



Artefacts and affordance: the surface of meaning

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The meaning or value of a thing consists of what it affords. Note the implications of this proposed definition. What a thing affords a particular observer (or species of observer) points to the organism, the subject. The shape and size and composition and rigidity of a thing, however, point to its physical existence, the object. But these determine what it affords the observer. The affordance points both ways. What a thing is and what it means are not separate, the former being physical and the latter mental as we are accustomed to believe. (Gibson, 1982)

The bound volumes of a PhD have about them the physical qualities of objects that afford, in Gibson's terms, such things as holding, opening, putting on one's lap: chiefly, the object has the affordances of a book, any book. In this sense the physical PhD is no more or less an object of meaning than any other artefact. The PhD might well be the Coke bottle that falls from the sky in the movie *The Gods Must be Crazy* (Uys, 1980). For the Bushman of Africa, the Coke bottle might be of more interest, in its novelty and its utility. Even allowing that the PhD could be burned to give heat, its meaning-uses, as an object of affordance, would seem to be quite limited. It is only on the extended plane of meaning, the plane of conventions and constraints, that the PhD takes on the special kinds of value that more sensibly answer the question "what is the purpose of this object" rather than "what is this object for".

The word "affordance" was invented by the perceptual psychologist J. J. Gibson (1977, 1979) to refer to the actionable properties between the world and an actor (a person or animal). To Gibson, affordances are relationships. They exist naturally: they do not have to be visible, known, or desirable. (Norman, 1999)

Burning the PhD might not be desirable, but it is one of the meanings of the object, as an artefact: the affordance is there whether we wish to bring it to our attention or not. These "hidden" natural uses are often made fun of in lateral thinking exercises and in Zen humour: burn the statute of the Buddha; use the Coke bottle as a musical instrument. Looked at this way, Gibson's notion of affordances becomes somewhat limited. The fundamental idea is quite exciting in that it allows us to reacquaint ourselves with the world

of things that we inhabit, but there is very little in research that takes meaning from such primary relationships: most of what we mean by “meaning” is social and not physical, most of what we expect of human activities is cultural and exceeds the “actionable properties between the world and an actor”; most of what we expect from design exceeds the particularity of any instance of the design. We might attempt to add “deep” meaning to our artefacts by claiming “affordances”, but in doing so we are simply confusing the conceptual and the actual.

To me, the most important part of a successful design is the underlying conceptual model. This is the hard part of design: formulating an appropriate conceptual model and then assuring that everything else be consistent with it. I see lots of token acceptance of this idea, but far too little serious work. The power of constraints has largely been ignored. To my great surprise, the concept of affordance was adopted by the design community, especially graphical and industrial design. Alas, yes, the concept has caught on, but not always with complete understanding. My fault: I was really talking about perceived affordances, which are not at all the same as real ones. (Norman, 1999)

There is a possible clarity in a hammer that is all but tautological: the hammer is truly for hammering: the object and its affordances seem to be in accord in a way that is pleasing. Here, in the hammer, the real and perceived affordances come together. In Norman's terms, the underlying conceptual model can be seen to persist in the object and its normal uses. In Gibson's terms, the variety of real affordances is not constrained by the perceived harmony of a hammer in its hammering: we can always take up the hammer in its other possibilities of use.

The agony of research objects is no different to that of any other designed objects: the struggle is in the “formulating [of] an appropriate conceptual model” that establishes the coherence of the object. In this sense, research objects aim to circumscribe the “real” affordances within the orbit of conventions and constraints just as other designed objects aim to do.

A convention is a constraint in that it prohibits some activities and encourages others. Physical constraints make some actions impossible: there is no way to ignore them. Logical and cultural constraints are weaker in the sense that they can be violated or ignored, but they act as valuable aids to navigating the unknowns and complexities of everyday life. As a result, they are powerful tools for the designer. A convention is a cultural constraint, one that has evolved over time. Conventions are not arbitrary: they evolve, they require a community of practice. They are slow to be adopted, and once adopted, slow to go away. So although the word implies voluntary choice, the reality is that they are real constraints upon our behavior. (Norman, 1999)

The physical constraints on research objects are mostly hidden by conventions of negative and positive limits. Negative limits include such things as size in time and space. It might be physically possible to publish a million page thesis but it would be socially all but impossible to find a supervisor let alone an examiner to read the thesis. In terms of other kinds of research artefacts, one might be able to produce a garden, a bridge, or some other very large object that would make the conventional forms of assessment impractical. This is not to say that the perceived affordances of such objects might not meet the conventional requirements of research: this garden is for “reading” as in the case of a Zen raked pebble garden.

Positive limits arise from the autonomy of certain processes. Some physical constraints emerge at the epistemological level: the evidence is in the seeing and not in the reading; the precise quality of a colour is only in the environment of its appearing; the determination of the characteristic can only be made in the actual performance. These last constraints are able to be met, within cultural conventions that acknowledge the significance of forms of research knowledge that only appear within physical constraints peculiar to a material convention. The perceived affordances are made evident in material forms such as special performances, special environments and special circumstances. Both negative and positive forms of limit are found in the case of the variability of traditional research objects: some PhD thesis are very small; some are very large; some require oral defence; some must be “brought into a presence” by being presented.

Logical constraints would seem to offer solutions to the question of size (both large and small). The conceptual burden of research, as it is conventionally understood, restricts the objects of research in terms of reducibility: if the conceptual scope cannot be made obvious then the object would seem to fall outside of the terms of research. This is a real issue for many postgraduate researchers, mostly through excess rather than lack. The challenge to establish a question that is both seen as a question and seen as having a possible answer defeats any amount of data. Data, of itself, does not amount to a research object though it might be the object of research. Equally, the purity of singularity fails this logical test, even if the singularity is God: one example is not a thesis, no matter what it is an example of. These logical constraints are not materially underwritten but are determined, at a distance, within a community of concern. They are more usefully seen as cultural constraints or conventions.

The cultural constraining of formal academic research objects is an issue of some prominence in the world of design. As the practice of design has come to take on features of a recognised profession, it has also come to take on features of the academic world. Design is now often practiced inside the university environment through the formation of new designs, and new understandings of design. As well, from within the academic world, design is being studied and formalised, as a practiced, by a variety of academic disciplines such as engineering, economics and cognitive and social sciences. Each of these kinds of study offers a series of cultural constraints that might help design in the formulation of new kinds of academic research objects. Design needs to expand the list of acceptable artefacts of knowledge that can be accepted as research objects in its own domain. Towards this end, an account needs to be made of the cultural inhibitions that currently constraint the use of objects as the ground and evidence and summation of research.

In Donald Norman's latest book, *Emotional Design*, he outlines three levels of human processing: visceral, behavioural and reflective. These three levels follow commonly accepted distinctions between humans and other animate members of the natural world. For Norman, lizards “operate primarily at the visceral level” while dogs and other mammals “have a higher analysis, the behavioural level” and of course humans get to the top of the tree where “the human brain can think about its own operations”. At the level of reflection we find “conscious thought” and “the learning of new concepts and generalizations about the world”. Expanding on these definitions, Norman's distinctions allow us to formalise understandings of how we find ourselves relating with a variety of cultural objects and experiences of the world.

Now let's look at some examples of these three levels in action: riding a roller coaster; chopping and dicing food with a sharp, balanced knife and a solid cutting board; and contemplating a serious work of literature or art. These three activities impact us in

different ways. The first is the most primitive, the visceral reaction to falling, excessive speed, and heights. The second, the pleasure of using a good tool effectively, refers to the feelings accompanying skilled accomplishment, and derives from the behavioural level. This is the pleasure any expert feels when doing something well, such as driving a difficult course or playing a complete piece of music. This behavioural pleasure, in turn, is different from that provided by serious literature or art, [p. 23] whose enjoyment derives from the reflective level, and requires study and interpretation. (pp. 23-4)

This system of three layers is articulated in two primary ways: "bottom-up" and "top-down". "Bottom-up processes are those driven by perception whereas top-down are driven by thought" (p. 25). In a simple way, this articulation can be called seeing and re-seeing where the real affordances of Gibson are found at the seeing or perceptual level and the perceived affordances are found at the behavioural level. While Norman does not attempt to overlay distinctions about kinds of affordance in Emotional Design, he has responded to this possible reading recently in an on-line discussion at PhD-Design, JISMAIL.AC.UK. The suggestion was made to Norman that one might map his three levels to three events in the film *The Gods Must be Crazy*. Norman's response is given entire to facilitate the argument.

Note that when I introduced the term "affordance" into design, I deviated somewhat from J.J Gibson's intentions for the term. (He and I used to argue for many long, lovely hours about the nature of perception. I disagreed with much of what he said, but thought that the disagreements were among the most informative and productive of my career. Judging by the twinkle in his eyes, I know he enjoyed them as much as I. He frequently overstated his case to make a point - and when we had both had drunk enough, he would admit it.)

To Gibson, affordances exist in the world as relationships between agent and object. It does not matter if anyone ever discovers them. To me, not only should affordances be perceivable to be useful, but I have generalized the term to include emotional affordances, social, cultural, ontological, ...etc. J.J would not approve. Moreover, one can have false affordances, when a designer (or nature) deliberately puts in signals so as to mislead. Hiding doors, placing false eyes on the wings of butterflies, putting steel-looking rods to block a car's path (even though they are rubber, so knowing drivers can just drive right over them). To Gibson, the notion of a false affordance would be abhorrent.

Note too that modern-day graphics and interaction designers have distorted the term even more, saying such things as "I put an affordance there," when in fact, they simply put a visual objection the screen and assigned an action to be performed if it were to be clicked upon. Technically, one can always click on any part of the screen, even if nothing is being displayed, but this is not a very useful sense of the term "affordance." The designer's sense, although technically wrong, is useful. In several essays on my website, I discuss this change in meaning. Eventually I have come to accept the changes: there is no other term to describe what designers are doing, and affordance was available, and close to the meaning. That is how language changes -- through borrowing and explanation. Purists have objected. I am not a purist.

Now, Keith Russell asked me some questions about mysterious coke bottles, affordances, and visceral, behavioral, and reflective design. (If you haven't seen the movie *"The Gods Must Be Crazy"* you will not get the reference. I recommend the movie. But basically, a coke bottle falls mysteriously out of the sky in a remote African village (having been dropped by a passing airplane), so people who had never seen such a thing before try to infer its deep meaning and significance.)

Keith suggests:

>Scene one where the bottle arrives is the Visceral moment

>Scene two where the bottle is given its Affordances (some social, some ontological), is the Behavioral moment.

> Scene three where they try to dispose of the offending object (abject) is the Reflective moment.

To a very, very rough first approximation, those are appropriate statements, but the approximation is very rough. Let me explain why.

I have defined Visceral design as perceptually-driven, yielding automatic emotional (technically, affective) responses that are the same for all people, all cultures. These are perceptually-driven, so they only encompass simple states such as liking or disliking, good or bad, safe or dangerous. (Fear of heights, crowds, the dark, and dislike of bitter tastes, liking of sweet ones are all visceral responses. Liking bright colors and symmetrical faces as well.)

So in some sense, the first perception of the coke bottle leads to a visceral response, but it immediately gets tied up with the attempt to understand it – a cognitive act that in my theory is mostly reflective, and a little bit behavioral.

Definitions: Both cognition and emotion are the result of information processing structures within the brain:

Cognition refers to the operations that understand and interpret the world.

Emotion: refers to the operations that judge and evaluate the world.

Emotion often precedes cognition, although cognition can drive emotions.

Cognition and emotion cannot be separated -- they work together in tandem, and each heavily affects the other. Thus, cognition processes information differently when in a negative emotional state (negative valence) than when in a positive emotional state (positive valence). (It's more complex than that, but that's a start.)

So, sure, the coke bottle starts off at the Visceral level, but goes on quickly to the others.

Affordances refer to the set of possible actions upon an object – always relative to the agent (or person, in this case). Actions are, of course, behavioral. So, in that sense, the second stage is indeed Behavioral. The coke bottle affords lifting, seeing through, throwing, filling-up, supporting, etc.

But the contemplation of the set of possibilities, and any discussion of its social or ontological status is Reflection.

According to the theory, Visceral and Behavioral responses are subconscious. Both levels of processing take in perceptual information and control muscle movements - actions.

Reflection is conscious. It is a meta-level activity - it looks at the person's own behavior and makes judgments. It can try to control actions, but only by influencing the lower levels. This is the home of consciousness, of full-fledged emotions, of feeling, and of self image.

Finally, the statement that: "...the bottle is given its Affordances (some social, some ontological) ..." is contradictory to the notion of affordance, at least as both Gibson and I have defined it. The bottle and person always have affordances because of the physical properties of both the bottle and the person. So affordances can only be discovered, not given.

Now, when we move to non-physical affordances, the story is more complex. I claim that a camera - especially a camera phone - provides emotional affordances. It makes possible the capturing, sharing, and preservation of important emotional events.

So perhaps a photo - or a coke bottle - can be given emotional, social, and ontological affordances. That's an interesting expansion of the concept. (Norman, May 28, 2004)

The slippages between levels in Norman's account offer an ideal model of how the artefacts of research provide and/or "can be given emotional, social, and ontological affordances". It may well be that events in the brain can be mapped to support simple directional "bottom-up" or "top-down" initiations. When we look at even the simplified events in the film narrative, of *The Gods Must be Crazy*, we are able to see that the bi-directional, multi-level operations of real and perceived affordances needs to be expanded to allow for affordances that can only appear at the reflective level. We can now allow that it makes good sense to ask the question "what are the affordances of a PhD". Earlier, this question was asked by way of purpose as if the involvement of consciousness neutralised the ontological possibilities. PhDs, as objects, might be good for thinking and reflecting but in their artefactual status, they would not function in the manner of real affordances such as hardness, sharpness, flatness. They might have metaphoric handles but not real ways, at the ecological level, of being taken in hand. As a physical book, they could be carried or balanced on the head; but as cognitive objects they would not afford.

Watching a man throw a stone to knock down a seed pod or fruit from a tree, I might disclose to myself the affordances involved. Hands can pick up rocks, arms can project rocks, rocks can sustain passages of flight, fruit can be knocked out of trees by missiles. This event takes place in the film and, presuming I had never seen such things done, I might have been initiated into the knowledge of all these affordances in an instant through my perception of these things.

If we accept that some artefacts find their virtues towards one or other end of the scale then we can accept that some artefacts will draw attention to (afford) visceral responses and some, at the other extreme will draw attention to (afford) reflective responses. This is not to exclude alternative directions of response, nor to suggest that such alternatives would be perverse. I might, as a geologist, reflect on the stone's composition and pay no direction attention to its visceral affordances. I might, equally, take up a novel such as *War and Peace* and be immediately aware of its bulk and weight as part of its visceral affordances. In both cases I may go on to act in a usual way: I might throw the rock away because it can be thrown and I might read the novel because that is what novels are for. The fact that I cannot remove the visceral affordances from a rock in no way alters the ambivalence of objects and their subjects. I have no ability to alter the qualities of the rock as a geological specimen or the novel as a novel without generating a new object that will now have the qualities of itself. Indeed, the visceral affordance aspects are equally

vulnerable to conscious alteration as are the reflective affordance qualities. The fact that the reflective qualities may be more open-ended and instructive in their negation does not exclude them from some hard or substantial model of objects. Rocks and books are both in the same world. Objects (rocks) may not set out to question their affordances or their subjects (rock gatherers), but subjects (rock gatherers) set out to question the affordances of objects (rocks) on a regular basis. As humans, we excel as machines of difference and affordance: we determine difference (this rock not that pebble) and affordance (for throwing, for keeping, for studying) as the grounds of design. That which might be different is open to design; that which affords difference is open to use in design.

In this one world that we inhabit, the conventions of academic research have elevated certain artefacts over others because of their perceived reflective affordances.

Five thousand years ago the affordances of orality and rhetoric were extended by the technology of written text. Writing enabled the precision of recorded memory. It afforded cognitive communication across time and distance. Literacy gave birth to History. The written word introduced constraints of grammar and syntax, but out of these constraints emerged stability and permanence of language. It was a means of representing and archiving human knowledge for later retrieval by one's self or by another.

...Athens produced history's most famous illiterate, Socrates, who opposed the technology of writing on the grounds that it would corrupt the human mind and destroy the memory of mankind (Plato, 360 BCE). We suggest, from the standpoint of affordance, that Socrates perceived no need to write. After all, he had his graduate students, Xenophon and Plato, to record his words for him. But more fundamentally the assertive will of Socrates found its full potential within the affordance of oral discourse and dialog. Writing, to Socrates, was an aimless diversion. Indeed, for most of written history, writing was not an affordance for the common person. For centuries, it was the exclusive realm of the power elite. (Ryder & Wilson, 1996)

The very term "grammar" takes its origin in "graph" such that the ability to determine the rule set of language is tied, historically, with the technology of writing. Writing, in this material way, has afforded a special kind of reflection that goes beyond Socrates' use of memory. What is lost, in this account, is the object affordances "of oral discourse and dialog". And this is the sticking point in terms of alternative artefacts as research objects. The oral examination has its place in many PhD programs just as the supporting artefacts have their place. Here is the designed object (model) and here is the design or conceptual knowledge (thesis). The special affordances of the thesis cannot be dissolved or resolved any more than the special affordances of the model or example can be dissolved or resolved. We can approach the research from the bottom up (model) or the top down (thesis) but effectively, in our system of cultural constraints we do both of these things all of the time and in the same process of examination.

Having expanded the notion of affordances to allow that the thesis has artefact qualities of affordance, we now need to expand our understanding of the cultural discourse of research to allow that bottom up aspects of research retain their status as the ground of research. As Norman points out, all three levels are involved in the Coke bottle events in the film *The Gods Must be Crazy*. The Visceral, or lizard-like knowledge might not seem to be of much importance, in terms of research outcomes. Presenting a roller coaster ride as evidence would not seem to be a successful way to be examined. Or, putting a series of sharp objects before one's peers would not seem to be of much importance. The hardness of a model might be examined, as an engineering aspect, but as "hardness" it would fall

into a range of aesthetic receptions that many examiners would question – just what is this experience for? By the time we came to handles and doors we might feel more confident.

You are approaching a door through which you eventually want to pass. The door, and the manner in which it is secured to the wall, permits opening by pushing it from its “closed” position. We say that the door affords (or allows, or is for) opening by pushing. On approaching that door you observe a flat plate fixed to it at waist height on the “non-hinge” side, and possibly some sticky finger marks on its otherwise polished surface. You deduce that the door is meant to be pushed open: you therefore push on the plate, whereupon the door opens and you pass through. Here, there is a perceived affordance, triggered by the sight of the plate and the finger marks, that is identical with the actual affordance. Note that the affordance we discuss is neither the door nor the plate: it is a property of the door (the door affords opening by pushing). (Anon, composite of Norman – see Norman, 1988, p.87)

When Norman talks about doors in this way, I think we start to feel confident that an exhibition of doors and photographs of doors might amount to evidence of research but only so long as the talking, or language account, accompanies the “dumb” artefacts. The talking, I suggest, always accompanies the “dumb” objects in the cultural discourse of research; the lizard-like knowledge is always presented along with the dog-like and the reflective. Artefacts are not found, in the discourse of research, without the full company of knowledge being available.

Klaus Krippendorff offers an account of what is here called “the full company of knowledge” in his recent paper, “The Social Reality of Meaning”. Dealing with the Coke bottle, Krippendorff points out the social world and language world that surrounds the entry of the artefact:

Before our Coke bottle entered the bushmen's world, their culture undoubtedly furnished many stories that kept their environment – its tools, resources, and threats – meaningful and manageable. In the movie, discussed earlier, we hear talk, but without understanding what the bushmen are saying, we can say little about their reality, their world, other than what we see and what the narrator tells us. This obvious difficulty supports my contention that much if not all of our understanding relies on language and con-sensual interaction. (2004)

When the language events are held at a distance, we become aware that they are “missing”; when the social language events are present we tend to discount the “con-sensual” and conventional nature of the stories that we tell. We also tend to discount the visceral aspects, especially when the convention, as in research, is to focus on the reflective. In the case of Fine Art exhibitions the reverse focus is often established as the convention: the visceral aspects of a painting are to be talked about and brought to attention.

Krippendorff goes on to provide an account of an experience in relation to an artefact where the “notion of meaning in social reality” is evident. He tells of a visit to a museum, with his children, where they came upon a suit of armor. This object triggers a series of memories and special knowledges.

I tried to imagine what the blacksmith's shop that tailored the armor may have been like with its master and his journeymen piecing this remarkable artifact together, probably under the pressure of deadlines, with inadequate compensation, and daily visits by an

evidently large-bodied Duke who may have been difficult to please, and demanding frequent adjustments. Having worked in metal once myself, I know how difficult it is to shape these complex humanoid forms, and I can barely imagine artfully inlaying them with silver.

This object obviously confronts the viewer at all levels but it is only in the coordination of these levels, in the narration of meaning, that the artefact evidences its affordances. For Krippendorff,

things do not have intrinsic meaning. Meanings are attributed by people who use these artifacts in particular situations, at particular times, and in interaction with other people. Attributions occur in language. For the bushmen our Coke bottle was something quite different from what it is to us, in fact, it had many uses and consequently meant many things that we cannot access without understanding their language, their culture.

The “instability” of such accounts may seem contradictory to the conventions of academic research. Krippendorff calls on the concept of “bricolage” to embrace this “difficulty” or reality:

...to conceptualize the multitude of meanings that artifacts can acquire in different contexts, I am relying on Lévi-Strauss' (1966) concept of “bricolage” somewhat liberally to suggest that our armor passed through many loose assemblages of artifacts, people, practices, and events, jointly participating in the constitution of systems of enacted meanings: the shop of the armor maker, the tournament during which the armor was “performed”, a transitional society that made the hiding of a knight's identity a virtue, the armory of a wealthy collector organized in conversations on medieval artistry among armament buffs, and the exhibit at the Philadelphia Museum of Art.

For Lévi-Strauss (1966), a bricoleur is someone who uses available means, not necessarily as originally conceived, adapting them in trial and error fashion to a current situation, and combining them with little regard for conventions of what should go with what else. To me, a bricolage is a relatively loose ecology of artifacts, produced or at hand, whose uses are guided by conceptions that its many participants bring to it. Complementary practices like buying and selling, winning and losing, even organizing an exhibit and visiting it, bring these artifacts into often novel interactions with each other. As they change users, they change their meanings. When institutionalized, such practices may systematically limit and refine appropriate conceptions and the interactions among artifacts.

The systematic limiting and refining of “appropriate conceptions and the interactions among artefacts” is surely the business of an academic community. The current inhibitions on “trial and error” and the hesitant acceptance of novel interactions is more an indication of the immaturity of the design research community than it is of any persistent obstacle to the integration of non-language objects, as artefacts, into the conventions of design research. If all levels, the visceral, the behavioural and the reflective are available all the time, within the “ecology of artefacts” then there is clearly a burden on design researchers to find “systems of enacted meanings” expansive enough to not only account for the current work of design researchers, but provocative enough to encourage the generation of new kinds of research objects.

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to cite this journal article:

Russell, K. et al (2004) *Artefacts and affordance: the surface of meaning*. *Working Papers in Art and Design* 3

ISSN 1466-4917

