Characterising affordances: the descriptions-of-affordances-model


Abstract

Artefacts offer opportunities for action, ‘affordances’, that can be described on various levels, from manipulations (‘pushing a button’) to social activities (‘dialling a friend’). However, research in design into affordances has not investigated what an ‘action’ is, nor has it distinguished those levels. This paper addresses the question of which kinds of descriptions can be applied to affordances. Its main claim is that different descriptions can apply to a single affordance. On this claim a descriptions-of-affordances-model is built that shows how these levels are connected, and that specifies what knowledge the artefact user would need in order to perceive affordances under each kind of description. The paper also shows several ways in which the descriptions-of-affordances-model can contribute to affordance-based design.

Keywords: affordance, perception, philosophy of design, product design, psychology of design

Introduction

It is obvious that humans can perceive objects and their properties, but only since the last century it has been claimed that we can also directly perceive opportunities for behaviour, or more specifically, opportunities for action (Gibson, 1979). Gibson calls these opportunities for action affordances, and argues that they are ubiquitous in our everyday environment: a single chair can afford sitting on, standing on, throwing,
etc. Not only has Gibson’s claim been supported by various experiments in ecological psychology (e.g. Milner & Goodale, 1995; J. Norman, 2002), designers have found it very useful to work with the concept of affordances, and have investigated what ensures that affordances of artefacts will be perceived (D. Norman, 1988/2002). This is an important issue, as user behaviour is influenced by perceived rather than by real affordances.

Defining affordances as ‘opportunities for action’ means that our understanding of what affordances are can only be as precise as our understanding of what actions are. Unfortunately, a good examination of the action concept is lacking in the literature on affordance-based design. This may not be problematic for simple cases (‘this chair affords sitting’), but it raises questions about more complex ones. For example, when I turn on the light by flipping the switch, does the switch afford flipping, or turning on the light, or both? Simply saying that the light switch affords flipping and the lighting system affords turning on the light does not seem to be a proper solution: ascribing different affordances to different parts of artefacts does not relieve designers of the need to formulate a proper concept of actions. Besides, if I turn on the light by flipping the switch, I perform only one action. That is, I do not have to do anything else besides flipping the switch in order to turn on the light: I merely describe my action in a different way (Anscombe, 1957/2000; Vallacher & Wegner, 1987; Michaels, 2003). And if there is only one action here, rather than two, it seems that there can only be one affordance here.

This paper aims to provide affordance-based design with a clear, conceptual account of what actions are, and use this account to clarify the notion of real or physical affordances as ‘opportunities for action’. Specifically, this paper assumes that actions can be described in different ways (e.g. Anscombe 1957/2000), which implies that affordances can also be described in different ways. This assumption is reminiscent of that behind the abstraction hierarchy, which assumes that a system can be described on different levels (of abstraction) (e.g. Vicente & Rasmussen, 1992). Where abstraction hierarchies describe whole systems on different levels, however, in this paper I am primarily concerned with the kinds of descriptions that apply to artefact or system affordances. The main question this paper will address will thus be: which kinds of descriptions can apply to the affordances of artefacts, and what knowledge do
we need in order to perceive what an artefact affords for each kind of description? I will address this question in several steps. In section one, I will treat four kinds of descriptions that can apply to what humans do, as proposed by the philosophy of action. In section two, I will construct a descriptions-of-affordances-model that mirrors the philosophical model of descriptions of actions. In particular, although many possible descriptions can apply to a single affordance, I will argue that there are four main kinds of descriptions that can apply to what an artefact affords: how the artefact can be manipulated, what the reliable effects of those manipulations will be, what can be done with the whole artefact (or technical system) in itself, and what can be done with the whole artefact as component of a socio-technical system. I will also argue that those four kinds of affordance descriptions can be differentiated in terms of the knowledge needed in order to perceive the affordance under that description. For example, in order to perceive that a switch affords flipping, a different kind of knowledge is needed (if knowledge is needed at all) than in order to perceive that a switch affords illuminating the room. In the last section, section three, I will give a general recommendation for affordance-based design that derives from the descriptions-of-affordances-model, show how my model can ground and specify existing recommendations like ‘give feedback’, and can extend the scope of affordance-based design to socio-technical systems.

1 Four ways to describe what humans do

We do many things each day: sit, stand, sneeze, blink, go to work, switch on the light, read and send emails, prepare dinner, greet friends... Some of these doings are fairly simple and direct, like blinking, others require more time and activity, like preparing dinner. Some doings require technical structures or artefacts to be present, such as turning on the light and sending emails, others require the presence of certain social structures, such as greeting friends.

According to the philosophers Anscombe (1957/2000) and Davidson (1980: essay 1), the things you intentionally do directly, not by doing anything else or by doing multiple things, are actions. Examples are (intentional) blinking, sitting and waving. Actions have consequences, however, and often we describe our actions in terms of their consequences. If I startle a burglar (unintentionally) by turning on the light
(intentionally) by flipping a switch by moving my hand, I can be said to do a number of things. However, Anscombe and Davidson hold that there is only one, basic, action here: moving my hand, as I do not (intentionally) do this by doing something else. The other descriptions of what I do are all descriptions of the same action, moving my hand, but in terms of some of its many consequences.

Sometimes we intend to do things that can only be realised by performing multiple actions. For example, when I call a friend, I do not just do this by doing something else, but by doing several things, or performing several actions, each with particular consequences. For example, calling a friend could require me to press the button for the first digit of his phone number, then the button for the second digit, and so on, until I have selected the whole number and can press the ‘dial’-button and wait to be connected. In this case, what I describe with ‘calling a friend’ is that I am executing a plan (Bratman, 1987). In this case, I am executing a particular ‘use plan’ for my phone (Houkes and Vermaas, 2004, 2010). As the example shows, executing a plan can include both executing actions and waiting.

Finally, it is important to note that, while all physical actions have physical consequences, some of those actions also have social consequences (Searle, 1996). If my action is intentional under any description in terms of its social consequences, it can be said to be a social action. Examples are making a promise, or challenging someone to a duel. Similarly, plans can be social if they are aimed at bringing about a social rather than a physical change: running for president; blackmailing my competitor. Social actions and plans thus work in the same way as physical actions and plans, but with intended effects in the social rather than in the physical realm. If artefacts can be said to afford actions and the execution of plans by virtue of belonging to a particular technical system, they can afford social actions by virtue of belonging to a particular socio-technical system (Kroes, Franssen, Van de Poel, & Ottens, 2006; Ottens, Franssen, Kroes, & Van de Poel, 2006).

If it is assumed that affordances are opportunities for action, then they would mirror the structure of actions. In that case, there would be basic affordances that afford basic actions. Those affordances would then afford actions under all other kinds of descriptions, by affording these basic actions. The light switch affords a basic action,
namely, moving your hand against it. The light switch affords actions under other
descriptions as well: turning on the light, startling the burglar, etc. These, then, would
all be the same affordance under different descriptions. Of course, the light switch in
itself does not afford turning on the light: it needs to be connected to electric wiring
and a light bulb. The same holds for basic actions: your action of moving your hand is
not an action of turning on the light if the light switch is disconnected. However,
given that the light switch is connected, the one action is the other, since you do not
need to do anything else to turn on the light beyond moving your hand against the
switch in a certain way. Similarly, the one affordance is the other, since the light
switch does not have to afford anything else to you beyond moving your hand against
the switch, in order to afford turning on the light. What is important here is that the
switch affords these actions under various descriptions by affording the basic action.
If the switch does not afford moving your hand against it, e.g. because it has broken
off, then it does not afford flipping, turning on the light, startling the burglar, etc.

Moving from actions to plans, it can be said that an artefact affords executing a plan
when it affords the actions required for executing the plan. This can e.g. be realised by
having the artefact offer a number of (basic) affordances that need to be acted on in a
certain sequence in order to execute the plan. For example, my phone affords dialing
my friend, because it affords selecting any of the digits from 0 to 9 (by affording
pressing certain of its keys) and affords dialling the chosen number (by affording
pressing the dial key). An artefact affords a social action, finally, if it affords a basic
action or plan that can have at least one particular consequence in the social, rather
than physical realm, and the action or plan can be described in terms of that
consequence. For example, a luggage monitoring system, because of the socio-
technical context in which it functions, could be said to afford ‘preventing terrorist
attacks’ and ‘improving the safety of plane travellers’.

In this section I have proposed that the structure of affordances mirrors that of actions.
The next step is to investigate what knowledge the user needs in order to perceive the
affordance under that kind of description. I will explicate this in the descriptions-of-
affordances-model. I will talk about ‘perceived affordances’ for each kind of
description, where I assume with Norman that perception can include interpretation
and/or past knowledge (as opposed to sensing; see Hartson, 2003), and thus that it is
possible to perceive affordances under high levels of description, like ‘dialling a friend’ or ‘improving the safety of plane travellers.’

2 The descriptions-of-affordances-model

In this section I will work out the four proposed kinds of affordance descriptions, show how these levels connect, and argue what kind of knowledge a user would need in order to perceive the affordance under that description.

In the previous section, I argued that there are basic affordances that correspond to basic actions. These affordances I will call manipulation opportunities. They are affordances at the first, lowest level of description, as they afford intentional actions at the lowest level of description: grasping, pushing, etc. As such, they map nicely onto the original Gibsonian concept of affordances that can be directly perceived and fit the neuropsychological evidence for the direct perceivability of affordances (J. Norman, 2002). In practice, users rarely encounter completely unknown artefacts without any signs or symbols, but if they do, the only affordances of those artefacts they will be able to perceive will be manipulation opportunities: can they stand on them? Push them? Pull at some parts, or twist them? They will then, of course, need to experiment with the artefact in order to find out whether those perceived affordances are real affordances. Just as they can only find out if they can do something new by trying to do it, they can only find out if some unknown artefact affords \( X \)-ing by trying to \( X \) with or on the artefact. Perceived basic affordances can tell them where to start experimenting, and what actions they might try out first.

By experimenting, or gaining knowledge about the artefact in some other way, users might discover reliable connections between manipulations and their effects. They might find out that pulling the trigger of a loaded gun will reliably fire it (‘this gun affords firing’), or that pressing the ‘A’ key on the keyboard of their computer will make an ‘A’ appear in their text editor (‘this computer affords typing A’s’). In short, they learn what the effects of their manipulations are. I will call affordances described in terms of the effects of manipulations effect opportunities. Although abstract knowledge can help the user in learning effect opportunities – the ‘A’ printed on the key that will make an ‘A’ appear in a text editor is there for that reason, effect
opportunities can be directly perceiveable. All that would strictly be needed for an observer to directly perceive effect opportunities would be to have a simple psychological mechanism that can correlate causes and effects.

According to You & Chen (2007), it is the task of product semantics to link affordances to their intended functions, via design but also via labels, symbols, etc., removing the need for experimentation. Norman (1999) similarly argues that software buttons and icons do not afford clicking – every pixel on a computer screen affords clicking – but that those buttons are symbols or conventions that advertise an affordance. The descriptions-of-affordances-model shows how product semantics (including adding buttons or icons) is related to affordance design: it allows the user to perceive effect opportunities, or higher-level descriptions of basic affordances. Also, effect opportunities seem similar to Hartson’s (2003) functional affordances, in the sense that functional affordances are physical affordances with a reference to their purpose included in the description (‘this doorknob can be grasped and turned in order to open the door’). Effect opportunities are also physical affordances described in terms of their effects, though these effects may not always be purposes intended by the designer (‘this shoddy doorknob affords pulling it loose from the door by affording grasping and turning’). Finally, as users often bring about effects by doing other things, such as turning on the light by flipping the switch, this account of actions explains how Gaver’s (1991) proposed notion of nested affordances works; how manipulation opportunities are connected to effect opportunities, or even use opportunities, which I will address next.

Affordances can also be described on a third level, in terms of what the user can do with the artefact, rather than how to act on it. I will call these kinds of affordances use opportunities. What the user can do with an artefact often depends on a number of basic affordances: just like goal-directed actions can be strung together in goal-directed plans, as when cooking a recipe, a number of basic affordances of an artefact taken together can enable a whole artefact to afford an action under a high-level description. My computer affords writing a paper because acting on its basic affordances realises effects (described as ‘typing an “a”’, ‘deleting a letter,’ etc.) that contribute to the use opportunity of the whole. In other words: by affording text insertion, deletion, etc., my computer affords writing a paper. These basic affordances
can all be present and perceivable at the same time, as with the keys on a phone, or they can be sequential (Gaver, 1991), that is, that acting on one affordance creates or highlights other affordances (e.g. when the selection of a menu item in a word processor makes a drop-down menu appear). Perceiving use opportunities seems to be what Searle (1996) meant when he said that humans often perceive objects as functional, for example, that we see bathtubs rather than enamel-covered iron concavities containing water (p 4). Sometimes, perceiving the context or socio-technical system of which the artefact is a part is necessary to perceive its use opportunities (e.g. Vaesen, 2008: p 56).

It does seem that mental representations or abstract knowledge is needed in order to perceive use opportunities; they require too much interpretation or past knowledge to be directly perceivable. Norman argues that the designer needs to provide the user with the information needed to construct a correct mental model of the artefact, that is, knowledge of what effects our actions will have on the functioning of the whole artefact. An abstraction hierarchy (e.g. Vicente & Rasmussen, 1992) could be used as an external mental model that would fit the descriptions-of-affordances-model particularly well: for each affordance, it could show how an action on it would affect the artefact on different levels of description. These effects on the artefact, in turn, determine that artefact’s effect and use opportunities.

As an alternative to mental models, Houkes & Vermaas (2004; see also Houkes, Vermaas, Dorst, & De Vries, 2002; Houkes & Vermaas, 2010) argue that the designer should communicate the use plan of the artefact to the user, that is, knowledge that a certain sequence of actions will lead to the realisation of a goal. The designer should in addition communicate information regarding the proper context of use together with the use plan, as well as the need for auxiliary items, if any, and whether the user would need special skills in operating the artefact. It is possible for users to construct use plans themselves rather than relying on one provided by the designer (if any is provided), but that would involve gaining knowledge about the artefact as well, e.g. by experimenting.

Finally, affordances of artefacts can also be described in terms of their effects on the social, rather than physical world. This is because artefacts almost never operate in
isolation, as purely technical systems: they are usually part of larger socio-technical systems that themselves have specific functions (Kroes et al., 2006; Ottens et al., 2006). Gibson seems to acknowledge this when he writes: “...the real postbox (...) affords letter-mailing to a letter-writing human in a community with a postal system. This fact is perceived when the postbox is identified as such...” (1979: p 139). Just as an artefact can offer a use opportunity by virtue of having a particular set of affordances, it can also offer an opportunity for action by virtue of being part of a system consisting of artefacts, humans, institutional arrangements, etc. I will call affordances under this kind of description *activity opportunities*. These would correspond with social actions in action theory: raising your hand *is* asking a question if the social/institutional setting is that of a talk, meeting, etc. Similarly, a debit card reader affords conducting a payment, and passing your debit card through the reader *is* conducting a payment, provided all kinds of other artefacts and institutional arrangements are in place. Abstract social and institutional knowledge is needed in order to perceive activity opportunities.

In this section I have explicated the descriptions-of-affordances-model and argued that there are four kinds of descriptions that can apply to affordances. An overview of the model can be found in Table 1.

Let me add that these different kinds of affordance descriptions are not applicable to every artefact. They will all be applicable to complex technical systems such as computers and cars, but for simple artefacts, some distinctions between kinds may collapse. For example, while a spoon can be manipulated in different ways, manipulating the spoon always means manipulating the whole artefact, so there will be no use opportunities that are not also effect opportunities or manipulation opportunities. This redundancy, however, is necessary to accommodate the different kinds of affordance descriptions that are applicable to more complex artefacts or systems.
<table>
<thead>
<tr>
<th>Affordance</th>
<th>Corresponding concept action</th>
<th>Knowledge needed</th>
<th>Examples of actions afforded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity for manipulation</td>
<td>Basic action</td>
<td>None; only neuropsychological mechanisms (Milner &amp; Goodale, 1995; J. Norman, 2002)</td>
<td>Pulling a trigger, hitting a glass pane, pressing a button...</td>
</tr>
<tr>
<td>Opportunity for effect</td>
<td>Action described in terms of its effects</td>
<td>None; only neuropsychological mechanisms (Milner &amp; Goodale, 1995; J. Norman, 2002); optionally knowledge of functions of parts (You &amp; Chen, 2007), or cultural symbols (Norman, 1999)</td>
<td>Firing a gun, breaking a glass pane, typing an ‘a’...</td>
</tr>
<tr>
<td>Opportunity for use</td>
<td>Plan</td>
<td>Mental models (D. Norman, 1988/2002); use plans (Houkes &amp; Vermaas, 2004)</td>
<td>Shooting a person, obtaining an emergency hammer, writing a paper...</td>
</tr>
<tr>
<td>Opportunity for activity</td>
<td>Social action</td>
<td>Abstract, institutional and social knowledge (Searle, 1996; Kroes et al., 2006; Ottens et al., 2006)</td>
<td>Murdering an enemy, escaping a crashed vehicle, working out a psychological theory...</td>
</tr>
</tbody>
</table>
In this final section I will show three ways in which the descriptions-of-affordances-model can contribute to affordance-based design (e.g. Maier & Fadel 2001; 2009). First, I will give a general recommendation for design suggested by the descriptions-of-affordances-model. Second, I will show how the descriptions-of-affordances-model can ground and specify design recommendations like ‘give feedback’. Third, I will show how the descriptions-of-affordances-model can extend the scope of affordance-based design to socio-technical systems.

As a general recommendation, if a certain system structure should possess a certain function, according to the descriptions-of-affordances-model this means that the system should have an affordance described on a high level, say, a use or activity opportunity. This can be realised by ensuring a) that the system has the proper (basic) affordance(s), and b) that the system structure is such that this affordance (these affordances) can be redescribed as the desired use or activity opportunity. For example, if an artefact should afford ‘lighting the room’, it should afford a manipulation like ‘flipping a switch’, and the artefact should be built so that the light comes on when the switch is flipped. In other words: the user should be able to light the room by flipping the switch. The next step is to make sure c) that the use opportunity can be perceived, so that the user can see what can be done with the artefact, and d) that the manipulation opportunity can be perceived, so that users can see how they can actually use the artefact. Note that it is possible to have c) without d): I might perceive the light bulb and know that it can be used to light the room, but if I do not manage to find the switch, I will not be able to actually turn on the light.

Furthermore, if a certain system structure can be used in a way that is unacceptable, the descriptions-of-affordances-model can be used to find possible solutions. For example, the sharp edge of a razor affords cutting hairs, but also cutting skin. In order to find a design solution that does not enable cutting skin, one option is describing the desired action (‘cutting hairs’) on a higher level, possibly in terms of the goal of the action (say, ‘getting a smooth face’), and finding an alternative route to this goal (e.g. by depilating). Alternatively, the designer could look for a way to ensure that the description of ‘cutting skin’ does no longer apply to the affordances of the razor,
while the description of ‘cutting hairs’ does (this is e.g. the case with electric razors, that contain a protective head to ensure that the blades cannot reach the skin) (see also Maier, Sachs & Fadel, 2009).

The descriptions-of-affordances-model can also ground and specify existing recommendations for design: here I will show how the model can specify the recommendation to ‘give feedback’.

In order to perceive effect opportunities, users should be able to register a reliable connection between their actions and the resulting behaviour of the artefact. Therefore, the artefact’s behaviour should be predictable, and the users should be given feedback on the effects of their manipulations. Norman emphasises the importance of giving immediate and obvious feedback. This can tell the user what result has been accomplished and ensures that users can determine the relationship between their actions and the effects on the system. The descriptions-of-affordances-model adds that feedback is necessary to go from perceiving manipulation opportunities to perceiving effect opportunities. Also, the model can offer a more specific recommendation: users should not just receive feedback, but they should receive feedback on different levels. More accurately, if different kinds of descriptions apply to their actions with the artefact, they should receive different kinds of feedback to indicate whether the action, described in that way, was successful. This does not only hold for functional changes within the system (‘Did the light come on when I flipped the switch?’), but also, perhaps even more so, for unwanted or possibly harmful changes (‘No; by flipping the switch you blew the fuse.’)

At least, the user should receive feedback that the manipulation was successful. For example, when pressing a button, there is direct feedback: the button is pushed back. This direct feedback is absent in for example touchpads, where the user has to rely on indirect feedback to perceive that the action was successful (a light, a tone, etc.). Where direct feedback is important for knowing that a manipulation is successful, indirect feedback is important for knowing that a successful manipulation is also a successful use of the artefact. Good pedestrian traffic lights, for example, offer feedback on all relevant levels. They have buttons that are pushed inwards when pressed. They have lights near the button to show that the button press was
successfully registered and constituted a successful use of the artefact. As Norman says, immediate feedback is important here. The light turning green is delayed feedback that the action was successful, but until the feedback occurs, the user cannot distinguish between delayed feedback on a successful action and no feedback on an unsuccessful one. Finally, other lights turn red to stop the traffic, showing that the socio-technical system works as it should: the button press is, in these circumstances, also a way to regulate traffic such that all road users can arrive safely at their respective destinations. Since with a traffic light pressing the button is operating the traffic light, that is, there is no distinction between effect opportunities and use opportunities, the light turning green is both feedback on the successful action on and the successful use of the artefact.

Intimately related to the recommendation of giving feedback is the recommendation to give feedforward, or to provide the user with clues as to what effect will result from a specific manipulation. This can be a design solution, for example, placing the control (say, a light switch) close to the function (the light). It can also be symbolic, like putting a symbol or a label on a switch. Norman argues that if design depends on labels, it may be faulty (p 78). The descriptions-of-affordances-model shows that this depends on the level that the label announces an opportunity on. It may be difficult to find an intuitive design alternative for a label that announces an effect opportunity, for example, a light switch with a picture of a glowing light bulb on it. However, the label can also announce a manipulation opportunity, say, a light switch with the word ‘press’ on it. Here, Norman’s recommendation holds, for the information denoting a manipulation opportunity should be made clearly available, not hidden behind clumsy or ‘artful’ design. In Gibson’s words, the (basic) affordances should be fully specified in the stimulus information (1979: p 140).

Knowing what an artefact does in itself is good, but no artefact works in isolation. Artefacts are connected to humans and to each other, their use and behaviour regulated by institutions and social procedures. In other words, many artefacts are part of socio-technical systems, systems that themselves have intended functions and need to contain artefactual, human and institutional parts in order to fulfill those intended functions (Kroes et al., 2006). An example would be a luggage monitoring service at an airport that requires an artificial scanner, a human operator and regulations
concerning luggage handling and safety in order to fulfill the service’s intended function within the larger civil aviation system. Given this additional context of the scanner, the scanner affords actions under new descriptions that take the socio-technical system in account. For example, as an artefact, the scanner affords ‘registering certain substances in portable containers’. As part of a socio-technical system, the scanner also affords ‘detecting bombs’, ‘improving the safety of plane travellers’, etc. Given that many artefacts are designed to function within the context of specific socio-technical systems, it is important for the designer to show how the descriptions of the affordances of the artefact as a technical system relate to the descriptions that apply to the affordances of the artefact by virtue of the socio-technical system in which the artefact is supposed to function.

While Norman does not concern himself with socio-technical systems or the place artefacts have in them, building a bridge between artefacts as technical systems and artefacts as parts of socio-technical systems is a natural step in the descriptions-of-affordances-model. Strictly speaking, it may not be the responsibility of the designer of the artefact to show what activity opportunities the artefact affords by virtue of belonging to a certain socio-technical system, but rather that of the designer of the socio-technical system. Still, it might have distinct advantages to do so, if only for marketing purposes. People do not buy modems because they afford modulating and demodulating analog signals to encode and decode digital information, though that could be said to be the technical function of a modem. Rather, people buy modems because they can be made a part of a socio-technical system and then afford emailing, surfing the internet, etc.

In this section I have shown what general recommendation for design the descriptions-of-affordances-model gives, and how it can ground and specify specific recommendations. I have also shown how the descriptions-of-affordances-model can extend the scope of affordance-based design from technical artefacts to socio-technical systems.
4 Conclusion

In this paper I have asked the question: which kinds of descriptions can apply to the affordances of artefacts, and what knowledge do we need to perceive what an artefact affords for each kind of description? I have addressed this question in two stages. First, in section one, I have argued that affordances are like actions in the sense that there are basic affordances, and those can be described in different ways. Second, in section two, I have worked out this idea in the descriptions-of-affordances-model, a structured account of the kinds of descriptions that can apply to affordances. The descriptions-of-affordances-model states that affordances of artefacts can be described on four levels: that of the manipulation opportunities, that are very basic, Gibsonian affordances; effect opportunities, that describe affordances in terms of the effects of their manipulations; use opportunities, that describe affordances in terms of their effect on the whole artefact; and activity opportunities, that describe affordances in terms of their effects on the particular socio-technical system the artefact belongs to. I have also investigated what knowledge is needed in order to perceive what an artefact affords on each of these levels of description. In section three, finally, I have shown how the model can give a general recommendation for design, as well as specify known design recommendations and extend the scope of affordance-based design to socio-technical systems.

Notes

1 For Gibson (1979), who describes affordances as what the environment provides or offers the animal, objects can afford both doings or actions (have goal affordances) and happenings (have happening affordances; Scarantino, 2003). For example: a fire affords cooking meat (goal affordance) but also burning yourself (happening affordance). This paper is concerned only with goal affordances: though happening affordances are arguably underexplored in affordance-based design, their treatment is outside the scope of this paper.

2 In this paper I will concentrate on visual perception and to a lesser degree on tactile perception, as vision and touch are the senses that can with most accuracy locate objects and their affordances relative to the observer. It is possible, however, to perceive affordances with other senses as well (Gaver, 1991).

Concepts similar to that of the basic action are also used in psychology, e.g. the basic level components of action of Humphreys, Forde, & Riddoch (2001) and the Basic Action Concepts of Schack (2004). My particular interpretation of the basic action concept is inspired by Hornsby’s definition of intentionally basic descriptions of actions, a formal version of which she elaborates and defends in (1980: p 78-79).

Gibson uses the term ‘basic affordance’ in passing (p 143). He does not specify it, but it seems compatible with my use of the term. Note that, contrary to what the term implies, there are no non-basic affordances: only different ways of describing a particular affordance.

References


