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### Abstract

An argument is developed that suggests the concept of affordances can best facilitate the pursuit of new knowledge if it's defined as an event. The first description initially generated by James J. Gibson was deceptively vague. This has led to several attempts by additional researchers to re-describe it. These efforts fall short of describing a concept that is consistent with both the historical context of Gibson's work and his motivations for introducing the term. Additionally, no definition has been introduced that aims to limit the scope of information researchers must consider when using the term. I put forth a description of affordances that is consistent with Gibson's motivations and is pragmatically motivated to restrain the scope of inquiry. The application of this new description may lead to more fruitful experimentation and less problematic discourse throughout the disciplines that use the term.

# Affordance Ontology: Towards a Unified Description of Affordances as Events

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## Abstract

An argument is developed that suggests the concept of affordances can best facilitate the pursuit of new knowledge if it's defined as an event. The first description initially generated by James J. Gibson was deceptively vague. This has led to several attempts by additional researchers to re-describe it. These efforts fall short of describing a concept that is consistent with both the historical context of Gibson's work and his motivations for introducing the term. Additionally, no definition has been introduced that aims to limit the scope of information researchers must consider when using the term. I put forth a description of affordances that is consistent with Gibson's motivations and is pragmatically motivated to restrain the scope of inquiry. The application of this new description may lead to more fruitful experimentation and less problematic discourse throughout the disciplines that use the term.

## 1. Introduction of a New Term to Science

James J. Gibson (1979) introduced the concept of “affordances” to psychology—the noun version of the verb *to afford*. However, he did not construct a complete description for it during his lifetime. Not unlike the subsequent literature on affordances, his concept and its use evolved. Without an explicit description of his new term, he failed to delineate its size and scope in a way that was optimal for scientific research, and its incompleteness may be charitable to usage of the term that Gibson may not have intended.

Traditionally, the motivation for introducing a new term to science is to guide inquiry. We would not talk of electrons, radio waves, or the biological cell if the knowledge to be gained by doing so was nil. By exploring Gibson's motivations for introducing the term; the objects that it may refer to; the evolving definitions he used to describe them; and the historical context that accompanied his work; we may avail ourselves to the direction his finger was pointing, not simply where it was at, in order to navigate the

relevant literature and assist with delineating a description that is most beneficial to scientific research.

## 2. Gibson's Affordances, Motivations, and Historical context

Gibson's first attempt to describe affordance was vague. He states "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (Gibson, 1979, p. 127). It's difficult not to assume this is referring to something or some property that exists out in the environment. However, he claims that what he meant for the term was "something that refers to both the environment and the animal in a way that no existing term does" (p. 127). This was a critical move on the behalf of Gibson because it reflects an attempt to eliminate the possibility for affordances to refer something we already have a term to describe, and to do it in a way that no other term does—it is parsimonious and must do new work. Gibson follows with a longer theoretical description of his new term:

An affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer (129).

What kind of entity points in two directions? How can any entity be both subjective and objective? How can something be two different things, yet also neither? Reed (1988) describes a young Gibson as a man who rejected the majority of psychological research during his time and chose to develop his own approach that he called an ecological approach to psychology. The fundamental difference between Gibson's approach and others' was that he was concerned with understanding an organism's behavior in an environmental context. And though his path veered from the psychological research of his time, he remained enthusiastic for experimentation and relied heavily on it to support his theories (Gibson, 1958, 1962, 1963, & 1979).

There are three crucial insights to be gleaned from knowledge about Gibson's life work with respect to what he intended his new term to refer to. First, the ecological approach to psychology sets its sights on behavior within the animal-environment system (AES) as the fundamental object of inquiry. Second, he claims that what we can perceive is what is real; and perception for Gibson was direct, therefore direct perception must be accounted for. Direct perception has since been a ubiquitous concept throughout the empirical data related to affordances (e.g., Mark, 1987; Riccio & Stroffregen, 1988; Warren, 1984; & Warren and Wang, 1987). Third, the emphasis on experimentation suggests that there

should be some way to measure them or use them in experiments to acquire new knowledge.

### 3. Postliminary Ontologies

Reed (1996) claims that affordances are objects in the environment that have the property of being a resource that can be exploited by an animal. Reed links his description to evolutionary theory, and wants a description of affordances that refers to something in the environment that exerts selection pressure on animals. Affordances, then, are resources in the environment that exist independently of any animal that may come to perceive them.

Turvey (1992) contrasts this view by providing a description of affordances that is motivated by physics as opposed to biology. He claims that they are physical dispositions of objects in the *environment*, dispositions that in some circumstances manifest properties that can be perceived by animals. The property of being an edible exists if animals exist that can eat it. Furthermore, affordances have to be *real* possibilities and also be complimented by the physical dispositions of the animals. He uses the term *effectivity* to refer to the dispositional properties of the animal. Under this description, affordances are not invariant features of the environment; rather, they come into and out of existence when the complimentary dispositions of the affordance and the effectivity co-exist. Therefore, he argues they are *emergent* phenomena.

Stroffregen (2000) and Michaels (2000) support Turvey's view that affordances are an animal-referential concept. However, Stroffregen (2003) later alters his description by claiming that they do not exist out in the environment. Also, motivating Stroffregen's (2000) work were the arguments made by Bingham (2000) where he claimed that affordances may be properties of events. Stroffregen rejects this idea on the grounds that affordances exist independently of an event. For example, the ratio of a person's leg length to the height of a step is an entity that exists independent of any event. He goes on to describe affordances as emergent properties of the animal-environment system (AES). Appealing to the widespread agreement that the discipline of ecological psychology posits behavior in the AES as the unit of analysis, this description motivates the need for a candidate definition that positions the affordance in the context of the AES. Reed and Turvey's descriptions failed to meet this standard. He explains that the constituents of a system will have their own properties, and that the systems that are made up of these constituents also have a unique set of properties; the latter are emergent properties. To illustrate, he asks that we imagine a triangle drawn out on paper. The lines that constitute the triangle have their own properties such as length, width, and straightness. When combined, they form a triangle that has the emergent property of having a quantifiable area, in addition to possibly being either acute, obtuse, or equilateral. This description of emergence places the context of affordances at the

level of the AES that differs qualitatively from the properties of the environment or the animal in isolation; and it excludes from consideration anything that cannot have consequences for action.

Chemero (2011) claimed that affordances are not properties at all; instead, he claims they are relations. To defeat the claims that affordances are properties, he makes a case that the type of perception involved with perceiving an affordance is one that involves perceiving the situation as a whole. He distinguishes his type of perception as feature placing rather than property perceptions. For example, to perceive that my mirror is dirty is to perceive a property that requires (a) perceiving the mirror; (b) perceiving that it is mine; (c) knowledge of what it means to be dirty; and (d) infer that this is my mirror that I am perceiving that has the property of being perceived. In contrast, to perceive that it is snowing outside is simply to recognize a feature of your current situation. This is akin to what it is like to perceive an affordance. Consider a ball kicking affordance. When the ball is near and in a position for us to kick, we directly perceive that it is time to extend the leg. This is to perceive that the situation has a feature that allows for a specific action as opposed to the perception of a specific property. Thus, Chemero describes affordances as a *perceivable* relation between the animal and the environment. Moreover, Chemero's concept of an affordance does not disappear when there is no local animal to perceive it, but the affordance does depend on the existence of an animal that can perceive it. He has narrowed down the ontology of affordance to a relation that holds between the complementary physical disposition of the environment and the animal, and this relationship need not be perceived or acted upon in order to exist.

#### 4. Delineating Scope

The differentiation of affordance ontologies above illustrates that each has their own position on the narrow to broad spectrum with respect to scope. The aforementioned descriptions of affordance are accompanied by three concerns regarding their implications on the scope of inquiry: (1) is it located in the environment, in the animal, both, or neither; (2) if it consists of multiple structures, which ones and in what way are they related; and (3) if they can be perceived or acted upon, do they have to be in order to exist?

Some (e.g., Reed, 1996; Shaw et al., 1982; & Michaels, 2000 & 2003) claim that affordances are properties of the environment that animals can perceive. For Reed (1996) they are dispositional properties of the environment that always exist; stair affords stepping on even if there is no animal present to step on it. A term also introduced along with these descriptions is *effectivity*. An effectivity refers to the dispositional properties of the organism that are complimented by an affordance. For Shaw, Turvey, and Mace (1982) affordances are properties of the environment relevant

to the body of an animal and exist when an animal that has an effectivity to act on them exists. While some have convincingly argued against these descriptions before (e.g., Chemero, 2011), their impact on the scope of investigation has not been addressed.

If affordances are properties of the environment that afford acting upon based on the effectivities of animals and can exist independent of any animal, then the scope of investigation for affordances includes everything in nature. However, we use the instruments of physics to measure the dispositional properties of nature. Contrary to Gibson's goal of referring to something *new* regarding the animal and the environment, this description encompasses all the objects we already know. It doesn't refer to anything new and doesn't introduce any new knowledge. Moreover, if affordances are dispositional properties of the environment, then they can be studied without considering the behavior of animals, neglecting the target of inquiry involved with affordances. It is also not clear what is intended when the environment is mentioned. Does an uninhabitable planet count as a part of my environment and afford lying down on? These descriptions deal with superfluous amounts of information that can be accounted for, and are supplemented by ambiguity of the terms comprising them. These descriptions should be rejected on the grounds that they neglect the logic of and Gibson's appeal to parsimony, in addition to offering far too broad of a scope for researchers to consider.

Some who argued against the descriptions of affordances as properties of the environment also responded by claiming that they are properties of the AES (e.g., Gibson, 1979, Chemero, 2003; & Stroffregen 2003). Here, an affordance is a property of a system that consists of two substances—the animal and the environment. Gibson's description falls into this category since he claimed what he meant for the term was “something that referred to both the environment and the animal in a way that no existing term did before” (Gibson, 1979). For Stroffregen (2003), affordances were “emergent” properties of the AES and for Chemero (2011), they were relations. Whether or not they're properties of the environment or relations that hold between it and an animal, these descriptions allow for a study of affordances that need not concerned with behavior. For example, we saw Stroffregen (2000) claim that the ratio of a person's leg length to the height of a stair as a thing in itself that referred to as an affordance. From the descriptions he puts forward, the ratio affords acting upon by the animal and fits his description of affordances. This is problematic in the context of Gibson's affordances in that this information can be acquired with complete indifference to the behavior of an animal. Take a measurement of something in the environment and compare it to a measurement of an animal, calculate the ratio, and you have an affordance. Not only does this not capture Gibson's concern with behavior, direct perception, or refer to something new (it is concerned with physical measurements with respect to the concept that had existed long before him—ratios) but it still leaves the scope of inquiry at the level of everything in nature—though it re-

emphasizes the need to target the animal. The question arises: If I am making measurements of the environment and animals, am I doing psychology or physics?

There is also a temporal problem with these descriptions; namely, an animal stands in a certain relation to everything in time as well as space. Thus, an affordance can be an infinite disjunctive. A stair affords sitting on and stepping on and licking and punching and kicking (this sequence can be repeated an infinite amount of times). If we consider certain social contexts as directly perceivable, then a slow pitch in baseball affords extending the batters arms and swinging the bat and hitting a home run and winning the game and becoming a sports legend. It is not clear where an affordance begins and where it ends in space nor when it begins and when it ends in time. The shortcomings of these descriptions enable an opportunity to generate a philosophically superior description.

## 5. Affordances as Perceived Events

My claim is that affordances are relational properties of the AES, and that they only exist when they are perceived. This description remains consistent with my pragmatic motivation for delineating the ontologies put forth by other researchers by standing above the rest with respect the how well it may facilitate the acquisition of new scientific knowledge. My explicit definition of affordances is forthcoming, but I want to begin by detailing what I believe is the essence of this description: That affordances are events.

By describing affordances as events, I build on a claims made by Stroffregen (2003) that affordances are emergent properties of the AES and Chemero (2011) that they exist as relations that obtain between an animal and the environment. Events, not unlike emergent properties, come into and out of existence. They are irreducibly temporal and durative. If I am to avoid the problems plaguing Chemero and Stroffregen's descriptions, then perhaps an explicit demarcation for when they come into existence can be the constraint on scope that is needed. This move also repositions behavior as the target of analysis, though still allowing for physics to compliment affordance research.

The first step towards this demarcation is to understand that events are fundamentally relational in nature. Building on Chemero's description, they can refer to a relation that exists between the animal and the environment. However, the nature of this relation cannot simply be complimentary physical dispositions if we are inquiring about behavior—we can simply use physics to measure dispositions. I argue that the type of relation that must exist is the relation that is engendered when the animal perceives the opportunity for action. When the complimentary physical dispositions of the perceiving animal and an object in its environment are perceived by the animal to afford it an



opportunity for action, then we have the instantiation of an affordance event. This description can be modeled by the “property exemplification account” of events (Kim, 1976).

The property exemplification account of events details a canonical description for what it takes for an event to be instantiated. An event has a structure consisting of substances( $x$ ), a property ( $P$ ), that occurs at a time ( $t$ ). Thus, an event ( $x, P, t$ ) exists when a structure has a property at a time. For affordances, the structure is the relation of the AES, the property which it possesses is the property of being perceived by the animal, and the time is the duration of the perception occurrence. Thus, an affordance can be said to exist at any duration when the perception of the opportunity for action is experience by the animal that can act on it. Because the structure element of the event is the relation between the animal and the environment, this description can include more than one perceived opportunity for action at a time. Here is an explicit definition that is consistent with my view:

An affordance is a behavior influencing event constituted by the structure of the animal-environment system and the perception of the complementary physical dispositions of the environment and the perceiving animal.

## 6. Concluding Thoughts

This description is Gibsonian at heart for several reasons. As an event, it refers to something in the AES that no other term does. Because it consists of physical properties and perceptions, it is both physical and psychical—yet neither because it is an event consisting of a structure—and also cuts across the dichotomy of subjective-objective. As a structure, it points both toward the animal—an object’s causal properties that specifies information in medium of the animal that it senses—and towards the environment—the causal properties of the animal’s body to act on the object. It provides for the animal a causal mechanism that influences behavior. It concerns behavior and can be detected in the lab, therefore consistent with Gibson’s enthusiasm for experimentation. Furthermore, this description is not plagued by problems of scope. The possibility of the infinite disjunctive is eliminated, and replaced only with the opportunities for action that are immediately available to the organism’s perception. Affordances as events is a promising description that limits the amount of information researchers have to account for and compliments the empirical endeavors of scientists employing the term in the lab.

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