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Are Events and Affordances Commensurate Terms?

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In this article, I argue that the dichotomy between events and affordances as Stoffregen (target article, this issue) devises is unwarranted and potentially misleading. I challenge the notion that the role of the actor distinguishes events from affordances in any useful way. The research labeled event perception is neither less ecological nor qualitatively different from research on affordances. Instead, the main distinction is constituted by affordance being a perceptual property, whereas event pertains to a different semantic category. Nonetheless, the contemplation of these concepts, in particular an elaboration of the concept of affordance, is desperately needed.

In his target article, Stoffregen (this issue) draws the grand conclusion that affordances are motivated by an ecological theory of perception and action, whereas events are not. The article culminates in the suggestion that only affordances are perceived, but events are not. Because I consider myself an event perception researcher, imagine how upset I was to read that people do not perceive events. The direction of Stoffregen's suggested theoretical development solicits commentary on two levels. First, from an ecological point of view, I raise some concerns about the juxtaposition of affordances and events. Second, from a more general point of view, I entertain that Stoffregen arrived at many of the right conclusions for the wrong reasons.

AFFORDANCE AND *EVENT* ARE CONCEPTS FROM DIFFERENT CATEGORIES

The ecological psychologist in me is puzzled by the almost amusingly simple dichotomy between event and affordance, the exploration of which, Stoffregen (target article, this issue) states to be the "logic of basic ecological theory" (p. 3). Logically, an

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event can be identical to an affordance, different from an affordance, or somewhere in between. If we were dealing with two perceptual properties that belong to the same category, such a distinction would indeed make sense. For instance, when investigating the perceptual qualities of color, we may ask whether the concept of color temperature is identical to the concept of saturation. If it is, parsimony would require that one of the concepts be dropped. In such a case, not only would all the questions Stoffregen asks be justified, but showing that event and affordance are tautologous concepts would be an important contribution to the field (for a criticism of tautology in psychological theories, see Gigerenzer, 1998). However, in the other case, if concepts do belong to two different categories, the question of identity appears fundamentally misguided.

I argue that the latter is the case. With respect to Stoffregen's (this issue) target article, I have to prove—of course—that event and affordance do, in fact, belong to two different categories and that entertaining an equality of the two amounts to committing a category error. The situation is analogous to confusing time-to-contact (TTC) with affordance, which the author put forth nicely in the category-error argument. I believe that it is rather easy to prove my point from an ecological perspective. Because such a perspective is ultimately grounded in a phenomenological analysis of perception, a terminological analysis in terms of the phenomenology of events and affordances seems to provide the necessary help. Strangely enough, Stoffregen never performed such an analysis.

Phenomenologically speaking, an event is something dynamic, extended over some period of time, involving some action such as burning, hitting, colliding, throwing, and so forth. A typical affordance, on the other hand, is a property. It can be a property of an object, telling us whether it can be thrown, whether it can collide with its neighbor, or whether it can be used to drive a nail into the wall or feed the fire. At a less complex level, affordances can be properties of media, such as air being breathable and "fly-throughable" for birds. At a more complex level, affordances can be properties referring to whole events. Thus, affordance and event are incommensurate categories. The former is potential, the latter is actual. Affordance is a property, whereas the event is what actually happens. A perceiver is needed in both cases, but this is a different issue.

Unfortunately, Stoffregen (target article, this issue) suggests rather unphenomenal definitions for event and affordance that are more controversial than he hopes. The notion that events are static and dynamic *properties* of objects appears misguided after our brief analysis. The weight of a rock cannot possibly be an event; nothing is happening. We may perceive the rock as heavy and even as barely throwable, but still nothing happens. Thus, an event cannot be a static object property. In contrast, the motion of the rock toward us constitutes an event. This motion, which may be necessary to reveal to us the rock's mass, might be taken to be a dynamic object property, and this is what might have seduced Stoffregen to maintain his definition. It is a little startling that he begins his analysis with the special case of a complex event, rather than starting with simpler object properties.

What seems to Stoffregen (target article, this issue) as beating around the bush by Gibson, Shaw, Bingham, Turvey, and others is only the manifestation of the fact that affordance and event go together. My take on this is that affordances are best defined as attributes, to avoid the term *qualia*, that capture the different event contexts in which the object can be placed. A rock affords throwing, catching, injuring, and so forth. An analysis we should pursue instead is whether the percept of a rock comprises all event classes (or all that are possible for the actor) in which it could feature. In other words, is perception holistic in the sense that we pick up all affordances at the same time, and if not, how do our intentions or predispositions figure into the concept of perceiving affordances?

The issue of whether we regard affordance only inasmuch as it relates to the observer seems to be an altogether different issue. We could define affordance as affordance for the actor him- or herself or also allow the perception of affordances for other people or animals. Because we can see that flies afford eating for frogs, we may want to use the latter definition. But no matter how we stand on this, affordance is always relative to an actor. The same holds for events. An event without a perceiver is utterly meaningless for a phenomenologist. Opaque moving matter is only individuated into events by the observer (e.g., see Husserl, 1900/1922). The Gibsonian realist only differs from this position by assuming some omnipresent generic observer. Thus, observer-dependence applies to both affordances and events. The difference between events and affordances by no means resides in the fact that the affordances require an actor, whereas events do not. Stoffregen (target article, this issue) arrives at the right conclusion for the wrong reasons. The concepts are distinguished only by their pertaining to different logical categories.

INVARIANTS AND WHAT THEY SPECIFY

As if we did not have enough trouble getting the difference between event and affordance straight, the third concept of an invariant entered Stoffregen's (target article, this issue) discussion early on. The ball-catching example is of particular interest here, because the invariant of tau is arguably the best-researched example for event perception that we have. Stoffregen asks whether tau may be an affordance or an event. According to a category analysis, we discern four questions here:

1. Is tau an object affordance?
2. Is tau the special case of an event affordance?
3. Is tau an event?
4. If tau is an invariant specifying an event, into what category does the invariant fall? Is an invariant categorically commensurate to event or to affordance, or does it belong to a third category?

Answers:

1. No, objects do not have certain relatively stable TTCs associated with them.
2. No, we do not perceive tau. But we can also argue the opposite, that yes, we perceive tau as a property of the event.
3. Certainly not, it is a category error.
4. Tau is a mathematical expression for a regularity in the optical information. Thus, it falls into a third category. Because Stoffregen seems to be aware of this fact, it is not clear why he also entertains the other possibilities.

Stoffregen's (target article, this issue) example comparing mountain goats, pies, and bricks on the same collision course is well taken. This clarifies that a given invariant is necessary but not sufficient to fully convey the affordances in this situation. Obviously, other invariants such as wobble, texture, and so forth are needed to differentiate between the benign impending pie collision and the potentially devastating brick collision. This again points to the fact that what a situation affords is typically complex, and we need to think about affordance classes rather than isolated affordances. Here he demonstrates nicely that TTC is not sufficient to explain an action, but that TTC has to be related to potential motor response times for that purpose. However, equating TTC with event and TTC relative to a motor response with affordance constitutes once more a category error. TTC and variations thereof remain invariant measures that only specify an event or an affordance.

In this context, it seems unfair to Runeson and Frykholm (1983) to first define what they called dynamics as object kinematics, then introduce the questionable term of array kinematics, and finally complain that array kinematics do not specify dynamics. The latter term remains undefined, and the whole word game does not go anywhere. Criticizing others for not following the questionable distinction between affordance and event that the author builds up, as in the case of Stins and Michaels (1997), seems equally unjustified. The conflict between the "environment taken in reference to an animal's possibilities for action" (Stins & Michaels, 1997, pp. 25–26) and the event-based description of environmental invariants is an artificial one. However, Stoffregen's (target article, this issue) criticism does entail the interesting suggestion that the measure of our perceptual units should always be action-based. Thus, instead of measuring a tau margin, we should use an escape margin or a catch margin. This idea deserves to be developed.

In the case of eyeheight, the situation is comparatively clear-cut. Eyeheight exists only for the psychologist to express the units with which the visual system might work. With respect to a level-ground plane, objects below one-half eyeheight might afford jumping over. Thus, an invariant belongs in a third category. It is neither event nor object property. It is a psychological unit of analysis. It is hard to understand why the author even entertains that invariants might have a differ-

ent ontological status. With the introduction of mutuality relations—eyeheight being an example here—the semantic mess is complete. The statement that "mutuality relations sometimes *have* [italics added] affordances" (Stoffregen, target article, this issue, p. 8) but at the same time *are not* affordances is impenetrable to me.

AFFORDANCES WITHOUT EVENTS

One conclusion that Stoffregen (target article, this issue) drew from his analysis of the two terms is that it is possible to perceive an event's affordance without perceiving the event itself. This is a strange conclusion indeed. How should it be possible to see that the approaching rock affords injury without seeing the rock move? I just do not get it. I can only speculate that the conclusion comes out of the self-imposed dichotomy between an observational and an action-oriented view of perception. But even if Stoffregen should be convinced that perception is only for action, the actor would still need to perceive what he or she acts on, unless of course what is meant here are reflex actions that circumvent phenomenal perception altogether. If one were to dwell on this, one could produce a theory of perception where only affordances enter our awareness, and all other information that is logically prior to the detection of affordances (pickup of layout, surfaceness, etc.) remains unnoticed. Stoffregen might have assumed this for consistency's sake, but such an assumption is not warranted. Many ingredients to our perceived affordances are accessible to awareness.

ECOLOGICAL CORRECTNESS

All terminological issues aside, Stoffregen's (target article, this issue) analysis captures some important aspects of perception that need to be addressed and that have been long neglected. There is mounting evidence that the actor's intentional state influences his or her perception (e.g., Hommel, 1993). We also have mistaken for too long the perceived object for a stimulus. Similarly, the abhorrence of mental processing appears to be a merely semantic problem. It seems quite irrelevant to perceptual research whether we call what the visual system does mental processing or information pickup. And certainly, a concept cannot be dismissed just because it reeks of mental processing. The issue seems to be one of awareness. And in my reading, Gibson (1979/1986, pp. 138–139) would be last to deny that some affordances enter our awareness although others may not.

The research we need is to assess how different invariants are exploited by the visual system. How do our intentions, perceptions of our own strength, and so forth modulate the use of optical invariants? Can the affordance of being hit by the approaching brick be broken down any further? How do tau and other invariants (specifying the brick as hard and heavy) combine? Do they influence our TTC esti-

mates or only our behavior? After all, large objects appear to reach us sooner, even if they have the same TTC value as smaller objects (DeLucia & Warren, 1994). The question of what it means to perceive an object's affordances requires investigation as well as theoretical elaboration. If a wine glass is used as a musical instrument, can we perceive it just as such, or are the other affordances necessarily present? An interesting and arguably most extreme theory in this context has been suggested by Wolff (1999; see also Hecht, 1999), who posits that all possibly intended actions are part and parcel of perceiving the object.

Stoffregen's (target article, this issue) distinction between perception in the case of action versus mere observation is well taken. This distinction would not lose anything if it were phrased as the role of intentionality in perception or as the pragmatic aspect of perception—and it is indeed the task of (ecological) psychology to investigate this side of perception.

In sum, the mere fact that we perceive both events and affordances does not justify the attempt to equate the two. We obviously can perceive members of incommensurate categories, but this does not mean that it is meaningful to ask whether the two might be the same. By entertaining the peculiar notion of an identity between affordance and event, Stoffregen (target article, this issue) builds up a mighty straw man and then defeats it. The defeat comes as no surprise, but the straw man does. However, to be fair, this maneuver might still have furthered our understanding of Gibsonian theory. It certainly has pointed out a serious challenge that the ecological community should take on: Operationalize the concept of affordance, continue Gibson's work. Once it is better operationalized, its character as perceptual properties that influence our actions will become evident. The dichotomy between "event researchers" and "affordance researchers" is an artificial one, but Stoffregen's challenge to develop a theory of affordance has to be taken seriously.

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