

PRIMING FROM OTHERS' OBSERVED OR SIMULATED RESPONSES

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We discuss a novel form of priming that (a) involves the activation of embodied as well as mental representations in the perceiver and (b) is caused by the observation or simulation of the belief, attitude, emotion, or behavior of one or more other people. As in any form of priming, the representation, once activated, may have effects on the perceiver's own responses. We focus on effects of simulating another person's or group's responses, which give rise to a form of priming that can occur without observation of or communication from the other. Theoretical considerations predict that this type of priming will be moderated by self–other overlap between the perceiver and the other, and will have greater effects on implicit or time-pressured responses than on more explicit, deliberative responses. Laboratory findings offer preliminary evidence for this form of priming, and recent thinking in cultural psychology converges by proposing that an individual's judgments and behavior are often driven not by that individual's beliefs, attitudes, or values, but by those that are assumed to be held by many people in the culture. Several implications of this novel form of priming are discussed.

At its core, priming refers to the activation or increased accessibility of a representation within a perceiver, which then influences or becomes incorporated into the individual's later judgment, behavior, or other response. The activation can be caused by many different sources, from attending to a brief flash of a prime word or image on a screen, to answering a previous question on a survey. The activated representation can be of many different types, including goals, semantic knowledge, affective reactions, or behavioral plans. And the effects of the activated con-

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tent can be diverse, including assimilation, as when an affective response to an image spills over into pleasantness judgments regarding subsequently presented neutral stimuli (Payne, Cheng, Govorun, & Stewart, 2005), or contrast, as when exposure to an extreme exemplar moderates judgments on the same dimension about subsequently encountered exemplars (Herr, Sherman, & Fazio, 1983).

We wish to focus on two areas within this wide-ranging definition, areas that are relatively novel although they have been considered in scattered existing work. First, we consider situations where the source of the priming activation is a response of another individual or group, whether a belief or attitude, an emotion, or an overt behavior. Learning another's attitude may influence your subsequently reported attitude, or observing another's emotional expression may influence your own emotion. Observing behaviors that imply that others have a specific goal can cause you to adopt the same goal (Aarts, Gollwitzer, & Hassin, 2004). This can occur, of course, if you deliberately shape your own response accordingly, but also may occur because (like any activated representation) the other person's response can unintentionally influence your feelings, judgments, or behavior. Because another person's or group's response influences the individual's later response, this form of priming goes beyond a single individual.

Second, we expand consideration of the types of representations that can be activated beyond the traditional assumptions about mental representations (stereotypes, attitudes, goals, etc.) to include *embodied* representations as well. So observing someone else's emotional reaction may cause the perceiver to automatically imitate the facial expression and experience the same emotion (termed "emotion contagion," Hatfield, Cacioppo, & Rapson, 1994). Observing someone's behavior may cause the perceiver to mimic that behavior (Chartrand & van Baaren, 2009; Heyes, 2011). These effects involve the activation of embodied (not merely mental) representations of the other's response.

Because the form of priming on which we focus involves effects of others on the individual, one notable implication is that the relationship between the perceiver and the other(s) will have a powerful effect on the process. Responses of friends or fellow ingroup members—with whom the perceiver experiences self-other overlap (Aron, Aron, Tudor, & Nelson, 1991; Smith & Henry, 1996)—will have the largest effects. This is because self-other overlap involves a psychological merging of self and other, resulting in application of the self's attributes to the other and vice versa. High self-other overlap will therefore make it more difficult for perceivers to separate the other's response from their own. Evidence supports this assumption. For example, people mimic the emotions of ingroup members but not outgroup members (Weisbuch & Ambady, 2008), and imitate the behaviors of liked individuals, but not disliked individuals (Miles, Griffiths, Richardson, & Macrae, 2010).

PRIMING FROM ANOTHER'S UNOBSERVED BUT SIMULATED RESPONSES

Existing theory and research just described makes clear that another's responses (expressed beliefs or attitudes, or observed emotional or behavioral responses) can induce similar responses in the perceiver, in a form of priming. Our major goal in this article is to lay out a theoretical argument, and describe supporting evi-

dence, that the same process can occur when another's response is not observed but merely *simulated*. As an example of the type of situation we will be considering, imagine someone who sees a hated politician making distasteful comments on a news show. If this perceiver knows that her father regularly watches this news show and admires this politician, she may mentally simulate his favorable reactions to the politician's comments. As with any instance of priming, that activated material (favorable evaluations) may influence the perceiver's own response, perhaps making it less unfavorable. Such an effect would represent a novel type of priming, and indeed social influence, that occurs without any direct observation of, or communication from, the other person.

Several points can be made using this example. First, in most demonstrations of attitudinal conformity, emotion contagion, or behavioral mimicry, the other person is physically salient (for example, the perceiver is in a conversation with the other or directly observes them). In this case, however, the perceiver's father is not physically present, but his response is simulated because she knows that he likes this politician. This observation raises important research questions regarding whose opinions people are likely to simulate. Second, it is of course possible for people to intentionally simulate relevant others' opinions—you might simulate your boss's reactions to the arguments you are incorporating in a presentation you will make, or your friend the camera buff's reactions to a new camera you are considering purchasing. But in the example, we intend to suggest that the simulation of another person's opinion is unintended. Third, as has been demonstrated in existing research on influence by others' directly observed responses (e.g., Weisbuch & Ambady, 2008), the relationship of the individual to the person whose reaction is simulated should be expected to determine the magnitude and perhaps even the direction of effects. In our example, despite the father's differing political views, we believe that self-other overlap with one's parent should create an assimilative influence of the parent's reaction. Evidence supporting this conjecture comes from a study by Jost, Ledgerwood, and Hardin (2008), whose participants were students who reported that their parents had opposite political views. The students were randomly assigned to think about a recent interaction with either their father or mother, and then complete a measure of their own political attitudes. The attitudes they endorsed were influenced by whichever parent they had thought about.

THEORETICAL CONSIDERATIONS

It is probably uncontroversial to argue that perceivers will generally form representations of the responses of others they encounter or observe. Knowing others' beliefs, attitudes, emotions, and behaviors facilitates interaction, cooperation, and adaptive action in general. Our novel claim is that perceivers will automatically simulate the probable responses of others even when they do not directly observe those responses. This can occur either when a person or group is salient in the environment, or when they are automatically called to mind (e.g., because they are associated with the particular topic of interest, or because they are interpersonally close, sharing high self-other overlap). Thus, in this first stage of the process we postulate, salience of another person or group leads to simulation of the other's relevant response.

In the second stage, the other's simulated response influences the perceiver's own response. The mechanism here is the same as in any priming paradigm (Loersch & Payne, 2011), in which previously activated material becomes incorporated into the perceiver's response, or (using different language) is misattributed as the perceiver's response. The effect may be to alter the content of the response, as in the Affect Misattribution Procedure (AMP) (Payne et al., 2005), where positive or negative responses to a prime influence the pleasantness rating given to a neutral target stimulus. Or it may be to alter the speed of a response, as in evaluative priming (Fazio & Olson, 2003) where responses are faster when the evaluation of the prime is similar to the evaluation of the target, compared to trials where they mismatch.

At this second stage, being influenced by the other's simulated response, self-other overlap exerts a moderating influence. Self-other overlap not only makes it more likely that a close other's response will be simulated, but also makes it more difficult to identify the other's response as separate from one's own, and thus more difficult to avoid being influenced by it. When influence is successfully avoided, it can only be through thoughtful, deliberative processing. As a consequence, we hypothesize that these effects will be observed more often on implicit or time-pressured responses than on thoughtful, explicit responses.

To summarize our model, we postulate two stages. First, people represent the relevant responses of salient individuals or groups, without any conscious intention. Our novel claim is that they may simulate a salient other's responses even when they do not directly observe them. Second, those responses are likely to influence the individual's own response, through the same processes that occur in any priming paradigm (Loersch & Payne, 2011). This will again happen more often when the perceiver and other have high self-other overlap, and more often for implicit or time-pressured responses. This is because both of these conditions make it more difficult for perceivers to effortfully separate the other's response from their own, avoiding influence.

PRELIMINARY EVIDENCE

Existing evidence shows that people automatically simulate another's perceptual viewpoint even when that other is merely a cartoon, symbolic representation of a person. Samson and colleagues (2010, experiment 3) had participants view scenes in which an image of an agent stood in the middle of a room, facing right or left (see Figure 1). On each trial, large dots appeared on the right and left walls of the room, so the agent could be inferred to see the dots in front of him/her but not behind. Participants viewed such a scene followed by a number, and pressed a yes or no key to indicate whether that was the total number of dots in the scene. Although the agent's perspective was irrelevant to the task, response time patterns showed that participants simulated the agent's viewpoint. For example, "no" responses to an incorrect number were slowed when the number matched what the agent could be inferred to see, such as "no" responses to the number 1 for the scene on the right.

This paradigm provides evidence for several aspects of the automaticity of the simulation of the other's viewpoint. The agent's inferred belief is not informationally useful; in fact, it is obviously limited and incorrect, detracting from the per-

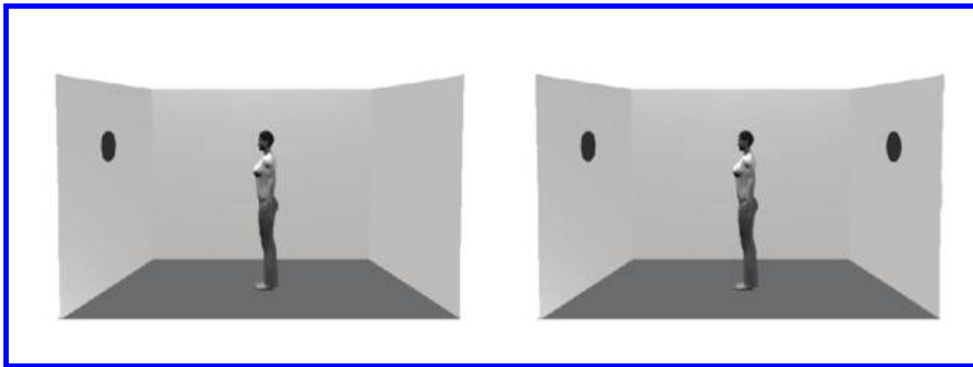


FIGURE 1. Example of stimulus displays from Samson, Apperly, Braithwaite, Andrews, & Bodley Scott (2010). Reprinted from Samson et al., "Seeing it their way: Evidence for rapid and involuntary computation of what other people see." *Journal of Experimental Psychology: Human Perception and Performance*, 36, 1255-1266, published in 2010 by the American Psychological Association. Reprinted with permission.

ceiver's goal of answering quickly and correctly. In addition, because the agent is merely a cartoon, normative motives to conform (e.g., to strengthen social relationships) are also absent. Still, participants simulated the other's view even though doing so interfered with their explicit goals to respond quickly and accurately, supporting the unintended nature of the process. This evidence also suggests (although not conclusively) that the process is uncontrollable, because presumably participants would try to control a process that interferes with their task performance. Additional studies in related paradigms (e.g., Kovacs, Teglas, & Endress, 2010) support these conclusions, and show that children less than a year old also spontaneously simulate the perceptual viewpoint of a cartoon agent.

A recent study obtains a conceptually parallel finding in the area of impression formation, and shows that others' simulated responses can influence the content of a perceiver's response as well as just response times. Waggoner Denton (2012) recruited participants for a study of group-person perception. Seated in separate cubicles, participants in each experimental session first performed a group cohesion-building task. Then in the main person perception task, they all first received initial positive or negative behavioral information about a target. They rated their initial impressions of the target and saw what they thought were the other participants' ratings (actually constructed by the researchers). They then received further information about the target, which was either consistent or inconsistent in valence with the initial information. The crucial manipulation was that participants believed either that they alone saw this additional information or that all participants in the session saw it. They then recorded their final impressions and rated their confidence.

Our model predicts that when perceivers believe others are also seeing the later information, they will simulate the others' responses to it, which will then spill over and influence their own final ratings (amplifying the impact of the later information). When perceivers believe that others do not receive the later information, the simulation will of course not occur. Results were consistent with these predictions. Final liking ratings were influenced in the obvious way by the valence of the later information, but more strongly for participants who believed that all saw that information (compared to those who believed that only they saw it; interaction

$F(1, 175) = 59.79, p < .001$). Similarly, judgmental confidence was increased, not surprisingly, when the later information was consistent with the initial information. This effect was also stronger when the later information was believed to have been seen by all (interaction $F(1, 175) = 17.49, p < .001$).

Thus, existing evidence from several laboratory paradigms supports the idea that people automatically simulate and are influenced by the unobserved responses of others. Additional, converging support comes from a very different area, cultural psychology. Research in this area usually compares samples drawn from different cultural contexts and typically has a substantive focus on values such as individualism/collectivism. However, a strikingly similar set of ideas has recently emerged in this literature: The effects of culture on an individual's emotions, judgments, or behavior may be mediated not by the individual's own internalization of cultural values, but by the individual's perceptions of the values that are endorsed by other members of the culture.

One type of evidence on this point comes from work by Shteynberg, Gelfand, & Kim (2009), who measured both personal endorsement of collectivist values (with items like "I will sacrifice for the benefit of the group") and perceptions of the values endorsed by most members of the culture ("Most Americans will sacrifice..."). In both American and Korean samples, perceptions of others' values but not personal endorsement of those values influenced judgments related to harm and blame. Zou and colleagues (2009) used similar methods and obtained parallel results. Using a different methodological approach, Becker and colleagues (2012) obtained samples from many different cultural contexts and applied a multilevel analysis that allowed estimation of separate effects of each *individual's* level of individualism/collectivism and of the *mean* levels within each sample—in other words, the consensual level of individualism/collectivism within each cultural context. The researchers found strong effects of the cultural consensus, but generally trivial individual-level effects. They conclude, "The differences we found ... cannot be attributed to individuals' internalization of cultural beliefs and values—instead, they appeared to be effects of living in a particular cultural context where certain things are believed and valued" (p. 850).

Many recent articles in cultural psychology contain explicit statements of the view that effects of others' beliefs, attitudes, or values often outweigh the individual's own. Shteynberg and colleagues (2009, p. 48) state that, "[T]o thrive in a social environment, people must not only be keenly aware of the thoughts and intentions of others in that social environment but also allow such social cognitions a unique status in their behavioral decisions." Zou and colleagues (2009, p. 580) similarly observe, "As we strive to see the world 'through the eyes of others' to be 'objective' and reach epistemically sound judgments, we think and act on ideas perceived to be consensual with little reservation." Chiu and colleagues (2010, pp. 482-483) review work in this area and conclude that, "[R]ather than acting on their personal beliefs and values, people sometimes act on the beliefs and values they perceive to be widespread in their culture. That is, what individuals see inside themselves (internalized cultural beliefs and values) does not always channel psychological processes; what the individuals see when looking outward at their social environments can also direct behaviors." Evidence obtained by these and other researchers in cultural psychology therefore supports the idea that people are often strongly influenced by the simulated views of ingroup others—in this

case, by their assumptions about the values held by other members of their culture—even more than by their own personally endorsed values.

SIMILARITIES AND DIFFERENCES FROM OTHER FORMS OF PRIMING

Our conception shares with all mainstream models of priming the assumption that a priming event (in this case, observing or simulating another's response) activates representations that then influence the perceiver's later responses (e.g., Loersch & Payne, 2011). However, there are also some meaningful differences in our thinking.

Most standard models of priming have assumed that the representations that are activated by a prime (influencing later judgments or behavior) are mental representations. One difference from most classic models is that we believe that embodied as well as mental representational systems may be involved in priming. Much evidence shows that when we perceive others' emotions and behaviors, we represent them not only mentally but by using our own bodies. Findings of automatic mimicry of others' emotional expressions (Niedenthal, 2007) or behaviors (Heyes, 2011) support this idea. The latter has often been studied in tightly controlled paradigms. For example, participants are instructed to close or open their hands cued by a visual signal, while observing a video of a hand making a task-irrelevant opening or closing movement. Responses are facilitated or inhibited by the observed hand movement. Notably, this effect is enhanced by priming participants with prosocial words such as *friend* or *cooperate*, and reduced by priming antisocial words such as *selfish* (Leighton et al., 2010). And the effect is reduced when participants see the identical video of movements by a gloved hand described as the movements of a wooden hand, compared to when it is believed to be a human hand (Liepelt & Brass, 2010). These findings show that even low-level imitation effects depend on one's orientation toward the other, such as ingroup membership and the resulting self–other overlap. To explain behavioral imitation, some have postulated mirror neuron systems, which are supposed to display similar activations when one perceives another's action and when one performs the action (Gallese, Keysers, & Rizzolatti, 2004; Brass, Ruby, & Spengler, 2009). This specific proposal is somewhat controversial, but our theoretical ideas do not depend on any specific proposed neural mechanism.

Another important difference is that the relational aspect of priming in our model brings in a new set of moderators of priming effects. We have emphasized the role of self–other overlap, with the responses of close or ingroup others having more influence compared to distant others (e.g., Weisbuch & Ambady, 2008). But other variables may shape perceived closeness or similarity to others, also moderating priming effects. For example, the perceiver's power relative to the other will be relevant. High power makes people see others as more socially distant (Magee & Smith, 2011). As a consequence, it should be easier for high- than for low-power people to distinguish themselves from others, leading to less susceptibility to influence by others' simulated responses among those with high power. Even a momentary or trivial experience of similarity or interpersonal connection with another person may create self–other overlap and enable these effects. Something as simple as learning that one shares a birthday with another individual has

been shown to cause the individual to take on the other's attitudes (Cheung, Noel, & Hardin, 2011). Or a brief experience of being mimicked by another can cause people to share the other's emotions (Stel & Vonk, 2010).

DISCUSSION AND IMPLICATIONS

In this paper, we have outlined a novel type of priming, driven by the simulation of others' responses, that can occur without communicating with or observing the other. We outlined theoretical hypotheses about the conditions under which this process would occur, and gave an overview of some preliminary evidence supporting it. Nevertheless, many important research questions remain open.

One intriguing possibility is that we may simulate not only others' overt responses such as beliefs or behaviors, but also their metacognitive experiences such as feelings of fluency. In fact, fluency-based processes may contribute to the unintended influence of others' responses on the perceiver's own, because after perceiving or simulating another's specific response, such as an attitude or behavior, generating a similar response oneself is likely to be more fluent. As we know, that feeling of fluency then may be misattributed, taken as evidence for the validity of the information or its appropriateness as a personal response (Reber & Schwarz, 1999).

Recent work supports the plausibility of this hypothesized process by demonstrating the opposite direction of misattribution (misattribution to an observed other of fluency that is actually based on one's own responses). In this study (Tipper & Bach, 2008), participants saw photos of two different individuals performing activities, and pressed a left or right key to indicate which person appeared in each photo. The photos were presented on the left or right side of the screen. In a condition where the photos were presented on the same side as the required response, spatial response compatibility made the key-press responses more fluent. And in that condition, the pictured individuals were rated as more competent in the activities they were performing: For example, a person shown performing athletic activities was rated as more athletic. This presumably occurred because the fluency of the participant's response was misattributed so the stimulus person's behavior seemed more fluent. The authors suggest that we represent both our own and others' actions, including not only specific motor acts but also higher-order appraisals (such as the experience of fluency). This idea supports our proposal that fluency due to having simulated another person's judgment or behavior may cause us to experience fluency when we consider making the same response ourselves, leading to a "feeling" that it is correct and appropriate.

The process outlined in this paper may have a range of potential effects. For example, suppose a White person who has a Latino friend encounters another White making anti-Latino comments in a social setting. Might this individual simulate his or her friend's potential reactions to the comments? Simulation of the friend's anger could make the individual feel angry, potentially motivating confrontation of the prejudiced individual. This would be a novel mechanism that differs from prior conceptualizations such as activating a nonprejudiced or egalitarian identity.

Another interesting possibility regards potential effects on the self-concept. Suppose an individual engages in several performances that reveal aspects of his or her ability (athletic competitions, academic tests, etc.). Knowing that a friend or in-

group will learn the results of a specific performance may lead to simulation of the other's view of the self—potentially increasing the impact of that particular performance on the self-concept (compared to an otherwise equivalent performance that is not witnessed by the other). There is a finding in the literature somewhat like this example. Kelly and Rodriguez (2006) asked participants to present themselves as introverted and extraverted (respectively) in two videotaped segments they believed would be viewed by others. They were then told that only one of the tapes was necessary, and they watched the other tape being erased. If the introversion tape was erased so that the participant believed only the extroversion tape would be seen by others, the participant subsequently displayed more extroverted behavior, compared to those whose extroversion tape was erased. Thus, when others are anticipated to view subsets of one's behavior, simulation of their beliefs about the self can alter self-perceptions and even overt behavior.

It is also worth speculating about the potential role of the process described in this paper in contributing to the power of stereotypes and prejudice, and the difficulty of changing them, which has been a major theme in social psychology over the past few decades. Theorists have advanced several plausible reasons for their power. It has been argued that we rely on stereotypes because they constitute easily applied general knowledge (compared to a more specific and detailed body of individuating information), and that we are "cognitive misers" who prefer such easily applicable information. It is also postulated that stereotypes and prejudice are learned early in life and therefore take precedence over beliefs or attitudes that are learned later (Wilson, Lindsey, & Schooler, 2000). The analysis advanced here foregrounds a very different type of reason: Stereotypes and prejudice are widely shared in society. It is even likely that the perceived sharedness of stereotypes and prejudiced views is greater than their actual sharedness—and as Zou and colleagues (2009) have argued, perceptions of cultural consensus are often biased in the direction of perceiving others to hold more traditional, conservative views than they actually do. In short, the tendency to draw on what one perceives as consensual views may contribute to the perpetuation of stereotyped beliefs and prejudiced attitudes. This idea is related to the claim (e.g., Fazio & Olson, 2003) that some implicit measures such as the IAT are sensitive to cultural learning rather than to individual attitudes. However, we strongly disagree with any implication that as a result, such implicit measures have little predictive power over the individual's judgments and behavior. As we have argued throughout, other people's perceived attitudes have pervasive, though unintended effects on our own responses (e.g., Chiu et al., 2010).

We conclude with a brief consideration of the functionality of priming. Barsalou, Breazeal, & Smith (2007) argue that priming is fundamentally for anticipation (allowing the organism to prepare for what is likely to come next). So if the word "doctor" is encountered in text, the representation of the word "nurse" becomes more active, enabling the reader to recognize that word more quickly should it appear (as is statistically likely). We agree that anticipation is one function of priming, but find this perspective overly individualistic. Another function of priming—the type of priming from others' responses we describe here—is social coordination, enabling convergence of beliefs, attitudes, emotions, and behavior within a dyadic relationship or ingroup. Others have also argued that behavior priming often serves as preparation for adaptive interpersonal behavior (e.g., Cesario, Plaks, & Higgins, 2006). This type of social coordination may well contribute to the con-

vergence of emotions within an ingroup, a topic to which we have devoted much study (Mackie, Smith, & Ray, 2008).

Social coordination in turn is a major part of the answer to a question that some may have about our theory: Is acting on others' beliefs, emotions, or behaviors adaptive? Should people not act on their own personal beliefs, emotional appraisals, and action plans, rather than those of other people? Chiu and colleagues (2010), working in the cultural psychology tradition described earlier, offer three reasons why influence by others' thoughts, emotions, and behavior is indeed generally adaptive. One is the point just noted, that adopting the same beliefs, emotions, and behaviors as ingroup others eases coordination and interaction. A second reason is that opinions or behaviors favored by many ingroup others are likely to be correct, valid, and useful—because they have been tested by many people, not just you. Third, shared beliefs, attitudes, and so forth promote the communicability of information. People prefer to and find it easier to communicate information that is shared rather than unique or idiosyncratic (Kashima, 2000), a process that also helps maintain and reinforce cultural norms (Fast, Heath, & Wu, 2009).

By advancing these theoretical ideas, we hope to promote convergence among detailed laboratory studies of the underlying mechanisms of priming, work on embodied representations and their effects such as automatic imitation (Heyes, 2011), and even work in cultural psychology stressing the powerful effects of others' perceived attitudes and values (Chiu et al., 2010). Conceptualizing all these phenomena under the umbrella of a novel form of priming from others' responses should allow productive interchanges among researchers and open new and exciting research questions.

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