aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Perspectives on Psychological Science
2017, Vol. 12(2) 341–343

DOI: 10.1177/1745691616679944
www.psychologicalscience.org/PPS
SAGE

Seeing and Thinking in Studies of Embodied "Perception": How (Not) to Integrate Vision Science and Social Psychology

Chaz Firestone and Brian J. Scholl
Department of Psychology, Yale University

Recent work argues that "embodied perception" findings aren't about perception after all. Schnall (2017, this issue) mounts a defense by using classics from the history of social psychology to explain away various empirical challenges centered on the role of task demands. We find this discussion refreshing for seriously considering and responding to one of the six "pitfalls" that we have suggested compromise this literature (for discussion of all six, see Firestone & Scholl, in press-a). But we also think this defense is deeply confused in both theory and practice and is bound to make things worse, not better. Here's why.

Thinking

A major source of skepticism about embodied perception has been the utter transparency of so many such experiments. In one study, for example, subjects were burdened with a heavy backpack, asked to report how heavy it felt, and then asked how steep they thought a nearby hill was (Bhalla & Proffitt, 1999). In another experiment, subjects held a wide rod, imagined what would happen if they tried to walk through a nearby narrow doorway, and then estimated the doorway's width (Stefanucci & Geuss, 2009). These subjects judged the hill to be steeper and the doorway to be narrower than did their backpack-less and rod-less counterparts.

Do such results entail that action-capabilities change perception? Or might subjects have answered as they did because they inferred the plainly obvious connections between the manipulations and the hypotheses? The subjects themselves have helped to answer these rhetorical questions. When asked open-ended questions about the backpack study, for example, subjects said things like, "I think I was asked to wear the backpack because when a person judges the slope of a hill their judgment can be skewed based on how difficult they think climbing the hill will be" (Durgin, Klein, Spiegel, Strawser, & Williams, 2012, p. 1594). Moreover, only those subjects who articulated such hypotheses actually showed the effect (Durgin et al., 2009).

This has struck many of us as a devastating blow to such research—but Schnall is unconcerned. She reviews classic social psychology studies on misattribution and confabulation and argues that "people do not always have introspective access to the reasons behind their judgments" (p. 329) and so "often give reasons for their thoughts and behaviors that are unrelated to the real underlying reasons" (p. 329). Thus, subjects' ability to so accurately articulate the experimental hypotheses, she argues, can be safely ignored.

Of course, we too are familiar with this classic work, and we agree: *Sometimes*, we do not know why we act. But sometimes we do. When subjects can report a study's purpose in such exquisite detail that they could practically write the hypothesis section of your paper, you can't just write off their reports because they *could* be unreliable—you need to actually rule out the possibility that your results simply reflect task demands. And this is especially true for these cases of embodied perception, in which—unlike so many other visual "demos" (see Firestone & Scholl, 2015)—the effects are never appreciable first-hand despite their truly seismic effect magnitudes. (For example, Schnall et al., 2010 reported that glucose ingestion changed the perceived grade of a hill by 14°, or about 50%; to put this into perspective, it would be as if a hill's slant increased by approximately the magnitude of San Francisco's steepest avenue, and as a result ended up being steeper than Mount Everest—and yet all this failed

Corresponding Author:
Chaz Firestone or Brian Scholl, Department of Psychology, Yale University, Box 208205, New Haven, CT 06520-8205
E-mail: chaz.firestone@yale.edu or brian.scholl@yale.edu

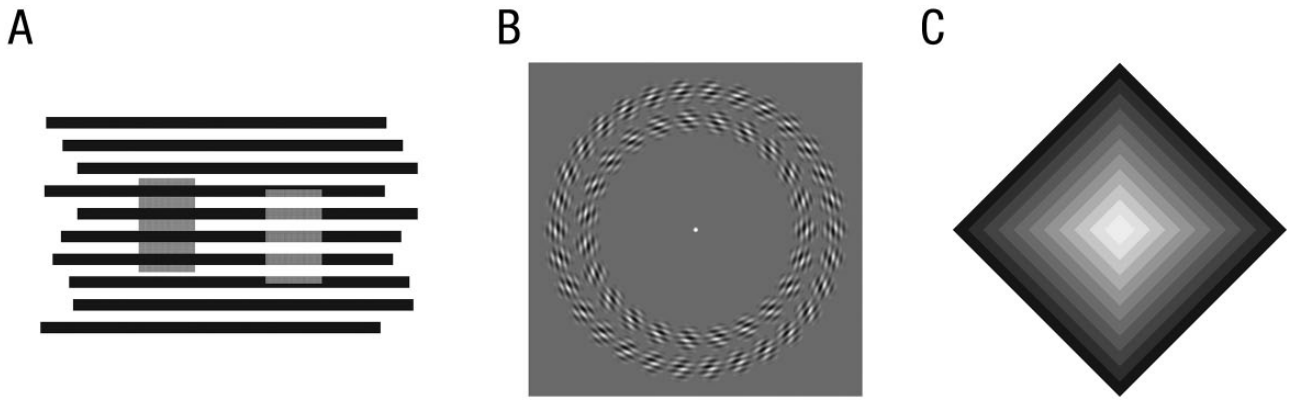

Fig. 1. Three of the countless examples in which visual phenomena do not "go away" even when you are made aware of the relevant contextual influences. (A) The two sets of equally gray bars look lighter or darker depending on the background they appear to "belong" to (White, 1981). (B) Moving the image closer to you or farther from you makes the inner and outer rings appear to rotate in opposite directions because the perceived motion of diagonal lines is biased toward the direction perpendicular to their diagonal (Pinna & Brelstaff, 2000). (C) A light cross is seen along the edges of each square. The light edges are not really there on any given square but are caused when the squares appear in the context of other squares stacked on top and beneath them (Adelson, 2000).

to be subjectively noticeable.) One cannot convincingly claim to overturn decades of orthodoxy in vision research without implementing these simple, critical controls.[1]

Seeing

An even deeper source of skepticism has been how easily embodiment effects can be made to vanish (e.g., simply by disguising the manipulation's true purpose with a cover story). For example, inspired by Durgin et al. (2009), we eliminated the rod/doorway effect simply by offering the plausible suggestion that we were testing differently sized rods to see if they might improve balance while walking (Firestone & Scholl, 2014). Moreover, when effort is manipulated even more surreptitiously—for example, by having subjects estimate the slant of either a staircase or an *escalator* (Shaffer & Flint, 2011, an important study Schnall neglected to cite)—there is no effect of effort at all.

Schnall redescribes such techniques as "explicitly drawing participants' attention to the presence of the rod" (p. 334), and she deems this "the most critical error" made by embodied perception's critics, because cover stories create countervailing demands of their own, and because it is well-known in social psychology that "previously observed effects should go away . . . once participants are aware of essential parts of an experimental set-up" (p. 331).

This response seems misguided in at least three ways. First, it does not apply even in principle to cases that do not use cover stories (e.g., the staircase/escalator study). Second, it is false that cover stories can only reverse (and never minimize) demand: For example, telling subjects that a rod is for balance doesn't imply a direction in which they should alter their estimates, because the story is simply orthogonal to any particular bias. And even if the manipulation does in some sense "draw attention" to the rod's presence, it arguably does so *less* than the original manipulation itself, which invited subjects to dwell on a mysteriously unexplained rod. Third, Schnall's historically informed argument—that making a contextual influence explicit eliminates its potency—is yet further evidence that these effects are not truly perceptual, because this argument fails dramatically in every other clearly visual case on record.

For example, notice that the gray bars on the left of Figure 1A look darker than those on the right. This is illusory; they are physically identical. Let's now reveal the "essential parts of the experimental set-up": The illusion is caused by the contextual influence of the surrounding black/white bars, which give the gray bars different senses of which background they "belong" to (Gilchrist et al., 1999). Take that in, and then return to the gray bars. Now that we've explicitly drawn your attention to the contextual influence, has its effect vanished? Of course not. This is as general an empirical observation as there is in perception research: When it comes to clearly visual effects, calling attention to the relevant manipulations (or even altering the social context—however you wish) can no more make them vanish than they can make gravity vanish.

But how can this be, if social psychology shows that "contextual . . . influences have an effect on judgments only as long as participants remain unaware of this influence" (Schnall, 2017, p. 326)? Evidently, this supposedly general insight is not so general after all, since most

perceptual effects don't suddenly disappear when the underlying influence is made salient. And that means there is something very different about these new embodied perception experiments that sets them apart from the entire corpus of vision research. What is that difference? One possible explanation is that this is truly the first visual phenomenon that vanishes the moment you know about it. Our explanation is simpler: Embodied "perception" is not really perception (seeing), but rather is mere judgment (thinking).

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. Schnall reviews other studies that she claims take advantage of "nonobvious manipulations" and individual differences, and then asserts that "none of the skeptics (e.g., Durgin et al., 2009; Durgin et al., 2012; Firestone, 2013; Firestone & Scholl, in press) have put forward any alternative theoretical account that could explain those findings" (p. 334). In fact, these critical papers offer straightforward alternative accounts of exactly the sorts of findings Schnall reviews—for example, we have suggested that work on individual differences in age and fitness accidentally commits the El Greco fallacy (Firestone, 2013, pp. 469–470) and that it often produces effects in the wrong direction for its "adaptive" account (Firestone & Scholl, in-press-b, section R4.2.3). It is one thing for this article to disagree with these responses, but quite another to suggest that they don't exist at all.

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