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Forum

Moral Perception

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Based on emerging research, we propose that human perception is preferentially attuned to moral content. We describe how moral concerns enhance detection of morally relevant stimuli, and both command and direct attention. These perceptual processes, in turn, have important consequences for moral judgment and behavior.

Morality Shapes Perception

We propose that morality shapes perception. While it seems unequivocal that moral content colors our interpretations of situations [1,2], we hypothesize that the influence of moral concerns reaches deeper, shaping what we see and how we come to

see it. In particular, moral content has been shown to influence two stages in the perceptual processing stream: moral content is (i) readily detected and (ii) both commands and drives attention (Figure 1). The role of morality in perception is especially important given recent evidence that perceptual processes influence judgments of wrongness, blameworthiness, and even legal punishment decisions [3].

Detecting Moral Stimuli

'Detection' is a basic element of perception; a stimulus must be detected for it to reach conscious awareness. The visual system is closely integrated with other parts of the brain, allowing people to segregate significant from mundane stimuli [4]. For instance, recent research suggests that moral concerns might enhance the detection of visual cues. Moral emotions, such as disgust, can tune perception towards the light end of the light–dark spectrum due to moral concerns regarding purity. Specifically, individuals high in trait disgust sensitivity and people exposed to disgusting stimuli are selectively better at detecting a digit presented one shade lighter than the background color [5]. Although this work does not test the effect of morality directly, it does suggest that moral emotions, such as disgust, can alter detection.

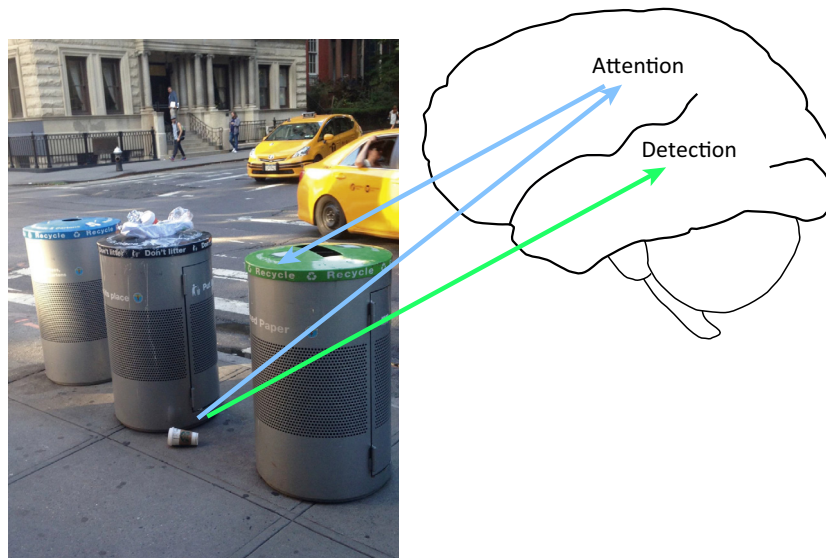
Recent research has shown that the visual system is preferentially sensitive to moral content. Specifically, people correctly detect moral words (e.g., kill, moral, should) with greater frequency than non-moral words (e.g., die, useful, could) – a phenomenon termed the 'moral pop-out effect'. Importantly, the moral pop-out effect is only observed when words are presented ambiguously, near the threshold for perceptual awareness (i.e., halfway between chance and complete accuracy). Not only are the moral and non-moral words similar in length and language frequency, evidence suggests that the moral pop-out effect is not due to differences in the reported intensity, extremity, or arousal of the stimuli [6]. The moral pop-

out effect provides initial evidence that perceptually ambiguous moral content reaches conscious awareness more readily than non-moral content, requiring fewer perceptual prerequisites.

Immoral social actions have also been shown to determine the detection of faces. Using binocular rivalry, researchers presented different images to the left and right eye simultaneously (e.g., a house and face), creating ambiguous input, which the mind reconciles by perceiving alternating images (e.g., first seeing a face, then a house). Neutral faces paired with 'negative' social actions (e.g., throwing a chair at his classmate) dominated visual awareness relative to faces paired with 'positive' (e.g., helping an elderly woman cross the street) or 'neutral' (e.g., passing a man on the street) actions [7]. Taken together, moral concerns appear to enhance detection for words, faces, and even minor deviations in color (for more, see Box 1).

Moral Concerns Tune and are Tuned by Attention

At any given moment, it is critical to be able filter and prioritize relevant information in a cluttered visual field. To maximize information processing, low-level features drive attention, and people tune attention (intentionally and unintentionally) toward motivationally relevant aspects of the environment. 'Attention' heightens sensitivity to a particular aspect of the visual field and has downstream consequences for what we see and how we interpret our surroundings. According to Just World Theory, people have a need to believe that they live in a world where people get what they deserve. In one study, people listened to auditory scenarios about protagonists acting in morally good (e.g., making dinner for his exhausted wife) or bad (e.g., demands his exhausted wife make him dinner) ways. Before revealing what happened next, participants were given a preview of two possible outcomes for the protagonists: a good one (e.g., a successful business contract) and a bad one (e.g., a terrible car accident). People's eye gaze



Trends in Cognitive Sciences

Figure 1. The Role of Detection and Attention during Perception of a Potentially Moral Situation. At a given moment, the visual field is cluttered with various stimuli. It is critical to be able filter and prioritize relevant information. People therefore selectively ‘attend’ (indicated by blue arrows) toward relevant aspects of the environment (e.g., looking at trash on the sidewalk). If so, the perceiver is more likely to ‘detect’ (indicated by green arrow) morally relevant cues (e.g., the trash is paper, and thereby recyclable), and sustain attention to a particular object (e.g., the recycling bin over the trash bin), which drives judgment (e.g., recycling is the right thing to do) and possibly behavior (e.g., I should recycle). The impact of morality on perception is likely greater when the cues are perceptually ambiguous. A stimulus is ambiguous when it does not conform easily to known objects (e.g., dissimilar perceptual input to the left and right eye) or because it is not easily visible (e.g., presented for a short time, in low contrast, or among many stimuli). We do not think that these processes happen in any one order, but rather can happen in different combinations (e.g., detecting a recycling symbol can capture attention).

Box 1. Morality: A Top-Down Influence on Perception?

Perception is the process by which we construct a representation of external reality in the mind. Morality involves a set of societal principles concerning the distinction between right and wrong judgments, decisions, and actions. Given these two disparate aspects of the mind – the construction of reality and the abstract values that guide our actions – it might be hard to imagine how they interact. Recent evidence in psychology and neuroscience suggests that prior experiences and motivations do indeed shape what people see through top-down pathways to early visual systems [11]. However, traditional wisdom in cognitive science asserts that prior states such as beliefs and desires play no role in determining the content of early vision [12]. Indeed, if beliefs, desires, and intentions alter perception in a top-down manner, some scientists would consider this a ‘genuine revolution in our understanding of perception’ [13].

Given that true top-down effects on perception may very well constitute a radical reinterpretation of a fundamental issue regarding the mind and brain, it is essential to disentangle effects on perception from effects of memory, judgment, tasks demands, and other processes. In order to successfully disentangle perception from these other processes, two significant – albeit related – propositions must be laid out. First, behavior is multiply determined by the integration of perceptual input, physical and social context, and current motivation. Any behavioral effect can be explained by changes in one or many of these aspects, such that it can be difficult to isolate perception or even consider perception as a unitary construct both empirically and theoretically. Second, perception is composed of multiple component processes. For instance, we include attention as a relevant determinant in the mind’s potential sensitivity to moral content, while other definitions simply exclude attention [13]. As such, the more relevant question is not whether morality exerts a top-down effect on perception, but rather which components of the perceptual processing stream are sensitive to moral concerns. To better address this question, future research should employ a mix of perceptual (e.g., continuous flash suppression) and neuroscientific methods (e.g., electrophysiological measures) to examine the influence of morality on perception – from initial encoding of sensory input to perceptual awareness. This will not only help address this longstanding debate in cognitive science but will also elucidate the psychological and neural processes that underlie moral judgment.

revealed that they were expecting good outcomes to befall good protagonists and bad outcomes to befall bad protagonists [8]. When individuals view a morally good or bad actor, their visual attention reflects expectations that people will get what they deserve.

Individual differences in concerns for justice also bias visual attention. In one experiment, people watched a video where either one group treats another unfairly or two groups get along peacefully, and were then asked to identify the direction of an arrow that appeared behind either a justice-related word (e.g., unfair) or a negative word (e.g., foolish) matched for length, language frequency, and valence. People who first saw the unfair video clip were faster at identifying the arrow’s direction when it replaced a justice-related word (vs a neutral word) – especially if they were high in justice

sensitivity. In other words, concerns about justice captured people's attention; their gaze was already in the right place to detect the arrow [2]. In the face of unfairness, justice-related information captures attention.

People are also able to amplify attention when their moral values are at stake. In one experiment, people took an Implicit Association Test (IAT) to assess how strongly they associated an outgroup with negativity. They were either told that the test measured competence or moral values (i.e., egalitarianism). Those who were told that the test measures egalitarianism expressed less racial bias on the IAT and had greater event-related potentials associated with early attentional processing of faces (P150) and error monitoring (N450), respectively [9]. Moral context heightened attention to relevant stimuli to promote the expression of one's moral values, leading them to act more egalitarian.

Attention is not merely a consequence of moral concerns, it can also influence moral judgment. In a set of experiments, participants heard a series of moral statements (e.g., 'murder is sometimes justifiable') and were subsequently presented with two on-screen choices ('sometimes justifiable' or 'never justifiable') while their eye gaze was tracked. The experimenters randomly selected one of the two choices, (e.g., 'sometimes justifiable') and prompted participants' decisions at a moment that they had either viewed the assigned option longer or were currently fixating on it. This led participants to endorse moral statements that the experimenters had randomly, and surreptitiously, selected [10]. These findings suggest that where one looks both tracks and determines moral judgment.

Concluding Remarks

The notion that morality influences perception is still a hypothesis and will require more evidence before it is firmly accepted. But growing evidence suggests that

morality plays a role in human perception: moral content is more readily detected by the visual system, commands attention, and moral judgment is influenced by attention. While we have focused on visual perception, we suspect that other sensory modalities are also sensitive to moral concerns. The ability to recognize moral situations and act appropriately is critical to one's survival in social groups, and helps to secure access to needed physical and psychological resources afforded by group members; so much so, that morality is chronically salient. To date, most models of moral cognition focus on the processes that unfold after perception has occurred. But future research on morality would be wise to incorporate perception. How we arrive at our moral judgments and actions almost certainly begins with perception.

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Science and Society Cognitive Obstacles to Pro-Vaccination Beliefs

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Two frameworks – cultural attraction theory and epistemic vigilance – predict a cultural disadvantage for counter-intuitive beliefs. We review several cognitive mechanisms that conspire to render pro-vaccination beliefs counter-intuitive. Trust and argumentation can spread counter-intuitive beliefs, but only under some conditions. We discuss the hurdles that trust and argumentation face in the case of vaccination.

Vaccine hesitancy covers a large range of attitudes toward vaccination, from mere uneasiness to staunch opposition. It is associated with lower rates of compliance which have led to drops in vaccination rates and a surge in deaths caused by vaccine-preventable diseases [1]. For instance, in 2007 there were only a few dozens of reported cases of measles in France; in 2011 thousands of cases caused six deaths [1].

To increase vaccination rates, a variety of messages have targeted vaccine hesitancy. However, most of the recent attempts, at least in the West, have had limited success, no success at all, or have even backfired [2,3]. We sketch a framework to understand these failures, and the success of vaccine hesitancy, based on cultural attraction theory [4] – which explains the differential spread of cultural