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Enhanced visual awareness for morality and pajamas? Perception vs. memory in 'top-down' effects

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ABSTRACT

A raft of prominent findings has revived the notion that higher-level cognitive factors such as desire, meaning, and moral relevance can directly affect what we see. For example, under conditions of brief presentation, morally relevant words reportedly "pop out" and are easier to identify than morally irrelevant words. Though such results purport to show that perception itself is sensitive to such factors, much of this research instead demonstrates effects on visual *recognition*—which necessarily involves not only visual processing per se, but also memory retrieval. Here we report three experiments which suggest that many alleged top-down effects of this sort are actually effects on 'back-end' memory rather than 'front-end' perception. In particular, the same methods used to demonstrate popout effects for supposedly privileged stimuli (such as morality-related words, e.g. "punishment" and "victim") also yield popout effects for unmotivated, superficial categories (such as fashion-related words, e.g. "pajamas" and "stiletto"). We conclude that such effects reduce to well-known memory processes (in this case, semantic priming) that do not involve morality, and have no implications for debates about whether higher-level factors influence perception. These case studies illustrate how it is critical to distinguish perception from memory in alleged 'top-down' effects.

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1. Introduction

What factors determine what we see? A traditional view suggests that perception results from "modular" processes that are encapsulated with respect to higher-level states and so are "cognitively impenetrable" (Fodor, 1983; Pylyshyn, 1999). However, a raft of recent findings falling under the general heading of "top-down" effects has suggested that higher-level factors such as an object's desirability, meaningfulness, and moral relevance can directly influence how (and even whether) we perceive it. For example, it has been reported that people who have fasted for several hours are better able to see food-related stimuli (Radel & Clément-Guillotin, 2012), that assigning linguistic labels to simple shapes makes them easier to visually locate in a crowded display (Lupyan & Spivey, 2008), and that, under conditions of brief presentation, morally relevant words "pop out" in visual awareness and are more accurately perceived than morally irrelevant words (Gantman & Van Bavel, 2014). These and hundreds of other empirical reports have revived claims (previously popular during the "New Look" movement from the middle of the last century) that the basic perceptual processes underlying visual awareness are directly influenced by such higher-level states (e.g. LoSciuto & Hartley, 1963; for a recent review, see Collins & Olson, 2014).

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1.1. Seeing and recognizing

Top-down effects on perception are framed as effects on what we *see*, but many studies of such phenomena instead report effects on how we *recognize* various sorts of stimuli. By its nature, recognition involves not only visual processing per se but also memory retrieval: in order to recognize something, the mind must determine whether the presented stimulus matches some stored representation in memory. For this reason, any improvement in visual recognition could reflect either an influence on 'front-end' visual processing (in which case it would challenge claims of encapsulated perception) or merely an influence on 'back-end' memory (e.g. influencing how efficiently the relevant memory representations are retrieved).

For example, consider the phenomenon of spreading activation in semantic memory, as studied via priming in a lexical decision task (Meyer & Schvaneveldt, 1971): subjects are faster to recognize a printed word (e.g. "nurse") if they first read a related word (e.g. "doctor") than if they first read an unrelated word (e.g. "butter"). However, this phenomenon clearly has none of the orthodoxy-busting qualities of alleged top-down effects on perception, even though it involves an improvement in visual recognition. Instead, semantic priming is universally understood as an effect on memory (Collins & Loftus, 1975; Masson & Borowsky, 1998; Norris, 1995): reading the word "doctor" activates stored representations of semantically related words such as "nurse", which subsequently become easier to access—not because the actual visual processing changes, but because the standing 'threshold' for activation in memory is lowered (which occurs regardless of whether the word "nurse" is ever presented).

Effects on perception and effects on memory have, to our knowledge, never been explicitly contrasted in this way in contemporary discussions of alleged top-down effects on recognition. If such top-down effects truly reflect influences on 'front-end' visual processing, then they indeed pose a revolutionary challenge to the traditional understanding of visual perception. But the existence of top-down effects on 'back-end' memory is undisputed and pedestrian, having been demonstrated countless times in a wide array of circumstances (and long before any discussions of modularity and cognitive penetrability). Thus, if certain top-down effects merely reflect these sorts of well-known memory processes, they will have no bearing on the foundational issues surrounding higher-level influences on perception (though they may of course be interesting for other reasons).

1.2. 'Moral Popout': visual processing or semantic priming?

We think many alleged top-down effects on perception are explicable as effects on memory rather than on perception. For example, in light of this distinction, consider again the "moral popout effect", whereby morally relevant words were more accurately identified than morally irrelevant words (Gantman & Van Bavel, 2014). In a modified lexical decision task, subjects were briefly shown morally relevant words and morally irrelevant words one at a time over many trials, and the subjects correctly identified more of the morally relevant words than the morally irrelevant words. This result was taken to suggest that morality is "privileged" by the visual system and that "moral concerns shape our basic awareness" (p. 29), a result that by its nature threatens the modular view of perception.

However, simply by virtue of being related to morality, the morally relevant words were also related to *each other* (including, e.g., "justice," "law", "illegal," "crime," "convict", "guilty", and "jail".) By contrast, the morally irrelevant words, having been drawn from a corpus to match the moral words for length and frequency, were not related to anything in particular (including, e.g., "exchange", "rule", "limited", "steel", "confuse", "tired", and "house".) Thus, just as the word "doctor" primes semantically related words such as "nurse", words such as "crime" may have primed semantically related words such as "convict"—whereas words such as "steel" would not have primed unrelated words such as "confuse". In that case, 'moral popout' would simply be another demonstration of semantic priming, with no implications for the relationship between perception and cognition.

1.3. The current studies

The two views of "moral popout" contrasted above make starkly different predictions about how the effect may or may not generalize. If the effect reflects an influence of morality per se on visual awareness, then the effect should be specific to the moral domain (and perhaps related domains of similar importance). But if the effect reflects only spreading activation among related words, then it may have nothing to do with morality at all, and may generalize to *any* group of semantically related words.

Here, we directly tested these competing predictions by asking whether the very same "popout" effect would arise for arbitrary categories with semantically related members, including categories that would be highly implausible candidates for "privileged" status in visual perception. In particular, we employed the same methodology used to demonstrate moral popout (Gantman & Van Bavel, 2014; see also Radel & Clément-Guillotin, 2012) to investigate whether categories such as fashion (Experiment 1) and transportation (Experiment 2) similarly "pop out", and we also replicated the "moral popout effect" itself (Experiment 3). These experiments may serve as a case study of (1) the broader distinction in principle between effects on perception vs. memory, (2) how this difference can be directly tested in practice, and (3) how drawing this distinction can radically alter the proper interpretation of such effects. We conclude by suggesting that this same distinction might force a reinterpretation of several other recently reported effects, and that it should accordingly be front-and-center in any discussion of top-down effects.

2. Experiment 1: a popout effect for 'Fashion'

We first investigated whether words related to 'fashion' (e.g. "pajamas" and "stiletto") would "pop out" in visual awareness, using the same methods as in the original moral popout effect (Gantman & Van Bavel, 2014, Experiment 1).

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