Reframing the Networked Capacities of Ubiquitous Media

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Abstract
James J. Gibson’s concept of perceptual affordances has a long history, particularly within the field of human computer interaction (HCI) where the concept has been used in various ways to address both the material and cultural requirements of interactive systems. New modes of digital media which look to engage a range of affordances as present in contemporary smartphone platforms offer an opportunity to rethink this critical divide within the use of the concept of affordances. Defining a concordance between Gibson’s use of the term and Manuel DeLanda’s theory of assemblages, it becomes possible to chart the networks of affordances present in the interaction with and function of these new media forms. Through an analysis of Kate Pullinger’s Breathe, a redefined understanding of the possibilities of affordances is developed, one that is concerned with both the materiality of the system itself and the speculative frame that is developed.

Keywords
Affordances, Assemblage Theory, Electronic Literature, Ambient Literature

Introduction
There has long been contention running across a number of disciplines regarding the nature and reach of James J. Gibson’s (1986) concept of “affordances.” First introduced by Gibson in order to provide an account of visual perception in the field of environmental psychology, the concept was quickly taken up in a number of areas, particular in areas related to human-computer interaction (Norman 1988). There, it was used to provide an explanation for the ways that computer systems made
themselves available to users. While Gibson (1986) described the affordances of the environment as “what it offers the animal, what it provides or furnishes,” saying that affordances “are in a sense objective, real, and physical unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental” (129), the concept was subsequently used in an expanded fashion to have cognitive, cultural, and conventional implications (Norman, 2008). As the term came to take on this expanded meaning, it came to be subject to charges of the cultural relativism implicit in the identification of any affordance (Costall and Still, 1989). In this, questions were raised about the viability of the application of Gibson’s initial “objective, real, and physical” formulation of affordances within more complex cultural settings (Greeno, 1994; Turner, 2005; Costall, 2012). Such critique came to include a consideration of the implications that an information processing model of psychology has for Gibson’s theory (Jenkins, 2008).

The importance of this long-running consideration of the conceptual power and usefulness of Gibson’s term is put into sharp relief by the work of the Ambient Literature project (ambientlit.com). Focusing on the design, implementation, and study of new modes of pervasive and literary media, the Ambient Literature project simultaneously engaged the material, functional, and semiotic affordances of interactive systems as they were utilized toward cultural and literary effect. As a form of situated media, the case of ambient literature provides a helpful example in addressing the question of the contemporary status of the term affordance. This comes as works of ambient literature engage physical location, literary meanings, and contemporary networks of information technology. In this article, the work Breathe by Kate Pullinger will be used as an example in order to draw out how Gibson’s term “affordance” can be understood today.

In tracing out the various networks of affordances present in Breathe, what becomes evident is that for complex works of interactive and pervasive media it is not possible to disentangle material affordances from cultural ones. That is, a work like Breathe takes advantage of affordances that make perception physically possible in general, as well as affordances that rely on a learned familiarity with semiotic systems. Instead of distinguishing between “affordances in general” and “canonical affordances”, as does Alan Costall (2012), or between “simple” and “complex” affordances as does Phil
Tuner (2005), it becomes necessary to consider a more deeply-set ontological reconfiguration of the idea of how affordances can function.

With this, the aim is to both contribute to the continued development of the term as well as to restore some of Gibson’s (1986) original meaning:

> 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. It is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products (130).

Expanding on this thematic within Gibson’s account of his concept, what this paper proposes is a re-consideration of the ontological terrain of affordances as they are considered within the field of digital media, particularly as works of ambient literature bridge the human reception of works with their material occurrence. Using Manuel DeLanda’s (2006; 2016) Deleuzian consideration of social assemblages and their interactions as a theoretical starting point, the case of the ambient literature project (and one work in particular) will be used to rework the idea of affordances in the study of interactive digital media along a materialist and flattened ontology.

The paper will proceed as such: Following an introduction to ambient literature in general, the specific work which is to be examined, *Breathe*, will be described. Focusing on the foundation that such a work has in traditions of HCI, developments in the field’s use of the concept of affordances will be analyzed, highlighting the divide between physical and cultural uses of the term. As an answer to this problematic, Manuel DeLanda’s conception of social assemblages will be introduced, with particular attention paid to the way that these assemblages engage uses of language. Finally, *Breathe* will be reconsidered through this newly-developed theoretical lens and the implications of this consideration of affordances/assemblages will be discussed.

**Ambient Literature**

The ambient literature project was an ambitious, multi-university project focused on the conceptualization and development of new forms of literary media which “produce encounters between humans and the complex systems to which they are subject”
(Dovey, 2016: 140). It brought together academics, authors, designers, developers, media producers, coordinators, and support staff in order to create smartphone-based works of literature that took advantage of the modalities and networked connections afforded by contemporary information communication technology (ICT). The concept of ambient literature was developed with particular attention to way that ICT has been understood in the wake of Mark Weiser’s (1991) initial conceptualization of ubiquitous computing (ubicomp) in the late 1980s.

The publication of Weiser’s article on the development of the idea of ubicomp, “The Computer for the 21st Century,” laid out a vision for computing in which computers, as media, were relegated to a background, supporting role. Working with researchers at Xerox’s Palo Alto Research Center, the vision for the future of computing detailed by Weiser was one in which computers acted silently, in the background, taking care of the more mundane tasks of life, leaving users free to engage in creative and fulfilling activities. Instead of spending time and effort to schedule meetings, ubicomp systems would silently arrange meetings according to the various participants’ schedules, allowing them to focus on the important matters at hand. Coffee would be brewed in the morning, weather reports would be presented right when they were needed, the right document would be on your desk just in time to get to work. Computing would swirl all around us, always on, supporting us in our daily lives without the need for us to worry about engaging or maintaining the systems that made this possible. Computers would adapt to us, not us to them.

A key aspect of the idea of ubicomp (or as it also came to be known under different branding, “pervasive computing” or “ambient intelligence” [Ronzani, 2009]) was that computing could be integrated seamlessly and quietly into the world around us (Weiser and Brown, 1997). Building on a vast array of data sources, from personal histories to city-wide sensor networks, ubicomp would embed computing into the fabric of our daily lives while at the same time ensuring that we never had to give it another thought. It would become ingrained in our environment and yet remain invisible.

Of course, like most good visions of the future, the results of Weiser’s account of the development of computing was more complicated than initially envisioned (Chalmers and Galani, 2004; Rogers, 2006; Abowd, 2012). Political systems, national cultures, new technologies, and existing social configurations all served to moderate the
development of the ideas first laid out in ubiquitous computing (Bell and Dourish, 2007). Importantly, however, even as ubicomp’s early vision of a world run on computational rails hit a number of roadblocks and false starts, it did inform the development of the modern smartphone, a device which relies on always-on computing, vast troves of user data, and arrays of sensor and information communication networks. As our lives have become enveloped by computing and networks of data in the wake of the smartphone, the question asked by ambient literature is “what might happen when data aspires to literary form” (Dovey, 2016: 140)? As ubicomp – or at least one version of ubicomp – becomes mundane and part of our everyday lives, how can it be transformed into a resource for aesthetic and specifically literary experiences which tap into our common cultural heritages?

The proposition of Ambient Literature is to take ubicomp’s model of a data-enabled world and to turn it around: instead of using techniques developed to push mundane interactions to the periphery of our attention, how can these same techniques be used to surface literary experiences as they exist around us? How can literary experiences be blended in with the world around the reader in an immersive way? In this, works of ambient literature look to build upon Weiser’s vision in order to integrate creative works of literature and culture into the world around readers. As works which are embedded within a wider world through the use of mobile devices, networks, and the vast arrays of data available, how do these works come to afford certain interactions and implications?

**Kate Pullinger’s Breathe**

As a research project, Ambient Literature was structured around the commissioning of three new works of digital media, each of which was focused on the idea of developing experiences which connected textual literature to the situation of their experience. More than just a program of creative practice research (Smith and Dean, 2009; Nelson, 2013), the project was also surrounded by a program of empirical participant research. While some of the outcomes of this empirical work will be included here, the methodology and analysis will not be discussed. A more thorough account of the methodological approach can be found elsewhere (Marcinkowski, 2018). A complete record of the research data collected around the project has also
been made available through an open access data repository (Marcinkowski and Spencer, 2018).

Of the three works commissioned and studied by the Ambient Literature project, I want to focus here on just one that illustrates the particular thematic that is to be developed. *Breathe*, by Kate Pullinger (2018), is a work of ambient literature designed to be read through a smartphone’s web browser. Made in partnership with the London-based publisher Visual Editions and Google Creative Labs, it is a short story-sized text, ideally meant to be read in one sitting at home.

A ghost story set in the present day, *Breathe* haunts the reader through a text that is altered by the conditions of its reading. Reading the time and location from the system, the piece draws in local conditions into the work: time of day, weather, nearby streets, cafes, the season, and so on are all adapted based on the conditions of reading and woven into the text. Drawing from Google’s own place-based APIs (Application Programming Interfaces), the world of *Breathe* is populated by a continually developing account of the reader’s surroundings. If a new shop opens nearby, Google’s databases are updated and the set of resources available to *Breathe* is expanded to include this. This is not a choose your own adventure or branching narrative – the narrative of the piece remains the same for all readers – but the experience is customized for each reader depending on their situation.

At the same time that it relies on the networked and locational affordances of the smartphone in order to create an uncanny sense of familiarity with the reader’s setting, *Breathe* also engages readers’ learned habits of interaction as part of the work itself. While presenting an initial interactive paradigm which mimics that of a traditional ebook, allowing readers to flip from page to virtual page, the experience unexpectedly shifts as the reader finds swiping to be no longer consistently effective. Without explanation, text starts running backwards, “unwriting” itself on the screen; readers’ swipes only leave black smudges across the white background of the page; the page of text is covered by shifting clouds; while in other instances text is only visible as the reader tilts their phone at an angle, as if trying to read through an obfuscating glare on the glass.
In all of these ways, the work announces its non-traditional nature to the reader, taking advantage of learned habits of interaction in order to surprise the reader and force them to reflect on their normal, seamless engagement with their device. Paired with an uncanny knowing of their whereabouts and situation, the readers’ experience comes to focus on the affordances of the device, what it is capable of doing, and how. Breathe emphasizes the specific interactive modalities of the smartphone and uses those modalities as part of the ambiance of the experience.

As will be developed, what Breathe presents is a unique confluence of textual, contextual, learned, and physically material conditions which, when taken together, complicate an easy account of the affordances of which the work takes advantage. It relies on both the immediate and local conditions of its reading, while at the same time relying on far-flung and network-enabled determinations.

**What is an affordance in computing?**

I’ve been coy about it so far, and hopefully the term has just slipped by as you’ve been reading, but for an article that attempts to re-work the idea of what “affordance” can mean in the space of digital media, I’ve used various forms of “affordance” in a very casual, but hopefully nevertheless intelligible manner. After all, it’s been more than 50 years since Gibson first used the term “affordance” in the field of environmental psychology to describe what an environment offers to an animal, and it’s been at least 30 years since it has filtered into common usage, especially in the field of human-computer interaction (HCI) research.

“Affordances” came to become a central concept in HCI largely through the work of Don Norman (1988) and his book *The Psychology of Everyday Things*. In it, Norman described how various objects – doors, coffee pots, washing machines, telephones, computer interfaces – all played into people’s existing cognitive models about how the world worked. By providing a link to users’ existing models, such objects gave individuals some clue as to how these objects might “afford” some kind of interaction. As a doorknob provides a surface able to support a human hand gripping, turning, and pulling, it provides an indication of its purpose. Norman’s logic was that in the work of design, it would be beneficial to tap into users’ existing cognitive models in order

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1 The book was later re-released under the title *The Design of Everyday Things* (Norman, 2013).
to help them understand unfamiliar interfaces. As such, if the aim was to design something to be pulled or turned, it might be helpful to have it resemble some familiar aspect of a doorknob.

This link between affordances and cognitive models led to affordances in HCI being largely seen as a concept linked to cognitive psychology. This was distinct from Gibson’s original environmental formulation of the concept. Instead of focusing on the relationship between an organism (in Norman’s case, human users) and their environment (the computer interface), Norman cast affordances as depending on a sense of familiarity from the perspective of the organism. For Gibson, the concept was not related to what went on inside the head of the animal or the way in which they recognized objects in their environment but was concerned with the fundamental and really-existing relationship between animals and their environment. Already here, the tension between the situational nature of a work like *Breathe* – as it brings the reader’s environment into contact with the work – and the learned and culturally-meaningful text becomes apparent.

What became problematic in Norman’s human-centered account of affordances was the possibility that any discussion of the affordances of a system relied on a culturally-relativistic position (Costall and Still, 1989). That is, instead of affordances describing a physical relationship between animals and their environment, it came to rely on a learned cultural accumulation of habit or knowledge. For computing, of course, the default position of such cultural learning came to be based on a largely North American, white, and male perspective. In this, there was a fundamental blindness to the culturally imperialistic aspects of computer interfaces as they were exported around the world (Philip et al., 2010).

This early dislocation (and the resulting problems) of the meaning of the term “affordances” as it was used in HCI was not lost on Norman, who later sought to clarify the meaning of the term for an HCI audience. As a corrective, he attempted to draw a distinction between Gibson’s “real affordances” and the version of the concept that he employed, which pointed to those that are perceived by users. In providing an account of the kind of “perceived affordances” described in *The Psychology of Everyday Things*, Norman (1999) highlighted the distinction between the two uses of the term:
Please don’t confuse affordance with perceived affordances. Don’t confuse affordances with conventions. Affordances reflect the possible relationships among actors and objects: they are properties of the world (42).

In clarifying the role of affordances in thinking about user-centered design, Norman highlights an important issue for understanding Gibson’s concept of affordances: that they are distinct from the kinds of cultural conventions that make up much of our interactive lives. This highlights Gibson’s (1986) assertion that affordances should be thought of as “objective, real, and physical” and that they are “unlike values and meanings” (129). This, of course, clarifies one perspective of the affordances of a work like *Breathe* that it relies upon the objective affordances of ICT, sensor networks, and smartphones to deliver the media experience to readers.

This tidy picture, however, is complicated by the nevertheless relational nature of affordances and the “possible relationships among actors and objects.” As Gibson put it, describing a kind of relativism distinct from the kinds of cultural relativism Norman’s account was accused of:

> They are not just abstract physical properties. They have unity relative to the posture and behavior of the animal being considered. So an affordance cannot be measured as we measure in physics (127-128).

That is, in its original use, the idea of affordances was linked to the particular configuration of the given animal to which it was applied as it exists within a particular environment. For Gibson, affordances offered “surfaces” which support the actions of actors within their environment. Different pools of water of different depths offer different affordances to fish as to cats. A leaf affords a surface upon which an insect might walk, but not a human. In this, the term lays out a murky space that exists between a physical reality that can be measured and a kind of phenomenological and existential being. Linked to the situation and context of their encounter, affordances are tied to abilities and actions.

This terrain of considering affordances at once physical, separate from values, and relative to the animal considered opens up a particular space for the consideration of
interactions with digital media. As the idea of affordances has been previously seen to resist an accounting of the kinds of cultural relativism built into its use in fields beyond psychology (Costall and Still, 1989), in what ways is it possible to account for affordances in human interactions, particularly as they are laden with meanings and implications? For thinking about affordances in the light of digital media, how is it possible to divorce meanings and values from the “objective, real, and physical” properties of the media?

Where Costall (2012) and Turner (2005) make claims for a bifurcated sense of affordances, with canonical or complex affordances on one site and general or simple affordances on the other, Norman’s reconsideration (1999) of his use of the concept takes a more nuanced view. In Norman’s revised account, perceived affordances sit atop real affordances, with real affordances making the perception of affordances possible. Unlike Costall’s and Turner’s approach of distinguishing classes of affordances by type, Norman opts for a progressive distinction, with “real” affordances underlying their perception. Perceived affordances only come about because of their relation to real ones. Turner and Costall, on the other hand, create new categories of affordances that, following Norman’s initial mischaracterization, offer a phenomenological rendering of affordances. They rely on the development of a specialized vocabulary to distinguish what is afforded culturally or by convention from what is offered by the physical environment itself.

Even as he draws a connection between real and perceived affordances, Norman (1999) nevertheless maintains a firm distinction between affordances and symbolic communication:

Far too often I hear graphical designers claim that they have added an affordance to the screen design when they have done nothing of the sort. Usually they mean that some graphical depiction suggests to the user that a certain action is possible. This is not affordance, neither real nor perceived. Honest, it isn’t. It is a symbolic communication, one that works only if it follows a convention understood by the user (40).

What I want to put forward in the coming sections is specifically that symbolic communication can be understood as an affordance. This is to be based largely on the
idea that symbolic communication (and cultural action more generally) can be understood as a kind of physical system which is “relative to the posture and behavior of the animal being considered” (Gibson, 1986: 127-128). That is, systems of inscription and interpretation can be viewed as physical components of the animal and their environment. While there isn’t space in this paper for a full rendering of the background of this consideration, it is relevant to point to Simon and Newell’s account of physical symbol systems in the field of artificial intelligence (Newell and Simon, 1976), particularly as it collides with Lucy Suchman’s account of situated action (Vera and Simon, 1993; Suchman, 2006). Put directly, the interpretation of symbolic systems is an activity that an animal takes part in given a certain posture of the body (the physical capacity to read and the established physical cognitive structures for reading, for instance) and the affordance of the environment (the inscription of text on a page, for example). Air affords a surface for birds who have learned to fly, an exit sign affords the person who can read a part of the surface for escaping from a fire.

Maintaining any distinction between cultural and physical affordances becomes difficult, if not untenable, as interactive modalities, such as those present in a work like Breathe, explicitly engage with physical forms which rely on culturally symbolic interactions for their function. For Breathe, it is not possible to simply bifurcate affordances into two distinct varieties. One avenue for the theoretical re-consideration of affordances comes via Manuel DeLanda’s account of the material capacities of assemblages. By rending a reading of DeLanda along a trajectory laid out by Gibson, it becomes possible to develop a provisional picture of how a work like Breathe might function. In this, it becomes possible to understand Breathe’s various component interactions (with the text, the environment, the smartphone interface) along a single conception of “affordances.”

**Affordances, capacities**

DeLanda’s account of social assemblages takes ideas developed in the work of Gilles Deleuze (and others) and gives them an immediate illustration in the formations of our contemporary social world. Providing a framing for the ways that social forms come into being, DeLanda’s work is reminiscent of Harold Garfinkel’s (1967) ethnomethodology and the more closely related work of Bruno Latour (2005) and others (Law and Hassard, 1999) in the area of Actor Network Theory. In these
approaches, despite their sometimes-strong differences, the idea of a cohesive and *a priori* social form is refuted by a kind of emergent and localized occurrence of social interactions.

In laying out a theory of social assemblage, DeLanda presents an ontological account of the fundamental organization of social forms. This relies on a realist consideration of how the various structures (assemblages) that make up our social world come in and out of being, and interact with each other, as well as the role that human beings play as part of this process. For DeLanda (2006), these assemblages are characterized by “relations of exteriority.” This means that “a component part of an assemblage may be detached from it and plugged into a different assemblage in which its interactions are different” (10).

For DeLanda (2006), the span of the exteriority of the identity of social entities is demonstrated “not only by their properties but also by their capacities, that is, by what they are capable of doing when they interact with other social entities” (7). Here, “capacities” becomes a central term, particularly because of its relative homology with Gibson’s affordances. The kinds of extrinsic relationships built up beyond any kind of internal affiliation between disparate things favored in DeLanda’s ontology provides a first description of Gibson’s affordances: in deducing affordances, the animal is considered relative to the environment within which it exists. The affordance appears only in the conjunction of the animal against some surface. For an assemblage, this conjunction takes place based on the capacities of each assemblage involved. Just as Gibson’s affordances are relative to the animal and expressed only as a sense of possibility given the particular arrangement within the environment, so too is DeLanda’s sense of capacities:

We can distinguish, for example, the properties defining a given entity from its capacities to interact with other entities. While its properties are given and may be denumerable as a closed list, its capacities are not given – they may go unexercised if no entity suitable for interaction is around – and form a potentially open list, since there is no way to tell in advance in what way a given entity may affect or be affected by innumerable other entities (10).
The user, in this case, is not a user in and of itself, but only in their interactions with some system and vice versa. The reader of *Breathe* cannot be understood separately from their reading of the work, even as they may nevertheless be readers of other works.

As DeLanda (2016: 1) describes it, quoting Deleuze (2007): “the assemblage’s only unity is that of co-functioning” (69). He goes on to say that in Deleuze’s definition, “two aspects of the concept are emphasized: that the parts that are fitted together are not uniform either in nature or in origin, and that the assemblage actively links these parts together by establishing relations between them” (2). This is essential here, since this concept of assemblages is applicable to not only thinking about the assemblage of a user and a system, or the reader and a work like *Breathe*, but also the ways that the system or the reader themselves are constituted according to their relations of exteriority.

Just as Gibson’s affordances “cannot be measured as we measure in physics,” the interactive capabilities of an assemblage’s capacities are likewise beyond the purview of a positivist accounting:

> But in an assemblage these relations may be only *contingently obligatory*.

While logically necessary relations may be investigated by thought alone, contingently obligatory ones involve a consideration of empirical questions, such as the coevolutionary history of two species (11).

In both, the actions of any user, the manner in which they configure the movements of their body and position themselves in relation to some environment depends on their own intentions and aims as they go about engaging with a system. There is no logical necessity that links users’ actions and the affordances/capacities of a system. This has been demonstrated in any number of examples of the re-purposing of systems for novel uses (the evolution of Twitter provides a good example of this [Siles, 2013]).

Even as the definition of capacities remains contingent and dependent on the conditions of their relations, how they are perceived is immaterial to their causes. In this, assemblages share in the conceptually independent nature of affordances, particularly considering Norman’s stated reconsideration and explication of the
distinction between real and perceived affordances. Like Gibson’s affordances, DeLanda’s (2006) theory of assemblages is wholly realist, with “the very fact that it cuts across the nature-culture divide” being “evidence of its realist credentials” (3). This being consistent with Gibson’s (1986) own proposition that it is a “mistake to separate the cultural environment from the natural environment” (128).

This is illustrated in Breathe as it comingles jarring interactive paradigms, the activation of global data networks, and a semiotic reading of text toward a singular meaningful affordance of the work. The perceived affordances of the alternating intuitive and counter-intuitive work in tandem with the real affordances of the networked systems. These are in turn surfaced to the reader in their reading of the text as it takes advantage of them as part of a semiotic system.

What begins to develop in bringing these two systems into contact with one another is a slow dissolve of the boundaries established separating real affordances from any sense of cultural or conditioned connection. While Gibson explicitly denies the immediate connection between “values and meanings” and affordances in his initial formulation, it is not difficult to see how there may nevertheless be a connection:

Behavior affords behavior, and the whole subject matter of psychology and of the social sciences can be thought of as an elaboration of this basic fact. Sexual behavior, nurturing behavior, fighting behavior, cooperative behavior, economic behavior, political behavior – all depend on the perceiving of what another person or other persons afford, or sometimes the mis-perceiving of it (135).

While affordances themselves might have no intrinsic value, they nevertheless serve to impart some communication of value. This is the case as they are the medium by which it becomes possible to interpret some relational cue. Just as they provide the solid substance of surfaces to stand on in Gibson’s account, so do affordances and capacities offer a more dynamic sense of relation. What can be seen in each, both in Gibson’s affordances and in DeLanda’s assemblages, is that they can play a variety of roles, as DeLanda (2006) puts it: “from a purely material role at one extreme of the axis, to a purely expressive role at the other extreme” (12). The assemblage of a work like Breathe, as it establishes and motivates relationships between distinct parts (the text, the
technologies at play, the situation of the reader, the readers themselves, and so on), cuts across all these types of roles. For *Breathe*, as a literary work, what comes to matter is the particular way that this re-figured sense of affordances might engage questions relating to a linguistic text.

**Codes, coding, coded surfaces**

In examining the relationship between affordances and language, it is important to approach the issue of “coding” as it is present in DeLanda’s work. While a consideration of the affordances of *Breathe* in light of DeLanda’s assemblages is relatively straightforward, the question of language provides an opportunity to delve deeper into the connection between assemblages and affordances. In *Breathe*, this question of language is driven by the interplay among the interface of the work, the wider situation within which the work is read, and the text itself.

Following Deleuze and Guattari (1988), DeLanda’s account of assemblages includes a consideration of “territorializing” and “deterritorializing” movements. Such movements are put into motion by the stabilization and destabilization of the identity of assemblages. Put briefly, as assemblages are subject to processes of territorialization, they sharpen their boundaries and increase their homogeneity. As they are subject to deterritorialization, their boundaries become less defined and they become more diverse.

Here, what is most important is the way that processes of territorialization lead to processes of “coding” or the formalization of communicative assemblages. This can be seen in the case of language, genetics, and other forms of reproducible patterns of communication. That is, through the various capacities of an assemblage, as they come to be stabilized, specific reproducible formations arise which allow for the systematic coding and decoding of an assemblage’s capacities. In this, coding is not expressive as in the sense above, as expression is considered as an in-formal process. Coding, however, represents a kind of reification of expression into a formal system. Where the territorialization of an assemblage represents a first articulation of this kind of expression, coding represents a second, formalizing system in which the definition of rigid rules develops protocols for reproduction. Decoding, on the other hand, represents that moment in which these rigid rules are broken down, as in the case of
informal conversations in which more formal protocols of conversation might not be met.

What this consideration of coding as a unique feature of assemblages puts forward is not that different from considerations of canonical or complex affordances. In each, there is some division between the sheer material aspects of affordances and those that serve some higher, information-processing ends. Just as Gibson saw affordances in the composure or posture of animals to each other while also allowing for the idea that affordances are not accorded with values and meanings, so too can it be seen that the expressive capacities of assemblages are distinct from codes such as language. For DeLanda, however, even as this coding might be of an order above the regular relations of the capacities of assemblages, they are still cut from the same cloth and are part of an overarching continuum of capacities.

This is illustrated in Breathe as the canonical affordances of an interaction with an ebook (swiping from one page of text to another) is disrupted. The disruption caused by readers not being able to swipe smoothly from one page to the next comes to be linked with a semantic shift in the work from that of a straightforward narrative to one that speaks directly to the reader. The expressive deterritorializing move of the interactive shift cascades into a deterritorializing of the terms of the coded languages at work.

In building from this account of the common ground between affordances and capacities toward this consideration of expressive surfaces and the territorialized process of coding, the aim is to be able to set language and culture on an even terrain with other kinds of affordances present in a digital system. As hinted at above, this is not the first such attempt toward this, with the work of Herbert Simon and Alan Newell (1976) working on the problem from the other end, so to speak; building up from computational models out toward a synthesis of human intelligence and understanding. At the foundation of this, for them, lay an assertion of the physical nature of cognition; not in an embodied sense, but in a sense which saw cognition taking place through the logical manipulation of physical symbol systems.

By positing the existence of an assemblage below that of the human – the physical symbol system – Simon and Newell saw the possibility for the construction of artificial means of human intelligence that would be independent of a human identity. Viewed
in this light, the coding of human culture, of language, and of basic thought, is not intrinsic to the human, but an extrinsic system of relations that has simply been subsumed into the human organism as part of a wider assemblage.

In this, the assemblage of a language faculty (of coding and decoding meaning into transmittable forms) functions simply as another material affordance for the human. This follows from both Gibson’s and DeLanda’s accounts: This is seen in Gibson’s (1986) relativistic account of affordances as having a “unity relative to the posture and behavior of the animal being considered” (127-128). Similarly, it can be found in DeLanda’s (2006) description of the way that an assemblage’s capacities “may go unexercised if no entity suitable for interaction is around – and form a potentially open list, since there is no way to tell in advance in what way a given entity may affect or be affected by innumerable other entities” (10). The capacity of a language act functions as an affordance to the human organism to whom it matters.

_Breathe_ (and works of ambient literature more broadly) take this link between traditional, physical affordances and those given in language as a matter of course. In these works, the physical affordances of place and a reader’s embeddedness within a situation are aligned along a common engagement of affordances. This common base runs from the capacities of the component assemblages of the work through coded systems of language.

Building from Gibson’s (1986) earlier quoted assertion that “[b]ehavior affords behavior” (135), it is possible to say that the linguistic posture put forward as a meaningful expression on the part of one party of a conversation is taken up by the listener, who, in reading the message as it is materially transmitted, has some activation of the awareness of potential affordances and future capacities that are to be made available. In this, language and a specific sense of a functional cultural relativism (knowing and being affected by a certain language) comes to be illustrative of what might be termed a “speculative affordance.” This notion of a speculative affordance is one founded on the possibility of the proper set of capacities being present in the environment (the environment in this case coming to include other people). This speculative nature of affordances was something for which the use of Gibson’s concept was critiqued by Martin Oliver (2005). In responding to Gibson’s account of the possibility of affordances, Oliver stated that “all that could be said then is that a
thing afforded something to someone in a specific circumstance” (403). While Oliver’s critique appears to be valid along a traditional reading of affordances, it is just this kind of speculative configuration that has been noted in relation to audiences’ engagement with works of ambient literature (Marcinkowski, 2019).

Instead of partitioning affordances into two regions, those that are cultural affordances and those that are not, what is given here is a more general consideration of affordances. This comes as the affordance of the possibility of affordances, one which comes to house both material affordances and their relative potential, as well as a phenomenological type of affordance as it has been heretofore known. While this kind of speculative affordance is undergirded by the theory of assemblages and their capacities, as given by DeLanda, in its application to questions of digital media it retains Gibson’s utility in the analysis of interactions. In this, it merges two distinct aspects of experience: first, the double articulation of a system of coding as it is read along a realist trajectory of the existence of physical systems; second, the relational rendering of the surfaces which afford this kind of articulation to take place.

The mechanics of a work of ambient literature displays this in a double way. First, and most evidently, this comes in the way that the text of the work is supported by the environment. In Breathe, the reading of the text is linked to the situation of its reading. Second, the possibility for this interpretation of the code of the text is only possible because of the networked affordances of the platform that make the conditional text possible. That is, the physical affordances linking technological systems (as will be discussed in the next section below) set up the conditions for the interpretive reading of the text.

As concepts, Gibson’s affordances and DeLanda’s account of the capacities of assemblages are unique, but in their consonance, they begin to develop a picture of the material interactions that contribute to human interactions with technological and cultural systems. The basic premise of their concomitance here is to put forward a view of material affordances or the capacities of assemblages that is able to account for systems of values and meaning. This is given not as a separate layer or special type of affordance or capacity, but as part of a continuum occurring across a flattened ontological space. Consonant with affordances, capacities describe the possible conjunction of surfaces, whether these surfaces are such as those concerning an animal
in its environment or any other type of assemblage. At bottom, DeLanda’s account of
the capacities of assemblages opens the way for a thinking of a sense of affordances in
which there is a more general system. Such a system provides for both people and the
physical systems with which they interact, from culture to the materials of
communication themselves.

Affording the assembled interface

In merging these veins of thought together toward a re-thinking of the idea of
affordances, it is possible to think of affordances beyond just human or animal
engagement with the world. It becomes possible to include language and culture
alongside the material of their enaction. In examining digital media, this comes to
include, importantly, the proposition of the function of ICT itself. That is, the
smartphone not only affords human grasping as it is of a shape and size such that it
can be held in the hand, but it also affords layers of network protocols, stacks of code,
and APIs. Our telecommunication networks present vast assemblages. In these, each
component is not determined by its interior relations, but instead by what it makes
possible within the broader network. The capacities of each of the assemblages provide
a coded and territorializing linkage within the network. That is, each segment of the
ICT network presents an affordance to the other, a configuration that is both material
and coded allowing for further territorialization and growth of the assemblage.

This is a connection between the idea of the interface of a digital system offering
affordances to users, as is commonly discussed, and a more remote or hidden set of
interfaces, as discussed by Christian Ulrik Andersen and Søren Bro Pold (2018) with
their concept of the “metainterface.” With this, they set up an aesthetic and analytic
argument for the consideration of the interface in digital cultural works that extends
beyond the immediate interface and begins to look at the layers of interfaces that exist
invisibly within systems. The interface of a system, the traditional moment in which
the affordances of a system are made evident to users, is pushed back to come to
include the platform itself. For Andersen and Pold, this becomes worthy of
consideration as these systems play a central part in contemporary society.

For them, the hidden layers of the interface have an aesthetic proposition of their own,
both because these layers of interfaces display a specific kind of aesthetic, and because
they are pervasive and enveloping. Here, as an accounting of the affordances of a
digital system is expanded to include physical capacities and cultural codings, this
thinking of the metainterface provides some guiding clarity toward the political
ramifications of our present systems. As the conception of Gibson’s assemblages is re-
oriented toward being thought of in terms of assemblages, what does it mean for
thinking about the possibilities of systematic control?

Such an idea as the meta-interface contributes a thinking of the entirety of a digital
system as representing the capacities or concordances of the system, and highlights the
cultural force that the hidden backend of digital systems can exert upon the experience
of the user. This understanding of how the metainterface itself becomes a surface for
interaction will be critical for thinking about how Pullinger’s Breathe can be
conceptualized under this re-framed conception of the affordance.

**Material capacities of networked affordances**

An initial consideration of the affordances of Breathe is straightforward enough. As a
smartphone-based webapp, Breathe relies on an interface of affordances that initially
coincides with the uses of a smartphone. Readers touch the screen, swipe, and engage
with the work almost exactly as they have learned to interact with an ebook on a
smartphone: they read each page, sliding their finger across it from right to left to flip
over to the next page when they are done with the first. In this, it relies on an interactive
paradigm which is easy to describe in the kinds of terms that Norman might use to
describe the perceived affordances of an interaction which builds on the groundwork
of possibility laid by “real” affordances. By having a cognitive model of the way that
books and ebooks work, readers are able to easily engage with the piece. Beyond this
sense of perceived affordances, the size, texture, and proximity of the glass screen of
the phone affords a surface for touching.

From this, the work begins to engage the cognitive model of the reader directly in the
narrative itself. As the reader is introduced to the supernatural elements of the story,
their normal cognitive models for interaction begin to falter: instead of being able to
easily swipe from page to page, the path of their finger across the screen leaves a black
trail, leaving them to puzzle over how to move on. Depending on how they are holding
their phone, pages become obscured by opaque shadows revealing new text; texts
become automatically covered over by new text; instead of pages swiping away, the text runs backwards. In this, the fact of the affordance, both real and perceived, comes to play an expressive role in the work.

In this, affordances – like capacities – are used in an expressive way. They become intermingled with the text which is itself dependent on the possibility of gathering situational information from the phone’s sensors and networked connections. In this, the experience of the work is not defined by the totality of the system itself, but by the relations of exteriority of the components which, through their own systems of capacities, come together to form the assemblage of the work. The narrative, the smartphone, the web browser, the network stack, the cellular network, global systems of geolocation, the vast databases of local information compiled by Google, networks of weather data – all of these exist in an independent fashion while being “held together” by the work. As a work, Breathe represents a global assemblage combining the material affordances of machine code, human language, and all the various modalities of communication that allow them to be brought together. In this, at each turn, the capacities of these various material assemblages afford the possibility of the work, and vice versa. The touch screen, cellular networks, databases, GPS satellites, mobile processors, smartphone software, and socio-technical system of information gathering utilized by Google comes into conjunction with other assemblages of the neighborhood streets, shop names, weather systems, seasons, and, importantly, the reader’s knowledge and recognition of these conditions. As in DeLanda’s account of the capacities at play in assemblages, all of these various components have both material and expressive roles which are not easily disentangled. As Breathe makes conscious use of the affordances of digital technology as a tool for narrative development, it is easy to recognize a reconfigured account of affordances at work. The expressive capacities at work have functional implications and vice versa.

With Breathe, it is possible to trace out the assemblages at work up and down the networked stack of affordances and the linguistic text of the work. It displays codings which range from the wholly programmatic computer code that supports the work all the way through the fuzzy algorithms employed for location detection to the human readable language of the text itself. At each of these junctions, there are various capacities at work that allow for the interaction of assemblages, from the backend
systems of the work which know how to appropriately call APIs to the moments in which literate readers are presented with an intelligible text. As such, it is necessary to attend to two levels simultaneously: the first comes with a consideration of the mechanisms of ICT by which symbolic interactions enact the worldwide networks making up the technical function of the work itself; the second comes at the moment of the interaction with the reader, as they, situated within the capacities of these networks, are offered opportunities for some recognition of the material capacities of the setting that they are in.

As the reader engages with the work, they partake in processes of territorialization and deterritorialization as they alternately coalesce and scatter the assemblage of the work through their reading. On the one hand, their reading establishes a homogeneity of the component parts of the work, bringing them together under the banner of a single work. On the other, their specific reading under their own specific conditions leads to an ultimately heterogeneous identity of the work.

In this, the meanings of the work are the result of the physical affordances and capacities of their environment. In the sense-based experience of the work, the surfaces with which readers engage are not just those that are immediate to them, but those that they can also see from a distance, without seeing them directly. The networked capacities provide meaning in only this speculative way. The affordances of the work are not simply divided between physical or perceived affordances. Instead, they may be traced along the various material networks of affordances that make both the technology and the meaning of the work possible. As a piece of digital media, Breathe works across these networks of material affordances as it engages the movement and comportment of the reader toward their phone. At the same time, these material networks of assemblages also provide the material codes necessary for the language and computer code necessary for making the networked actions possible.

**The cultural affordance of speculation**

From all that has been said, it is clear that Breathe functions as an assemblage, more than even just at the kind of theoretical and ontological level established by DeLanda. It relies on readers, the text, smartphones, the situation of the reader, their geographical surroundings, sensor networks, remote databases, global information
networks, and the various individual and shared histories that make these parts fit together. Across all of these are networks of capacities that serve to interlink and provide these separate components with the identity of the work called *Breathe*. But how does this appear to the reader? If we are to follow along the trajectory of the use of the term “affordance” from Gibson to Norman and beyond, continuing to think of the interface and the question of human-centered design, what should we think of the moment when this interlinked assemblage of capacities comes to matter to the user?

For readers of *Breathe*, what comes to be the common locus for their engagement with the work is a persistent concern with what the work affords, and how it affords it. What gives the work its force, as a contemporary ghost story about lost mothers and the refugee crisis in Europe, is that readers are left adrift wondering how – and along what kinds of affordances – the work might play out. This sentiment was on display in interviews with readers of *Breathe* (Marcinkowski, 2019).

This unsteadiness in the possibilities of the work is something that has already been discussed in terms of the shifting interaction paradigms. As the conventions of interactions with ebooks are consciously undermined by the work, readers are left without a stable footing at the level of their perceived affordances. More importantly, however, it is through the speculative capacities at work in the networked assemblage of the work that the unique formulation of affordances described here can be seen most strongly.

For readers of *Breathe*, what came to matter was not just what happened in the work itself, but what *might* be happening in the work. As readers’ situations (locations, local weather, time of day etc.) come to be incorporated within the piece, readers are left without knowing the exact mechanisms by which these variations within the text are introduced. For some readers, whether or not the entirety of the text is unique to their experience was questioned. Through the various affordances at play in the work – some of which might be completely obfuscated from the reader’s view – readers could be left wondering if the application was tracking their movement for days before reading. Through algorithmic sleights of hand, the application is able to use a sliver of geolocational data to spin out a web of implications for the reader.
With this, readers’ expectations for what the piece had to offer not only leaned in to supply what amounted to folk theories regarding the backend function of the application – at its most suspicious, readers thought of Google’s involvement with the piece and suspected persistent tracking of their movements – but also led readers to wonder what else might be possible. In coming to recognize the global assemblage at work, readers engage not just with the affordances of the interface present before them on the screen, but with the interface of the global system of technology as it is writ small into a short story-sized narrative. For *Breathe*, the key capacity of the assemblage comes to be its link to the larger and longer history and cultural paradigm of technology and the idea of technological progress.

What this points to is the sense that readers’ engagement with the work is driven by a sense that they are engaged not just with the work as it is, but as it could come to be: in tapping into global networks of ICT and making these material pathways germane to the specific conditions of a meaningful narrative, the edges of the affordances as they are immediately present blur with what lies just beyond their reach. As this is linked to readers’ understandings and expectations of contemporary technology, the affordances at play are acted out at the level of the metainterface. Much like as discussed by both Gibson and DeLanda, the affordance or capacity of a system is not just what is present, but also what might yet be possible, but is still unknown.

This develops a sense of the idea of affordances that, as described in the situational rendering by James Greeno (1994), are comprised of attunements and constraints. Readers are, on the one hand, attuned to what is going on, in a cultural sense. On the other, they are also cognizant of the constraints that are placed on them in any interactive setting. However, what *Breathe* and the other works of ambient literature present is an engagement with a cultural attunement in which the sheer idea of some kind of constraint on technological possibility is significantly tempered. In this, new media works like *Breathe* take as part of their interactive paradigm the idea that readers’ cognitive models allow the door to speculation to be left open. The capacities of these works, by virtue of the diffuse assemblage which makes them possible, become ambient distributed across the assemblage of the work.
What is possible

The central provocation that is put forward here is a wider and more fully material and realist account of the idea of affordances. This being the case, even as it points toward an ambient sense of affordances being linked to the possibilities of an assemblage. Instead of becoming bogged down with a worry over the difference between physical affordances and those that might be considered to be culturally rendered, what is proposed is a fully material rendering of the entire spectrum along a flattened ontology in which the facts of human culture are no different than the facts of the curve of a jug handle. Each present real systems that offer some capacity to be drawn into large assemblages. The complexities of the human hand as it is afforded the opportunity to grasp are not so different from the complexities of the human mind as it recognizes not just affordances across an ICT network, but also language. In this, the idea of the perceptual affordance is not so distinct from a rendering of physical symbol systems that affordances, when considered as capacities, can be thought of as existing between inanimate things, as in the case of computer codes and electrical switches.

For a work like Breathe, this re-formulated approach to affordances in which the capacity for meaning is set equal to the capacity for physical interaction opens a way toward understanding audiences’ engagement with the work in new ways. For works of interactive media, affordances come to refer not only to those aspects that are immediately present in the interface, but also to those aspects that are only speculatively encountered or expected by audiences. These networked capacities for the elicitation of meaning raise questions in regard to how to think about chains of affordances in media and how the context of the affordance becomes part of the affordance itself.

Affordances are simple things that, by their attendant capacities, are able to create complex webs of potential interactions. By re-framing affordances in this way, future links can be drawn between the classical understanding of affordances as they exist at the moment of interaction and the wider socio-technical setting in which our systems today function.
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