in kind of a passageway, waiting for them to go by, and it seemed like I - it just seemed like it became a living room, because, you know, I was talking to people in there. Yet I never kinda finished with them, and then went out to the street, back out to the sidewalk, to see where these other kids were, and they weren't in sight. I expected to see them kinda pass by. I never saw them pass by when I was in this room. So when I got out, I expected to see them right around there, I didn't know where they were. It was all kinda strange. They kinda disappeared. Then, at some point, I was walking through an old hallway in a -- I was going through a long -- it was in this kinda old factory, industrial section, and I was going through a long hallway that twisted in some -- somehow in the dream it was very familiar, it was like I had been there before. And shortly after I entered the door, to this long hallway went up this long hallway, and the hallway seemed twisted a little bit, kinda on the way out. Actually, I'm kinda taking a short cut out to the alleyway where I parked my motorcycle earlier. And as I go up to the exit door, from this kinda shortcut, there are a bunch of, whatever they call them, by the doorway. And they're just sitting there, kinda in a small pile. And walking by that, I just picked one of those. And the way I did it was by walking all the way back to the new building, where I had come from, and went out the front door. And then I was conferring with Connie about, um, me going back and getting them, except there was a quarrel because she wanted to have some information, and I wasn't telling her, I was in a rush, I was saying, just wait two minutes, I'll be right back. I guess I didn't want to tell her I was going to take some? or? some information that she wanted that I wasn't giving her? And that created a lot of bad feeling between the two of us. So if - when I go out to get the motorcycle, it moved several feet from where it was in the alley when we parked it. And, a lot of the instruments and all that stuff on the bike - the handle-bars were way off, like turned over, and the mirror was turned over, and the front rotor parts were turned over backward. ... we could fix it by pulling the handle-bars down, ... And we reached the conclusion that the bike must have been worked over while it was parked there, or something. Then I think - I don't think we actually ended up driving off... I'm in the living room scene that I described, the room with Ron and Chris and the other students. And then Diane being there, and the - taking a message on the phone. Kinda like an academic, seemed like me and the O.D. issue I was talking to Reise about before.

S. Oh, one other little thing. While I was on the street where the tra- where the railroad tracks, the trolley tracks, where there was a subway tracks went by, standing there against the wall and watching, I saw this little automated vehicle running on the tracks, that was very peculiar. It was in a sense of a, I think just a little, tiny two wheel thing in the front, that didn't have any depth or height, it was kinda like as if a Ford with two wheels. And that had attached to it - there was some piping to the thing - kind of a trailing little - little car, with a little compartment on it, it was - wasn't a car, it was a, well, some kind of a wagon, or I don't know, something --

Morning Interview:

S. I was happy to see the new issue of Playboy out, so that I could check that out. That's how the

whole thing started. Then after I kind of ordered it, he took it away to cook it. He took it away, I don't know why. I didn't just pay for it and take it. Then I looked at the cover and said 'hm, this looks like an old cover', this is last month's issue and I had to admit that yeah it was. But I thought it was this month's issue -- but maybe it changed. Yeah, it's more likely that it changed - I presume it did because things change a lot - to an older issue. What stands out to me is my lack of aggressiveness in telling him - as soon as I found out - that it wasn't what I wanted. I mean so that I wouldn't have to have the pizza that I necessarily didn't want. I rationalized it that maybe it would be a long time before the next issue is out so maybe we won't pizza like that anyway. We wanted the kind we ordered, but this one was alright. In awakening I felt bad and annoyed that I hadn't been more aggressive. That's something that I do all the time. I mean I'm usually very aggressive, but in one situation that I'm not aggressive is like with sales people. You know, like when I want change for a dollar or something or cashing in bottles at the Jewel I'll wait in a long line instead of going ahead of the people. Sometimes I'm really not aggressive that way and it really annoys Connie and she is basically very unaggressive, but in those situations she is very aggressive. ... in the dream where I waited and wound up having to buy the pizza because it had already been cooked. I felt bad when he said that it had already been cooked.

The experimenter then says that he did have to enter the room before KJ's dream about the scissors. KJ continues:

S. As I was recounting that to you I was thinking about all the Freudian implications. Cutting off my penis or castration or something like that. I get that my sense of your coming in with them was - yeah you brought one tool in - during the dream I had the fantasy that from the reading you know that something was wrong and you and Linda got together to decide what tools to bring in there with you to repair, and the one tool you brought in was the scissors and this is my fantasy in the dream, you decided that, but how was the scissors going to work. You can't just cut a wire - you repair wires not cut wires. So it was a sense of confusion. You didn't have to use it for anything. You did whatever you did and I was just sitting there playing with the scissors and they were hard to open. There was a couple spots of rust on the scissors.

E. The segment that preceded that one was your living in a tenement house and 'there was a guy living above me and I didn't like him'. What kind of feelings do you have about that?

S. I don't remember anything like that. During the dream it made sense to me that I didn't like him, but there were more things that happened in the dream because I knew I felt okay about not liking and it made sense to me because he did or he was something. I was very grateful when that plane did his thing with the top wings. There was a very large scratching sound like he was scraping off the bottom layer of this guy that is represented by a cloud. It was kind of like a narrow space in the sky. The wings were like on top of the plane. I'm having problems dealing with Benton these days and so the first thing that comes to my mind is that it could be him even though I don't have any recollection of the dream that it was him or any of the particular things that have happened between me and Benton recently. In my conscious state now though, he is a source of concern for me.

E. Okay, let's go on to the third REM. 'I was standing around playing catch with some guys and a football...' You said that you figured that you shouldn't be there and you were packing up your stuff.

S. Yeah. That was - it wasn't as if I went there to play football. I don't know what it was that I went there for. I have feelings about ambivalence, but it wasn't about throwing a football around. I was more concerned about them smoking hash. It wasn't like a football game, just standing around and a lot of trees. No motorcycles, just bicycles and stuff scattered on the ground. Once in a while way off in the distance I would hear a siren very far away. It wasn't as if they were closing in on us - they were far away. That made me think, 'gee, I wonder if that has anything to do with us here'. It wasn't your typical dope scene paranoia. In telling the dream I was surprised I had a dream like that because I smoke so little these days and I'm not at all concerned about busts or anything like that.

E. Why don't you try and put all these things together and see if you can come up with some kind

of general theme for the night and see how it could fit in with what we were talking about before you went to sleep.

S. The dreams were pleasant, but they all had anxious elements in them ... I'm used to functioning with a certain amount of anxiety at all times so that it doesn't incapacitate me. I guess I noticed in every single form that I filled out, I'm at least moderately anxious except on rare occasions. Things weren't peachy and rosy, but they were positive, I was enjoying life in my dreams, but there were always problems to overcome, sources of discomfort. Let's see how did I deal with these in the dreams. The thing with Steve Reise, yeah, I was very upset about that because I take pride in my communication skills. I was pretty clear that I - I guess I felt challenged by what he said. The element with the sirens coming, I was concerned. I had a little difficulty in leaving because my strap was around the wheel and all tangled up.

E. You didn't resolve the pizza thing very well.

S. No, I was real passive in there.

E. It seems like you were resolving things as you were going through the night. You started out with pizza where you weren't able to resolve anything and were left feeling kind of frustrated about the whole thing.

S. And did that have the thing where you came in?

E. Yes.

S. Yes, that's also very passive.

E. Yes, you never asked me what I was going to do with them, and in the next dream you needed an airplane to come and take care of the guy, you couldn't do it yourself. But then you started resolving things - with the football you were trying to get out of the situation - you started becoming active.

S. I don't know why the elements of photography came into that dream twice with Stew. I am also getting into photography a little more now.

E. So you think there was an underlying tone of anxiety throughout all your dreams?

No, I don't think that was the predominant thing. The last dream shifts more toward the negative. There are more anxious elements in the segments. I find myself processing it in terms of how I'm doing with my life now instead of looking at the dreams. I feel like I have a better control over my life now, much more optimistic about my life here, I feel much more in control. I'm much more at peace with my environment here. I was fighting it. I feel much better about it. That seems to be in there. That quality that there still has to be problems to be overcome and stuff that still gets in the way, but they don't debilitate me, I still say the dream is pleasant despite having those aspects in them because I don't experience them as terribly as before like with the dream at the railroad station [night 1]. That dream blew me apart whereas here there was just something to be overcome. A little uncomfortable but I guess there is more of a sense of detachment than frustrations.