

Attitudes, meaning, emotion and motivation in design for behaviour change

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Abstract

This paper discusses some distinct—but related—psychological concepts which are relevant to design for behaviour change, but of which some, at least, do not necessarily fall within the scope of 'conventional' interaction design. They may fall superficially along the *cognitive* blade of Simon's scissors (1990), dealing with users' thought processes rather than the contextual interaction environment itself, but the interaction of meaning and form demonstrated by product semantics (section 2.1) makes it clear that cognition depends on context: the scissors must work together. While design for emotion (Desmet and Hekkert, 2009) is enjoying increasing attention and practical application, including in behaviour change applications (e.g. Visser et al, 2011), influencing and supporting motivation through design is underexplored except by a few pioneers such as Bisset (2010), while the complexity of work on attitudes and persuasion has not necessarily lent itself to practical design applications to the extent that it might. Nevertheless, much public discourse on behaviour change persists with a preoccupation with measuring and 'changing' attitudes.

1 Attitudes, behaviour and persuasion

An assumption often found in the literature on behaviour (and influencing it) is that attitudes are the main determinant of behaviour, and that they precede behaviours. 'Changing minds' will lead to 'changing deeds'; attitude change is to some extent conflated with behaviour change. Petty and Cacioppo (1981, p.7) note "the presumed ability of attitudes to direct (and thus allow prediction of) behaviours."

Attitudes "tend to be conceived as the product of a deliberative calculation weighing an individual's beliefs about a behaviour with the value they attach to those characteristics" (Darnton, 2008, p.12). Beliefs themselves are "information that a person has about other people, objects and issues. The information may be factual or it may only be one person's opinion" (Petty and Cacioppo, 1981, p.7).

A primary difficulty with researching attitudes is that while behaviour can be observed, measuring attitudes tends to rely either on asking people directly to self-report (so-called direct procedures), or indirect procedures such as 'disguised' self-reports, where "people provide verbal reports about themselves, but they are unaware that the purpose of the self-report is to measure their attitudes" (Petty and Cacioppo, 1981, p. 16), inferring attitudes from observed behaviour, or measuring physiological

responses to attitude-related stimuli. None of these methods necessarily provides evidence of the ‘real’ attitude.

Winter and Koger (2004, p.59-60), specifically considering attitudes towards the environment, suggest that “[w]e think we recycle cans because we believe it is important to save resources; if someone told us we think it is important to save resources because we recycle cans, we would think that explanation was bizarre. . . [yet] research on the relation between environmental attitudes and behaviours has shown inconsistent results. Sometimes pro-environmental attitudes correlate with pro-environmental behaviour (e.g., people who think recycling is important are more likely to recycle). Sometimes pro-environmental attitudes are unrelated to behaviour (e.g., people who think use of fossil fuels should be reduced do not necessarily drive less than others).”

1.1 Correspondence between attitudes and behaviours

One condition where attitudes and behaviours do appear to be more closely correlated is how *specific* the attitudes and behaviours compared are. Ajzen and Fishbein (1977, p.889) define attitudes and behaviours as comprising four elements: “the action, the target at which the action is directed, the context in which the action is performed, and the time at which it is performed.” By specifying each of these elements, a behaviour or the attitude towards it can be described at a level where there is found to be a greater correspondence between attitudes and behaviours: for example, someone’s attitude towards turning down the thermostat set-point in early spring is likely to be more correlated with that actual behaviour “than a general concern about environmental problems correlates with a variety of conservation behaviours” (Winter and Koger, 2004, p.60).

A related concept here is Thøgersen and Crompton’s (2009, p.154) recommendation to make *connections* between different pro-environmental behaviours more explicit to drive positive spillover: “positive spillover is most likely between pairs of pro-environmental behaviours that are reasonably similar, or that are perceived as being reasonably similar”, which suggests that from a design perspective, portraying new behaviours as being ‘like’ existing familiar ones in some way might be effective. Thøgersen and Crompton (2009) also suggest that users’ taxonomic categories are important here—how people categorise and group different kinds of behaviours. In a design sense, use of metaphors in particular could help people construct new mental models and ‘behaviour categories’.

1.2 Which way around?

Bem’s *self-perception theory* (1972, p.2) suggests that “[i]ndividuals come to ‘know’ their own attitudes, emotions and other internal states partially from inferring them from observations of their own overt behaviour and/or the circumstances in which this behaviour occurs”. That is, attitudes can be a result of behaviours, rather than the other way around. *Cognitive dissonance* theory (e.g. Festinger et al, 1956; Festinger and Carlsmith, 1959) offers an explanation of the same phenomenon, via the mechanism of people rationalising their beliefs or attitudes to reduce the uncomfortable tension caused by holding or by implication holding dissonant or conflicting beliefs.

The notion of behaviours affecting attitudes has resonance in a design context. Aside from deliberately provoking cognitive dissonance in an attempt to change attitudes, there are opportunities where redesign of products and services could directly lead to behaviour changes without depending on any shifts in public attitudes as a precursor, but potentially leading to “changing people’s environmental attitudes more generally [as a result]. People may recycle simply as a result of changes in municipal waste collection services, without ever having decided that ‘recycling is a good thing’. But once they start recycling, some people will infer from this that they are (to some extent) ‘green’. The possibility that this new attitude

will ‘spill over’ into other behaviours is an intriguing one” (Jackson, 2005, p.viii).¹

1.3 TRA, TPB, TIB and other models

Returning specifically to attitudes preceding behaviour, two of the most widely cited models here are Ajzen and Fishbein’s *Theory of Reasoned Action* (TRA; 1975) and Ajzen’s *Theory of Planned Behaviour* (TPB; 1985). These models make use of the idea of ‘behavioural intention’, resulting from both attitudes and subjective norms—what it is perceived that others will think of a behaviour—as a precursor to actual behaviour. In Ajzen (1985) the factor of ‘perceived behavioural control’ was added, drawing on Bandura’s (1977) concept of *self-efficacy*, to take account of the degree of control someone believes he or she has over a situation. The general sequence of both TRA and TPB is that a person’s attitude towards a behaviour, subjective norms (and in TPB, perceived behavioural control)—all drawing on the person’s beliefs—are combined in a weighted sum (with the weightings empirically determined) which comprises the intention. The behaviour will then occur when the opportunity exists.

Abraham and Michie (2008, p.382) list three techniques which draw on TPB (and are consistent with TRA) which could all be applied in a design context: “Provide information on consequences. . . Information about the benefits and costs of action or inaction, focusing on what will happen if the person does or does not perform the behaviour; Provide information about others’ approval. . . Information about what others think about the person’s behaviour and whether others will approve or disapprove of any proposed behaviour change; Prompt intention formation. . . Encouraging the person to decide to act or set a general goal, for example, to make a behavioural resolution such as ‘I will take more exercise next week’.”

1.3.1 The incompleteness of TRA and TPB

While techniques drawing on the models are commonly used in health-related behaviour change interventions (e.g. as reviewed by Abraham and Michie, 2008), from an interaction design point of view, the emphasis on intentions and ‘planned’ behaviour rather than situational factors suggests that models such as these do not provide a complete picture (compare Suchman (1987/2007)).

Environmental context factors such as affordances and constraints are conceivably covered by the ‘perceived behavioural control’ element of TPB, if the user is accurately aware of them in advance and incorporates them into his or her intentions (i.e. if ‘actual behavioural control’ equates to the ‘perceived behavioural control’), but the ways in which people may inventively or apparently spontaneously perceive affordances or opportunities for new behaviours in their environment (e.g. as illustrated by Fulton Suri and IDEO (2005) and Brandes and Erlhoff (2006))—and make use of them—do not appear to be covered by TPB or TRA². It could be argued that variables such as ‘skills’ and ‘resources’, important in human factors treatments of behaviour, are also included in the perceived behavioural control component but the model does not provide any information on the decision processes within this component: how do people make decisions (if they do) about whether given the abilities they have, and the affordances offered by the environment, they perform one action or another? Jackson (2005) notes that TPB also does not directly offer insights into how habits, morals or emotions affect behaviour.

There is also the matter of choice among alternatives, something common to many interaction design situations. Sheppard et al (1988, p.327) note that it is difficult to apply TRA (and by extension TPB) in situations where because

¹There is perhaps a parallel here with the ‘trimtab’ approach favoured by Buckminster Fuller, in particular in the form expressed in a 1966 interview with the *New Yorker*: “I made up my mind. . . that I would never try to reform man—that’s much too difficult. What I would do was to try to modify the environment in such a way as to get man moving in preferred directions” (Krause and Lichtenstein, 2001, p.17).

²Given the ‘planned’ in the name TPB, this is perhaps only to be expected.

“many of the attributes and consequences associated with various alternatives in the choice set are apt to be quite similar, the attitudes and subjective norms toward each of the alternatives also are likely to be similar. Consider, for example, the consumer who thinks that buying a package of Oscar Mayer hot dogs is a terrific idea. S/he is likely to have similar thoughts about buying Ball Park, Beef Masters, or Hebrew National hot dogs. However, only one package of hot dogs actually will be purchased. In the case of the chosen alternative, our consumer’s positive attitude and subjective norm is consistent with his/her purchase but not for each rejected alternative (i.e., for each rejected alternative, the attitudes and subjective norms are positive, but the behaviour is not performed).”

1.3.2 TIB and other models

It is outside the scope of this review to consider in detail all the numerous theories and models of behaviour that have been developed in different branches of psychology, but the *Theory of Interpersonal Behaviour* (TIB; Triandis, 1977, cited in, e.g., Jackson, 2005 and Darnton, 2008) deserves mention as it includes explicit recognition of habits (driven by past experience) alongside attitudes, social factors (including norms and roles), emotions and contextual facilitating conditions in determining behaviour. Although referring to interpersonal behaviour rather than interaction with objects and environments, TIB encompasses enough variables to suggest a fairly comprehensive account of human behaviour. As Jackson (2005, p.95) puts it,

“my behaviour in any particular situation is, according to Triandis, a function partly of what I intend, partly of my habitual responses, and partly of the situational constraints and conditions under which I operate. My intentions in their turn are influenced by social, normative and affective factors as well as by rational deliberations. I am neither fully deliberative, in Triandis’ model, nor fully automatic. I am neither fully autonomous nor entirely social. My behaviours are influenced by my moral beliefs, but the impact of these is moderated both by my emotional drives and my cognitive limitations.”

Models of behaviour and behaviour change range from the elaborate and complex (e.g. Howard and Sheth, 1969, or Bagozzi et al, 2002, cited in Jackson, 2005) to the very simple (e.g. Fogg, 2009). Some of the most comprehensive models edge into the territory of system dynamics, with multiple nested feedback loops. For example, the UK government’s Foresight Programme’s (2007) model of the factors (including many behavioural factors) affecting obesity includes “108 variables, some of which are measurable (e.g., the ambient temperature of the indoor environment), and other variables that are more difficult to quantify (e.g., desire to differentiate food offerings). The relationships between the variables are illustrated with >300 solid or dashed lines to indicate positive and negative influences. All the variables are interconnected” (Finegood et al, 2010). The approach taken in the author’s work on Design with Intent is to try to extract elements from models and different disciplinary perspectives which are potentially useful or applicable in a design context: admittedly, sidestepping the issue of which models are really most predictive of behaviour.

1.4 Central and peripheral persuasion

The concept of *persuasion* is important to discussions of attitudes and behaviour. Fogg’s use of the term *persuasive technology* and the field that has developed as a result will be covered in a forthcoming working paper, but it is useful to consider persuasion here, in the context of attitudes and how persuasive messages are constructed and delivered.

Classical rhetoric, “the faculty of observing in any given case the available means of persuasion” (Aristotle, c.350 BC), is often taken to involve three ‘appeals’: the rationality of the argument itself (*logos*), the credibility (*ethos*) of the speaker, and the appeal to emotions (*pathos*), or in Cicero’s terminology of 250 years later, “the task of informing (*docere*), the task of establishing the speaker’s personal credibility (*conciliare*), and the task of involving the feelings of the listeners (*movere*)” (Christensen and Hasle, 2007, p.307). Much 20th century research on how persuasion occurs, such as the Yale Communication and Attitude Change Program (Hovland et al, 1953) has made use of similar concepts. For example, the concept of *source credibility* has been widely studied in the context of websites (e.g., Fogg, 2003; Cugelman et al, 2008).

Petty and Cacioppo’s *elaboration likelihood model* (ELM; 1981) proposes two ‘routes’ through which persuasion can be effected. The elaboration likelihood is essentially “how likely is it that the . . . person will be motivated and able to think about the message [being presented]?” (p. 268). If the likelihood is high—the audience motivated and able to think—it is worth trying to pursue the ‘central route’, presenting an argued explanation of why the message is correct. For this to work, “[t]he message recipient attends to the message arguments, attempts to understand them, and then evaluates them. Some arguments lead to favorable thoughts, whereas others lead to counterarguments. The person then integrates all of this information into a coherent and reasoned position. . . [F]or the most part, under the central route, persuasion is based on a thoughtful consideration of the object or issue at hand” (p.256). This would appear to correspond most closely with Aristotle’s *logos*.

On the other hand, Petty and Cacioppo’s ‘peripheral route’—to use if the elaboration likelihood is judged to be low, or if the actual message being presented is weaker—involves persuasion that occurs through less thought, attention or effort on the part of the persuadee: “persuasion is determined by simple cues, such as the attractiveness of the communicator, whether or not the people around you agree with the position presented, or the pleasure or pain associated with agreeing with the position, or whether a reason is given (no matter how bogus) for complying with a request” (Pratkanis and Aronson, 2007, p.35). A number of the cues involved in peripheral route persuasion seem to accord with cognitive biases, heuristics, shortcuts and social proof (see forthcoming working papers) and ‘persuasion’ via operant conditioning (see Lockton 2011), and indeed probably the majority of the techniques used in advertising, for example. Petty and Cacioppo (1981, p.263) suggest that “if the new attitude results from effortful issue-relevant cognitive ability (central route), the new attitude is likely to be relatively enduring. But if the new attitude results from various persuasion cues in the situation (peripheral route), the attitude change is likely to exist only so long as the cues remain salient.”

Thus, for longer-term, enduring attitude change (which may lead to behaviour change), central route persuasion is the usual route³. Shorter-term attitude change may be elicited via the peripheral route, but will “tend to decay unless the new attitude is subsequently bolstered by issue-relevant thought” (Petty and Cacioppo, 1981, p.268). As Jackson (2005, p.108) points out, the peripheral route can also lead directly to behaviour change—“a target responding to . . . celebrity involvement [e.g. a celebrity endorsement of an activity, or a celebrity delivering the message] may find themselves taking public transport without ever having deliberated over the choice. Once the behaviour in question has changed, the target begins to consider the advantages of public transport and adjust their attitudes accordingly.”

³As an additional consideration, Schwarz (2002, p.543) cites studies suggesting that “sad individuals are more likely to engage in spontaneous message elaboration than happy individuals. . . [They] are strongly influenced by compelling arguments and not influenced by weak arguments, whereas happy individuals are moderately, but equally, influenced by both. Therefore, a strong message fares better with a sad than with a happy audience, but if communicators have nothing compelling to say they better put recipients into a good mood.”

1.5 Implications for designers

- There is often an assumption that attitudes are the main determinant of behaviours, and that they precede behaviours, but this is not necessarily the case—attitudes can also be the result of behaviours. Thus while design for attitude change may lead to behaviour change, design for behaviour change may also lead to attitude change.
- As well as deliberately provoking cognitive dissonance in an attempt to change attitudes, redesign could directly lead to behaviour changes, potentially shifting public attitudes as a result.
- From a design perspective, portraying new behaviours as being ‘like’ existing familiar ones (perhaps metaphorically) might be effective in driving a ‘positive spillover’ effect.
- Three techniques drawing on the Theory of Planned Behaviour applicable in a design context are providing information on consequences and others’ approval, and prompting intention formation.
- However, TPB’s emphasis on intentions and ‘planned’ behaviour rather than situational factors suggests that it does not provide a complete picture in an interaction design context. TIB offers a more comprehensive model, with each element—social, affective and rational factors, habits, and situational constraints—potentially addressable via design.
- Design can address either peripheral or central route persuasion. Although the central route is more usually associated with longer-term, enduring attitude change, the peripheral route can lead directly to behaviour change.

2 Meaning and emotion

Krippendorff (2006) provides an introduction to the study of *product semantics*—that is, “how people attribute meanings to artefacts and interact with them accordingly” and, simultaneously, a “vocabulary and methodology for designing artefacts in view of the meanings they could acquire for their users and the communities of their stakeholders” (p.2). There is insufficient space here to provide a full treatment of the field, which has many implications for designers in general⁴, but some of the elements of product semantics which Krippendorff describes could have direct relevance for influencing user behaviour.

2.1 Influencing behaviour through product semantics

Aside from a discussion of affordances, constraints and different kinds of feedback (covered in Lockton, 2012), Krippendorff (2006) deals with some concepts particularly applicable to influencing behaviour, including: the intentional use of *visual metaphors* to enable users to understand a ‘new’ product in the way that they understood a previous one—“Key to most visual metaphors is the resemblance of one or more parts of an artefact with objects in a familiar empirical domain, the source domain of the metaphor, from which desirable meanings are imported” (p.97); deliberate use of *discontinuity* in the appearance (e.g. colour or form) of a product or interface to draw attention to the difference in function and meaning between elements—“users are always inclined to ‘find its reason’” (p.104); the use of *maps of possibilities* to “present the space within which users can navigate their interface with an artefact” (p.125); the use of *semantic layers* to reveal different ‘meanings’ as appropriate to users at different times and in different

⁴Krippendorff distinguishes product semantics from the “ontological schizophrenia of semiotics” (2006, p.274), which in his conception, by separating *signs* and their *referents*, “divert[s] attention from the meaning of artefacts” (p.273). This paper has avoided a treatment of semiotics, since although undoubtedly relevant to interaction design (e.g. de Souza, 2005), the terminology and approach used have made it difficult, in this author’s eyes at least, to extract practically applicable insights for design that are not already adequately covered by other disciplinary perspectives.

contexts; and the use of form to help reveal 'how products work' where this understanding is important to users (Krippendorff uses the Dyson vacuum cleaner's transparent dust canister as an example.⁵

Some elements which can be considered part of product semantics have received considerable attention in areas of psychology outside design. For example, Rozin and Nemeroff (2002) have studied what they term a 'law of similarity', essentially that "appearance equals reality," via findings such as subjects' reluctance to eat sugar from a bottle onto which they had just themselves placed a label saying SODIUM CYANIDE, POISON, or the fact that subjects "were disinclined to put in their mouth a fake vomit, clearly made of rubber, in comparison to their willingness to put in their mouth a flat rubber sink stopper of about the same size" (Rozin and Nemeroff, 2002, p.205). They make the point (p.204) that "[t]he idea that appearance equals reality is eminently reasonable because, in the world we evolved in, causes often do resemble effects, and most things that look like tigers are tigers. . . . However, this generally useful heuristic becomes more of a bias in the worlds created by cultures, which invariably include art, symbolic language, and images."

One of the most fundamental elements of product semantics is the use of *colour*: how colour is used by designers not only to signify meaning but to attract and repel, connote particular themes or moods, and evoke ways of thinking or acting, and indeed how this can vary across cultures. Again, there is not scope here for a detailed review, but it is worth considering briefly how some aspects have been used to influence behaviour. For example, Soldat et al (1997; cited in Schwarz, 2002, p.546) found that reasoning tests presented to subjects on different coloured paper—'upbeat' red or 'depressed' blue—led to test performances indicative of different styles of cognitive processing (similar to the elaboration likelihood model—see section 1.4): "Paralleling the effects of happy and sad moods, they observed that upbeat colors fostered heuristic processing, whereas more depressing colors fostered systematic processing, resulting in differential performance on the. . . tasks."

Goldacre (2008, p.67-68) discusses a study involving the use of different coloured pills: "Blackwell [et al, 1972] did a set of experiments on 57 college students [who] were given either one or two [sugar] pills, which were either pink or blue. They were told that they could expect to receive either a stimulant or a sedative. . . . Afterwards, when they measured alertness. . . the researchers found that two pills were more effective than one. . . . The pink sugar tablets were better at maintaining concentration than the blue ones. Since colours in themselves have no intrinsic pharmacological properties, the difference in effect could only be due to the cultural meanings of pink and blue: pink is alerting, blue is cool."

It is too strong to assert that "pink is alerting" in general; for example, Schauss (1985) discusses the use of 'Baker-Miller pink', a particular shade of paint developed for use in prisons and psychiatric facilities, which is claimed to have a measurable, if short-term, effect on "reducing physiological variables associated with aggression" (p.55)—the so-called 'drunk tank pink'. It is unclear the extent to which these kinds of effects would be generalisable in product design.

2.2 Portions and the unit bias

As aspect related to Krippendorff's discussion of discontinuities is work on cognitive biases relating to *portions*—related to much of the work on framing discussed in a forthcoming working paper. The *unit bias* (Geier et al, 2006) suggests that (within limits) people will often perceive whatever size of portion of food they are presented with as being the correct 'unit' to consume, and act accordingly. For example, Wansink et al (2005) used secretly self-refilling bowls of soup to investigate "whether visual cues related to portion size can influence intake volume without altering either estimated intake or satiation", finding that "[p]articipants who were unknowingly eating from self-refilling bowls ate more soup. . . than those

⁵This example has also been incorporated into v.1.0 of the Design with Intent toolkit as the pattern TRANSPARENCY (Lockton et al, 2010).

eating from normal soup bowls. However, despite consuming 73% more, they did not believe they had consumed more, nor did they perceive themselves as more sated than those eating from normal bowls.” (p.93).

The implication is that designing the packaging of food or other goods to provide particular portion sizes could be an intervention to help influence healthier consumption; related research includes Hsee’s (1998) findings that people were willing to pay more for 7 oz of ice cream overflowing a 5 oz container than 8 oz of ice cream ‘underfilling’ a 10 oz container (when presented separately): the perception of value was such that a ‘generous’ portion was considered more valuable than a ‘mean’ one, even though the actual amount of ice cream was less in the generous case. This (perhaps commonsense) finding adds an additional twist to the designer’s possible treatment of portions: make it look generous, perhaps by using an intentionally undersized container.

Thaler (1999) discusses related aspects of portion sizing in the context of self-control and mental accounting: for “tempting products, consumers may regulate their consumption in part by buying small quantities at a time, thus keeping inventories low. This practice creates the odd situation where consumers may be willing to pay a premium for a smaller quantity”. Wertenbroch (1998) investigates this phenomenon further, finding that “consumers voluntarily and strategically ration their purchase quantities of goods that are likely to be consumed on impulse and that therefore may pose self-control problems. For example, many regular smokers buy their cigarettes by the pack, although they could easily afford to buy 10-pack cartons. These smokers knowingly forgo sizable per-unit savings from quantity discounts, which they could realize if they bought cartons; by rationing their purchase quantities, they also self-impose additional transaction costs on marginal consumption, which makes excessive smoking overly difficult and costly” (p.317).

2.3 Design for emotion

Elements of product semantics adopted in industry often relate to provoking emotional or *affective* responses from users⁶, or satisfying emotional needs when they have been uncovered through market research—part of what Jordan (2000) calls “designing pleasurable products” rather than simply meeting basic functionality and usability needs. Crilly et al (2004) consider “consumer response to product visual form” to be “the final stage in a process of communication between the design team and the consumer”—an approach which lends itself to investigations such as Mugge’s (2011) study of “the effect of a business-like personality in product appearance [i.e. angular, formal styling and interfaces—in this case of CD players] on the perceived performance quality of the product”.

In HCI, the field of *affective computing* (Picard, 1997) covers the development of computer systems which make use of emotion, both recognising it and emulating it (enabling ‘empathy’); many projects in Persuasive Technology (see forthcoming working paper) come into this category, where computers become ‘social actors’ (Reeves and Nass, 1996), to which users respond with similar emotions as they do with human interaction.

Kansei engineering (Nagamachi, 1995) is defined as “translating... a consumer’s feeling and image for a product into design elements” (p.3), and has been widely used in Japan, for example in the design of the Mazda MX-5 sports car. Kansei engineering aims to “capture and convert subjective and even unconscious feelings about a product into concrete design parameters” (Schütte, 2005, p.i), mainly visual elements of form⁷ but also other sensory aspects such as sound, smell and the feel of materials and action

⁶ Attempting to elicit emotional states through technology are, of course, not unique to product design. Clynes (1977) offers an intriguing perspective on communicating emotional states from one person to another via sound or physical movements.

⁷ Perceptual phenomena in psychology such as the ‘*bouba/kiki* effect’ (Köhler, 1930, p.186—originally the *maluma/takete* effect; Ramachandran and Hubbard, 2001), where participants from many different cultures and with many languages largely agree that a spiky shape is likely to be called ‘kiki’ (or ‘takete’) and a rounded shape ‘bouba’ (or ‘maluma’) seem

of moving parts. Among others, de Botton (2006) applies some similar ideas to a discussion of emotion in architectural design.

Similar work is being done on *emotional design* or *design for emotion*; Desmet (2002) developed PrEmo, a “product emotion measurement instrument” in which animated characters displaying different emotions enable users to rate products or images of products for the emotions they provoke. Desmet’s contention is that “in spite of... interpersonal differences, the process of emotion, i.e. the way in which emotions are elicited, is universal” (p.106); the emotions elicited by a product are caused by an automatic, subconscious appraisal of a product’s *personal significance*, and so concentrating on understanding patterns in this appraisal process can help designers elicit the emotions they intend. This automatic appraisal process is related to the *affect heuristic* (Slovic et al, 2002, p.397): “that is, representations of objects and events in people’s minds are tagged to varying degrees with affect. In the process of making a judgment or decision, people consult or refer to an ‘affect pool’ containing all the positive and negative tags consciously or unconsciously associated with the representations.”

2.4 Implications for designers

- At the intersection of context and cognition, product semantics concerns how users read meaning into the products they use, and hence interact with them accordingly
- Visual metaphors or intentional similarity can enable users to understand a ‘new’ product in the way that they understood a previous one
- Colour can be used to signify meaning or to connote moods
- Discontinuity in appearance can draw attention to differences in function between elements
- Strategic use of portions or size framing could influence quantity of consumption
- Maps of possibilities can show users the behaviours available
- ‘Semantic layers’ can reveal different meanings as appropriate in different contexts, perhaps revealing ‘how products work’ where understanding is important to behaviour
- Design for emotion and affective computing deal with both recognising users’ emotional responses and responding to, emulating or eliciting them appropriately, where computers or products become ‘social actors’
- There is the potential to influence user behaviour via emotional interaction, e.g. through empathy (displaying or engendering) or through triggering particular associations or personal significance for users

3 Motivation

Motivation has been touched on in discussing central route persuasion (section 1.4), but deserves some further treatment. Terms such as enthusiasm or *gumption* (Pirsig, 1974) may be partly analogous in this context. Ryan and Deci (2000, p.54) define motivation thus: “To be motivated means to be moved to do something. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated.”

highly relevant here.

3.1 Intrinsic and extrinsic motivation

The basic distinction commonly drawn is between *intrinsic* and *extrinsic* motivation: intrinsic “refers to doing something because it is inherently interesting or enjoyable,” while extrinsic “refers to doing something because it leads to a separable outcome” (Ryan and Deci, 2000, p.55). Extrinsic motivation often implies the promise of rewards (or avoiding punishment), and thus has some parallels with aspects of operant conditioning where the reinforcers are clearly external (Lockton, 2011) and peripheral route persuasion (section 1.4), particularly the shorter-term level of engagement which results.

As part of *self-determination theory*, Deci and Ryan (1985) suggest that humans have innate needs related to intrinsic motivation: *competence*, *autonomy* and *social relatedness*, each of which may be salient at different times and in different circumstances. Competence here is “the capacity for effective interactions with the environment” (Deci and Ryan, 1985, p.27), and the belief in the ability to do so, somewhat parallel to Bandura’s self-efficacy (1977) or perhaps Ajzen’s perceived/actual behavioural control (1985); autonomy “is different from independence. . . [i]t means acting with choice—which means we can be both autonomous and happily interdependent with others” (Pink, 2010, p.90); while relatedness refers to the need to belong or to feel part of a community with others.

Ryan and Deci (2000, p.64) suggest that relatedness can help in shifting motivations from extrinsic to intrinsic: “the groundwork for facilitating internalization is providing a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal.”

Other elements of self-determination theory include a number of sub-theories dealing with different motivational phenomena, including internalisation of extrinsic motivation. Pink (2010), reframes the three ‘motivation needs’ somewhat differently, as *mastery* (instead of competence), *autonomy* and *purpose*, the last of these providing a context for the autonomy and mastery, “a sense of doing something beyond themselves” (attributed to an interview with Mihaly Csikszentmihalyi: Pink, 2010, p.134). As such, he offers a potential ‘checklist’ for designers seeking to increase intrinsic motivation via a product or service.

The conversion or reframing of extrinsic to intrinsic motivation—a goal inherent to many game-based behaviour change interventions, for example—is an idea which Pink (2010) calls the ‘Sawyer effect’, after the idea demonstrated in Mark Twain’s *The Adventures of Tom Sawyer*, where by reframing the extrinsically motivated task of whitewashing his aunt’s fence—work—as something intrinsically motivated—play—he makes it seem desirable enough for his friends to want to do it, indeed ‘pay’ to do it.

The opposite case—turning ‘play’ into ‘work’—is also seen. For example, Lepper et al (1973, p.129) found that children “showing intrinsic interest” in using felt-tips to draw in their free time, if offered a ‘Good Player Award’ (a coloured card with the child’s name and school alongside a gold star and red ribbon) for their drawing, subsequently “showed less. . . intrinsic interest in the target activity” than children who had not been offered the award or who had been given it unexpectedly without previously being aware of its existence.

3.2 Intrinsically motivating design

Bisset (2010) is exploring the potential of ‘intrinsically motivating design’ for socially beneficial behaviour change via services and products, with the designer helping support the user’s motivation: “One way of conceptualising the role of a designer in this situation is by comparison with a sports coach or film director, working with the athlete or actor, supporting and guiding him towards reaching your shared performance goals, or in less ambitious cases, simply ensuring that they do not produce a low-quality performance” (Bisset, 2010, p.303-5).

In an article co-written with the author (Bisset and Lockton, 2010), focusing on service design,

Bisset notes some of the challenges and opportunities involved, for example how “the concept of ‘design for motivation’ is perhaps something of a Catch-22—design to control user behaviour too closely and you’ll constrain users’ sense of autonomy. On the other hand, design with too many options or encourage responsibility in users too early and without sufficient support, and you’ll create an equally demotivating experience” (Bisset and Lockton, p.16). Participatory design or co-design can allow designers “to see what it is that motivates our customers and embody those values ourselves (at least for the duration of the project)” (p. 18).

A key part of supporting motivation in service design is to offer suitable support to users at the different stages of the customer journey or service blueprint (e.g. Bitner et al, 2008). Bisset (2010, p.307) offers a set of six ‘motivational design personas’ representing users at different levels of motivation, “the natural ‘motivational’ progression of users throughout an experience or service encounter” (Bisset and Lockton, 2010, p. 16), moving from completely amotivated, through stages of extrinsic motivation (with increasing levels of internalisation) towards fully intrinsically motivated users who “love... being immersed in the process”.

3.3 Implications for designers

- Motivation can be influenced via design—including internalisation or reframing of extrinsic motivation to intrinsic motivation.
- Deci & Ryan (1985) and Pink (2010) suggest needs that should be fulfilled to achieve intrinsic motivation, including autonomy, competence / mastery, social relatedness and purpose, thus providing a potential checklist for designers.
- Design has the potential to support motivation through offering tailored ‘coaching’ as a user moves through a process of engagement (after Bisset, 2010).

4 Discussion

Sections 1–3 of this paper discuss ideas which are related, but each have their own contributions to make to the field of design for behaviour change. The interaction between attitudes and behaviour explored in section 1 is complex but does offer insights useful to designers, including raising the possibility that while design for attitude change may lead to behaviour change, design for behaviour change may also *lead* to attitude change. Design changes could cause (more) direct behaviour change, with attitude changes resulting in the longer term (or not), depending on the persuasion ‘route’ used. Do you try to get people to think about what they’re doing—and perhaps persuade themselves—or do you try to persuade them directly, right now, in whatever way is most effective?

The meanings that users read into the products and services they experience, and the emotions they elicit (section 2) also relate to a more involved treatment of interaction behaviour, with multiple ‘semantic layers’ reflecting different degrees of engagement and understanding as products perhaps become social actors in users’ everyday lives. There are specific visual and other techniques applicable to influencing and eliciting these different semantic and affective effects.

Finally, as touched upon in section 3, motivation for behaviour change is something potentially addressable via design, particularly the reframing of extrinsically motivating factors to more intrinsically motivating ones, engaging users in particular behaviours for their own sake rather than solely for ‘rewards’. It is possible that the inverse might also be useful in some behaviour change contexts: shifting an undesirable behaviour which is intrinsically motivated (e.g. pride in frequent replacement of consumer

goods) to a clearly extrinsically motivated one (e.g. “you are wasting money”). The motivation progression ‘journey’ explored by Bisset (2010) offers designers a template for relating motivational factors and degrees of engagement to common user experience and service design tools such as customer journey mapping.

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