

Commentary on Firestone & Scholl:

Behavior is multiply determined and perception has multiple components:

The case of moral perception

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Abstract: We introduce two propositions for understanding top-down effects on perception.

First, perception is not a unitary construct but composed of multiple components. Second, behavior is multiply determined by cognitive processes. We call for a process-oriented research approach to perception and use our own research on moral perception as a 'case study of case studies' to examine these issues.

It is tempting to agree that top-down effects on perception (such as our own, *moral pop-out effect*; Gantman & Van Bavel, 2014) constitute a radical reinterpretation of a foundational issue (Firestone & Scholl, this issue). Unfortunately, we cannot get excited about a notion of perception that excludes attention, inference, prediction, or expectations; this whittles the fascinating and broad domain of perception to sawdust. It is one thing for Firestone & Scholl to argue that the entire field of visual neuroscience is irrelevant to understanding human perception. It is quite another to dismiss evidence of re-entrant processing precisely *because* it is well-established (“whatever one thinks of the relevance,” p.10). This makes their cognitive penetrability argument circular.

Firestone and Scholl define perception to “encompass both (typically unconscious) visual processing and the (conscious) perceptions that result” (p.4-5) as they “have the broader aim of evaluating evidence for top-down effects on *what we see* as a whole” (p. 7). Yet, they only consider perception that is separable from attention and occurs prior to—and independently from—memory, judgment, and social and physical context. It is difficult to understand how this definition might include “*what we see* as a whole.” Moreover, their dismissal of unconscious inferences in vision, cross-modal effects, evidence of re-entrant processing in neuroscience, and changes in perceptual sensitivity over time, carves the mind at false joints. Their model of the mind seems to reify the administrative structure of psychology departments, manufacturing natural kinds of perception, cognition, and social processing.

The architecture of the mind does not recognize these distinctions. After perceptual input reaches the retina, multiple brain regions operate on this input, selecting the significant from the mundane (Lim, Padmala, & Pessoa, 2014), often by emotion (Anderson & Phelps, 2001)

motivation (Egner & Hirsch, 2005), some via top-down re-entrant processes (Gilbert & Li, 2013) to construct perceptual experience. We suggest that the more pertinent question for future research is not *whether* top-down influences penetrate perception, but rather *which components* of the perceptual processing stream are sensitive to top-down influence. But perhaps this is a matter of preference.

Thankfully, the crux of Firestone & Scholl's argument lies in their empirical re-explanations of a handful of case studies. These are falsifiable. We invite readers to take a closer look at their case studies, which make strong claims about psychological process. We evaluate Firestone and Scholl's empirical claims regarding the moral pop-out effect and ask whether this exposes a fundamental problem with their case study approach.

We previously reported that moral words were more frequently detected than non-moral words (matched for length and frequency), only when presented at the threshold for perceptual awareness (termed the moral pop-out effect, Gantman & Van Bavel, 2014; 2015a). The moral pop-out effect occurred over and above measured differences in valence, arousal, or extremity. We concluded that moral words were detected more frequently than control words.

Firestone and Scholl recently claimed that semantic memory must be solely responsible for the moral pop-out effect because the moral words were more related to each other than the control words were. As proof, they claimed to find "entirely analogous" fashion and transportation pop-out effects. Unfortunately there are fundamental flaws in the design and reporting of these studies that make it difficult for us to see how they could draw such strong conclusions.

First, there are some surprising problems with the experimental design of Firestone and Scholl's studies. For instance, participants were never randomly assigned to experiments. Without this lynchpin of experimental design, it is difficult, if not impossible, to draw any firm inferences about the similarities or differences between moral versus fashion/transportation pop-out effects.

Even more surprising, Firestone and Scholl's inferences rely on merely looking at the studies side by side and judging whether summaries of the results appear similar. Yet, there is good reason to believe these similar behavioral effects (moral vs. fashion/transportation word detection) arise by different processes even at the semantic level. We suspect that moral words are not explicitly encoded in semantic memory as moral terms or as having significant overlapping content. For example, *kill* and *just* both concern morality, but one is a noun referring to a violent act and the other is an adjective referring to an abstract property. Category priming is more likely when the terms are explicitly identifiable as being in the same category or at least as having multiple overlapping semantic features (e.g., pilot, airport).

Unfortunately, Firestone & Scholl (2014) do not present the necessary data to evaluate whether or not a similar process (specifically, repetition priming, p. 42-43) underlies moral vs. fashion/transportation experiments. While they reported the relevant means for the fashion/transportation experiments—which support their claims that fashion/transportation words show repetition priming effects—they do not report the analogous means for their morality experiment [8]. This unfortunate omission seems particularly problematic because this case study—like all the presented case studies—are presumably arguments about process.

Any observed behavior can be explained by multiple processes intervening between perceptual input and motor response. A single process rarely explains any behavior, and possible explanations are not always mutually exclusive. Accordingly, it is trivially true that semantic memory plays some role in the moral pop-out effect (how else would our participants know words like “kill” and “die”?), yet this does not rule out that the motivational relevance of morality (or any motivationally relevant construct) boosts related content to awareness. Accordingly, we do not think morality is modular either (Van Bavel, FeldmanHall, & Mende-Siedlecki, 2015). For instance, we would expect a “pop out” effect for any motivationally salient construct, such as food-related words when participants are food-deprived (Radel & Clément-Guillotin, 2012). We suspect that other case studies suffer from this same failure to consider the multiple determinants of behavior.

Arguments about process--and especially mediation--must examine it directly. Otherwise, dismissing any effect with a 1:1 model of cause-to-behavior seems presumptuous (and even naive). These problems plague their reinterpretation of the moral pop-out effect, and may well be embedded in their reinterpretation of other case studies.

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