

Theorizing Affordances: From Request to Refuse

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Abstract

As a concept, *affordance* is integral to scholarly analysis across multiple fields—including media studies, science and technology studies, communication studies, ecological psychology, and design studies among others. Critics, however, rightly point to the following shortcomings: definitional confusion, a false binary in which artifacts either afford or do not, and failure to account for diverse subject-artifact relations. Addressing these critiques, this article demarcates the mechanisms of affordance—as artifacts *request*, *demand*, *allow*, *encourage*, *discourage*, and *refuse*—which take shape through interrelated conditions: *perception*, *dexterity*, and *cultural and institutional legitimacy*. Together, the mechanisms and conditions constitute a dynamic and structurally situated model that addresses *how* artifacts afford, *for whom* and *under what circumstances*.

Keywords

affordances, J. J. Gibson, Donald A. Norman, technology, artifacts, theory

Affordance has emerged as a central analytic tool within science and technology studies, ecological psychology, communication studies, and design fields (Evans, Pearce, Vitak, & Treem, 2017; Nagy & Neff, 2015; Parchoma, 2014; Torenvliet, 2003). Broadly, *affordance* refers to the range of functions and constraints that an object provides for, and places upon, structurally situated subjects. In the context of this article, the analytic import of *affordance* is its capacity to recognize technology as efficacious, without falling prey to technological determinism (Neff, Jordan, McVeigh-Schultz, & Gillespie, 2012). Indeed, affordances are the dynamic link between subjects and objects within sociotechnical systems.

As an interdisciplinary construct, *affordance* is both persistent and pervasive across literatures (Evans et al., 2017; McGrenere & Ho, 2000; Parchoma, 2014). The term's development and diffusion has generated both keen analytic insight and also, dense theoretical and philosophical debate. Despite widespread application, *affordance* maintains a sordid history in which overuse, misuse, and varied uses have led some to argue that analysts should abandon the term altogether (Oliver, 2005). Debates derive from disagreement about what an affordance is, how it works, and the continued intellectual value of the concept, if any value at all. Beginning with the assumption that *affordance* does important theoretical and practical work, this article proposes a nuanced and dynamic model that brings much needed structure and precision to affordance theory, facilitating complex analyses of subject-artifact relationships through a user-friendly framework.

Out of debates within the affordances literature, we distill three broad critiques: (a) definitional confusion, (b) a false binary in which artifacts either afford or do not, and (c)

failure to account for diverse subjects and circumstances. In recent years, key conceptual developments have gone far toward addressing issues of definitional precision, clarifying questions about *what affordances are*. We use these conceptual developments as a jumping off point from which we delineate a structural and relational model of *how affordances work*. The model is built around sets of interrelated *mechanisms* and *conditions*. Mechanisms represent gradations in the ways that artifacts afford and conditions represent the diverse circumstances through which mechanisms take shape.

Conceptualization: What Is an Affordance?

Affordance first emerged within ecological psychology, defined succinctly as “what things furnish, for good or ill” (Gibson, 1966, p. 285). Gibson later expanded his definition:

The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill. . . . These affordances *have to be measured relative to the animal*. (Gibson, 1979, p. 127, italics in original)

A decade later, Norman (1988) proposed an alternate definition, one that emphasized perception and brought the concept into design studies:

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The term *affordance* refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. A chair affords (“is for”) support and, therefore, affords sitting. A chair can also be carried. (p. 9, italics in original)

Norman (1999) went on to distinguish between real and perceived affordances. Real affordances are the functions attached to a given object—what, potentially, that object affords. Perceived affordances are features that are clear to the user.

The relative place of an artifact’s properties and user perceptions of those properties continues to drive debates about the meaning of *affordance* (Parchoma, 2014; Reed, 1996; Torenvliet, 2003; Turvey, 1992). While Gibson’s conceptualization has been critiqued for granting artifacts too much efficacy (Chemero, 2003; Stoffregen, 2003), others have taken Norman’s perceptual focus to the extreme, arguing that artifacts *only* afford what subjects perceive them to afford (e.g., A. Cooper et al., 1995/2014). At the same time, critics note that researchers across disciplines have employed the term without providing any definition and/or neglecting to engage with ongoing definitional contentions (Hutchby, 2001; McGrenere & Ho, 2000; Parchoma, 2014; Torenvliet, 2003), prompting calls for both definitional precision and also, conceptual balance between technological efficacy and agentic subjectivity (Neff et al., 2012).

Out of a muddled conceptual landscape, promising developments in affordance theory offer important clarifications. Highlighting the intersubjective nature of affordances, Schmidt (2007) introduced the concept of *social affordance*, capturing the way networks of relations enable and constrain technological capacities. With a specific focus on communication technologies, Nagy and Neff (2015) proposed *imagined affordance*, which they theorize as webs of relations among user perceptions, attitudes, and expectations; the materiality of artifacts; and the intentions of makers and designers. Accounting for affect, materiality, and mediation, “social affordance” and “imagined affordance” do the important conceptual work of situating affordances as relational processes among users, designers, environments, and things.

In a similar vein, but with added precision and a wider scope, Evans et al. (2017) draw on existing conceptual work (Hutchby, 2001; Parchoma, 2014; Treem & Leonardi, 2012; Wright & Parchoma, 2011) to distinguish between *affordances*, *features*, and *outcomes*. They situate affordances as the variable process that mediates between properties of an artifact (features) and what subjects do with the properties of an artifact (outcomes). With this formulation, they set forth threshold criteria for establishing what an affordance is, and what it is not. Namely, an affordance must be variable, must not be a feature, and must not be an outcome. These criteria underlie Evans et al.’s (2017) conceptual definition, which describes affordances as “the ‘multifaceted relational structure’ (Faraj & Azad, 2012, p. 254) between an object/

technology and the use that enables or constrains potential behavioral outcomes in a particular context” (p. 36).

Given conceptual advancements that properly situate affordances as relational, material, and dynamic, it is of little use to cloud the literature with new or alternative definitions. Rather the task of knowledge building depends upon researchers defining *affordance* when they use the term, and employing definitions that incorporate the concept’s interrelated component parts (i.e., dynamism, materiality, and relationality). The primary work of our proposed model, then, begins with Evans et al.’s (2017) clear statement on *what affordances are* and animates this conceptualization by explicating *how* artifacts afford for structurally situated subjects.

Mechanisms of Affordance: How Do Artifacts Afford?

Through debates about what affordances are, a second critique has emerged with regard to how affordances work. Empirical studies that identify sets of affordances—that is, the functions an artifact enables and constrains—represent a common but methodologically flawed approach that perpetuates a false binary in which affordances are either present or absent (Evans et al., 2017; McGrenere & Ho, 2000; Nagy & Neff, 2015; Neff et al., 2012; Parchoma, 2014; Wright & Parchoma, 2011). In contrast, theories that break through the false binary recognize variability in Gibson (1979) and Norman’s (1999) germinal formulations, explicating that affordances operate by degrees. For instance, a set of stairs does not just afford climbing, but based on the angle of construction, may facilitate an easy climb, pose challenges to climbing, or be unclimbable entirely (McGrenere & Ho, 2000; Warren, 1984). Indeed, variability is key to Evans et al.’s (2017) distinction between features, affordances, and outcomes. A feature is either there or not, and an outcome either obtains or does not, but an affordance necessarily operates through gradations.

The conceptual assumption that affordances vary by degree indicates, in a broad sense, how affordances work. The particularities of this *how* can be packaged into a suite of interrelated mechanisms. We propose that artifacts *request*, *demand*, *allow*, *encourage*, *discourage*, and *refuse*. *Requests* and *demands* refer to bids that the artifact places upon the subject. *Encouragement*, *discouragement*, and *refusal* refer to how the artifact responds to a subject’s desired actions. *Allow* pertains to both bids placed upon on the subject and bids placed upon the artifact. These mechanisms are neither rigid nor exhaustive, but rather serve as analytic pegs that transpose structure onto subject-artifact relationships, which are at once nebulous and identifiably patterned. Indeed, features can rest ambiguously between categories and slip from one category to another. The mechanisms are thus reference points along a graduated continuum.

Requests and *demands* refer specifically to technological efficacy. They move subjects upon given paths, with differing levels of insistence. A technological artifact *requests* when it pushes a subject in some direction, but leaves room for divergence. A technological artifact *demands* when one path seems inevitable. The next three mechanisms, *encourage*, *discourage*, and *refuse*, refer to an artifact's response to those things a subject may wish to do. A technological artifact *encourages* when it welcomes a particular line of action, especially vis-à-vis alternate lines of action. An artifact *discourages* when it creates barriers to a particular line of action, especially vis-à-vis alternate lines of action. An artifact *refuses* when some line of action seems impossible. An artifact *allows* when actions are available, but ambivalently so. Of note, although the model distinguishes *request* and *demand* on one hand, and *encourage*, *discourage*, and *refuse* on the other, the same feature can afford both through bids on the subject, and also, in response to the subject. That is, what an artifact *requests* of a user, it can also *encourage*; when it *demands* one thing, it *refuses* anything else.

Requests

Requests recommend one line of action, but workarounds remain possible and plausible. *Requests* invite subjects to engage the object in a particular way, evoking particular outcomes over others. For instance, speed bumps *request* that drivers slow down (Latour, 1994), creating discomfort, fear, and possibly vehicular damage should a driver maintain constant road speeds. However, the speed bump does not make high speeds impossible. Rather the speed bump makes one way of driving (slow) more seamless than another (fast). Similarly, upon signing up for Facebook, the platform *requests* that users include a profile image (a single representative image associated with the user). Users may receive reminders that they have not yet designated a profile image, suggestions for which images to include, and implicit social pressure from others in their networks. However, the absence of a profile image does not preclude participation on the platform. That is, Facebook asks users to display a profile image, but does not require it.

Demands

An artifact *demands* when its use is conditioned on a particular set of circumstances. Facebook *demands*, for instance, that users select a gender category before signing up. This *demand* is not only a matter of the company's terms of service but architecturally inbuilt. Facebook registration will not proceed until a user checks a gender box. In this vein, Twitter *demands* that users communicate succinctly, architecturally limiting shared text to 140 characters. Mobile phones that are "locked" (i.e., tied to a single company) *demand* that users remain with a particular service provider. Should someone elect to go to another service provider, that device would no longer *request* or even *allow* transmission.

Although formulating affordances as *demands* runs the risk of technological determinism, it is important to note that subjects may rebuff these *demands*, albeit with intention and effort. For instance, users might change their Facebook gender designation regularly, or select a gender category that contradicts other forms of their own gender display. Similarly, people can "tweetstorm," sending off a series of tweets that amalgamate into a long form narrative, rather than 140 character blip. Users with technological savvy might "jailbreak" (i.e., illegally unlock) a mobile device, carrying the device to unintended service providers.

Encourage

Artifacts *encourage* when they foster, breed, and nourish some line of action, while stifling, suppressing, and dissuading others. Large dinner plates, for example, *encourage* diners to consume large quantities of food while smaller plates *encourage* diners to exercise portion control. Indeed, empirical research shows that diners eat more when food is presented on a large plate, and are more satisfied with less food when consuming from a small plate (Wansink, van Ittersum, & Painter, 2006). That is, the small-plate diners are *encouraged* to consume less and large-plate diners are *encouraged* to consume more. Those with small plates must climb over the physical and psychological hurdle of obtaining a second serving should they wish to eat a large meal, while those with large plates must omit part of their plate should they wish to consume only a little.

On Instagram, users are *encouraged* to access others' images by carefully designed algorithms that present users with the content most likely to evoke engagement. Similarly, "Like" and "Share" buttons on Facebook *encourage* network interaction, generating easy and regular network connections and regular feedback for content creators. For those who wish to socially engage, the propensity to do so is encouraged on these platforms; in contrast, those who wish to glance at the platforms in passing, are instead encouraged to stay awhile.

Discourage

Artifacts *discourage* when one line of action, though available should subjects wish to pursue it, is only accessible through concerted effort. That is, *discouraged* outcomes are those that lie behind inbuilt barriers. For example, gender segregated bathrooms (as indicated by the presence/absence of urinals and gendered signage) *discourage* queer gender enactment. One *could* utilize bathrooms that do not coincide with their sex assigned at birth, but doing so would entail an act of rule breaking, norm breaking, and in some places, law breaking.

In the realm of dating applications, two competing models hold purchase: one genre *discourages* careful selection of a partner, while another genre *discourages* "hookup" style connection. Exemplifying the former, Tinder restricts users'

biographical descriptions to 500 characters, presents users with a high volume of “matches,” and makes selection and rejection of matches seamless through a simple swipe function. In contrast, the dating app “Hotline” leaves ample room for biographical text and requires users to call each other in order to proceed in the matchmaking process. Tinder thus *discourages* labored consideration, while Hotline *discourages* impulsive romantic decisions.

Refuse

Finally, artifacts *refuse* when they make certain actions unavailable to users. For example, through an error avoidance design feature in some cars, the vehicles *refuse* to lock the doors if the engine is on, the keys are in the ignition, and the car is in park, even if the driver hits the automatic door lock button. Similarly, many computer monitors *refuse* to respond to the direct touch of a person’s finger but instead, respond only to directions from keyboards and mice. Of note, *refusals*, like *demands*, are not teleological. In both cases, they harken back to (agentic) human coders and designers and in many cases, can be circumvented by *the right user* (an issue to which we return in the final section). For instance, car manufacturers may design automobiles that *refuse* starting without the proper key, yet an experienced thief may be able to ignite the engine by rearranging wires, thus turning a *refused* practice into one that is merely *discouraged*.

Allow

When artifacts *request*, *demand*, *encourage*, *discourage*, and *refuse*, those artifacts push, pull, and adapt to subjects with varying degrees of intensity. While *requests* and *demands* place bids upon subjects, artifacts *encourage*, *discourage*, and *refuse* based upon subjects’ wishes. *Allow* is distinct in its neutral intensity and multidirectional application. Artifacts *allow* by remaining indifferent to if and/or how a particular feature is used, and to what outcome. *Allow* applies to bids generated by both artifacts and subjects.

For instance, although Snapchat *requests* that users share regularly by pinging users with opt-out mobile notifications, and *encourages* users to filter images by providing a variety of quickly available overlays, the app *allows* users to select which filters fit the tenor of their message and decide with whom to share. In this way, low hanging bridges *refuse* to let busses through, thus *discouraging* public transit riders from accessing particular locales (Winner, 1980), but these same bridges *allow* small occupancy vehicles of any variety, at any speed, with any passengers, to go under.

Mechanisms and Their Interrelation

The mechanisms of affordances, both bids upon the subject and bids upon the artifact, are best understood as conceptually

relational. *Requests* take on meaning placed against *demands*. In turn, when artifacts *encourage* one thing, they *discourage* (and *refuse*) others.

Relationality becomes clear when one imagines filling out an online form. These forms prompt users with a variety of questions (e.g., name, age, date of birth, e-mail, etc.). Some questions have red stars or other differentiating symbols next to them. Others do not. For users to complete the form, they are required to provide content where the red stars indicate. They are not required to provide content in slots without red stars. The form therefore *requests* and *encourages* applicants to provide all indicated information, *allows* them to provide information in a variety of fonts, and *demands* that they provide specific types of information, while *refusing* to let them proceed without satisfying the red-star criteria. In this way, a rope fence *requests* that actors stay off of a perimeter, while an electric fence *demands* it¹; when starting a car, a persistent ding *requests* that riders buckle their seatbelts, and *encourages* riders to practice safety; a breathalyzer-enabled ignition *demands* that drivers breathe into a tube (and *demands* that drivers have not consumed any alcohol), but *allows* any driver with low enough blood alcohol levels to operate the vehicle.

This is not to say that features fall cleanly within one category and are thus precluded from the others. Rather the mechanisms of affordance constitute an analytic tool. The boundaries between mechanisms are porous and interrelated, with easy slippage from one category to the next. Through changing empirical circumstances or even divergent readings of a situation, *requests* can increase in intensity to become *demands*, while *demands* may relax into *requests*; artifacts may lightly *encourage*, heartily *discourage*, or almost entirely *refuse*. The mechanisms of affordance—*request*, *demand*, *allow*, *encourage*, *discourage*, and *refuse*—represent not an inherent empirical reality, but instead, a theoretical scaffold and conceptual language that addresses the dynamic relations between subjects and artifacts.

In addressing variability, the mechanisms explicate *how* artifacts afford. Yet simply delineating categories of gradation leaves room for the (faulty) assumption that artifacts operate in uniform ways across contexts. In contrast, affordances take shape and meaning only through the interrelation of artifacts, subjects, and sociostructural environments.

Conditions of Affordance: Affordances for Whom and Under What Circumstances?

A final critique leveraged against affordances theory is its struggle to account for contextual variation. Although both Norman and Gibson constructed affordances as organism-environment relations, such relationality has remained highly conceptual. That is, affordances are largely defined ecologically, but in practice, reduced to a “homogenous block” (Scarantino, 2003, p. 961). Thus, once we know what affordances are, and how they work, the next question is *for whom* and *under what circumstances*?

Affordances operate at the intersection of artifacts, actors, and situations (Chemero, 2003). Though artifacts do have features, the accessibility of those features vary between individual subjects and amid diverse circumstances, fostering an array of possible outcomes (Evans et al., 2017). What an artifact *requests* of one user it may *demand* of another; what the artifact *refuses* in one moment, it may later *allow*.

Empirical studies that centralize user and environmental variability demonstrate the structural and relational nature of affordances. The field of digital inequalities research is exemplar in this regard. Important findings demonstrate the ways that access to technology, technological savvy, and social networks affect the likelihood that the features of an artifact will produce (or not produce) a range of results such as technological literacy, access to information, and digitally mediated social connection (Hargittai & Litt, 2013; Robinson et al., 2015; Schradie, 2012). These studies are significant for their empirical documentation of the ways that features do not determine outcomes but are instead, mediated through dynamic affordances (Evans et al., 2017). In short, the mechanisms of affordances take shape through material and social circumstances.

Our model denotes three conditions of affordances: *perception*, *dexterity*, and *cultural and institutional legitimacy*. Perception and dexterity are adapted from McGrenere and Ho (2000), who identify two planes along which the accessibility of affordances vary: “the ease with which an affordance can be undertaken and . . . the clarity of the information that describes the existing affordance” (p. 7). Thus, perception refers to what a subject knows about the artifact, and dexterity refers to what a subject can do with that artifact. In addition, we capture the social and structural embeddedness of the affordance relationship through a third factor: *cultural and institutional legitimacy*.

Through this model, the conditions of affordances vary with subjects’ awareness of the function (perception), their skill and ability to execute the function (dexterity), and social support in executing the function (cultural and institutional legitimacy). Concretely, evaluating an artifact’s affordances entails discerning if a subject perceives the artifact’s function, and if so, does that subject have the physical and cognitive dexterity to utilize it, and if so, is the subject’s use of the artifact culturally valid and institutionally supported.

The conditions of affordances operate together, such that each component is a necessary but insufficient condition for discerning how artifacts afford. In this vein, subjects’ relation to each condition informs and is informed by their relation to the other conditions. That is, perception is tied to dexterity, and cultural and institutional support make perception and dexterity more or less likely for subjects in varied structural and historical positions. To be sure, cultural norms may foster skill development for some subjects, while stifling such development in others; what seems plausible for one person, may be inevitable for others, and inconceivable for others still.

Perception

An artifact’s functions are only accessible to a particular subject if that subject knows the functions are available. This is key to Norman’s (1999) distinction between real and perceived affordances—with the former representing features of an artifact and the latter representing a subject’s awareness of said features. Indeed, features remain inert until subjects recognize the features’ potentialities (A. Cooper et al., 1995/2014). Thus, an artifact *requests*, *allows*, and *encourages* only in relation to those features of which a subject is aware. If a subject is unaware of a feature, the artifact *refuses* the lines of action that the feature enables.

For example, a mobile phone camera will only produce video for those users who are aware of the camera’s presence and functions, while a dining room chair can only act as a stool for those who recognize the potential to stand (rather than sit) upon it. In this way, a sign that claims a fence is active with electricity *demand*s that people stay away, but for those who notice cows safely making contact with the fence, the sign is instead a *request*.

Similarly, Google’s e-mail service has long contained a feature that enables users to unsend mail, but due to the service’s architectural configuration, many remained unaware that “*unsend*” was an option. The unsend feature was initially located behind several clicks in the Advanced Settings menu, but is now more prominently situated as part of Primary Settings. Until its move to Primary Settings (which one could read as a shift from *discourage* to *allow*), neither the first nor second author perceived retraction as a possible line of action, and were thus *refused*. That is, although Google *allowed* some users to unsend mail, we were not among them. Rather Google *demand*ed that our sent mail reach the recipients’ inboxes.

Dexterity

Perception is a necessary condition for access, but remains insufficient. To utilize a feature, subjects must not only know that the feature is available but must also be capable of deploying the feature. Dexterity refers to both physical ability (e.g., can a subject physically type on a keyboard or click a mouse) and cognitive aptitude (e.g., does a subject know how a mouse click will affect screen functions). Dexterity is the key premise underlying the social model of disability and related activism. The social model of disability is premised on a society that privileges able-bodies, making it difficult for those with physical and cognitive atypicalities to navigate the world (Oliver, 1990). For example, the presence and purpose of stairs may be abundantly clear to a person who uses a wheelchair, yet the stairs *refuse* to escort the wheelchair user from one floor to the next, while *encouraging* or at least *allowing* persons who walk to utilize multiple levels of the space.

Similarly, a person might know that unsending e-mail is an option, but not have the skill to navigate settings and

implement that option. Users may record live events on their mobile devices and be aware that recorded content can be distributed on social media, but if they do not know how to transfer the material from phone-to-platform, the content *refuses* to be shared. In turn, location-based mobile applications *request* that users share their geographic position with other users in the network, but this becomes a *demand* for those users without the savvy to employ the application's privacy settings.

Cultural and Institutional Legitimacy

Finally, affordances hinge on cultural and institutional legitimacy. The push and pull of an artifact rests partially on the structural position of the subject with whom it relates. That is, affordances are always part of a world that is "propertyed by other people" (Schmidt, 2007, p. 137) and thus rests at the intersection of history, biography, and culture. The driver's license provides a useful example. The license is an institutional document that unlocks the transportation features of motor vehicles. A person may perceive that a car carries people and goods between points, and may have both the knowledge and physical ability to operate the vehicle. Yet those with licenses are *allowed* and at times even *encouraged* to drive, while those without are *refused* or at least *discouraged*. That is, the car *demand*s that the unlicensed driver sit in a passenger seat, while the licensed driver is invited behind the wheel.

Expanding this example historically, men in the United States have enjoyed primary driving privileges, while women drivers have been the subject of denigrating humor about driving ability. Although this dynamic has shifted dramatically in recent years, a substantial contingent of women who were born before the 1950s never learned to drive, or did so only when necessary. Though aware of the car's function, physically capable of operating the vehicle, and legally entitled to vehicular operation, the culture and interactions pertaining to cars have historically *discouraged* or *allowed* women to drive, while *encouraging* and *requesting* that men do so.

In this way, Facebook's age policy *demand*s that users be older than the age of 13 years and *refuses* to let children participate. In turn, normative structures foster the feminization of platforms like Pinterest, racialization of 4Chan, and a youthful demographic on Snapchat, animating *requests* and *encouragement* for certain types of users (i.e., women, White people, millennials) while *discouraging* and/or *refusing* others (i.e., men, people of color, older adults). Thus, intersections of history, biography, and culture interplay with material artifacts to shape how those artifacts afford over time, in varied situations, and in relation to diverse subjects.

In sum, how artifacts *request*, *demand*, *allow*, *encourage*, *discourage*, and *refuse* is always relative to the subjects who engage said artifacts, and the structural position in which the subject-artifact relationships are embedded. How artifacts

afford hinges on perception, dexterity, and cultural and institutional legitimacy, and these conditions hinge on one another. Thus, the mechanisms of affordance are necessarily situated within the conditions of affordance. In turn, how artifacts afford will vary amid new circumstances, new information, architectural adjustments, bodily changes, cultural turns, and institutional shifts.

Of note, conditions facilitate engagement with technological artifacts not only by revealing and concealing intended functions but with regard to circumventing intended functions too. For example, "cheat codes" in video games enable players to acquire resources in the game (e.g., points, money, tools, level-ups) through awareness of system workarounds, skill in deploying those workarounds and normative practices of gaming communities. In this way, teenagers may recognize, utilize, and jointly promote stairs, curbs, and steep hills as objects that *encourage* skateboarding tricks among their peers, despite the design of these artifacts for the purpose of urban pedestrian flow.

Finally, it bears repeating that the conditions of affordance—perception, dexterity, and legitimacy—though analytically distinct, are inextricable in practice. Cultural norms certainly guide the kinds of knowledge subjects acquire (perception) and in turn, the skillsets they develop (dexterity). Social location informs life trajectories with regard to plausible lines of action, network formation, and embodied knowledge. In this way, the functions of a smartphone may be more obvious to young middle-class Westerners than to those young adults' grandparents (Smith, 2014), just as gender differences in computational dexterity are born of social norms that masculinize technological proficiency (e.g., J. Cooper, 2006).

Summary and Conclusions

The concept of *affordance* holds a prominent place across disciplines. This is well deserved, as the concept maintains an important analytic role, navigating the tenuous space between subject agency and technological efficacy. However, critics have rightly expressed concern that *affordance* is a blunt analytic tool, in need of sharpening. Specifically, detractors call for definitional clarity, the dissolution of false binaries, and depictions of situated subjects for whom affordances take on diverse trajectories, and toward whom artifacts afford in nonuniform ways.

While conceptual developments have advanced scholarly understanding of what affordances are, these advancements underscore the need to delineate *how affordances work*. Centering the *how*, our model captures variability in the way affordances mediate between features and outcomes, and situates these variations in sociostructural patterns. Mechanisms and conditions thus create a scaffold through which artifacts *request*, *demand*, *allow*, *encourage*, *discourage*, and *refuse*, and do so through variations in *perception*, *dexterity*, and *cultural and institutional legitimacy*.

The model provides a dynamic rendering of affordances, one that moves with shifting material and cultural landscapes, and with subjects who evolve and change in their own lives. In the spirit of dynamism, the analytic categories of the model are intertwined and porous. Rather than fixed by empirical designation, features may reside ambivalently between categories. A hard *request*, for example, may well be experienced as a *demand*, while a faint *allowance* may seep into *discouragement*. In this vein, the conditions under which artifacts afford—*perception*, *dexterity*, and *cultural and institutional legitimacy*—are inextricable, each informing and informed by, the others.

Moving forward, researchers can employ the theoretical structure of the above model as it applies across shifting conditions of material artifacts, agentic subjects, and sociocultural systems. Such a project is significant for both theoreticians and designers alike. Clear and flexible analytic tools are essential for deconstructing how technologies—new and old—operate in practice. Theoreticians can thus effectively trace the dynamic processes of subject-artifact relations amid a quickly changing material and cultural landscape. In turn, designers with end users in mind can employ the model to consider how features will prompt and dissuade, for whom, and under what circumstances.

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1. The fencing example comes from one of our students, who astutely observed the need for more nuance in affordance theory.

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