

Affordances: Bringing Them Out of the Woods

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Thanks to a number of articles on affordances in this magazine, chapters in textbooks on interaction design, and online interaction design resources, almost every interaction designer is aware of the concept of affordance. Yet, we observe that despite widespread awareness of affordance by designers, the concept has yet to translate into widespread benefits for end users.

It's not uncommon to observe users completely befuddled by everyday objects. There is a video on YouTube with more than 70,000 views showing a man unable to open an airplane lavatory door—despite a hand-size aluminum plate on the door that suggests the “pushability” of the door and words describing the affordance (PUSH)—until a cabin crew member advises him to push the door open. So much for the theory of congruence provided by cognitive scientists to explain the perception of affordances. Though there may be theoretical debate over whether the door's affordance was “perceptible” or “false” or “hidden” [1], design has failed when end users cannot perceive the affordance of an object as simple as a door.

To minimize such befuddlement in the digital world, interface designers implemented physical affordances on screen-based interfaces through *skeuomorphism*. Skeuomorphism transports visual cues from real-world physical objects to screen-based interfaces to make interactions with screen elements more evident. An aesthetic backlash to skeuomorphism led to the *flat design* principle, which eliminated affordances altogether. Visual cues for possible actions simply disappeared. Users now hover, click, and swipe with abandon until the right action occurs. While nearly everyone agrees that affordances increase the utility of an object and make them easier to use, we have some way to go before we know how to design affordances effectively. In this article, we will describe two design strategies to improve the perception of intended affordances.

Let's first delve into the question of why our profession has made less than stellar achievements in designing affordances. The first problem? The community still cannot settle upon a definition of an affordance. When J.J. Gibson [2] coined the term *affordance*, he posited that it refers to “the actionable properties between the world and an actor” [3]. Don Norman [3,4] went a bit further and said that (perceived) affordance refers to “the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could properly be used.” To explain this definition, Norman stated, “A chair affords (‘is for’) support and, therefore, affords sitting.” Later, Norman completely recanted his position on affordances, proclaiming affordances do not exist; only signifiers exist.

Strangely, users do not appear anywhere in the definition of or discussion about affordances. Some definitions of affordances lack evidence from user studies, instead relying on one or two well-argued examples. For us as designers, one paramount factor remains ignored. Whether there is or is not an affordance or whether the affordance is perceptible or hidden does not really matter. What matters is that *users should perceive the intended affordance*. Designing affordances means designing for recognition of the affordances intended by the designer. Therefore, *perceived intended affordances* are the only relevant affordances. As designers, we create things hoping that everyone will understand what we did, why we included certain features, and the relevance of those features to

the user's perception of the intended purpose of the object. We care that users will know how to use the object to achieve its intended purpose. Philosopher Daniel Dennett calls this behavior the design stance [5]. When people predict the behavior of any entity that interests them, they assume designers made the object for a specific purpose. Designing objects from an affordance perspective is not a matter of making certain affordances perceivable; rather, it is about making the intentional ones more obvious.

Instead of worrying about whether an object possesses *any* affordance, designers should worry about the perception of intended affordances. We tested this question through an online experiment because we wanted to limit the ability of the participants to physically manipulate the object to determine its affordance. We presented more than 100 participants with novel versions of common objects such as a cake server and an ashtray. We then asked users the simple question, "What would you most likely do with this object?" The participants selected a potential affordance from a given list. Notably, the list of options contained valid affordances for the object, but only one option described the intended affordance. For instance, the cake server example offered *throw it*, *grip it* (the correct one), *stand on it*, and *attach it to something* as potential affordances. We then asked them to explain their answer. What we found confirmed our hypothesis. Yes, users can perceive affordances. However, users struggle to identify the intended affordance.

What could be done to make affordances more visible without marking them with a label such as "PRESS HERE"? We have been working on two design strategies as a means to influence the perception of an affordance [6]. The first strategy, *classification*, refers to manipulating the relationship between the context in which the object may live and the user's motivations and knowledge. The second strategy, *framing*, refers to manipulating the relationship between the intrinsic properties of the object and (again) the user's motivations and knowledge. The intentional manipulation of affordances through classification and framing influences the likelihood of the intended perception.

For instance, as a way to strengthen framing, a pen and pencil holder might have individual holes having the circular profile of pencils and circles with the notch profile of pens (stronger framing) rather than one large opening (weak framing). To strengthen classification, an effective approach would be to signal its intended context by designing the holder with a large number of holes (people have many pens and pencils but few toothbrushes). Materials such as cardboard could reinforce the fact the holder does not belong in wet environments (e.g., bathrooms).

So, in our next experiments, we strengthened the framing and classification of each object. To strengthen framing, we changed the appearance of the object by highlighting the properties of the object conveying information about the intended affordance. We tested the strength of classification of the object by placing other objects having another affordance but not the object's intended affordance in the image. As expected, these manipulations helped participants to perceive the intended affordances. We found a statistically significant change in correctly perceived intended affordances. It makes sense that highlighting the intended affordance makes it more visible. Confusing the users with objects having unrelated affordances decreased their ability to perceive the target object's intended affordance. The results show the importance of considering the environment in which the object exists. The environment influences the user's perception of the

intended affordance. We shouldn't forget that Gibson did intend the term *affordance* to describe the properties of the environment itself with respect to an organism. The environment takes on an important role in what the user perceives as the intended affordance.

Were the intended affordances previously hidden in the sense that they were not visible to the participants' perception? We think not. In reviewing the participants' responses explaining their answers, only a small fraction of them justified their responses by referring to the object's affordance. Instead, their responses referred to the intended purpose of the object or its semantic category—what it is. More frequently, these open responses suggested the following. When users viewed the object, they:

- tried to think about what the object is, in other words, whether the object is a scissor or a caliper,
- tried to think about its intended purpose, that is, its function or what it is meant to do,
- then tried to think about how to use it, that is, how they would make it perform its intended purpose.

The last item is what we were looking for, as it corresponds to the perceived intended affordance. A button that opens an app on a mobile phone has *tapping* as its affordance and *launching the app* as its function. Our participants rarely explicitly thought of an object's intended affordance—at least, they did not express it. Most often, they thought of the object's function. The results suggest that individuals may have perceived the intended affordance, but they did not know that they had and therefore chose some other affordance.

Affordances exist in every product. Unfortunately, users often fail to perceive the intended affordance. That's why we continue to observe so many users struggling to use the simplest object. Moreover, it turns out that slight changes to the visual features of an object and their placement in a context that reinforces (or diminishes) the intended affordance can influence whether users perceive the intended affordance. Finally, users think about affordances less commonly than we might expect. Perhaps people never even recognize an affordance; they simply learn affordances from prior experiences. Fluent interaction with objects and screen-based interfaces develop through habituation rather than anything natural about objects.

Our experiments show that designers can rely on users perceiving an affordance but cannot rely on users recognizing the intended affordance. We're not even sure if users know what an affordance is, even though we keep writing as if they do. They just know that they push the door to enter a room. If designers want users to perceive and recognize the intended affordance, they must strengthen the framing or classification of the affordance.

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Endnotes

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Insights

- Designing for usability through affordances requires designers to be aware of an object's perceived intended affordances.
- Intended affordances can be manipulated or thwarted by the visual features of an object, and by other objects in the user's field of view.