

POSIWID and determinism in design for behaviour change

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Please cite as: Lockton, D (2012), 'POSIWID and determinism in design for behaviour change', working paper, available at <http://danlockton.co.uk>

Abstract

When designing to influence behaviour for social or environmental benefit, does designers' intent matter? Or are the *effects* on behaviour more important, regardless of the intent involved? This brief paper explores—in the context of design for behaviour change—some treatments of design, intentionality, purpose and responsibility from a variety of fields, including Stafford Beer's "The purpose of a system is what it does" and Maurice Broady's perspective on determinism. The paper attempts to extract useful implications for designers working on behaviour-related problems, in terms of analytical or reflective questions to ask during the design process.

1 Design and intent

A question that often arises when discussing design for behaviour change is around *cause and effect*, and *intent*: features of a design might lead to certain behaviours being influenced, but if this is not being done deliberately, should it count as 'Design with Intent' (Lockton et al, 2008) or not?

1.1 Who benefits?

One approach would be to ask *cui bono?*—who benefits from this behaviour change? If a user's behaviour is influenced through the design of a product, and that change benefits the manufacturer or retailer, the *cui bono?* approach would suggest that this is more likely to be by design than by accident. An obvious example here is digital rights management, essentially using the design of systems to enforce particular business models via enforcing particular user behaviours (Doctorow, 2004)¹.

Greenfield (2011) suggests that "every act of design involves choices that are deeply interested, in the sense that they necessarily serve someone's needs before (or to the exclusion of) those of

¹'Doctorow's Law' is relevant: "Anytime someone puts a lock on something you own, against your wishes, and doesn't give you the key, they're not doing it for your benefit" (d'Andrade, 2009, quoting a presentation by Cory Doctorow).

other parties. This is not a particularly profound point, but you might be surprised how much pushback it generates.”

Nevertheless, the question of ‘who benefits?’ does not always enable a straightforward analysis, particularly where the behaviour being influenced has larger social or environmental consequences. Does a designer working on influencing reduced energy use, or improved health behaviours benefit from the behaviour change? Ultimately, he or she may well do, if enough behaviour change occurs that future society uses less energy or is healthier, but it is not a simple case of immediate self-interest.

1.2 The veil of ignorance

In this vein, Berdichevsky and Neuenschwander (1999) provide one of the most widely referenced views of ethics within Persuasive Technology, a field substantially overlapping with design for behaviour change. Their eight rules include the ‘golden rule’ that “[t]he creators of a persuasive technology should never seek to persuade a person or persons of something they themselves would not consent to be persuaded to do” (p.52), drawing on Rawls’ (1973) ‘original position’. In this context, Rawls’ ‘veil of ignorance’ principle would suggest that a designer should design systems while blinded as to whether he or she will, ultimately be a user of the system—so (supposedly) ensuring that *self-interest nevertheless results in a fair outcome* and rendering the *cui bono?* question moot. There are parallels with the ideas of ‘universality’ and ‘Design for All’ in inclusive design (e.g. Clarkson et al, 2003).

This is superficially appealing, but as Berdichevsky and Neuenschwander (1999) go on to note, it raises questions about empathy: should a designer be involved in trying to influence behaviours he or she might consent to have influenced, but which are nevertheless controversial, e.g. due to cultural differences? What if the designer believes that the behaviour change is socially desirable, and supports it him or herself, but knows that the users being targeted do not want to change their behaviour? Berdichevsky and Neuenschwander’s other rules attempt to resolve this kind of dilemma, but it is clear that this is a potential problem.

Other questions relating to *cui bono?* include—most obviously—those relating to utilitarianism, individual rights² and Berlin’s (1958) concepts of positive and negative liberty (as noted by Brey (2006), in reference to ‘behaviour-steering’ technology). For example, drawing on Mill’s *harm principle* (1859), even if an individual user doesn’t ‘want’ to change his or her behaviour, if it would benefit society more generally, should an attempt be made to influence it? Is it, in fact, unethical *not* to try to influence that individual’s behaviour? What if the individual’s family will be directly harmed by his or her behaviour unless it is changed? What if the individual *currently* does not want to change his or her behaviour, but it is believed that in future, he or she will look back and be glad that it was changed? How ‘transparent’ should the intervention be? Should it reveal that it is trying to influence behaviour? What if it will only work if the intent is kept hidden?

²Especially where governments become involved in behaviour change, these issues potentially become politically charged, and have been considered at some length by bodies in the UK such as the House of Lords’ Science and Technology Select Committee (2011) and the Nuffield Council on Bioethics (2007), without necessarily reaching definitive conclusions about when, and in what circumstances, different kinds of behaviour change interventions are ‘ethical’, and how much the law should be used to enshrine or ban particular actions.



Figure 1: Low bridges over the Shore Parkway, Brooklyn / Queens. Photos by the author.

1.3 Intentionality

Questions on intentionality become especially pertinent when discussing controversial cases such as New York City ‘master builder’ Robert Moses’ low parkway bridges on Long Island (Caro, 1975; Winner, 1986). The point of contention here is whether or not a particular feature, which has a particular effect on behaviour—preventing buses (and by implication poorer people, often minorities) using the parkways (e.g. to visit Moses’ Jones Beach State Park)—was implemented intentionally (to discriminate against minority groups), or whether the effect was just a by-product of a design decision?

If it were done intentionally for reasons of discrimination, it is both cunning and unethical, but if simply a poor design decision—which has limited the flexibility of the parkways for use by buses and commercial traffic ever since—then is it anything more than shortsighted? On the other hand, if the parkways were always intended to be free of commercial traffic, then low bridges were simply an efficient way of meeting the design requirements—good design, in fact?

Joerges (1999) questions details of the intentionality involved in this case, suggesting that the story as presented by Winner is more of a ‘parable’ (Gillespie, 2007, p. 72) about the embodiment of politics in artefacts—an exhortation to recognise that “specific features in the design or arrangement of a device or system could provide a convenient means of establishing patterns of power and authority in a given setting,” (Winner, 1986)—than a real example of architecture being used intentionally to discriminate against certain groups. Tromp et al (2011, p.4) comment that “[e]ven as a mere thought experiment, the example shows how deeply intertwined human politics and nonhuman technological artefacts are.”

It is also an example of how, as Ittelson et al (1974, p. 357) put it, “we are all living in the relics of the past”, and how design decisions made in one context have the power to constrain (or enable) future generations. The discussion in Lockton (2011b) of ‘High Road’ and ‘Low Road’ approaches to structuring systems, drawing on Brand (1994), explores this further.

2 “The purpose of a system is what it does”

Rather than intent, is it really the *effects* on behaviour that matter? And if so, are those effects produced by the designer, or are they constructed by the system in which the user and the artefact operate? Actor-Network Theory (e.g. Law, 1992) where both humans and technology are considered as elements in a network, makes use of the concept of *agency* rather than trying to deal with intentionality; agency arises from the relations between human and non-human actors. Yaneva (2009) considers design as “a type of connector” enacting the relations between actors.

One might take a a hermeneutic approach, as in science and technology studies (STS)—treating buildings, products and systems as ‘texts’,

“decipher[ing] the effect of technical... artefacts primarily via their expressive values. Things induce nothing, but they indicate something. Built spaces are considered as media which tell something to those capable of reading and listening... Authorial intentions (that is, designers’ purposes) sometimes play a rôle in this, but usually a peculiarly indeterminate one. In a highly contingent process, many many others will decide over and over again which meanings and uses are inscribed into built spaces” (Joerges, 1999, p.18).

While superficially appealing, this approach still relies substantially on interpretation: the researcher tries to read *meaning* into the effects. An alternative would be to dispense with subjectivity, rejecting any necessity of interpretation, and *look purely at the effects*. This is the approach taken by the operational researcher and management cyberneticist Stafford Beer, whose maxim “the purpose of a system is what it does” (POSIWID) cuts through all layers of interpretation, meaning and intentionality. This “bald fact... makes a better starting point in seeking understanding than the familiar attributions of good intentions, prejudices about expectations, moral judgements, or sheer ignorance of circumstances” (Beer, 2002).

2.1 Dispensing with interpretations and goals

The implication of a POSIWID approach is that it *doesn’t matter* why a system was designed, or whether the intention was to influence behaviour or not. All that matters are the effects: if a design leads to people behaving in a different way, then that is the ‘purpose’ of the design.

Instinctively this may provoke some pushback, since ‘purpose’ usually implies *teleology*, that someone or something created the system with a particular end in mind (see also the discussion of means and ends in a behaviour change context in Lockton 2011a), but in Beer’s usage—while somewhat tautological—*purpose* is exactly what he says, a description of *what a system does*.

If new rolling stock results in more commuters using a rail line, then, in Beer’s view, that is a purpose of the new trains. If building the new trains creates jobs, then that also is a purpose of the new trains. If the new jobs mean that a local politician can hail the new rolling stock programme as being a successful achievement for his or her constituency, then that too is a purpose (even if it were not at all one of the reasons that the railway operator envisaged when planning the programme). Intentionality is irrelevant: to understand the behaviour of systems,

we need to look at their effects. If the increase in commuters means the ticketing system can't cope, that is a purpose of the new trains too: essentially, a POSIWID approach means that both 'positive' and 'negative' effects of a system must be dealt with. We might try to dismiss unintended effects, but they are still effects, and we need to recognise them, and deal with them. Undesirable "phenomena are not simply blemishes—they are [the system's] outputs" (Beer, 1974, p.7).

Beer's approach modified some earlier cybernetics perspectives on purpose, such as Rosenblueth et al's (1943, p.18) discussion of purposeful behaviour (in machines or organisms) as being that which "may be interpreted as directed to the attainment of a goal". For Beer, the interpretation and the goal could be dispensed with: Pickering (2010), discussing the application of POSIWID to understanding how 'viable' companies operate (e.g. Beer, 1972), represented his view as being that "in a world of exceedingly complex systems, for which any representation can only be provisional, performance is what we need to care about. The important thing is that the firm adapts to its ever-changing environment, not that we find the right representation of either entity" (Pickering, 2010, p.235).

2.2 Teleology and teleonomy in design

There are parallels with the issue of *teleological* language in evolutionary biology, which may seem to imply that an adaptation has developed 'for' a particular purpose or goal rather than as a result of natural selection: "Typical statements of this sort are: 'One of the functions of the kidneys is to eliminate the end products of protein metabolism,' or 'Birds migrate to warm climates in order to escape the low temperatures and food shortages of winter.'" (Mayr, 1988). The term *teleonomy*, used to mean, effectively, 'apparent purpose', is now commonly used, and it may be sensible to adopt this usage in the design community.

In particular, from the point of view of constructing and structuring libraries of possible design methods for influencing behaviour (e.g. Zachrisson and Boks, 2012; Lidman and Renström, 2011; Lockton et al, 2010a, 2010b), a teleonomical approach would justify the wisdom of looking at situations where people's behaviour *appears* to be influenced by aspects of systems around them, in addition to situations where the influence is known to have been designed intentionally into the system.

3 Determinism

A fundamental concept linking the designer's intent and effects on behaviour is the idea of *determinism* in design and architecture—often finding its expression through 'grand plans' such as New Towns and ambitious social housing projects. Ittelson et al (1974, p.345) explain that "[i]n its simplest interpretation, [determinism] holds that man can manipulate environments to produce specified behaviours." On one level, this is what design for behaviour change is about: if it is 'successful', then design will have led to behaviour changing as intended. But there is more to the subject than this.

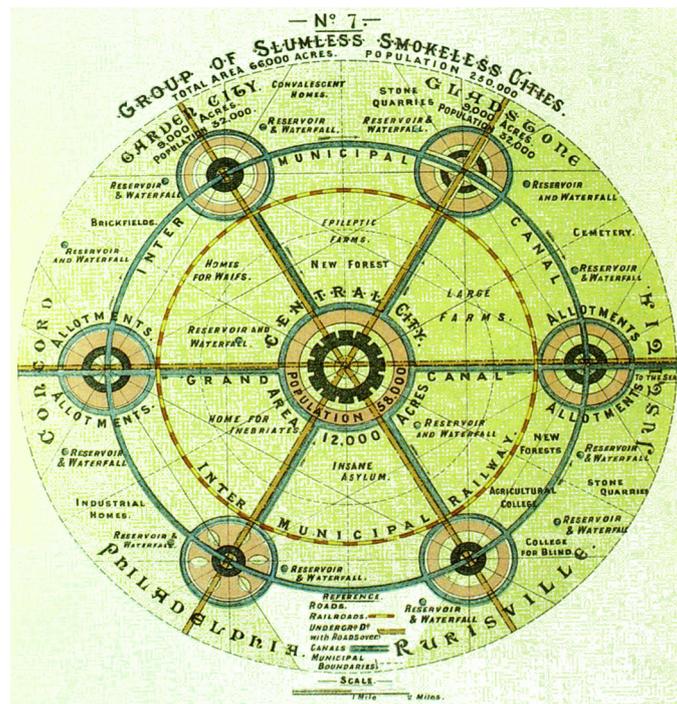


Figure 2: A plan from Ebenezer Howard’s *Garden Cities of To-morrow* (1902). Image from Wikimedia Commons.

3.1 One-way and two-way processes

Broady (1966, p.174) criticised determinism in relation to architects and planners trying to engineer social change, such as elements of the work of architects ranging from Le Corbusier to Denys Lasdun; it “implies a one-way process in which the physical environment is the independent, and human behaviour the dependent variable. It is of a kind with the other varieties of popular determinism—such as the view that national character is determined by climate—which save the layman the trouble and worry of observing accurately and thinking clearly.”

This one-way process “is intriguing design but poor psychology, since it ignores the feedback role of the participant—the degree to which his own perceptions of, and reactions to, a situation modify the very stimulus he is responding to. Nor does this position account for the goals which the behaving person brings to any environment. For instance, one does not necessarily perceive a cheerfully decorated room as cheerful if his own mood is gloomy; indeed, the decor may be seen as totally inappropriate, or at best neutral” (Ittelson et al, 1974, p.346).

It has been argued (Buchanan, 1985; Redström, 2006) that *all* design is intended to influence user behaviour, in the sense that the artefacts around us contain socially constructed ‘scripts’ for users (Akrich 1992)—e.g. if we position a chair at a desk, we are influencing a user to ‘follow the script’ and sit down. Nevertheless, systems intentionally designed to influence behaviour different from that usually associated with the situation, or in situations where a user would not otherwise have a strong idea of what to do (e.g. with an unfamiliar interface), represent a degree of designer intent beyond this. Any such products will, of course, always be used within a context involving users’ own intentions: emergent behaviours, intuition (Blackler et al, 2010), appropriation (Salovaara 2008) or prior experience (Chamorro-Koc et al, 2008) mean that designers’ intended use (or usability) is not always translated into user behaviour.

The one-way approach implied by determinism cannot, therefore, always be true in practice. The *task-artefact cycle* (Carroll et al, 1991) suggests that new artefacts will coevolve with behaviours (Walker et al. 2009), in turn offering new possibilities. Equally, as Kanis (1998) shows, users operate the same products in many ways and still achieve the desired results—many designs afford a degree of *equifinality* (von Bertalanffy, 1968) in the required user behaviour. However, in fields such as security or health and safety, user adherence to a specified programme of behaviour can be more critical than in others—as Cairns & Cox (2008) put it, “in safety critical systems, like air traffic control or medical monitors... the cost of failure is never acceptable.”

3.2 Possibilism and probabilism

To some extent the critique of determinism by Broady discussed above assumes a very *strong* representation of the notion, where social change can be fully determined by the configuration of products and environments. While this may be inherent to some approaches to design for behaviour change (e.g. many of the ‘Errorproofing’ patterns detailed by Lockton et al, 2010b), it is probably unfair to attribute this view to *all* architects, urbanists and indeed other designers seeking to promote social change through their work. The level of determinism represented by many projects is perhaps something closer to an eminently reasonable recognition that the way people live their lives is directly linked to the designed environments in which they live, and so a thoughtfully designed environment can act as a facilitator for a more contented, happier lifestyle for inhabitants. This is essentially little more than human-centred design, in current terminology.

Porteous (1977, p.137-8) elaborates alternative perspectives to determinism: *possibilism* and *probabilism*. Possibilism treats “the environment as the medium by which man is presented with opportunities”, which are realised or not—in the terminology developed in Lockton et al (2009a), this might involve *enabling* behaviours through design—while probabilism “asserts that lawful relationships exist between environment and behaviour... The individual’s decision cannot be predicted, but the range of his possible decisions and the probability of his making any one of them can be ascertained.”

Establishing these probabilities sounds like a somewhat economic treatment of behaviour applied to the environment, along the lines of the weightings used in Simon’s (1955) categorisation of elements required for a model of rational behaviour—“the possible future states of affairs, or outcomes of choice,” “a ‘pay-off’ function, representing the ‘value’ or ‘utility’ placed by the organism upon each of the possible outcomes of choice”, “information as to which outcomes will actually occur if a particular alternative... is chosen” and “information as to the probability that a particular outcome will ensue if a particular behaviour alternative is chosen”.³

In most system design situations, for either usability or safety reasons, designers probably want users to have a high degree of certainty about the outcome and payoff of each choice, so the weighting reduces somewhat in complexity⁴. A product (other than a game) where the user had

³See Lockton et al (2009b) for a discussion of the parallels between Simon’s model and Gaver’s (1991) classification of affordances.

⁴Of course, in many cases, users do not have full understanding of what the outcomes or implications of their actions will be beyond the immediate or surface functionality—and, from a ‘design for sustainable behaviour’ perspective, this is a major contributor to resource wastage worldwide. For example, a report by a document management company cited by Condon (2006) estimated that FTSE 100 companies typically waste £400 million per year on unwanted printing. That waste has an origin, and it is in millions of individual decision-making errors

to work out the probabilities of certain outcomes occurring in response to particular interactions would be difficult to use, at least until the user had learned patterns and satisficing heuristics to achieve what was desired (although the idea of Csíkszentmihályi's *flow* (1991), where a user's skills keep pace with an escalating challenge, may lie behind the enjoyment some users derive from manipulating complex and arcane interfaces).

4 Implications for designers

Designers discussing influencing behaviour are sometimes met with the question of whether design should be involved in this area at all—whether design should concentrate on fulfilling people's needs rather than trying to change people's behaviour. One response to this is discussed by Sunstein and Thaler (2003, p.1,164) in their well-known 'cafeteria layout' example: in *any* design process, some decisions will have to be made which will affect user behaviour, whether or not the designer intends any particular behaviour change to result.

By this argument, *designers cannot help changing behaviour*: ethically, therefore, it is incumbent on us to consider the impact of design decisions, and try to achieve a 'good' outcome (by whatever standards are applicable). *Choosing not to think about influencing behaviour is still a decision about influencing behaviour*. As the Nuffield Council on Bioethics (2007, p.42) puts it, "it is not the case that the option of 'doing nothing' requires no justification, as deciding to 'do nothing' is itself a value judgement and may have adverse consequences for some."

4.1 The value of the POSIWID and determinism concepts

What, then, are the value of the POSIWID and determinism concepts for designers seeking to influence behaviour? Is either a useful perspective?

For this author, the main value of each perspective is in what it offers us in terms of analysing and reflecting upon the systems within which we are working when designing. The value of considering determinism seems to be two-fold:

- In the limit: if we were able to determine user behaviour exactly, completely, with our design, would that actually be desirable in the circumstances for which we are designing? As mentioned earlier, for some situations (especially around safety measures), the answer might be 'yes'. In many others, what we are really trying to do is related to possibilism, enabling or facilitating particular behaviours, influencing them by making them easier or even possible rather than determining them exactly. The better our modelling gets, the closer this comes to probabilism.
- Overall: recognition of the notion that, to some extent, *all* design is intended to influence user behaviour, even if the intentions are not the main focus of our process, and even if there are many factors which come between a vision of behaviour change and people's actual behaviour in practice.

as users do not fully understand the outcomes of the actions they are taking. The true weighting of the choices users make is either hidden, ignored or poorly understood.

What is the value of the POSIWID perspective?

- The main value is in supporting an attitude of *responsibility* in design. The behavioural outcomes of our design decisions are still our responsibility even if we have made the utmost effort to predict and model possibilities and yet (due to the failure of determinism, or our modelling abilities) have not managed to predict particular behavioural eventualities. (One might argue, alternatively, that POSIWID implies that user behaviour is something out of the designer’s hands entirely, but practically, this seems problematic.)
- Additionally, as a question to reflect upon in analysing a situation, particularly more complex systems, POSIWID can trigger us to investigate ‘what’s really going on’ and uncover the effects of design decisions (and other factors) beyond those we may have initially considered important. Richard Veryard, who maintains an extensive blog exploring POSIWID in many areas of society and politics, suggests that:

“if there is some unexplained pattern of behaviour, look for a system whose purpose this pattern reveals. (We often can’t see the system directly, but we infer its hidden presence because this helps to make sense of some observed pattern of behaviour.)” Veryard (2003-12)

This seems a useful recommendation for any designers involved with behaviour change—understanding better the systems producing current behaviour as a precursor to attempting to influence it.

4.2 Conclusion: taking a position

So far as the author has taken a position with the Design with Intent project (Lockton et al, 2010a, 2010b), it is that design is unavoidably going to affect people’s behaviour, so as socially and environmentally responsible designers it is vital for us to consider—and demonstrate that we have considered as best we can—the possible impacts on socially and environmentally relevant behaviour which our designs produce. Further, we must attempt to ameliorate those impacts where the design methods available to us afford influencing behaviour more beneficially. This assertion sidesteps questions of ‘when?’ and ‘where?’ and ‘why?’, but as Pask (1969, p.496) notes, design goals are generally underspecified, with the designer (and the systems he or she designs) often needing to be “an odd mixture of catalyst, crutch, memory and arbiter” for users, supporting them but also, potentially, making decisions for them.

The designer should, then, as Gram-Hansen (2010) suggests, bear ethical considerations in mind throughout the design process when seeking to influence behaviour, not only up to the point of ‘delivery’ to users, but also afterwards, evaluating the effects on user behaviour (the ‘what it does’ of POSIWID) and the ethical consequences of these. As designers we cannot ‘wash our hands’ of a product once the design is finished; regardless of the intentions embodied, our responsibility extends into use.

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