

Shared Attention

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Abstract

Shared attention is extremely common. In stadiums, public squares, and private living rooms, people attend to the world with others. Humans do so across all sensory modalities—sharing the sights, sounds, tastes, smells, and textures of everyday life with one another. The potential for attending with others has grown considerably with the emergence of mass media technologies, which allow for the sharing of attention in the absence of physical co-presence. In the last several years, studies have begun to outline the conditions under which attending together is consequential for human memory, motivation, judgment, emotion, and behavior. Here, I advance a psychological theory of shared attention, defining its properties as a mental state and outlining its cognitive, affective, and behavioral consequences. I review empirical findings that are uniquely predicted by shared-attention theory and discuss the possibility of integrating shared-attention, social-facilitation, and social-loafing perspectives. Finally, I reflect on what shared-attention theory implies for living in the digital world.

אנשים חולקים את המידע במגוון מקומות וערוצים, צורת שיתוף המידע מאוד גדלה עם הטכנולוגיה בשנים האחרונות, המחקרים בודקים את הקשר בין שיתוף תודעה לבין זכרון מוטבציה, שיפוט, והתנהגות אני מציג את זה כרמה תודעתית אחרת, ואיך זה יכול להשפיע על ההתנהגות שלנו בעולם הדיגיטלי

Keywords

shared attention, shared experience, group attention, joint attention, common knowledge, social facilitation, social loafing, social media

הצורך בשיתוף תודעה הוא הישרדותי, זה אפילו נמצא בתינוקות שהקדישו מאמצים רבים יותר למידע משותף

Faced with limited processing resources, the human mind must continuously prioritize certain aspects of the environment over others. Although this choice can be guided by a number of different factors, prioritizing those objects that are attended to in common with other people may be especially important. Indeed, researchers studying infant development have long noticed that human babies are particularly interested in objects they attend to with others (Baron-Cohen, 1995; Bruner, 1983; Tomasello, 1999). Psychologists studying adults have recently caught on and have begun to investigate when simply attending together may hold special significance for the human brain.

In the last several years, studies have begun to outline the conditions under which attending together is consequential for human memory, motivation, judgment, emotion, and behavior (Boothby, Clark, & Bargh, 2014; Eskenazi, Doerrfeld, Logan, Knoblich, & Sebanz, 2013; He, Lever, & Humphreys, 2011; Shteynberg, 2010; Shteynberg & Apfelbaum, 2013; Shteynberg & Galinsky, 2011; Shteynberg, Hirsh, Apfelbaum, et al., 2014; Shteynberg, Hirsh, Galinsky, & Knight, 2014; Walton, Cohen, Cwir, & Spencer, 2012). Broadly, the research suggests that shared attention can amplify memories, goals, evaluations, emotions, and behavioral learning.

מחקרים הראו שאנשים פיתחו יכולת קוגניטיבית מופתחת במצבים של תודעה משותפת מול המצבים שהם עם אנשים זרים או לבד, השיתוף לשלעצמו היה גורם מעצים

Specifically, studies (Shteynberg & Apfelbaum, 2013; Shteynberg, Hirsh, Apfelbaum, et al., 2014) have shown that people devote greater cognitive resources to those features of their environment that are thought to be co-attended simultaneously (vs. at different times) with close others (vs. with strangers or alone).

In what follows, I discuss the relevance of shared attention in everyday life, put forth a conceptual lens that underscores the importance of shared attention to intra-group coordination, and advance a specific theory of shared attention that is uniquely consistent with the extant data. I also integrate the shared-attention theory with social-facilitation and social-loafing scholarship and reflect on what the theory implies for living in the digital world.

Relevance of Shared Attention

Shared attention is common. In stadiums, public squares, and private living rooms, people attend to the world with others. Humans do so across all sensory modalities—sharing the sights, sounds, tastes, smells, and textures of

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everyday life with one another. The potential for attending to the environment in the absence of physical co-presence. It is conceivable that shared attention is as important as it is common, shaping cognitive, affective, and behavioral responses to the jointly attended target. As the gateway to the mind, attention occupies a privileged position in determining what the individual thinks about and acts upon. If awareness of shared attention changes cognitive, affective, and behavioral responses to targets of attention, it would suggest that the psychological process of attention is, in part, socially grounded.

Critically, the awareness of shared attitudes, beliefs, and preferences (Echterhoff, Higgins, & Levine, 2009; Festinger, 1950; Pines, Long, Landau, Stanley, & Pyszczynski, 2006) is conceptually distinct from the awareness of shared attention (Shteynberg, 2009, 2010). The distinction rests in the essential difference between one's awareness of "believing in something together" and "attending to something together"—whereas the former is a perception of shared subjective states that exist in the mind, the latter is a perception of shared objective stimuli that exist in the world. Indeed, infants who lack an understanding of subjective mental states as independent entities (i.e., theory of mind) are still keenly interested in attending to objects with others (e.g., Striano, Reid, & Hoehl, 2006). That is, human brains develop the ability to monitor joint attention to the world considerably before experiencing shared attitudes about that world.

In all, whereas shared subjective mental states have been a cornerstone of scholarly interest in social psychology for the better part of a century (Festinger, 1950), the significance of simply attending to something together has been largely overlooked.

Conceptual Lens

The idea that humans are a group-focused species is well grounded in the literature. In addition to the fact that, in general, it also drives high levels of intragroup coordination that allows for the execution of collective action. Festinger (1950, 1954) argued that uniformity in attitudes and beliefs within groups is a form of intragroup coordination that is essential for collective action. However, whereas attitudinal consensus is a critical facilitator of collective action, it may not be the ground floor of human coordination. For instance, although progress toward a collective goal (e.g., building a fire) necessitates some subjective agreement within a group (e.g., the rewards of building a fire outweigh its risks), it absolutely requires that group members attend to the same features of their environment as one another (e.g., fire, food, lions). As Wegner (1987) pointed out, even when different group members are tasked with focusing on distinct aspects of the

environment, they must still have common knowledge about who knows what.

Thus, beyond shared attitudes and beliefs, common knowledge is a basic problem of intragroup coordination. That is, group members must have significant overlap in basic knowledge of their environment in order to communicate and be understood. Moreover, group members must constantly update common knowledge in order to acquire new information without compromising intragroup communication. How, then, does the human brain build actual common knowledge and update what is held in common in the face of new information?

Devoting more cognitive resources to targets of shared attention constitutes one method. Specifically, shared attention can increase common knowledge if targets of shared attention receive greater cognitive resources. For instance, if my partner and I watch a movie together, and we both allocate greater cognitive resources to those scenes that we knowingly attend together (vs. apart), we should achieve greater overlap in our respective representations of the movie. Moreover, if shared attention functions to facilitate intragroup coordination, specific propositions follow: First, people should devote greater cognitive resources to those features of the environment

that are relevant to the shared goal. Second, people should update their common knowledge of the environment when they learn new information about the environment. Third, people should coordinate their cognitive resources to the environment in a way that allows them to achieve their shared goal. These expectations are based on the idea that group members must learn new things about their environment and also maintain common knowledge. Directing cognitive resources to stimuli under synchronous co-attention achieves both goals. Because the perception of synchronous co-attention is likely to co-occur in both observers, the adoption of the co-attended information preserves common knowledge (Shteynberg, 2014). For instance, if my partner and I are both aware that we are sharing attention to a movie scene and then direct cognitive resources to that scene, we both learn new information and maintain shared knowledge about the film. In all, the likely co-occurrence of shared attention in both observers coordinates knowledge adoption in a manner that preserves intragroup coordination.

Based on the above logic, I advance a psychological theory of shared attention in which I define the mental state of shared attention and outline its impact on the human mind. I then review empirical findings that are uniquely predicted by the proposed theory.

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A Theory of Shared Attention

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Although attending together with another agent typically evokes the psychological state of shared attention, the

שיתוף פעולה בין הצדדים לעיתים יכול להתקיים גם בלי הנוכחות של אחד הצדדים, לדוגמה בזמן שצופים בסרט ומישהו אחד נרדם

her partner has fallen asleep. Here, I focus on the psychological state of shared attention—its description and impact.

The shared-attention state

I define the shared-attention state as the perception of in-the-moment attention to an object from a first-person-plural perspective. Put simply, it is the perception that *we are attending* to some aspect of the world. Stronger shared-attention states are likely when more (vs. less) relationally close others are more (vs. less) synchronously attending to the object of one's attention. This minimalist view of what is involved in a shared-attention state is motivated by two considerations—accuracy and efficiency.

In terms of accuracy, a shared attention state needs to selectively “switch on” when an individual registers simultaneous co-attention with agents with whom future collective action is likely, thereby accurately channeling cognitive resources to aspects of the environment that will become shared knowledge. The extent to which the self and the other can be fused into a “we” during co-attention serves as a fairly reliable indicator that the other is an in-group member, and hence that future collective action with him or her is likely. Indeed, if we assume that the shared-attention state is an evolved adaptation from a time when humans survived through the collective actions of a single group (Bowles & Gintis, 2003), the perception that *we are attending* to an object would accurately indicate that the self is co-attending with one's in-group members and, thus, that the object of co-attention would serve as an axis of future collective action. Relatedly, identification within a specific social category is unnecessary in an environment where the collective actions of a single group ensure survival. Simply differentiating “us” from “the rest” would suffice. As such, shared-attention states are possible in dyadic and larger group contexts, where specific collective categorizations are absent (e.g., watching a movie with friends).

In terms of efficiency, the perception that *we are attending* is fairly simple when compared to other possibilities for tracking joint-attention behavior. For instance, Baron-Cohen (1995) proposed a shared-attention mechanism that involves triadic representations, whereby the self perceives that the other agent is aware that the self is attending to that object (e.g., “Mommy sees that I see that the cup is on the table”). Alternatively, the shared-attention state proposed here involves a relatively simple representation: *We are attending* to the object (e.g., “we” see that the cup is on the table). The shared-attention state

emerges when the agent in the representation shifts from the first-person singular to the first-person plural. This representational shift allows the attendee to perceive the self and the other as a unified agent with a singular attentional focus. It also obviates the need to calculate whether the other agent is aware of one's personal attentional focus, expanding the applicability of the shared-attention state to circumstances of anonymous shared attention. For instance, I can be in a state of shared attention when watching the Olympics with millions of others who do not know me or know that I am watching. Finally, the shared-attention state does not require the agent to mentalize about others' inner states (e.g., beliefs, attitudes, and preferences; see also Echterhoff et al., 2009). Akin to an awareness of solitary attention to an object (e.g., I see a cup), shared attention to an object (e.g., we see a cup) need not involve experiencing one's own or others' attitudes about that object.

Notably, the diversion of cognitive resources to an object of shared attention can maintain intragroup coordination only as long as group members interpret the object in a similar fashion. That is, if both my partner and I perceive that we are attending to a candle and direct greater cognitive resources to that candle, we achieve common knowledge. However, if I interpret the object as a candle, but my partner interprets it as a roll of paper, we would fail to attain common knowledge. Thus, the logic of shared attention assumes that, much of the time, group members' interpretations of a given object will be the same. This assumption is backed by conceptual and empirical work in social and cultural psychology, which suggests that group members have comparable interpretations of everyday stimuli due to similar socialization histories (Triandis, 1994).

The impact of the shared-attention state

As discussed, I make the assumption that the function of the shared-attention state is to build common knowledge in the face of new information. Because any perceived stimulus could become common knowledge that enables group coordination, the effect of shared attention is not limited to any particular class of stimuli. In fact, because an individual can experience any stimulus as co-attended, the shared-attention mechanism can have wide-ranging implications for memory, motivation, judgment, emotion, and behavior. For instance, when an individual directs

שיתוף תודעה זו תופעה כה חזקה שאינה מוגבלת רק לתחום מסוים או אפילו להשפעה מסוימת כגון זכרון, מוטבציה, שיפוט, רגש והתנהגות. בנוסף, כחלק מעובדה שאנחנו מקדישים מאמצים נוספים קוגניטיבים לשיתוף, אנו נראה העצמה נוספת של הדברים שדיברנו עליהם

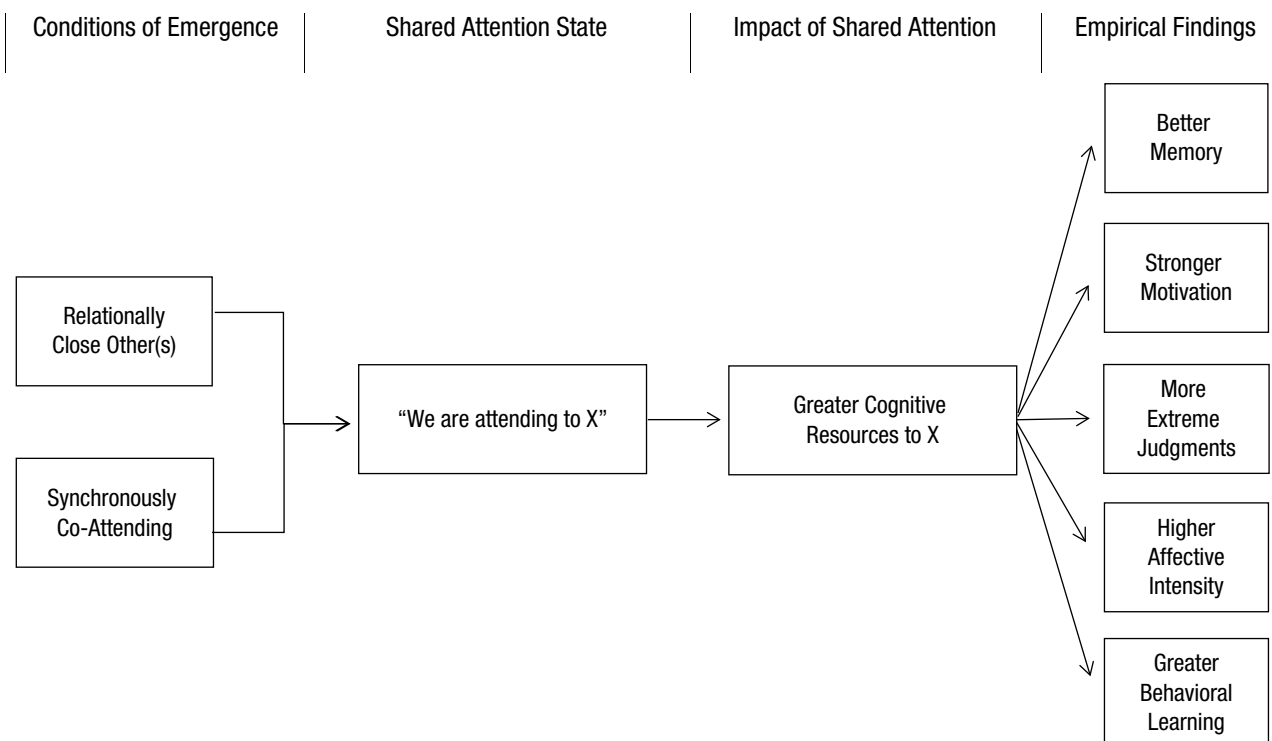


Fig. 1. The shared-attention model and empirical findings.

the valence. If those objects happen to be observed behaviors, we can expect greater internalization or adoption of those behaviors as greater cognitive resources are focused on the behaviors. The omnipresence of attention in human functioning renders the perception of its social dimension exceedingly relevant. As conceptualized, the psychological state of shared attention has considerable leverage—using few cognitive resources itself, the shared-attention state channels significant cognitive resources to simultaneously co-attended aspects of the environment. In all, the shared-attention mechanism can be represented as a simple rule of knowledge formation (Kruglanski & Shteynberg, 2012): If people perceive shared attention on an object, more of their cognitive resources will be directed toward that object (see Fig. 1 for the full theoretical model).

Joint attention and shared attention

Unlike the existing joint-attention literature (e.g., Striano et al., 2006), the research reviewed below does not require that co-attendants engage in dyadic eye gazing (i.e., look at each other) or triadic eye gazing (i.e., look at each other looking at the object). Rather, participants are led to make assumptions about the existence of shared attention based on the combination of their general knowledge and cues from the environment. For instance, studies have evoked awareness of shared

attention by simply informing participants that they are attending to the same object at the same time as someone else. In many of the studies, the co-attending other was not physically present but was assumed to be co-attending from elsewhere. Thus, the studies instantiated shared attention in ways that mirror shared experiences in everyday life—even when the gaze of others is hidden from view, people assume that a news story, a television broadcast, or a social media post is the object of shared attention. In all, I make the theoretical assumption that awareness of shared attention is a psychological state that can arise in a number of different ways. What is critical is the perception that *we are attending* to the object. Notably, dyadic and triadic gaze behaviors in infancy may serve as developmental precursors to a fully internalized shared-attention state (e.g., Mundy & Newell, 2007).

Empirical Evidence

In the last several years, researchers have become more interested in the influence of others' attention on mind and behavior. Below, I review findings from the domains of memory, motivation, judgment, emotion, and behavior, which are difficult to explain through the extant theories of social facilitation (Geen, 1991), mentalization (F. H. Allport, 1924), and imitation (Bandura, 1977) but are consistent with the proposed theory of shared attention.

Memory

If shared attention on an object increases the cognitive resources focused on that object, then the co-attended object should be more easily recalled. Findings suggest that this is the case. I (Shteynberg, 2010) presented participants with a list of words that they thought were being co-attended by two similar (or different) others in an online environment (similar others appeared to have chosen the same color avatar as the participant). After a distractor task, participants were given a surprise memory test in which they were asked to recall if a word had appeared on the previously co-attended word list. Participants who thought they co-attended with similar (vs. different) others exhibited both faster (Cohen's $d = 0.76$) and more accurate (Cohen's $d = 0.75$) recall memory for the words. A follow-up study included a third condition in which participants saw that similar others were present in an online environment but were not co-attending to the object, as they were attending elsewhere. Participants in this condition did not exhibit greater recall, suggesting that the effects were not due to the mere presence of similar others or to social facilitation (Geen, 1991). Consistent with the proposed theory of shared attention, the effects occurred only when the self and others could be considered a "we." Specifically, sharing a subjective preference for color created a minimal sense of social connection (minimal-groups paradigm; Tajfel, 1970). Moreover, since this minimal in-group similarity had no discernable association with the objects presented, it seems unlikely that participants could reliably ascertain co-attendants' thoughts about the objects. As suggested by the proposed theory of shared attention, the effects found did not rely on mentalization, or knowing the co-attendants' beliefs, attitudes, and preferences regarding the objects (F. H. Allport, 1924).

He et al. (2011) presented pairs of participants seated side-by-side and looking at the same computer screen with images from three categories: a first category that the participant had to attend, a second category that the other person had to attend, and a third category that no one had to attend. Participants were then given a surprise memory test for the items in all three categories. Unsurprisingly, the first-category words that were assigned to the participant were remembered best. Critically, however, the researchers found that recall was better for second-category than third-category words. Given that participants should have been more confident that the other was attending to the second-category words (which the other participant had to remember) than the third-category words (which no one had to remember), the perception of co-attention should have been more likely for the second- than third-category words. Moreover, when participants were friends or members of a collectivistic culture, word recall was better across conditions. It is

possible that the presence of a close other with no alternative targets of attention increased one's perception that *we are attending* across the board.

Eskenazi et al. (2013) utilized the same three-categories paradigm but included a condition in which the side-by-side partner of the participant was absent. Across two studies, recall was better for words that were supposed to be memorized by the other when that other was actually present and attending (vs. absent or not attending; Cohen's $ds = 0.91$ vs. 1.61), hence allowing for the perception of co-attention. Interestingly, memory for co-attended words increased recall even when monetary incentives encouraged participants to memorize only their own words. Although the relationality of the other attendee was not manipulated, it is likely that simply sitting side by side with another agent activates an adequate amount of relationality to perceive that *we are attending*.

Motivation

If shared attention on an object increases the cognitive resources allocated toward that object, what happens when the object is a directive or a goal? If more cognitive resources are focused on a given goal, we should expect greater goal persistence and goal completion (Higgins, 1996).

My colleagues and I (Shteynberg & Galinsky, 2011) presented participants with either a promotion or a prevention goal¹ (Higgins, 1998) before having them complete a signal-detection task in which they were asked to recognize previously seen nonsense words. The goal and the task were personal (vs. collaborative) in nature but were co-attended with either two similar others or two different others, who were in different rooms. The results indicated that the hit rate was greater when similar (vs. different) others co-attended to the promotion goal (Cohen's $d = 0.70$). Conversely, the false-alarm rate was greater when similar (vs. different) others co-attended to the prevention goal (Cohen's $d = 0.65$). Moreover, participants did not intensify goal pursuit when similar others were present but attending to a different goal. Notably, the perceived similarity between co-attendants (i.e., minimal-group paradigm based on color preference) had no discernable association with the goals presented, severely limiting the basis on which the participants could determine the goal-related attitudes of others through mentalization. Moreover, participants had no information about the degree to which others accepted the goal, nor could they see the level of others' goal pursuit, rendering behavioral imitation unlikely (Bandura, 1977). In all, the results suggest that shared attention to goals increased goal persistence.

Walton et al. (2012, Study 3) had participants solve math puzzles that were also given to others. Participants exhibited greater goal pursuit in the task when they

experienced a minimal social connection to unseen others who were also solving the puzzles (Cohen's d s = 0.47 vs. 0.54). Notably, as in our studies on shared goals (Shteynberg & Galinsky, 2011), participants could not observe the level of their minimal group's goal pursuit, rendering imitation unlikely. In another study (Study 4), the results suggested that attending to a goal performed by a close other heightened the cognitive accessibility of that goal (Cohen's d = 0.40) and goal-relevant behavior (Cohen's d = 0.42). Overall, these findings fit well with the idea that knowingly attending to a goal with close others leads to greater cognitive focus on, and stronger pursuit of, that goal.

Judgment

If shared attention to an object increases the cognitive resources directed toward that object, what happens when those cognitive resources are directed toward an emotionally valenced object or event? Given that more thought about a valenced object should result in stronger attitudes (Tesser, Martin, & Mendolia, 1995), we should expect that shared attention to a valenced object would result in a more extreme judgment of that object (Shteynberg, Hirsh, Apfelbaum, et al., 2014).

Consistent with this prediction, Boothby et al. (2014) found that shared tasting experiences can lead to the amplification of taste judgments. Across two studies, participants tasted a pleasant-tasting chocolate with a confederate who was either attending to the same chocolate taste at the same time or doing something else. When the confederate attended to the same chocolate, participants reported more liking of the chocolate (Cohen's d = 0.56). A follow-up study indicated that when participants attended to the taste of the same (vs. different) unpleasant-tasting chocolate as the confederate, they reported more disliking of the chocolate (Cohen's d = 0.34). Although the authors did not manipulate the relational closeness of the confederate, it is possible that sitting side by side and eating the chocolate together generated a social connection and, hence, an awareness of shared attention to the taste of chocolate. Notably, the Boothby et al. (2014) studies highlight that shared-attention effects can occur across distinct sensory modalities.

Shared attention may also influence the judgment of novel objects that have no prior valence. For instance, my colleagues and I (Shteynberg, Hirsh, Galinsky, & Knight, 2014) found that simultaneously co-attending to neutral paintings with similar others (i.e., minimal-group identification, manipulated via choice of avatar color) led to judgments that were more congruent with participants' baseline mood—such that co-attended neutral paintings were more liked by participants who were in a positive

mood and more disliked by participants who were in a negative mood (Cohen's d s = 0.53 vs. 0.47). A follow-up study suggested that more elaborate processing of neutral paintings mediated the influence of shared attention on judgments. These findings are in line with Forgas's (1995) affect-infusion model, which anticipates greater effects of mood on judgment formation when cognitive processing is high (vs. low). As in the other domains, we found that co-attending with minimally close others (vs. merely being in the presence of close others, co-attending with strangers, or attending alone) led to more elaborate processing and, hence, to a greater impact of mood on judgment. Notably, the studies took place in the anonymity of an online setting. Even under these minimal co-attention conditions, attending with similar others allowed for the perception that *we are attending* to the object.

Emotion

Moving from judgments to emotions, the shared-attention logic remains the same. Specifically, shared attention should intensify emotional reactions to emotionally evocative stimuli as more cognitive resources are channeled toward the valenced stimuli: Positive stimuli should feel more positive, and negative stimuli should feel more negative.

Accordingly, across five studies, my colleagues and I (Shteynberg, Hirsh, Apfelbaum, et al., 2014) found that co-attending to happy images and videos with close others increased happiness, whereas co-attending to sad images and videos with close others increased unhappiness (population effect size $[\delta] = 0.40$; 95% CIs = [0.24, 0.55]). Studies also showed that the shared-attention effect on emotion was mediated by the amount of thought devoted to happy and sad videos, as indexed by the percentage of written thoughts referencing video content (Cohen's d s = 0.39 vs. 0.49). That is, compared to attending with different others or alone, attending with close others (i.e., minimal-group identification, manipulated via choice of avatar animal) led to more thoughts about the valenced videos and to more intense emotional reactions. Moreover, the results suggested that the timing of co-attention was critical. Co-attention with close others increased the focus of cognitive resources to emotional scenes only when it was thought to be synchronous (i.e., participants believed that their group was co-attending with them at the same time) rather than asynchronous (i.e., participants believed that their group attended 1 minute before or after them). Given that synchronous co-attention with close others was predicted to evoke the perception that *we are attending* to the object, the results are uniquely supportive of the shared-attention account. Finally, these findings discount the possibility that emotional amplification was the result of guessing what

others felt (i.e., mentalization or vicarious experience; F. H. Allport, 1924), because such guessing was also possible in the asynchronous-attention conditions, in which there were no increases in emotional reactions.

Behavior

In the domain of behavior, shared attention to a given action should lead to the channeling of greater cognitive resources to that behavior. Therefore, we should expect that behavior observed under shared attention would be subject to greater adoption. My colleague and I (Shteynberg & Apfelbaum, 2013) tested whether awareness of simultaneous co-attention with close others can increase behavioral learning. Specifically, participants were asked to read a written exchange between two engineers that was formatted in either paragraph form (with few line breaks) or chat form (with many line breaks). Toward the end of the study, participants were asked to submit a writing sample of their own, the style of which (as indexed by the number of line breaks) served as an indicator of behavioral learning. Across two studies, the researchers found that attending to the engineers' writing with a close other (vs. merely being in the presence of close others, co-attending with strangers, or attending alone) led to greater behavioral adoption (i.e., fewer breaks in one's own writing in the paragraph condition and more breaks in one's own writing in the chat condition; Cohen's $d_s = 0.34, 0.31$). Moreover, only synchronous shared attention with a close other led to greater behavioral adoption. Attending alone or attending asynchronously with a close other (1 minute before or after) did not lead to greater behavioral adoption. This pattern of findings discounts the possibility that increases in behavioral learning were the result of simply thinking about what others read, since this was possible in the asynchronous-attention conditions, in which greater behavioral learning did not occur. These results are uniquely supportive of the proposed shared-attention theory—synchronous co-attention with close others uniquely increased behavioral learning. In all, rather than constituting a rival theoretical account, greater social learning or imitation of a given behavior can be a consequence of greater shared attention on that behavior.

Research Conclusions

The research reviewed suggests that people devote greater cognitive resources to any feature of their environment that is thought to be co-attended synchronously with a socially close other—whether shared attention is instantiated by simply sitting next to a co-attending student (Boothby et al., 2014; Eskenazi et al., 2013; He et al., 2011; Shteynberg, Hirsh, Apfelbaum, et al., 2014) or by

incidental similarities in preferences with co-attending others who are not physically present (Shteynberg, 2010; Shteynberg & Galinsky, 2011; Shteynberg & Apfelbaum, 2013; Shteynberg, Hirsh, Apfelbaum, et al., 2014; Shteynberg, Hirsh, Galinsky, & Knight, 2014; Walton et al., 2012). Given the specific conditions under which shared-attention effects have occurred, the alternative accounts of social facilitation, mentalization, and imitation seem inadequate. In all, the conceptual reasons articulated and the empirical findings reviewed suggest that shared attention is of unique importance in human psychology and behavior.

These findings are broadly consistent with philosophical scholarship on the importance of the “we-mode”—a collective orientation toward the world (Searle, 1995). Moreover, recent models of human evolution highlight the importance of cognitive adaptations that promote attentional coordination with members of one's social group (Boyd & Richerson, 2009; Tsai, Lan, Chen, Henrich, & Boyd, 1998). In line with these models, shared-attention theory posits that co-attended stimuli are the focus of greater cognitive resources because they have greater relevance (Sperber & Wilson, 1986), standing a better chance of serving as an axis of social coordination and communication at a later date. Indeed, assuming that human genetic survival relied on adaptive mechanisms promoting within-group coordination and collective action (Kesebir, 2012; Wilson & Wilson, 2007), greater allocation of cognitive resources to co-attended stimuli may have constituted a critical adaptation in human evolutionary history.

Shared-attention research suggests that thinking about the attitudes, beliefs and preferences of others, or mentalizing, is not the ground floor of human connectedness. Indeed, shared-attention research holds that a basic social attentional stance toward the world precedes theories of mind—reality, as people experience it, is changed by the simple act of attending together. Relatedly, shared-attention research implies that even basic cognitive mechanisms are attuned to enhancing coordination within social groups. When group members prioritize simultaneously co-attended aspects of their environment, they achieve higher levels of intragroup similarity in knowledge, motivation, judgment, affect, and behavior—thereby facilitating future collective action. In all, attending together may be critical for acting together.

Integrating Shared Attention Into the Wider Psychological Discourse

G. W. Allport (1985) described the gist of social psychological research as “an attempt to understand and explain how the thought, feeling, and behavior of individuals are influenced by the actual, imagined, or implied presence

of others" (p. 3). This social-influence perspective paints other agents as powerful forces that shape mind and behavior. The perspective continues to serve us well, with the mainstay themes of obedience, compliance, and conformity all easily discernible through its view.

However, whereas the traditional social-influence perspective renders other agents practically important, it may also make them theoretically superfluous. That is, by locating social agents on the stimulus side of the theoretical formula, it allows the theoretical formula itself to remain strictly asocial in its basic conceptual logic. Put differently, whereas social influence provides important "contents" of cognition, it is not allowed into the basic "structure" of cognitive theory. Accordingly, using this traditional understanding of social influence, connectionist (Read, Vanman, & Miller, 1997), lay epistemic (Kruglanski, 1989), and ideomotor (Massen & Prinz, 2009) perspectives account for many social-influence effects using more general cognitive processes. Social influence seen from this perspective is cognition with social stimuli (Ickes & Gonzales, 1994).

Shared-attention theory is an atypical theory of social influence. Its distinctiveness rests in the fact that it does not conceptualize other agents as simply vehicles of information. Unlike other objects in one's environment, other agents are constitutive of the shared-attention state itself, since shared attention does not exist without the perception that *we are attending*. Thus, the theory of shared attention introduces an information-processing mechanism that is not simply influenced by other social agents but is rather constituted by them.

Some social-influence theories are not reducible to general nonsocial cognitive processes (e.g., relational-models theory: A. P. Fiske, 1992; sociocultural perspective: Vygotsky, 1978). I believe that shared attention scholarship is a promising new development in this tradition. Next, I apply the shared-attention perspective to the two long-standing research domains of social facilitation and social loafing.

Social facilitation

Some of the earliest research in social psychology demonstrated that the mere presence of others could enhance performance (F. H. Allport, 1924). Evidence also accumulated for the opposite hypothesis, whereby the presence of others impeded performance (e.g., Hunt & Hillery, 1973). Resolving the controversy, Zajonc (1965) argued that the mere presence of others increases general arousal that may either enhance or impede performance depending on the difficulty of the task. Baron (1986) proposed an alternative explanation, arguing that the presence of others leads to distraction and hence arousal, which can either enhance or hinder performance depending on the

demands of the task. Other accounts of social-facilitation effects are more motivational in nature, positing that greater performance in the company of others is a function of self-presentation motives, evaluation apprehension, and fear of disapproval (cf. Geen, 1991).

The shared-attention perspective offers a novel account of when others would impede versus facilitate performance. First, it is conceivable that being in the company of other humans while performing a task leads to the perception of co-attention on the task (i.e., *we are attending* to task X). If so, we would expect greater channeling of cognitive resources to the task, thereby facilitating performance, especially on difficult tasks that require more cognitive resources. However, the task may not be the only object of shared attention. For instance, if the others are not working on their own task but are simply watching one's performance, the shared object of attention shifts from one's task to one's performance. The channeling of greater cognitive resources to monitoring one's performance could lead to anxiety, especially on difficult tasks (Geen, 1991). In sum, the shared-attention perspective predicts facilitation effects when there is shared attention on the task itself but debilitation effects when there is shared attention on one's performance during difficult tasks.

The shared-attention research reviewed provides some support for the above hypothesis. Both in the memory and motivation domains, shared attention to the same task (i.e., co-attending to words, goals) led to greater recall memory (Shteynberg, 2010), goal accessibility (Walton et al., 2012), and task performance (Shteynberg & Galinsky, 2011; Walton et al., 2012). In these studies, shared attention to one's task was evoked, but shared attention on one's performance during the task was impossible (i.e., others could not observe one's performance). Accordingly, the shared-attention perspective uniquely predicted that the perception of co-attention to the task with close others (vs. their mere presence) would lead to the facilitation effects found. Additionally, counter to expectations of extant social-facilitation theories, but supportive of the shared-attention perspective, the increase in performance was observed on difficult memory recall tasks (i.e., average accuracy was below 50%; Shteynberg, 2010) that likely benefited from the channeling of greater cognitive resources.

Further research at the intersection of shared-attention and social-facilitation perspectives is required. Although shared attention to one's performance during difficult tasks may lead to anxiety that hampers performance, shared attention to one's performance during easy tasks may lead to increases in general accountability that facilitate performance. In all, the effects of shared attention on task performance depend on the focus of shared attention as well as the difficulty of the task.

Social loafing

The basic finding in the social-loafing literature is that people put less effort into goal achievement when working with others on that goal versus alone. A meta-analysis of this research indicates that loafing is more likely when participants expect that others in the group will put in the effort (Karau & Williams, 1993). Specifically, if one regards one's own work as dispensable to the group effort, especially when one's contribution cannot be identified, social loafing is expected (Latané, Williams, & Harkins, 1979).

The shared-attention perspective expects that the perception of co-attention to any goal should channel greater cognitive resources to that goal, resulting in greater activation of the associated means (Higgins, 1996) and, thus, an increase in overall goal performance. However, during collaborative goal pursuit, when individual effort is not identifiable, people may also perceive shared attention to the high cost of goal pursuit. Specifically, when the possibility of free riding becomes apparent to everyone involved (Baumol, 1952), individual efforts become more costly. Thus, the shared-attention perspective predicts social-striving effects when there is shared attention to the goal but social-loafing effects when there is shared attention to the possibility of free riding and, hence, costly goal pursuit.

The shared-attention research reviewed provides some support for the above hypothesis. Walton et al. (2012, Study 3) found greater goal pursuit in participants who thought they were in a "puzzles group" with unseen others who were also solving puzzles. In the comparison condition, each participant was called a "puzzles person" and told that unseen others would be doing something else. As such, participants in the "puzzles group" condition attended to the goal with similar others, resulting in the perception of co-attention to the collaborative goal but not the possibility of free riding (i.e., individual contributions remained identifiable). While social-loafing research suggests that identifiability of individual efforts should eliminate social loafing (Williams, Harkins, & Latané, 1981), the shared-attention perspective goes further and uniquely anticipates the social-striving effects found.

Additional research at the intersection of shared attention and collaborative goal pursuit is required. Interestingly, shared attention on one's contribution to, or role in, the collaborative effort may increase performance by increasing general accountability and motivation. In all, the effect of shared attention on collaborative task performance depends on the focus of shared attention—focus on the goal itself, the means of attainment, and one's responsibility to others should result in social striving, whereas focus on the possibility of free riding should lead to social loafing.

Shared Attention in the Digital World

Shared attention is ubiquitous in the contemporary world. Awash in social media, viral videos, and live breaking news, people experience shared attention to an unprecedented degree. Mass communication and media technologies are delivering shared-attention experiences more frequently and on a larger scale than could be achieved through physical co-presence. Public education, already suffused with shared-attention experiences within the confines of the classroom (e.g., Lott & Lott, 1966), is embracing the online delivery of such experiences to millions of students. Market data, once the province of those on the trading floor, are now provided in real time to a global audience. In all, the digitization of information and its blistering-fast delivery to individuals across the world allows for frequent and pervasive instances of shared attention.

Yet the effects of perceiving simultaneous co-attention with countless others are unknown. The results in hand speak only to shared attention within small groups of individuals. Moreover, most studies evoke a minimal relational connection among co-attendants. As such, empirically, we can speak only to the influence of shared attention in the circumscribed context of a small, familiar group. In theory, however, some preliminary hypotheses are possible.

As discussed, the perception that *we are attending* can grow stronger as more (vs. less) relationally close others are more (vs. less) synchronously attending to the object of one's attention. Hence, the relationality of co-attendants and the experienced synchronicity of co-attention are clear parameters of the shared-attention state. What is unique about contemporary co-attention experiences, however, is the possibility that a billion people are watching the same event at the same time (e.g., Olympic opening ceremonies; Harris, 2010). Assuming that an individual is aware of the massive viewership, is it possible to experience a shared-attention state with the masses? I would argue that a shared-attention state with countless others is possible simply because individuals do know something about the co-attendees—they chose to watch the same event as one's self, allowing for a relational connection based on the similarity of preferences (Pinel et al., 2006). As a result, individuals can perceive that *we are attending* to the widely viewed event.

A related question is how the number of co-attendants influences the strength of the shared-attention state. Here, assuming that the number of co-attendants increases the cumulative relational connection during co-attention, we should expect stronger shared attention states and, hence, stronger effects. Finally, should we expect a linear relationship between the number of co-attendants and the strength of shared attention, or does

the shared-attention state plateau when it surpasses a certain number of co-attendants? At this point, this remains an open question under investigation. Given that human cognitive mechanisms have evolved in small group settings (Bowles & Gintis, 2003), it is possible that the mechanism of shared attention is sensitive to a limited number of co-attendants. At the same time, evolved cognitive mechanisms are informed by the scaffolding of learned experiences. Therefore, it is possible that humans can become particularly sensitive to large-scale shared-attention experiences as these experiences become more frequent in daily life. Indeed, one provocative possibility is that the breadth of human social organization (e.g., families, villages, cities, nations, earthlings) dovetails with the breadth of shared-attention experiences (e.g., family dinner, village ritual, city festival, national news, global Olympics). That is, broader social organizations both enable and are enabled by the social scope of shared attention. It is conceivable that leadership and control in such social organizations consists of encouraging shared attention among members and then shaping the targets of that shared attention.

In all, the numerosity of co-attendants may serve an important amplifier of shared-attention effects. Recent research suggests that massive media events, which many viewers attend simultaneously, generate greater engagement as indexed via number of tweets (Lin, Keegan, Margolin, & Lazer, 2014). However, we do not know whether greater viewer engagement during mass media events is simply due to more people being exposed to the event or, as a shared-attention perspective would suggest, to each person exposed being more profoundly influenced by the event. To understand the unique effects of shared attention in the mass media context, we need experimental designs that manipulate the perceived number of live co-viewers while keeping other variables constant.

If humans are susceptible to large-scale shared-attention experiences, it is possible that extreme behaviors that surround the targets of large-scale shared attention are due to the channeling of vast cognitive resources to such targets. The effects on mind and behavior may be substantial, and not always positive. For instance, sizable stock movements and news of incurable diseases are common targets of large-scale shared attention, allowing for the prospect that market bubbles and disease panics are, in part, its products.

It is also possible that humans are motivated to seek out instances of shared attention, rendering engagement in social and mass media consumption especially compelling. Conversely, it is conceivable that instances in which shared attention is thwarted are particularly frustrating (e.g., overhearing a one-sided phone conversation; Galván, Vessal, & Golley, 2013). Perhaps this is the

reason why the use of laptops in class hinders learning for nearby peers (Sana, Weston, & Cepeda, 2013) and annoys presenting teachers—in both cases, it frustrates the quest to share a singular focus of attention.

Final Thoughts

Shared attention and its consequences underscore a deeply social dimension of the human mind. However, it is likely that not all humans are subject to the shared-attention mechanism. Individuals who do not channel greater cognitive resources to objects of shared attention become “out of tune” with the rest of the group. They are more likely to misunderstand their group members and are more frequently misunderstood by them. It is possible that they are more likely to be socially rejected (Smart Richman & Leary, 2009). Alternatively, such individuals may be able to avoid the negative consequences of cognitively prioritizing co-attended information, perhaps avoiding the internalization of widely co-experienced, but ultimately harmful, messages.

In all, I have argued that the shared-attention mechanism aids in intragroup coordination and thereby facilitates collective action. However, the mechanism does not speak to the morality of intragroup coordination and the collective action that it facilitates. Groups of humans can undertake morally reprehensible and praiseworthy actions. Ultimately, the influence of shared attention on mind and behavior depends on the target of shared attention.

Declaration of Conflicting Interests

The author declared no conflicts of interest with respect to the authorship or the publication of this article.

Note

1. Promotion goals promote a state of eagerness with an emphasis on getting “hits” and avoiding “misses,” thus keeping the hit rate high, whereas prevention goals foster a state of vigilance with an emphasis on getting “correct rejections” and avoiding “false alarms,” thus keeping the false-alarm rate low (Crowe & Higgins, 1997).

References

- Allport, F. H. (1924). *Social psychology*. Boston, MA: Houghton Mifflin.
- Allport, G. W. (1985). The historical background of social psychology. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology* (Vol. 1, pp. 1–46). Mahwah, NJ: Erlbaum.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Baron, R. S. (1986). Distraction/conflict theory: Progress and problems. In Berkowitz, L. (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 1–40). Orlando, FL: Academic Press.

- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.
- Baumol, W. (1952). *Welfare state economics and the theory of state*. Cambridge, MA: Harvard University Press.
- Boothby, E., Clark, M., & Bargh, J. (2014). Shared experiences are amplified. *Psychological Science*, 25, 2209–2216.
- Bowles, S., & Gintis, H. (2003). Origins of human cooperation. In Hammerstein, P. (Ed.), *Genetic and cultural evolution of cooperation* (pp. 429–443). Cambridge, MA: MIT Press.
- Boyd, R., & Richerson, P. J. (2009). Culture and the evolution of human cooperation. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364, 3281–3288.
- Bruner, J. (1983). *Child's talk: Learning to use language*. New York, NY: W.W. Norton.
- Crowe, E., & Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes*, 69, 117–132.
- Echterhoff, G., Higgins, E. T., & Levine, J. M. (2009). Shared reality: Experiencing commonality with others' inner states about the world. *Perspectives on Psychological Science*, 4, 496–521.
- Eskenazi, T., Doerrfeld, A., Logan, G. D., Knoblich, G., & Sebanz, N. (2013). Your words are my words: Effects of acting together on encoding. *The Quarterly Journal of Experimental Psychology*, 66, 1026–1034.
- Festinger, L. (1950). Informal social communication. *Psychological Review*, 57, 271–282.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117–140.
- Fiske, A. P. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review*, 99, 689–723.
- Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin*, 117, 39–66.
- Galván, V. V., Vessal, R. S., & Golley, M. T. (2013). The effects of cell phone conversations on the attention and memory of bystanders. *PLoS ONE*, 8, Article e58579. Retrieved from <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0058579>
- Geen, R. G. (1991). Social motivation. *Annual Review of Psychology*, 42, 377–399.
- Harris, N. (2010, June 10). *World Cup final "will vie for record of second most-watched event in human history."* Available from <http://www.sportingintelligence.com>
- He, X., Lever, A. G., & Humphreys, G. W. (2011). Interpersonal memory-based guidance of attention is reduced for ingroup members. *Experimental Brain Research*, 211, 429–438.
- Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York, NY: Guilford Press.
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1–46). New York, NY: Academic Press.
- Hunt, P. J., & Hillery, J. M. (1973). Social facilitation in a coaction setting: An examination of the effects over learning trials. *Journal of Experimental Social Psychology*, 9, 563–571.
- Ickes, W., & Gonzales, R. (1994). "Social" cognition and social cognition: From the subjective to the intersubjective. *Small Group Research*, 25, 294–315.
- Karau, S. J., & Williams, K. D. (1993). Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology*, 65, 681–706.
- Kesebir, S. (2012). The superorganism account of human sociality: How and when human groups are like beehives. *Personality and Social Psychology Review*, 16, 233–261.
- Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases*. New York, NY: Plenum Press.
- Kruglanski, A. W., & Shteynberg, G. (2012). Cognitive consistency as a means to an end: How subjective logic affords knowledge. In B. Gawronski & F. Strack (Eds.), *Cognitive consistency: A fundamental principle in social cognition* (pp. 245–264). New York, NY: Guilford Press.
- Latané, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, 37, 822–832.
- Lin, Y. R., Keegan, B., Margolin, D., & Lazer, D. (2014). Rising tides or rising stars? Dynamics of shared attention on Twitter during media events. *PLoS ONE*, 9, Article e94093. Retrieved from <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0094093>
- Lott, A. J., & Lott, B. E. (1966). Group cohesiveness and individual learning. *Journal of Educational Psychology*, 57, 61–73.
- Massen, C., & Prinz, W. (2009). Movements, actions and tool-use actions: An ideo-motor approach to imitation. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364, 2349–2358.
- Mundy, P., & Newell, L. (2007). Attention, joint attention, and social cognition. *Current Directions in Psychological Science*, 16, 269–274.
- Pinel, E. C., Long, A. E., Landau, M. J., Alexander, K., & Pyszczynski, T. (2006). Seeing I to I: A pathway to interpersonal connectedness. *Journal of Personality and Social Psychology*, 90, 243–257.
- Read, S. J., Vanman, E. J., & Miller, L. C. (1997). Connectionism, parallel constraint satisfaction processes, and gestalt principles: (Re)introducing cognitive dynamics to social psychology. *Personality and Social Psychology Review*, 1, 26–53.
- Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. *Computers & Education*, 62, 24–31.
- Searle, J. R. (1995). *The construction of social reality*. New York, NY: Simon and Schuster.
- Shteynberg, G. (2009). *Social attention theory: A new look at knowledge formation in groups* (Doctoral dissertation). University of Maryland, College Park, MD. Retrieved from <http://hdl.handle.net/1903/9188>
- Shteynberg, G. (2010). A silent emergence of culture: The social tuning effect. *Journal of Personality and Social Psychology*, 99, 683–689.
- Shteynberg, G. (2014). A social host in the machine? The case of group attention. *Journal of Applied Research in Memory and Cognition*, 3, 307–311.
- Shteynberg, G., & Apfelbaum, E. (2013). The power of shared experience: Simultaneous observation with similar others

- facilitates social learning. *Social Psychological & Personality Science*, 4, 738–744.
- Shteynberg, G., & Galinsky, A. D. (2011). Implicit coordination: Sharing goals with similar others intensifies goal pursuit. *Journal of Experimental Social Psychology*, 47, 1291–1294.
- Shteynberg, G., Hirsh, J. B., Apfelbaum, E. P., Larsen, J. T., Galinsky, A. D., & Roese, N. J. (2014). Feeling more together: Group attention intensifies emotion. *Emotion*, 14, 1102–1114.
- Shteynberg, G., Hirsh, J. B., Galinsky, A. D., & Knight, A. P. (2014). Shared attention increases mood infusion. *Journal of Experimental Psychology: General*, 143, 123–130.
- Smart Richman, L., & Leary, M. R. (2009). Reactions to discrimination, stigmatization, ostracism, and other forms of interpersonal rejection: A multimotive model. *Psychological Review*, 116, 365–383.
- Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition* (Vol. 142). Cambridge, MA: Harvard University Press.
- Striano, T., Reid, V. M., & Hoehl, S. (2006). Neural mechanisms of joint attention in infancy. *European Journal of Neuroscience*, 23, 2819–2823.
- Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, 223, 96–102.
- Tesser, A., Martin, L., & Mendolia, M. (1995). The impact of thought on attitude extremity and attitude-behavior consistency. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 73–92). Mahwah, NJ: Erlbaum.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Boston, MA: Harvard University Press.
- Triandis, H. C. (1994). *Culture and social behavior*. New York, NY: McGraw-Hill.
- Tsai, S. F., Lan, I. K., Chen, C. L., Henrich, J., & Boyd, R. (1998). The evolution of conformist transmission and the emergence of between-group differences. *Evolution & Human Behavior*, 19, 215–241.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Walton, G. M., Cohen, G. L., Cwir, D., & Spencer, S. J. (2012). Mere belonging: The power of social connections. *Journal of Personality and Social Psychology*, 102, 513–532.
- Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185–208). New York, NY: Springer.
- Williams, K., Harkins, S. G., & Latané, B. (1981). Identifiability as a deterrent to social loafing: Two cheering experiments. *Journal of Personality and Social Psychology*, 40, 303–311.
- Wilson, D. S., & Wilson, E. O. (2007). Rethinking the theoretical foundation of sociobiology. *The Quarterly Review of Biology*, 82, 327–348.
- Zajonc, R. B. (1965). Social facilitation. *Science*, 149, 269–274.