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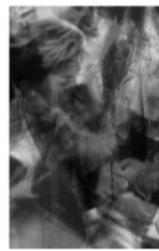
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## Bodies, Technologies and Action Possibilities: When is an Affordance?

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### **ABSTRACT**

Borrowed from ecological psychology, the concept of affordances is often said to offer the social study of technology a means of re-framing the question of what is, and what is not, 'social' about technological artefacts. The concept, many argue, enables us to chart a safe course between the perils of technological determinism and social constructivism. This article questions the sociological adequacy of the concept as conventionally deployed. Drawing on ethnographic work on the ways technological artefacts engage, and are engaged by, disabled bodies, we propose that the 'affordances' of technological objects are not reducible to their material constitution but are inextricably bound up with specific, historically situated modes of engagement and ways of life.

### **KEY WORDS**

affordances / body / disabilities / sociomateriality / technology

## Introduction

Social science, Dennis Wrong (1961) has argued, tends to oscillate between 'undersocialized' and 'oversocialized' conceptions of 'man' (sic).<sup>1</sup> According to many commentators, the sociology of technology is currently caught up

in a very similar predicament (see for instance Kling, 1992a, 1992b; vs. Grint and Woolgar, 1992). Sociological studies of technological objects, it is claimed, are faced with an unpalatable choice between *undersocialized* and *oversocialized* conceptions of technology – represented by technological determinism and social constructivism respectively. This framing of the problem inevitably leads to a quest for a ‘third way’, a conception of technology that is neither over nor under-socialized but is – not unlike baby bear’s porridge – ‘just right’. For seekers of this third way, Gibson’s (1979) concept of ‘affordances’ has obvious attractions. As is well known, Gibson coined this neologism as a description for the ‘action possibilities’ which a given environment presents to an animal. For instance, for an object to be graspable, that ‘object must have opposite surfaces separated by less than the span of the hand’ (1979: 133). ‘Affordances’ reflect the co-evolution of (human and non-human) animals and environments. They are understood as products of the animal–environment *system*:

... an affordance is neither an objective property nor a subjective property; or it is both if you like ...[It] points both ways, to the environment and to the observer. (Gibson, 1979: 129)

Gibson saw the concept as equally applicable to the artificial environment humans build for themselves. ‘It is a mistake to separate the natural from the artificial as if there were two environments: artifacts have to be manufactured from natural substances’ (1979: 130). Drawing on Gibson, Hutchby (2001a) has, in a contribution to this journal, proposed that the way out of the determinism vs. constructivism impasse is to recognize the range ‘of affordances that particular [technological] artefacts *by virtue of their materiality possess*’ (Hutchby, 2001b: 193, our emphasis), and that in turn ‘these affordances *constrain* the ways that they can possibly be [interpreted]’ (2001a: 447). This allows us, he claims, to counter the (over-socialized) conception of technology which he identifies with a constructivist (over)emphasis on social actors’ interpretations of technological objects, without falling prey to (an under-socialized) technological determinism.

Let us note in passing that the notion of ‘affordances’ has already undergone a number of migrations to other fields of social science, sometimes successfully, sometimes less so. In the course of these migrations the concept typically ‘travels light’, leaving behind much of the conceptual apparatus of Gibsonian psychology (such as direct perception, theory of information, theory of meaning; see Michaels and Carello, 1981). This, in turn, facilitates its assimilation to the vernacular of a new field. As a result of these adaptations a range of different meanings is now associated with the term, some of which depart considerably from Gibson’s original formulation. Consider for example the (Actor-Network Theory compatible) definition of ‘affordances’ given by Akrich and Latour (1992: 259):

*Prescription; proscription; affordances, allowances:* What a device allows or forbids from the actors – humans and nonhuman – that it anticipates; it is the morality of a setting both negative (what it prescribes) and positive (what it permits).

Hutchby's (2001a) sociological adaptation of affordances has attracted attention and commentary both within sociology (e.g. Rappert, 2003; Woolgar, 2002) and within related fields such as cultural studies (e.g. Dant, 2004; Gordon, 2006), or organization studies (Fayard and Weeks, 2007; Zammuto et al., 2007). Accordingly we take it as a starting point for our own discussion here. The rest of the article is organized as follows; the next section focuses on the ways 'action possibilities' are made available (or unavailable) by means of, and as, technological artefacts. Then, drawing on the work of Scarry (1985), we propose that the 'affordances' of technological objects need to be understood in terms of the sociohistorically contingent folding(s) of the body and the artefactual world into one another. The section after that provides an empirical illustration of our argument, drawing on the ethnographic investigation of a scheme run by a British non-governmental organization ('CommunITy' – a pseudonym). CommunITy aims to address social isolation among housebound disabled individuals by providing them with reconditioned computers (i.e. IT – information technology) to access the internet. The article concludes with some reflections on the implications of the arguments developed here for ongoing debates on the question of the 'sociality' of technology.

### The Parable of the Plug

The verb to afford is found in the dictionary, but the noun affordance is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. (Gibson, 1979: 127)

Transformations of verbs into nouns (nominalization) should be handled with care. Nominalizations usually reduce processes to their effectivity – eat-ability becomes a property of apples and cook-with-ability a property of fires (e.g. Scarantino, 2003) – thereby eliding details of process and agency (Fairclough, 2001). Accounts of 'affordances' often strip them of their relational character by identifying them as properties of *the object* and matching them to the 'effectivities' of the subject (e.g. Shaw and Turvey, 1981; Turvey, 1992). We have already seen how Hutchby, for instance, describes affordances as something that a given technological artefact 'possesses' by virtue of its materiality (e.g. 2001a: 447, 2001b: 193). But 'cook-with-ability' is not a *property* of fires. Rather, humans have developed practices and equipment for *making* fires which are 'cook-withable' and, importantly, for *keeping* them this way and thus preventing them from becoming house fires or forest fires, which are not.

There is also a question as to whether the language of animal–environment pairings provides an adequately sociological lens for viewing encounters with technological artefacts. For example, to say that a postbox 'affords letter-mailing to a letter-writing human in a community with a postal system' (Gibson, 1979: 139; also Hutchby, 2001b: 27) may well be adequate in terms of an ecological-psychological discussion of *perception*. From a sociological viewpoint, however, this framing in terms of *a* human animal encountering *a* post-box and picking

up its letter-mailing affordance throws but little light on such encounters. Affordances are said to be possessed 'by virtue' of the artefact's materiality (Hutchby, 2001b: 193). They are thus 'independent of the actor's experience, knowledge, culture or ability to perceive' (McGrenere and Ho, 2000: 3). The 'affordances' of a post-box, however, exist only insofar as a particular letter-writing and mailing culture, knowledge, experience and so forth are *actively* maintained. The letter-mailing 'affordance' of the post-box is not something it possesses by virtue of its materiality but an ongoing – 'sociomaterial' (Barad, 1998) – accomplishment.

To illustrate what we see at stake here, let us consider an example of Hutchby's (2001a, 2001b) use of the concept of affordances. Hutchby's main objective, it will be recalled, is to draw a line under what he sees as the inflation of sociality (at the expense of the materiality of technologies) in constructivist accounts. The worst offender in this respect is the 'technology as text' analogy propounded by Steve Woolgar and his fellow 'technographers'. Hutchby revisits Grint and Woolgar's (1997) analysis of a usability trial for a new educational computer where a potential user (Ruth) is asked to connect a printer lead to the new machine while being observed and videoed by members of the design team. After scrutinizing the manual and examining the computer Ruth (we are told) was unable to complete the task and eventually turned for help to one of the observers (Nina). Following an inspection by Nina and her colleagues it is announced that the task was in fact 'impossible' (Grint and Woolgar, 1997: 89; also Hutchby, 2001a: 451). The printer lead Ruth had been given was actually designed for a previous model and would not fit the socket on the new machine. Grint and Woolgar see Ruth as labouring (and failing) to effect a reconciliation of the instructions in the manual with the observable features of the machine. They highlight issues of 'identity and authority' as key elements in the performance of this interpretive labour. For instance, Nina et al. were insiders who had authority to 'speak for' the machine whereas Ruth was an outsider, an intentionally 'naïve' user.

Hutchby offers a different perspective on Ruth's actions:

What is missed in [Grint and Woolgar's] interpretation is precisely the sense in which Ruth's interaction with the machine is underpinned by a material substratum in which she encounters, not a text, but an array of affordances. For example, one of the affordances of the socket at the back of the computer is that a lead with a similarly shaped connector can be inserted into it; similarly, the connector at the end of the lead has as one of its affordances that it may be inserted into a similarly shaped socket. These affordances may be reinforced by illustrations in the manual (though it is not clear whether the manual is, in fact, illustrated: reference is made to what Ruth 'reads' in the manual and what she 'sees' on the machine ...) But undoubtedly they are also available as a result of Ruth's everyday experiences of 'plugging devices in'. Ruth's ultimate failure to accomplish the task as set, is, indeed, due to the fact that connector and socket are technically incompatible. ... We are not told whether she actually attempts any connection or is simply baffled by the unavailability of a socket that 'looks right'. Nevertheless, among the array of affordances that the artefact confronting Ruth possesses, these particular ones are

observably available to her and she can attempt to carry out actions within the framework that they make available. (2001a: 452)

Clearly Hutchby is right in that the unavailability of a socket that ‘looks right’ is a necessary part of any explanation of Ruth’s actions. At the same time it is not a sufficient explanation and issues of ‘identity and authority’ are indeed relevant. First, the mediation of the manual – here glossed as ‘reinforcing affordances’ – means that we are not talking about (Gibsonian) ‘direct perception’. Instead, we could surmise that Ruth treats the issue as an *intellectual* puzzle to which she has proved inadequate under the gaze of the technically sophisticated observers. She therefore appears relieved when her self-image is repaired by being authoritatively told that the task was indeed impossible:

Oh it's not just me being *thick*. Thank god for that hah hah! I came in the back an' as soon as I got round here, with the machine I looked at this and looked at that and I thought 'No I'm being stupid, now this is silly.' Well I wasn't hahahah! [Ruth] (Grint and Woolgar, 1997: 90)

Ruth was only looking for this particular ‘affordance’ having been assured by those ‘who knew better’ that it was there and, in a way reminiscent of Asch’s (1951) experimental subjects, appeared to doubt herself rather than the experts.

Further, although Ruth’s everyday experiences of ‘plugging devices in’ are, as Hutchby argues, relevant, they are, like posting letters, cultural knowledge. Moreover, this incident *differs* from those everyday situations in the sense that the action has to be performed subject to a specific set of rules and conditions imposed by the insiders. For example, Ruth does not appear to have the option of exploring other ‘affordances’ available in that setting, such as looking for a different lead or changing (or asking someone else to change) the plug.

We can illustrate this last point by means of another ‘plugging-in’ story, this one narrated by Kranz (2000) and Lovell and Kluger (1995). During the failed *Apollo 13* moon mission, astronauts had to abandon the malfunctioning command module (*Odyssey*) and seek refuge in the lunar module (*Aquarius*) for the duration of the trip back to Earth. *Aquarius*, however, was designed for the moon landing and was not suitable for lengthy habitation. For instance, the carbon dioxide filters had a lifetime of about 40 person-hours, after which they had to be replaced. The *Odyssey* filters were square and would not fit the round sockets present onboard the *Aquarius*. The mission engineers had to somehow devise a way of plugging the square filters into the round sockets using only objects available on the spacecraft to accomplish this task. A pile of diverse objects was duly collected and a connection improvised using suit hoses, cardboard covers from on-board manuals, plastic stowage bags, all stuck together with duct tape. The engineers then radioed instructions to the astronauts who succeeded in replicating the device: ‘[T]he contraption wasn’t very handsome, but it worked’ (Lovell and Kluger, 1995). The build-up of carbon dioxide was avoided.

Ruth’s unsuccessful ‘plug-in’ and the *Apollo 13* astronauts’ successful one were both *collective* accomplishments. The affordances of technological objects are typically interfered with, and modulated by, what we might call the

'co-presence' (Michael, 2000: 112) of other social actors and other objects. Rather than talk of *an* individual encountering *an* object (in the manner of a reptile encountering a stone, or a buffalo encountering a river – see Hutchby, 2001a: 447), we need to talk instead of *how* and, importantly, *when* specific action possibilities emerge out of the ever-changing relations between people, between objects, and between people and objects. Michael (2000: 112) uses the term 'cascades' of affordances to describe such processes: 'for example; socks afford the easier wearing of boots which afford the attachment of crampons which afford the climbing of snow-covered slopes which themselves become "affordable", that is to say climbable ....Indeed the affordances of any technology are always, at least potentially, ambiguous.' It is easy, but rather uninformative, to say that object X affords this but not that, that a car affords driving and a computer mouse affords clicking, but that neither affords eating (e.g. Dohn, 2006: 1). And yet, in 1970 Australian strongman Leon Sampson ate a car in order to win an AUS\$20,000 prize. Surely his actions are better understood in terms of the particular social circumstances that prompted them – including membership in a media-oriented culture that prizes the extraordinary and the bizarre – rather than by tinkering with the list of the affordances possessed/not possessed by the car? The 'affordances' of technological artefacts should, we suggest, be treated as themselves topics for analysis – as Rappert (2003) indicates – rather than as bottom-line explanations.

### Affordances Revisited

One way of approaching the analysis of affordances is to ask: how, and under what circumstances are particular 'affordances' *made* present? How and when are different action possibilities made available – or *unavailable* – to specific actors in particular settings? Such questions are particularly pertinent when we consider how dis-abled bodies engage with, and are engaged by, technological artefacts. Within the fields of sociology and disability studies there is an extensive literature that identifies the ways in which abilities and *disabilities* emerge and are allocated within specific sociomaterial arrangements, settings and situations (Law, 1994; Moser, 2005; Moser and Law, 1999; Winance, 2006).

Against this backdrop, Elaine Scarry's (1985) work can help highlight the ways in which technological artefacts tend to take as their referent particular (culturally situated) versions of the human body. A *made* object, Scarry argues, 'is a projection of the human body' (1985: 281; see also Mumford, 1963). The placing of a bandage over a wound replaces the missing skin; spectacles, microscopes and telescopes reproduce the lens of the human eye while correcting for its weaknesses. This representation of the human body in *made* objects is at work not only in the objectification of various body parts, but more generally of human *attributes*. For instance, the various technological artefacts associated with the written text (books, indexes, photocopiers) replicate, correct and augment human memory. This projection of the body into *made* objects ultimately recasts 'the division between the inside and the outside of the body' since the

separation and objectification of bodily attributes is matched by the recovery and re-incorporation of such objectified parts (e.g. heart valves, insulin pumps, artificial limbs) into the body.

A chair, Scarry argues (1985: 290), does more than just represent ‘the shape of the human skeleton, the shape of body weight, nor even the shape of pain perceived, but the shape of perceived-pain-wished-gone’. The chair therefore possesses what Scarry terms, a ‘*counterfactual*’ structure in that it takes on the perceptual characteristics not only of the actuality of tiredness but also the perceptual characteristics that aim to counter or reverse that tiredness.<sup>2</sup> The ways in which bodies and made objects co-define one another calls attention:

... to the fact that it is part of the work of creating to deprive the external world of the privilege of being *inanimate* – of, in other words, its privilege of being irresponsible to its sentient inhabitants on the basis that it itself is nonsentient. (1985: 285)

It is worth noting at this point, that such processes of ‘projection’ and their artefactual manifestations, such as chairs, remain nevertheless culturally and historically situated. Large sections of humanity – in Asia, Africa and pre-conquest America – did not use chairs nearly as much as their European conquerors. In these cultures it was far more common to sit cross-legged on the ground on mats or cushions. Also for many – beyond Euro-America – squatting is a restful pose (Ingold, 1996). Most Euro-Americans, however, having grown up in a world of chairs, find this position painful to sustain over any length of time. The story of the ‘adoption’ of the chair by the great majority of humanity is therefore at the same time a story of Occidental cultural dominance over the other. Following on Scarry’s argument we could add that bodies are themselves, so to speak, reflections of the world of made objects as well as vice versa. A body’s abilities and disabilities – disability researchers insist – cannot be defined independently of the made world (including the politics of artefacts, accidental or otherwise) that body inhabits. Drawing on Scarry, Cooper (2001: 25) argues that:

Each object – chair, cup, spoon – can never be separate and self-contained; by definition, it is always partial, a *con-verse* in a dynamic network of *convertibilities*. The body, too, is necessarily partial, momentarily defining itself through assemblage with another partial object.

We can then reframe the question of the affordances ‘of’ technological objects. Such ‘affordances’, we might say, name the various ongoing exchanges of attributes between human bodies and the world of made objects. Understood in this manner ‘affordances’ cannot be seen as merely bundles of properties ‘possessed’ by objects (Hutchby, 2001a, 2001b) which in turn may, or may not, be activated by corresponding ‘effectivities’ of the subject (Shaw and Turvey, 1981; Turvey, 1992). It is rather the manner in which such attributions of ‘simple location’ are made by actors in particular social settings that should be the object of sociological study. In short we are proposing that ‘action possibilities’ are better understood and described via a vocabulary of processes than one of end-states (Cooper and Law, 1995).

In what follows, we attempt to flesh out our argument by drawing on and analysing ethnographic material gathered as part of an ongoing research project exploring bodily engagements with computers. The empirical focus of this research was a scheme ('CommuniTy') intended to combat social isolation among housebound disabled individuals in north-west England through the use of IT. The scheme provides participants with industry-sourced reconditioned computers and adaptations suited to their disability to support their use of the computer. Each potential user is to have support from a volunteer with some 'computer literacy'. One of us, Yvonne, acted as participant observer on the project and was involved in installing the equipment and also revisiting users in order to determine whether, and if so how, they had been using their computers.<sup>3</sup> In respect of recording the data generated during this involvement a detailed research diary was maintained and a digital voice recorder was used (when acceptable to the respondent) and/or detailed notes made. Drawing on this research we relate the case of 'Jim'<sup>4</sup> (an individual whose circumstances were fairly typical of other scheme members) in order to show how the 'affordances' of technological objects and the effectivities or action capabilities (Dohn, 2006) of human agents should not be viewed as *given* but emerge as situated, and indeed ongoing, accomplishments.

### Jim in his Environment

Jim is in his early sixties. He has cerebral palsy, a dislocated hip and asthma. He uses a wheelchair all of the time and would have no mobility without it. Jim has difficulty communicating because of the effects that his cerebral palsy has had on his physical ability to speak.

On installation day, Tom (the coordinator of the scheme) and I arrived at the supported living scheme where Jim lives, with the computer, printer, keyboard etc. loaded into my car. Dan, Jim's Support Worker, told us that the computer was to be installed on a unit in the kitchen upon which Jim ate all his meals. This, because of the height of the unit, was the only place Jim could get his wheelchair close enough to access the keyboard. He could not have the keyboard on his lap because of his physical impairments which leave his body quite twisted. We were told that a tray could not be fitted onto Jim's wheelchair, on which he could have put the keyboard, because this might affect the strength and stability of his wheelchair. Dan said that a joiner was going to 'measure up' with a view to designing a workstation which would accommodate the computer and also allow Jim access with his wheelchair; but for the time being it would have to stay on the kitchen unit.

We started installing the equipment and soon discovered that the plug on the power lead that connects the computer to the mains socket was the wrong type of plug. It was slightly bigger than a domestic plug and the earth pin was horizontal rather than vertical. We did not try to plug it into the socket as it was visually obvious that it would not have fitted. I then asked Jim whether he had any spare plugs anywhere and he pointed to a drawer in the kitchen which Dan opened.

Dan found a spare plug and passed it to Tom, along with a screwdriver. Tom began to change the plug using the screwdriver and also a knife (the screwdriver was too big for the small screws on the inside of the plug), voicing his concerns whilst doing so of the health and safety implications involved. Once the plug had been changed the equipment was installed with the computer on the kitchen unit along with the keyboard, speakers and monitor; because of the lack of room the printer was placed under a table next to the kitchen unit, on top of which was Jim's microwave. Jim has difficulty steadyng his hands so a rollerball mouse had been ordered for him. However, this had not arrived and when we left he was trying to use the conventional mouse but with great difficulty.

The installation of Jim's computer appears to neatly fit the ideal-typical 'affordance story'. Thus the computer arrives as the proverbial black box in order to become part of Jim's 'environment'. Yvonne, Tom and Dan are in this version engaged in ascertaining Jim's 'effectivities' and how these match, or fail to match, the machine's 'affordances'. There are constraints imposed by Jim's medical conditions and the fact that he would have to access the computer from his wheelchair. Further considerations arose due to the size and spatial configuration of his home and the objects within it (such as the kitchen appliances, storage cupboards and furniture) together with their 'affordances' – such as whether they could accommodate the computer as regards space or load bearing capabilities and so on.

On closer inspection, however, a number of significant complications become apparent. Let's note how the quest for the 'affordances' that will match Jim's 'effectivities' takes the form of re-negotiations of both the materiality *and* the 'morality of the setting' (Akrich and Latour, 1992: 259). Consider, for instance, the non-standard plug. In circumstances analogous to Ruth's unsuccessful plug-in, Jim's successful one is again not a case of an individual actor encountering the singular object. Instead we have the 'co-presence' of other actors (Tom, Dan and Yvonne) who egg each other on, as well as the orchestration of multiple objects (substitute domestic plug, screwdriver, knife, etc.) and their interrelationships in 'cascades of affordances' in the course of attempting to make the machine use-able by Jim.

The plug's horizontal earth pin was designed in accordance with technical standards operative in certain industrial settings and thus incompatible with domestic power sockets. (It will be recalled that the reconditioned computers for the CommunITy scheme came from industrial donors.) The industrial standard for plugs or sockets is specifically meant to prevent the connection of unauthorized equipment to an electrical supply. The mismatch between (industrial) plug and (domestic) socket is therefore a material expression of particular rules of membership and of proper conduct. On this occasion, however, the moral order represented (and enforced) by the materiality of industrial plugs and authorized sockets is renegotiated by Tom, Yvonne and Dan. Furthermore, Tom's comment about health and safety signals his awareness that changing the plug is bound up with rules and regulations about who was allowed to do what with particular objects. We might suggest that the 'morality' of the industrial

plug became subordinated to the morality of the CommunITy scheme: the (now errant) plug had to be changed so that the computer could be set up for Jim, and Tom and Yvonne could thereby discharge their duties – their moral commitment to ‘get Jim connected’.

In contradistinction to the typical affordance story (the reptile encountering the stone, etc.), ‘affordances’ in Jim’s environment are not just picked-up but *made* real. They are therefore better described through a vocabulary of emergence and construction rather than one of (mere) discovery. ‘Construction’ here refers to the, often piecemeal, assemblage of what Scarry (1985: 285) calls ‘counterfactual structures’. An assemblage aimed to compensate for the misrepresentation of Jim’s body in the computer (Grint and Woolgar’s (1997) ‘[pre]configured user’) and to counter the latter’s accidental politics. Such structures, we have seen, carry a moral load (Akrich and Latour, 1992; Scarry, 1985) directly mirroring the negative valuation of those of Jim’s conditions (discomfort, isolation) that they (aim to) ameliorate.

### Counterfactual Structures

Nine months later Yvonne made a follow-up visit to Jim and was struck by the sheer amount of bricolage that had been carried out in order make the computer usable for Jim in his wheelchair. Jim had had a shelf (workstation) fitted onto the wall in his living room and his computer and computer equipment, along with his telephone, were all located on this shelf. Jim had also had a makeshift tray *taped* to his wheelchair. These improvisations engineered the ‘cascades of affordances’ deemed necessary for Jim to use the computer.

Dan: Did he have this when you came before?

Yvonne: No, I don’t think so. When I came the computer was on the kitchen unit and everything was up on the unit. So, how did you manage when it was like that?

D: We struggled a bit didn’t we?

Jim: Yeah (nodding)

D: But we’re sorted now.

So, Jim had had his workstation built and it seemed to ‘fit’ him well in that it allowed access for his wheelchair. However, because of the height (in order for it to be accessible by Jim in his wheelchair) it was impossible for him to see the keyboard. Dan explained how they overcame this problem.

D: With the keyboard, if the keyboard was flat on there (the shelf) he can’t see it. Same with the phone. If it’s flat on there (the shelf), with him being sort of here (Dan points to the height of Jim in his wheelchair) he can’t see. Yeah, so we just tilt them up.

Y: So what did you do? Is that sponge? (I point to the phone).

D: That’s just sponge.

Dan had cut a piece of sponge in a triangular wedge shape so that Jim's phone sits at an angle in order to make it possible for him to see the numbers. Without it Jim would have great difficulties in making calls. Even the use of operator services requires that the user be able to see and 'dial' the access number.

- Y: And what's this? (I point to the keyboard). Is this on sponge as well?  
D: It's just er.  
Y: Who's the technical guy, (jokingly) is that you?  
D: Yeah, I stuck a piece of wood [wedged shaped] behind it an stuck some er, it's only Blu-Tack®.

With this wood, sponge and Blu-Tack® bricolage, Jim was able to see the keyboard and determine which keys to press when using the computer. As well as these physical adaptations using assorted objects, Jim's body was also undergoing adaptation. The rollerball mouse that had been on order since the installation visit had taken some time to arrive. In the intervening period, with effort Jim had managed to use a conventional wireless mouse, and with even greater effort a wired mouse. In the event, when it was delivered the rollerball mouse had been sent back. Yvonne's (and Dan's) surprise at the ability of Jim to learn to use the 'normal' mouse is a handy reminder of the relational (subjective/objective, both/neither) character of 'affordances'. In other words, 'abilities' or 'effectivities' and 'affordances' may be best thought of not as pre-given but as emergent in relation to one another. We might say that in Jim's case the restricted movement of his body, and the discomfort he experienced when attempting to move or assume a posture beyond his limits, was counterfactually reversed by specific – if contingent – sociomaterial (wheelchair, wireless mouse, etc.) configurations.

### Convertibilities

The representations (Scarry, 1985) of the user that are built into a computer are not just associated with matters of physical constitution. For, not unlike Gibson's post-box, the functioning of the computer presupposes particular cultural practices of reading and writing (e.g. reading drop-down menus and selecting or clicking menu items). In this connection it is important to note that Jim experiences some problems with written language. At the time of Yvonne's follow-up visit he had not been connected to the internet (the objective of CommunITy). Principally this was because Dan was worried that Jim might click on sites 'that should be avoided'. Dan wished to uphold particular social rules regarding the use of the technology but how could this moral order be maintained if Jim could not recognize the dangers associated with certain internet sites? A potential solution to this problem was sought in the form of *Thunder*, a software package that verbalizes the computer user's actions, something that would inform Jim about what he was doing as he went along and that wouldn't require an ability on his part to read the text or instructions on the screen.

Jim began to tell us what things he thought should be added into the computer but it was unclear what he was saying. He then began to demonstrate *Thunder*. This is software that speaks (in a foreign accent) the words that are on the screen.

D: There it is. *Thunder*.

Y: Oh is this that thing you were saying about.

Jim switches on the software. The noise is deafening as a computerized, robotic, male voice with a non-British accent booms out.

Y: Is this what your volunteer [Chris] put in?

Each time Jim moves the mouse to a different icon or presses a button on the keyboard, which he is doing to demonstrate the software to me, the action he takes is repeated by this robotic male voice. For instance, if 'My Documents' was clicked the software would say 'my documents', etc.

Y: You could do with a British version couldn't you. (laughing) He'd do your head in him wouldn't he? (...)

Jim carries on demonstrating what he can do on the computer.

D: What we do is we get books and he just sort of copies out of books. Like *Dick Whittington*.

Jim clicks on the *Dick Whittington* text and the *Thunder* software says 'Dick Whittington script initialized'. Jim is talking, it's unclear but he's indicating that he cannot find the document he is looking for.

D: Did you not save it?

The software is repeating, i.e. verbalizing, everything Jim is doing.

D: When he types stuff it reads what, as he's typing it, it reads each letter.

Y: Right, so you know you're spelling it right?

D: Yeah and then when you've done a line it will read the line back.

Y: Right, so do you find it really useful Jim?

J: I do.

D: Really it's for people who can't see very well.

(...)

The computerized voice is still at it and Jim is trying to turn it off.

D: It's a bit annoying after a bit isn't it? It does help though.

Y: Yeah.

Jim is speaking here about the *Thunder* software but it's unclear.

Y: It would help with the internet though wouldn't it? Until you get familiar.

The computerized voice goes crazy.

Y: He sounds like he's gone mad that bloke doesn't he?

J: Turn it off ...(laughing)

D: Knock it off.

J: I am doing.

The voice ceases.

Jim's use of the computer is mediated by the *Thunder* software (installed by Chris, Jim's volunteer) which provides confirmation or corrective feedback concerning his actions using the computer keyboard and mouse. Notably, as Dan indicated, this software is not intended for individuals such as Jim, but rather is for those with visual impairment.<sup>5</sup> *Inter alia*, this particular artefact effects the conversion between Jim's level of literacy and that presupposed by the computer. Furthermore, as far as Dan is concerned, it might protect Jim from the dangers of the internet. Its deployment can be construed as another instance of projection – the human capability to interpret inscriptions becoming materialized through computer software. In a sense this projection represents a transfer of attributes – that is, an 'effectivity' of the subject is made into an 'affordance' of the object. Furthermore, though the presumed moral order that might discipline Jim's exploration of the internet still depends on his recognition and understanding of the words articulated via *Thunder*, we might suggest that it is simultaneously underscored by the disembodied voice that almost stands as witness to his actions.

Amongst the members of CommunITy, Jim's case was far from atypical. Each member's set of circumstances (their history, disabilities, domestic space, contact with others, etc.) presented a diversity of particulars that brought forth (or in some cases failed to bring forth) a corresponding variety of sociomaterial arrangements necessary to get them connected. For instance, Linda, another member of the group, is in her forties. With severe multiple sclerosis she is confined to a wheelchair and had been using the computer for typing. At the time of the follow-up visit she had been given a new wheelchair but this one did not have a tray on which she could place her keyboard, which unfortunately meant that she was no longer able to use the computer. Broadband equipment meant to enable her to get online was stored behind an armchair in her living room because her volunteer had left the scheme before sorting it out for her. In Linda's situation then we might suggest that there was a collective failure – a keenly felt absence of the sort of sociomaterial bricolage that made possible Jim's 'computer use'.

Kathryn, also with severe multiple sclerosis, would not have a volunteer because she didn't want to be seen having a spasm. Kathryn would like to use the computer but because of the unsteadiness of her hand cannot do so. Instead her son uses it 'for her' – as she put it. She was to receive a rollerball mouse to help with the unsteadiness, but this had not yet been provided.

Ron is a quadriplegic in his fifties. Ron's computer, initially installed on a workstation in his bedroom, was supplied with voice recognition software. This equipment allowed him to use his computer – providing someone was there to wheel his workstation into position, switch on the computer, and put on the headset needed to use the software. Afterwards, someone had to remove Ron's headset, switch off the computer, and wheel the workstation out of the way to allow access for his carers. Some months later, Ron was supplied with a new chin-operated wheelchair and to reflect his new mobility the workstation was moved into the living room. He also received a specialist mouse that he can blow into to control the computer. Ron still needs someone to get him out of

bed, put him in his new wheelchair, and turn the computer on and off for him. He can only get out of bed, he explained, on 'a good day'.

For Ron, as for the others, we might say that what the computer afforded (or not) was dependent on the co-presence (or absence) of various other people and objects. For us then, situations such as those of Jim, Kathryn, Linda, Ron and the rest, draw attention to the diverse human and artefactual elements that typically have to be configured for a technology's 'affordances' to emerge.

## Conclusion

If there is a common pattern that we can infer from the cases discussed here, it is that the 'affordances' of technological objects cannot be easily separated from the arrangements through which they are realized in practice. Drawing on Engestrom (1990) then, we must ask not only what a given 'affordance' is, but *for whom and when*?<sup>6</sup>

'[I]n the empirical moment of engagement between a human and a technological artefact', argues Hutchby (2001b: 194), 'both may be treated as equally stable for all practical purposes'. For us it is the 'may' that deserves the emphasis. For most CommuniTy members, the empirical *process* of engagement involved considerable renegotiation and problematization of – what followers of Gibson often describe as – (human) effectivities and (machine) affordances (e.g. Shaw and Turvey, 1981; Turvey, 1992). Stabilization, when it occurred, was a local, perhaps temporary, and often fragile, accomplishment. A number of aspects of these sociomaterial explorations and renegotiations are particularly relevant to the present discussion. First, and in order to understand the processes by means of which particular action possibilities were realized or foreclosed in a given setting, we need to look beyond the (individual)human / (individual)machine dyad. We have therefore sought to remain aware of the ways in which technological 'affordances' were catalysed by or interfered with, by the 'co-presence' (Michael, 2000) of other people and other objects. Second, these renegotiations are not conducted *ex nihilo* and do presuppose shared understandings of, and reliance upon, material enablements and constraints (Hutchby, 2003). At the same time, as many researchers within disability studies and the sociology of technology would insist, such enablements and constraints do not make sense without reference to the social practices and cultural conventions that cohere to them. The 'affordances' of, say, a chair, a post-box or a cigarette are not reducible to their material constitution but are inextricably bound with specific, historically variable, ways of life. We therefore need to better acknowledge what lies beyond the here-and-now timeframe adopted by most analyses conducted in terms of affordances. Often the only other timeframe invoked in such analyses is that of evolution, the long process of mutual attunement between the natural environment and the human sensorium. Yet, the emergence and ongoing transformation of the made environment, including

whatever we might mean by ‘culture’, falls between those two temporal frames. Partly as a result, Gibson’s affordances appear undersocialized and in need of further socialization (Costal, 1995).

In this article we have attempted a critical exploration of the concept of ‘affordances’ (proposed by Hutchby) as an analytical tool for the social study of technology. It should be apparent that what we find useful in the concept is its relational character, something affirmed, but not always faithfully adhered to, by Gibson or Hutchby. What we consider least useful is the suggestion that ‘affordances’ can be invoked as a way of settling the properties of the technological artefact in advance of its immersion into social life and interactions. Since this article has not been conceived as being primarily a theoretical contribution to the ongoing sociological and philosophical debate on technology, we can only briefly indicate why we think this is not a promising path to take. Hutchby (2003: 582) proposes that the concept of ‘affordances’ is a much-needed corrective to the, perhaps endemic, ‘prioritization of representation in [anti-determinist/anti-essentialist] analyses of given technologies’. Hutchby implicitly assumes that the technological artefact always comes first and its representation afterwards so that the pertinent question is by what means the material properties of the former constrain the latter (2001a: 447). However, in what Mumford (1963) calls the ‘neotechnic’ era, the technological artefact and its representation can be said to have a *recursive* relationship. The technological artefact, in other words, may be equally said to be a materialization of its representation (a design document, a list of specifications, a blueprint, a description, etc.). As a temporal sequence, the architectural plan, for instance, comes before the building and dictates (sometimes with the force of the law behind it) how it should be built. Even fictional representations of non-existent artefacts (such as *Star Trek*’s ‘Replicator’ – see Green et al., 1999) may be taken up and orient subsequent attempts to realize them (e.g. Kaku, 2008).<sup>7</sup> Representation and matter-realization are therefore perhaps best viewed in terms of different *moments* in the unfolding biography of the artefact (Bloomfield and Vurdubakis, 1994).

Following this line of reasoning, we might view ‘representation’ as something other than a superstructural layer, something that comes to adhere to the ‘material substratum’ of the technological artefact as Hutchby (2001a: 452) implies. Instead, as in Scarry’s work (1985; see also Cooper, 1993; Latour, 2002; Mumford, 1963), representation can be said to describe the ongoing folding(s) of the body and the made world into one another. It is therefore a *process* through which the body comes to grant particular affordances to the (made) world and conversely, the world comes to be ‘mirrored’ in the effectivities or action capabilities of the body. ‘Sociality’ and ‘materiality’ appear irredeemably entangled with one another. Drawing on this we might argue that the relationship between ‘sociality’ and ‘materiality’ in technological artefacts is a Derridean (1976) one of mutual (in)determination and supplementarity.

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## Notes

- 1 'Homo Economicus' and 'Homo Sociologicus' (Dahrendorf, 1968, or for that matter Garfinkel's 'cultural dope') respectively.
- 2 'If this complex, mysterious, invisible percipient event, happening somewhere between the eyes and the brain and engaging the entire psyche, could be made visible, could be lifted out of the body and endowed with an external shape, that shape would be the shape of a chair which now more fully represents the completed reversal of perceived-pain-wished-gone' (Scarry, 1985: 290).
- 3 The research was carried with approval from Lancaster University's Research Ethics committee and the agreement of the sponsoring organization.
- 4 All names are pseudonyms.
- 5 See <http://www.screenreader.net/>, accessed April 2008.
- 6 For instance, Scarry (1985) discusses how mundane objects can be transformed into instruments of torture, a process she describes as the un-making of the world.
- 7 For instance, the influence of science-fictional 'models' (such as Kubrick's HAL, 1967) on artificial intelligence research is well documented (e.g. Stork, 1997).

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