Initial Impressions of Others

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Abstract and Keywords

“Initial impressions” join personality and social psychology like no other field of study —“personality” because impressions are about personalities and perceivers’ personalities affect these impressions; and “social” because social cognitive processes influence impression formation and sociocultural contexts have major effects on impressions. How people describe others is reviewed: terms used, how descriptions reveal theories about others, and importance of types and categories. Research on social cognitive processes underlying these descriptions is highlighted: automatic and controlled attention, effects of primes and their dependence on contexts, acquisition of valence, spontaneous inferences, and interplay of automatic and control processes. Accuracy of initial impressions is examined, as are what accuracy means and motivated biases and distortions. Perceiver features and relations between targets and perceivers are reviewed. Frameworks for understanding explanations, as distinct from descriptions, are detailed: attribution theory, theory of mind, and simulation theory, including synchrony and the role of embodied cognition and metaphor.

Keywords: stereotypes, social cognition, priming, spontaneous inferences, automaticity, accuracy, attribution, theory of mind, simulation, synchrony

Who are you? How can we describe you? A colleague once asked if I (J. S. U.) knew what it is like to be a bat, referring to Nagel’s (1974) famous essay on consciousness and the mind–body problem. I replied in all honesty, “I don’t even know what it’s like to be me.” Where should I begin? What should I leave out, so the account takes less than a lifetime and responds to the question? How accurate are my impressions, and against what standards of accuracy? Is there one truth or many? These are the kinds of questions this chapter raises by noting how social and personality psychologists approach them in theory and in research.

The impressions studied by social and personality psychologists differ sharply. Social psychologists' impressions are fleeting and dissipate in the face of extended interactions; exist only in the minds of perceivers; can be manipulated or managed; and are presumed to be flawed guides to future behavior. Personality psychologists' impressions are stable and coherent over time and place; exist apart from particular perceivers; and provide accurate guides to future actions.

But, these impressions are inseparable, two sides of the same coin. Both are social constructions (like "the economy" or "the legal system"). Both concern what persons' characteristics are; what causes them to behave as they do in specific situations, as well as more generally; what they think and feel; and so on. Both arise from the same initial evidence: people's behaviors in particular situations. Social psychologists focus on perceivers and what they make of this evidence; personality psychologists focus on targets and what produces this evidence. But, perceivers have personalities, and targets act in the actual or imagined presence of perceivers. So, these two emphases are intertwined aspects of a conceptual Gordian knot. Simply cutting through this (p. 416) knot to divide it into social and personality halves does violence to these interrelations and does not "carve nature at its joints," as Plato recommended. The apparent social/personality division is largely a matter of (real) professional territoriality, differing scientific traditions and academic audiences. In this chapter, we weave them back together.

How we form impressions of people has long been a fundamental question in both social and personality psychology because our interactions depend on our impressions of others. Alternatively, we might have started with impressions of social situations or relationships. But Western, and especially US, psychology has long been individualistic for cultural (Lehman, Chiu, & Schaller, 2004) and ideological (Ichheiser, 1949) reasons. We begin this chapter with the terms we explicitly use to describe other people. What are they, and when do we use them? How are they related to each other, and what do these relations reveal about our theories about other people?

We also form implicit (unspoken and unconscious) impressions, and explicit descriptions are based on processes of which we are largely unaware. What are these processes? What captures our attention, unbidden? What produces evaluations? How do we unconsciously infer inner qualities (e.g., traits) from outer observables (e.g., behaviors)? The second section of this chapter deals with some of these processes.

Research on accuracy has been oddly independent of research on processes, in part because Cronbach's (1955) devastating critique of accuracy research intimidated researchers for decades, and Mischel's (1968) critique of personality research questioned whether there is anything to be accurate about. But now there are more sophisticated approaches to these questions. We review conceptions of accuracy and sample current results, including motivated biases and distortions in forming initial impressions. The fourth section concerns features of perceivers and targets' relations to them that affect

initial impressions. We also note recent work on distributed impressions, in cyberspace and in reputations. Relations to perceiver include power and psychological distance.

Finally, we note recent work on explanations of others' behaviors, focusing on three frameworks: (a) attribution theory, (b) theory of mind, and (c) simulation theory, self-reference, metaphor, embodied cognition, and synchrony. Explanations are inherently interpersonal and are usually motivated and judgmental. They often depend on implicit theories.

Lay Descriptions of Others

Our descriptions of others are a function of who they are, who we are, our familiarity with them and the goals of our descriptions, previous descriptions, and our culture. Traits are particularly prominent (Park, 1986). Their semantic and perceived relations to each other have been studied for over 50 years (Uleman & Kressel, 2013).

Traits' Relations to Each Other

The same "Big Five" factors of personality—openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism—emerge from ratings of traits' semantic similarity, co-occurrence likelihoods, and prototypicality of acts, as well as ratings of complete strangers, well-known others, and the self (John, 1990). Rosenberg, Nelson, and Vivekananthan (1968) identified two correlated but distinct evaluative dimensions: social warmth and competence. Judd, James-Hawkins, Yzerbyt, and Kashima (2005) termed these "the fundamental dimensions of social judgment" and dubbed them the "Big Two."

Wojciszke, Bazinska, and Jaworski (1998) presented evidence that morality is just as important in impression formation as the traditional Big Five or Big Two. Goodwin, Piazza, and Rozin (2014) made this case more strongly, and Uhlmann, Pizarro, and Diermeier (2015) asserted that we are all naïve "virtue theorists," focusing on people's morality rather than merely their behaviors. (See Graham and Valdesolo's Chapter 13 on morality in this volume.)

Traits have been conceptualized in several ways and differ from types (including ethnophalisms and stereotypes), person models, and social roles (see Uleman and Saribay, 2012, pp. 340–344). For example, people may believe members of an ethnic or national group are "no different than lower animals." This tendency is reliable over time and shows discriminative validity in predicting important social and political attitudes (Kteily, Bruneau, Waytz, & Cotterill, 2015).

Categories

Traits (*extraverted*) can become categories (*extravert*), and types are already categories. But, in this literature, "categories" chiefly refer to race, sex, and age (the "big three" first singled out in US federal legislation outlawing discrimination). Recent research showed (a) methods to trace the time course of these categories' emergence in judgments; (b) that these (and other) categories integrate (p. 417) top-down and bottom-up (perceptual) information from multiple modalities simultaneously; and (c) that these categories interact with each other in decision tasks.

Mouse tracking (Hehman, Stolier, & Freeman, 2015) reveals temporal decision dynamics when people categorize others if their appearance presents conflicting cues, as it often does. In one series (Johnson, Freeman, & Pauker, 2012, Studies 2–4), participants saw *Male* in the upper right of a computer screen and *Female* in the upper left and quickly categorized photos of sexually ambiguous faces appearing at the bottom center of the screen by moving the cursor from the photo to the correct label. Faces also varied by race: black, white, and Asian. Deviations from the straight line connecting faces with categories showed that "Female categorizations were facilitated, and male categorizations were impaired, as stimuli changed from Black to Caucasian to Asian." Categorizations of black females and Asian males produced the largest deviations, indicating the most conflicting cues. Stereotypes exerted a top-down influence in that "the race bias for sex categorizations was more pronounced among participants who held stronger associations for Asian/female and Black/male" and "common cues in the facial phenotypes of Black and male faces impacted the efficiency of sex categorizations in a bottom-up fashion" (pp. 12–13).

Neuroscience also reveals categorization dynamics based on conflicting cues. Hehman, Ingbretsen, and Freeman (2014) varied facial emotions and races to be stereotypically congruent (black and angry) or incongruent (black and happy) with each other and included faces intermediate on emotion and race. Participants' BOLD (blood oxygen level dependent contrast imaging) responses were measured to each face using fMRI (functional magnetic resonance imaging), as they judged facial symmetry (to ensure attention to each face). Then, they used a mouse tracker to categorize faces by race and by emotion.

> The medial prefrontal cortex (mPFC) and anterior cingulate cortex (ACC) showed stronger activation to faces that violated stereotypical expectancies . . . [and showed] linearly increasing responses as race and emotion became stereotypically more incongruent. . . . Participants with stronger behavioral tendencies to link race and emotion stereotypically during categorization [with mouse tracking] showed greater dorsolateral prefrontal cortex activation to stereotypically incongruent targets. (Hehman et al., 2014, p. 704)

This suggested greater effort to inhibit stereotypic associations.

This work illustrates “an interdisciplinary ‘social vision’ approach . . . [that examines] the functional neuroanatomy of four visually-based social perception processes: identity recognition, social categorization, emotion recognition, and trait attribution . . . in which higher-order social factors flexibly constrain these lower-level perceptual processes” (Stolier & Freeman, 2016). Freeman and Ambady (2011) offered a theoretical framework and computer model for such research, based on a recurrent connectionist architecture. It “permits lower-level sensory perception and higher-order social cognition to dynamically coordinate across multiple interactive levels of processing to give rise to stable person construals” (p. 247) to describe how we construct categories from multiple cues “on the fly.” See also Amodio (2014).

Processes of Impression Formation

Many current accounts of cognitive processes posit two classes: automatic and controlled. The title of a recent popularization of dual-process theories, *Thinking, Fast and Slow* (Kahneman, 2011), captures one distinction between these two, but there are others, such as how conscious, intentional, easily disrupted, and demanding of limited cognitive capacity they are. How might controlling executive functions (EFs) be related to estimates of automatic and control processes in Jacoby’s (1991) process dissociation procedure (PDP)? And how are individual differences in these variables related to motivations and success in controlling, for example, racial bias? Ito et al. (2015), in an exemplary study with multiple measures and latent variable analyses, found that

> (a) measures of [automatic] implicit bias [the weapons identification task (Payne, 2001), the shooter task (Correll, Park, Judd, & Wittenbrink, 2002), and the IAT (Greenwald, McGhee, & Schwartz, 1998)] were only weakly intercorrelated; (b) EF and [PDP] estimates of automatic processes both predicted implicit bias and also interacted, such that the relation between automatic processes and bias expression was reduced at higher levels of EF; (c) specific facets of EF [response inhibition, working memory updating, and task-shifting, each measured with three tasks] were differentially associated with overall task performance and controlled processing estimates across different bias tasks; (d) EF did not moderate associations between implicit and (p. 418) explicit measures of bias; and (e) external, but not internal motivation to control prejudice (e.g., Plant & Devine, 1998) depended on EF to reduce bias expression. (p. 187)

This study measured individual differences via self-report questionnaires, cognitive tasks, and estimated parameters. In short, “dual” is an oversimplification.

Attentional Processes

There are many attentional processes. Some are internal and often indexed by response times and central nervous system activity; some are external and indexed by the orientation of sensory receptors (e.g., eye tracking) as noted by Chun, Golomb, and Turk-Browne (2011); and some are interpersonal, such as gaze following. Both stimulus characteristics and persons' goals affect attention (Gaspelin, Leonard, & Luck, 2015).

Maner and Miller (2013) used a dot probe task to measure inability to disengage attention from a target ("attentional adhesion") to the detriment of task performance. They found that participants in a minimal group study "who perceived the outgroup as dangerous had their attention captured selectively by [neutral] images of outgroup males" (p. 733), taking about 110 ms longer to disengage attention as when the out-group was not seen as dangerous. No such effect occurred for female or in-group images.

Attention may be deployed automatically, and this can depend on prior rewards (Le Pelley, Pearson, Griffiths, & Beesley, 2015) and top-down preparatory attention allocation (Everaert, Spruyt, Rossi, Pourtois, & De Houwer, 2014). For example, attention to others can be moderated by social anxiety, specifically brief fear of negative evaluation (BFNE). Buckner, DeWall, Schmidt, and Maner (2010) used eye-tracking data with negative, happy, and neutral faces to show that participants high on BFNE, told that "they would become increasingly accident prone in future years" (a nonsocial threat), paid more attention to negative faces. In contrast, participants high on BFNE told "they would likely end up alone in the future" (p. 451) paid more attention to positive faces. Those low on BFNE showed no such effects. Ofan, Rubin, and Amodio (2014) provided event-related potential (ERP) N170 "evidence that anxiety arising from the social situation modulates the earliest stages of face processing" in a top-down manner (p. 1055).

Differential attention plays a role in stereotype formation. Sherman et al. (2009) reported a series of studies based on Kruschke's attention theory of category learning. The theory notes that

> the features of majority groups are learned earlier than the features of minority groups. [As a result,] the features that become associated with a minority are those that most distinguish it from the majority. [In addition, there is] an attention-shifting mechanism that directs attention toward group–attribute pairings that facilitate differentiation of the two groups and may lead to the formation of stronger minority stereotypes. (p. 305)

Thus, the theory accounts for both the ways stereotypes differentiate among groups without requiring that these differences be real and for the role of distinctiveness in illusory correlation phenomena.

Attention also interacts with individual differences to affect important social judgments. In a striking example, Granot, Balcetis, Schneider, and Tyler (2014) measured or manipulated participants' identification with an out-group target (police or peer) involved

in a videotaped altercation. Then, they tracked or manipulated participants' visual attention to the out-group target as they watched the videotape.

> Individuals weakly identified with police or a novel social outgroup punished an outgroup target [e.g. a policeman] more harshly than strongly identified individuals when they frequently attended to that outgroup target. However, identification had either no effect on judgments among people who fixated infrequently on the outgroup target . . . or tended to have the reverse effect. (p. 2205)

That is, attending *to the same videotape* polarized punishment decisions among those strongly (vs. weakly) identified with the out-group target. Participants' interpretations of and memory for what they "saw" mediated these effects.

Risko, Laidlaw, Freeth, Foulsham, and Kingstone (2012) reviewed the literature on gaze following and attention to others' eyes, comparing static artificial ("real") stimuli versus dynamic, richly contextualized ("reel") stimuli. They showed that many variables affected gaze direction and gaze following, including knowing that you are being watched. Individual differences in the extent of autism symptoms on the 50-item self-report Autism Spectrum Quotient (AQ) questionnaire affect gaze following (Freeth, Foulsham, & Kingstone, 2013). Eye tracking showed that undergraduates high on AQ looked less at a prerecorded videotaped (p. 419) interviewer but showed no attentional differences to a live interviewer.

Gaze cueing (more rapid detection of target stimuli where another person is looking) is greater for political liberals (Dodd, Hibbing, & Smith, 2011). When gaze is cued to a particular object (presumably including a person) by someone with a neutral or positive expression, it increases liking for that object relative to when gaze is cued away or their expression is negative. When gaze is cued by many people, this liking effect is greater (Capozzi, Bayliss, Elena, & Becchio, 2015). When information conveyed by a person's gaze is helpful, it increases trust in that person and "can prompt altruism" in a variety of economic games, particularly if that person is familiar to the perceiver (Rogers et al., 2014, p. 763).

Beliefs about whether the "other" whose gaze is followed is human or not affect visual processing very soon (100–140 ms) after target stimuli appear. Wykowska, Wiese, Prosser, and Müller (2014) presented participants with computer images of human and robot faces, each looking right or left before a target letter appeared on one side or the other on each trial. Participants identified targets as quickly and accurately as possible during electroencephalographic (EEG) recording. Study 2 involved only a robot face, but participants were told that its movements were controlled by a human or by a computer. The primary dependent variable was the ERP P1 response in the posterior occipital lobes, on correct trials, and was interpreted as indicating amplification of the visual signal by suppressing attention to ignored locations.

> Attentional control over sensory processing (the sensory gain control) [was] enhanced when participants believed that the observed gaze behavior was controlled by a mind, rather than by a machine. . . . This is the first study to show that higher-order, task-irrelevant beliefs about the observed scene can influence early sensory processing by modulating stimulus-related neuronal activity, dependent on whether the stimulus location has been signaled by a meaningful social cue (gaze direction of an agent with a mind) or not (gaze direction of a machine). (pp. 7–8)

In an important theoretical paper, Adams and Kveraga (2015) "review the traditional theories of emotion and face processing that argued for dissociable and noninteracting pathways (e.g., for specific emotional expressions, gaze, identity cues), as well as more recent evidence for combinatorial processing of social cues." They note "contemporary work that reveals a flexible visual system, one that readily incorporates meaningful contextual influences in even nonsocial visual processing, thereby establishing the functional and neuroanatomical bases necessary for compound social cue integration" (p. 591).

Priming

Incidental exposure to almost any stimulus can affect subsequent responses to other stimuli, producing a variety of priming effects. Perceptual priming effects are sensitive to the stimuli's format and modality. Procedural priming is sometimes equated with mindset priming (Fujita & Trope, 2014). Response priming (Neumann & Klotz, 1994) makes particular responses rather than concepts more likely. Affective or evaluative priming occurs when the valence of the first stimulus affects judgments of the second. It is widely used in indirect or implicit measures of attitudes (Herring et al., 2013). See the special issue of *Social Cognition* on "social priming" (Molden, 2014).

Many effects depend on flexibly interpreting and applying concepts. Thus, when *elderly* is primed and slows participants' walking (Bargh, Chen, & Burrows, 1996), is the primed person behaving like an older person or anticipating interacting with an older person? Loersch and Payne (2011) suggested that primes answer implicit questions prompted by participants' immediate situations, and different situations prompt different questions. DeMarree and Loersch (2009) showed that directing attention immediately after a prime toward the self produces assimilation in one's own behavior and self-perception, whereas directing attention to another affects impressions of that other. Consistent with this interaction between primes and attention, S. C. Adams and Kiefer (2012) showed "that an attentional orientation toward semantics [rather than phonemics] is necessary for subliminal semantic priming to be elicited" (p. 1). Spruyt, De Houwer, Everaert, and Hermans (2012) showed that "unconscious activation of (affective) [vs. nonaffective] semantic information is modulated by feature-specific attention allocation" (p. 91). That

is, task sets (i.e., procedural primes) sensitize people to particular aspects of unconscious semantic primes.

Wheeler, DeMarree, and Petty (2007) proposed that behavior primes' effects depend on "creating changes in the active self-concept . . . and describe how individual differences in responsiveness of the self to change . . . can moderate prime-to-behavior (p. 420) effects" (p. 234). Fujita and Trope (2014), concerned with how people resist temptation in the face of tempting primes, proposed that those with a mindset of "structured regulation . . . will be particularly sensitive to the goal relevance of salient stimuli, attending to and responding to goal-relevant stimuli, and ignoring or perhaps even *acting in the opposing direction* of goal-irrelevant or goal-undermining stimuli" (p. 82, italics added). Kleiman, Sher, Elster, and Mayo (2015) showed that chronic and situational distrust blocks cognitive accessibility effects, including the effects of primes. Priming distrust reduced the effects of stereotypes on impressions of others (Posten & Mussweiler, 2013).

Counterstereotypic exemplars of success can prompt automatic inferences about social conditions, without intention or awareness (Critcher & Risen, 2014). Participants were primed with successful African Americans (e.g., Barack Obama, Toni Morrison) in one task and then completed attitude measures in "an unrelated task." Such priming made them more likely to deny that racism is a problem and to reduce support for policies that address racial inequality. These effects were independent of explicit reasoning about the exemplars and were stronger for those high in the need for cognition and for those experimentally prompted to think inductively.

Valence Acquisition

There was a time in the study of impression formation when the primary questions focused on explicit evaluations (Uleman & Kressel, 2013). Interestingly, traits and their evaluative meanings seem to be stored in different brain locations (Ma, Baetens, Vandekerckhove, Van der Cruyssen, & Van Overwalle, 2014).

Much of the research on valence acquisition is in the attitudes literature, where attitudes toward (i.e., evaluations of) a target are at issue, and in the stereotyping and prejudice (evaluation) literature. Relations between implicit and explicit evaluations are central: how they develop and change and their relations to behavior. For an excellent summary of current thinking in this area, see the work of Ferguson and Fukukura (2012). They contrasted "direct versus indirect" attitude measures to avoid conflating measures with theoretical constructs. They noted that measures of the same type often do not correlate highly and concluded that all are subject to context effects and often correlate with different kinds of behavior. In addition, and contrary to conventional wisdom, Ferguson and colleagues have shown that "newly formed implicit evaluations can be completely overturned through deliberative considerations about a single piece of counterattitudinal

information" (Cone & Ferguson, 2015, p. 37), and that "participants fully reversed their implicit evaluation of a novel target person after reinterpreting earlier information" (Mann & Ferguson, 2015, p. 823).

Automatic evaluation of strangers also occurs, based solely on unrecognized physical resemblance in facial features (Gawronski & Quinn, 2013). Preverbal infants develop preferences for other people based on what the others do (Hamlin, 2014a). And, the similarity of people's neural (fMRI) responses to hundreds of video clips predicted friendships and social network closeness, even after controlling for demographic variables (Parkinson, Kleinbaum, & Wheatley, 2016).

More positive evaluations of out-group members, both explicit and implicit, result from taking their perspectives. Todd and Galinsky (2014) summarized these effects of perspective taking and the multiple mechanisms, affective and cognitive, behind them.

Implicit negative attitudes toward out-groups may confound (a) attitudes based on explaining the group's low status in terms of its own failings and faults with (b) those based on its oppression by others, both of which are negative. Andreychik and Gill (2012) distinguished implicit attitudes that were prejudice based (predicting discrimination) and those that were empathy based (predicting empathy and compassion), respectively. Blanton and Jaccard (2008) critically reviewed research on implicit racism.

Perceptual fluency and the resulting positive evaluation of faces can depend on the task context. Faces that are disfluent because they display mixed emotions or social category ambiguity, following an emotion or social category classification task, are devalued. Thus, "the impact of facial features on evaluation is qualified by their fluency, and . . . the fluency of features is a function of the current task" (Winkielman, Olszanowski, & Gola, 2015, p. 232).

Hütter and Fiedler's (2016) special issue of *Social Cognition* addresses evaluative conditioning.

Spontaneous Inferences From Behaviors

Spontaneous trait inferences (STIs) from behaviors are those that occur unconsciously and unintentionally (Uleman, Saribay, & Gonzalez, 2008). They affect explicit trait ratings of actors (Carlston (p. 421) & Skowronski, 2005) and predictions of actors' behavior (McCarthy & Skowronski, 2011). In most of this research, they are prompted by attention to pairs of actor photos and verbal descriptions of behaviors selected for their trait implications. But, selection can be theoretically based (e.g., Elsbach, Cable, & Sherman, 2010). STIs are also prompted by static silhouettes of actors behaving (Fiedler, Schenck, Watling, & Menges, 2005).

Ferreira et al. (2012) posited an inference-monitoring process that distinguishes intentional trait inferences from STIs and may explain why traits organize memories for trait-implying behaviors under impression formation goals but not under memory goals. In three studies, they presented considerable evidence that “explicit goals produce awareness and monitoring of otherwise unconscious inferences relevant to these goals” (p. 2).

Temporary mindsets or mental sets and mood affect STIs. Rim, Uleman, and Trope (2009) found that an abstract mindset and greater spatial or temporal distance from targets made STIs more likely. Crawford, McCarthy, Kjaerstad, and Skowronski (2013) showed that approach and avoidance movements (i.e., arm flexion and extension, respectively) decreased the likelihood of negative and positive STIs, respectively. That is, interpreting approach as a positive set and avoidance as a negative set, when set and trait valences mismatched, STIs decreased. Furthermore, holding a warm (positive) or cold (negative) object while reading trait-implying sentences had similar effects on mismatched STIs. This effect of temperature seemed largely automatic, according to a PDP analysis.

Unconscious goals affect STIs. Rim, Min, Uleman, Chartrand, and Carlston (2013) primed an affiliation goal. Experiment 1 showed that affiliation (vs. neutral) priming made unconscious trait inferences more accessible, regardless of trait valence. Experiment 2 showed that this priming made positive (vs. negative) traits more likely to bind to actor representations (photos) in the false recognition paradigm, as though participants had been prompted to see others positively by anticipating affiliation. Experiment 3 showed that a goal rather than mere semantic associations had been primed by satisfying the goal for some. Goal satisfaction cancelled the effect for these participants, but effects persisted for others.

Although STIs are more likely in Euro-American (individualist) than East Asian (collectivist) cultures (Na & Kitayama, 2011; Shimizu, 2012), they do occur in East Asia (Lee, Shimizu, Masuda, & Uleman, 2017; Shimizu, 2012; Shimizu, Lee, & Uleman, 2017). Lee, Shimizu, and Uleman (2015) and Shimizu et al. (2017) used a PDP model to show that this cultural difference occurred for automatic but not controlled processes. Shimizu et al. (2017) argued that such automatic processes are core features of culture. Consistent with social class differences in individualism/collectivism, STIs are less likely among lower classes (Lillard & Skibbe, 2005; Varnum, Na, Murata, & Kitayama, 2012).

Individual differences in perceivers also affect STIs. STIs differ for those high versus low on authoritarianism (Uleman, Winborne, Winter, & Shechter, 1986). They are more likely for those high on the personal need for structure (Moskowitz, 1993) and on dispositionism (Gill & Andreychik, 2014, Study 4). Zelli, Huesmann, and Cervone (1995; Zelli, Cervone, & Huesmann, 1996) found that aggressive participants (who reported being more physically aggressive in the past year) were more likely to spontaneously infer aggressive traits than nonaggressive participants, even though their intentional trait inferences did not differ. Wilkowski and Robinson (2010) reported on differences in hostility and anger among undergraduates. They used ambiguously hostile behavior

descriptions to measure both STIs and spontaneous trait transferences (STTs; see discussion that follows), with the false recognition paradigm. They found that STIs "predicted higher levels of anger and aggression in daily life, and these relationships were mediated by daily [diary] hostile interpretations" (p. 187). Those "who displayed a nonrational tendency to exhibit spontaneous hostile *transferences* assessed in the laboratory [STTs] reported higher levels of anger in their daily lives. Moreover, relations of this type were independent of implicit hostile *inferences* assessed in the laboratory [STIs] and hostile interpretations reported in daily [diary] life" (p. 187, italics added).

Boecking and Barnhofer (2014) used depression-related STI behavioral stimuli reflecting "need for approval" and "performance evaluation." Relative to healthy controls, depressed patients showed "a general tendency to ascribe depression-relevant traits to other people" (p. 3002). STIs among patients were positively correlated with depression (Beck Depression Inventory–II [BDI-II]) and with self-reported childhood abuse and neglect (both emotional and physical).

Crouch et al. (2010) reported that parents high on risk for child physical abuse (CPA) inferred more traits from children's negative behaviors than from positive ones, and this difference was greater than (p. 422) for low CPA risk parents. McCarthy et al. (2013) looked at STIs from children's behaviors in a PDP analysis of false recognition among parents at high versus low risk for CPA. Traits were positive or negative and either vaguely or strongly implied. High (but not low) CPA risk parents were more likely to infer negative traits automatically from ambiguous negative behaviors, suggesting an important risk factor for CPA.

Stereotypes affect STIs, and spontaneous trait inferences about groups (STIGs) may be the seeds of stereotypes (Hamilton et al., 2015). Wigboldus, Sherman, Franzese, and van Knippenberg (2004) used a probe recognition paradigm and found that when stereotypes of actors are inconsistent with the traits implied by the actors' behavior, trait activation is reduced even under high cognitive load. Yan, Wang, and Zhang (2012) found "stronger STIs for gender stereotype-consistent behaviors and weaker STIs for stereotype-inconsistent behaviors" (p. 220; Experiment 1), but only for gender-schematic participants (Experiment 2). Ramos, Garcia-Marques, Hamilton, Ferreira, and Van Acker (2013) used this same paradigm. They found that when

> the stimulus sentences include the actor's group membership, a trait implicative behavior and a possible situational reason for the behavior, participants were more likely to make STIs from behaviors that were attributed to members of a group for whom these behaviors are stereotypically consistent . . . when the stereotype of the actor was inconsistent with the behavior, participants were more likely to spontaneously infer something about the situation in order to make sense of what is being processed. (p. 1253)

People spontaneously infer other things, including goals (Moskowitz & Olcaysoy-Okten, 2016); beliefs (Van der Wel, Sebanz, & Knoblich, 2014; Young & Saxe, 2009); counterfactual behaviors (D. T. Miller, Visser, & Staub, 2005); justice concepts (Ham & van den Bos, 2011); social roles (Chen, Banerji, Moons, & Sherman, 2014); the visual perspectives of others (Furlanetto, Becchio, Samson, & Apperly, 2016); cultural values, depending on one's culture (Fu, Chiu, Morris, & Young, 2007); as well as traits of organizations (Risavy, Komar, & Brown, 2010, Study 2) and of groups (Hamilton et al., 2015). Goals seem to be inferred faster than STIs (Van Overwalle, Van Duynslaeger, Coomans, & Timmermans, 2012).

Todd, Molden, Ham, and Vonk (2011) showed the simultaneous activation of trait and situational causes, and Ham and Vonk (2011) showed this for traits and ulterior motives. Todd et al. (2011, Study 4) showed that explicit inference goals and cognitive load interact, such that after multiple inferences occur, goals select the goal-relevant inference under no load (but not under load).

People also make spontaneous evaluative inferences (SEIs; Schneid, Crawford, Skowronski, Irwin, & Carlston, 2015). Whereas STIs are disrupted by lie detection instructions (Crawford, Skowronski, Stiff, & Scherer, 2007), SEIs are not (Schneid, Carlston, & Skowronski, 2015). Consistent with this but using very different methods and participants, Hamlin and her colleagues have shown that "preverbal infants make sociomoral evaluations" (reviewed by Van de Vondervoort & Hamlin, 2016). Infants as young as 4.5 months evaluated targets positively not only when they helped prosocial actors, but also when they hindered antisocial actors (Hamlin, 2014b). It is unclear whether all these valenced responses reflect the same underlying representation and predict similar consequences or represent different representations and processes, as seems likely for stimuli that prompt disgust.

Young and Saxe (2009) presented fMRI evidence for spontaneous belief inferences. Participants read brief "moral or non-moral" stories and then answered neutral factual questions. In one scenario, the protagonist served children ground beef that had (vs. had not) passed its "sell-by" date or where no expiration date was mentioned. When the protagonist's belief about the beef's safety was implicit (vs. explicit), "The RTPJ [right temperoparietal junction], PC [precuneus], and MPFC [medial prefrontal cortex] were recruited selectively for moral over non-moral facts, suggesting that processing moral stimuli elicits spontaneous mental state inference" (p. 1396). Presumably spontaneous guilt or blame inferences also occur. These studies included no behavioral evidence, but relied on contrasting multiple conditions and on prior evidence of these brain regions' functions, illustrating "reverse inference" from brain activity to mental states.

Van Duynslaeger, Van Overwalle, and Verstraeten (2007) compared P300 EEG responses to words that were evaluatively inconsistent (vs. consistent) with moral traits implied earlier by brief paragraphs, under both spontaneous and intentional trait instructions. "Spontaneous inferences show greater activation in the temporo-parietal (p. 423) junction" (p. 174) and correlated as expected with memory measures. Van Duynslaeger,

Sterken, Van Overwalle, and Verstraeten (2008) used a similar method to show that event-related P300 responses in the parietal scalp to inconsistent words confirmed STIs, again corroborated by subsequent memory measures. Baetens, Van der Cryssen, Achtziger, Vandekerckhove, and Van Overwalle (2011) replicated the P300 findings and also found N400 responses, which they interpreted as reflecting the increased effort needed to understand the inconsistencies. Spontaneous and intentional trait inferences were compared with fMRI by Ma, Vandekerckhove, Van Overwalle, Seurinck, and Fias (2011). They reported that intentional trait inferences recruited additional brain areas, relative to STIs, suggesting that "intentional instructions invite observers to think more about the material they read, and consider it in many ways besides its social impact" (p. 123).

Ma et al. (2012) studied effects of inconsistent moral behaviors. Under spontaneous or intentional impression formation instructions, they had participants read several behavioral sentences about each of 48 agents. The last sentence about each agent was consistent or inconsistent with the others. Brain activity was detected with fMRI.

> Under spontaneous instructions, there was an increased interaction between mentalizing and conflict monitoring networks . . . but not under intentional instructions. . . . [This] suggests that the inconsistent information was salient enough to interrupt spontaneous trait processing, leading to more deliberate conflict resolution. In contrast, . . . the intentional instruction may have . . . prevented participants to make [sic] robust trait inferences (reducing mPFC activity). A related explanation is that the elaborate and deeper processing of the discrepancy under intentional instructions might have resulted in many individually tailored solutions to resolve the discrepancy, precluding a convergence in the connectivity pattern between brain areas. (p. 947)

Hackel, Doll, and Amodio (2015) showed that people can infer agents' traits through interactions with them and then use these traits to make cross-context decisions. Participants played a game with four human and four slot machine targets. On each training trial, they chose between two targets of the same type and learned how many points they had been awarded (in a dictator game) and the size of the point pool available to the target, from which the trait "generosity" could be inferred. Then, on test trials, they played without feedback but knowing the point pool available to each target. Finally, they indicated how much they would like to work with each human target on a future cooperative puzzle task. Computer modeling of choices showed that participants relied on points and generosity (which were orthogonal by design), but more on generosity. This was also true of preferences for future partners. Concurrent fMRI data showed that "both learning types [reward learning of points and trait generosity learning] implicated ventral striatum, but trait learning also recruited a network associated with social impression formation" (p. 1233). These results support a multiple memory systems model of social cognition. Generosity inferences were estimated by the computer model from task parameters and choice data.

Carlston and Skowronski (2005) described STIs as the result of inferring and STT as the result of associative processes. What evidence supported this general distinction between inferential and associative processes? Recent research on intentional deductive and inductive reasoning provided some. Although this work involved meta-cognitive reflection, whereas "spontaneous" inference does not, results supported two modes of reasoning, one associative and the other more complex. For deduction, participants evaluated problems of the form, "If *p*, then *q*. Not *q*. Therefore not *p*?" "The default strategy is to evaluate the probability of a conclusion [e.g., not *p*, which is illogical] given the premises," that is, to use the stated statistical association between *p* and *q*.

> The second strategy evaluates the logical status of a conclusion by examining whether there are any counterexamples to that conclusion, in line with mental model theories. . . . When put under pressure, it appears that reasoners default to the statistical strategy; when given more time, however, reasoners are more likely to opt for the counterexample approach. (Markovits, Brunet, Thompson, & Brisson, 2013, p. 1220)

For induction, Bright and Feeney (2014)

> develop[ed] a measure of knowledge about the degree of association between categories and show[ed] that it dissociates from measures of structured knowledge. . . . Inductive strength was predicted by associative strength under heavy cognitive load, whereas an index of structured knowledge was more predictive of inductive strength under minimal cognitive load. Together these results suggest that **(p. 424)** associative and structured models of reasoning apply best under different processing conditions and that the application of structured knowledge in reasoning is often effortful. (p. 2082)

Thus, both associative and structured knowledge, the latter in many forms, are used for inferences under different conditions.

On the other hand, Orghian, Garcia-Marques, Uleman, and Heinke (2015) suggested that STI and STT phenomena can both be simulated by "one simple autoassociative connectionist network, based on a single underlying associative process" (p. 24). Their simulations were able "to show that a very simple associative model that does not posit dual processes could account for major differences between STI and STT that have been interpreted as supporting a dual process account, and to describe some of the consequences of such a model" (p. 60). The model included three types of nodes connected with each other through bidirectional links: the trait-implying behavior, the implied trait, and the actor (or face). Nodes' activations, which can be thought of as memory traces, reflect task demands on how attention is deployed and spreading activation among the nodes. Connection weights between nodes describe the activation transmitted and are adjusted by the delta rule algorithm.

Rich and Zaragoza (2016) showed that implied misinformation is relied on more than explicit misinformation. Participants read a newspaper account of a crime that either implied or explicitly stated misinformation that was later explicitly discredited. The authors suggested several possible mechanisms for this effect, including constructing a more complex mental model for implicit misinformation because inferring it requires more elaborate processing. They also suggested that detecting the inconsistency between discrediting information and the misinformation may be harder when it is inferred. This suggests that spontaneous inferences might show similar effects. (Implications were not spontaneous here because participants read for comprehension, knowing they would answer questions later. In addition, the story was long enough that comprehension required participants to construct a text base or mental model.)

Control and Automatic Processes

Process dissociation procedure analyses (Jacoby, 1991) have been prominent in recent research on STIs. Some of this was described previously and focuses on cultural differences. McCarthy and Skowronski (2011) used the PDP to show that instructions given before encoding affected automatic but not control response processes, whereas delays between stimulus exposure and test affected control more than automatic processes. They also found that awareness of making trait inferences was related to control but not to automatic processes.

More complex multinomial models have been used to study control and automatic processes in stereotyping (see Gonsalkorale, Sherman, Allen, Klauer, & Amodio, 2011). Krieglmeyer and Sherman (2012) used a multinomial model to disentangle stereotype activation from stereotype application in the stereotype misperception task. Soderberg and Sherman (2013) investigated the effects on implicit racial bias of encountering black faces in racially homogeneous versus heterogeneous contexts. They found that homogeneous contexts increased bias and heterogeneous contexts decreased bias. Such changes carried over to isolated encounters, but they were specific to the particular targets and did not generalize to novel targets. Quad model analyses showed that the changes occurred in automatic evaluations and were unrelated to controlled attempts to inhibit bias.

The Correspondence Bias and the Fundamental Attribution Error

In the correspondence bias (CB), people draw correspondent dispositional inferences from others' behavior even when the behavior is highly constrained by situational factors. One influential view of the CB holds that behaviors that afford dispositional inferences are categorized by these inferences automatically; that these categories are then used to characterize the actors; and that correcting these dispositional inferences with situational knowledge follows, but only with effort (Gilbert, 1989). Cimpian and Salomon (2014) proposed a related but more general process that subsumes CB, the inherence heuristic,

"an implicit cognitive process that leads people to explain observed patterns . . . in terms of the inherent features of their constituents" (p. 461). Inherence is an intuitive rather than a deliberate heuristic.

Several recent studies supported the Gilbert model with novel neuroscience evidence. Brosch, Schiller, Mojdehbakhsh, Uleman, and Phelps (2013) had participants read about a series of people who enacted behaviors in situations that might moderate dispositional inferences. For (p. 425) example, "Tom left the restaurant in a hurry without tipping the waitress" implies *rude*, and "Tom's baby was screaming" provides a situational explanation. Participants made an attributional judgment after each behavior–situation pair (from 1 = situational to 8 = dispositional), while brain activity was monitored with fMRI. Importantly, the stimuli produced equal degrees of situational and dispositional judgments across participants, and within participants there was no preponderance of either judgment. So, the stimuli's implications were well balanced. Sorting the fMRI images in terms of judgments actually made revealed that situational judgments uniquely activated the left dorsolateral prefrontal cortex (left DLPFC), an area "potentially reflecting a controlled process that integrates situational information into attributions" (p. 649). This was truer of those with a high need for cognition (Cacioppo & Petty, 1982). In addition (as expected but never before demonstrated), ratings of liking correlated positively with how dispositional positive behaviors were rated and negatively with how dispositional negative behaviors were rated.

Consistent with this, Kestemont, Vandekerckhove, Ma, Van Hoeck, and Van Overwalle (2013) obtained fMRI results suggesting "a bias toward person attributions (e.g., fundamental attribution bias)." They examined person and situation attributions under both intentional and spontaneous inference instructions. First, "the medial prefrontal cortex was activated only under spontaneous instructions." Second, "intentional situation attributions activated a stronger and more extended network compared to intentional person attributions, suggesting that situation attributions require more controlled, extended and broader processing of the information" (p. 481).

Because physiological stress impairs prefrontal cortex and EFs, Kubota et al. (2014) tested whether a cold pressor task (keeping your arm in ice water for 3 minutes) increased dispositional attributions for the same scenarios as Brosch et al. (2013) used and elevated cortisol levels (as a check on stress). It did both. In a second, online study, with self-report measures of current and chronic stress and judgments of a legal scenario, they found that "when mitigating factors exist in criminal scenarios, individuals might be less likely to attribute the crime to those situational factors when they are under [current] stress" (p. 121). Negative implications of these findings for several social settings are discussed.

Accuracy of Initial Impressions

Studying accuracy requires that you have criteria against which to compare judgments. Studying bias requires markers for the sources of bias. West and Kenny's (2011) truth and bias model of judgment provides "a single, integrative framework for the study of accuracy and bias that can be applied widely across domains within psychology" (p. 358) and is illustrated with examples from social perception. It is intended as a complement to Brunswickian, Gibsonian, and signal detection analyses.

Accuracy in Category Judgments

The process of categorizing people (as, e.g., male or female, or black or white) from their faces can be complex, even when the faces are relatively unambiguous (see previous discussion of categories and mouse tracking). But, there is apparently considerable evidence that people can judge sexual orientation, political preference, and criminality "accurately" from faces alone. For example, Rule and Ambady (2008) reported that men's sexual orientation could be "accurately perceived at 50 ms" from facial photographs. However, Todorov, Olivola, Dotsch, and Mende-Siedlecki (2015) described four ways that such studies can be empirically misleading. First, researchers may fail to control for the effects of correlated facial cues that are not ambiguous (e.g., Republican candidates are more likely to be older white males). Second, accuracy above chance is hardly accurate. The criteria should be predictions based on obvious cues and well-known base rates in the population. Third, meta-accuracy (beliefs about how accurate one is) is typically ignored and, when measured, is very poor. Fourth, one photo of a person's face is not the only possible view, and the view matters. For example, Jenkins, White, Van Montfort, and Burton (2011) had participants judge the attractiveness of many publicly available photos of many unknown "celebrities." They found that the within-judge variation in the attractiveness of the same target person was comparable to the between-judge variation, so that preferences for one target over another could be reversed by selecting different photos. Todorov and Porter (2014) reported similar effects for judgments of extraversion. To date, clear evidence for accurate categorization of this sort from faces is lacking. Other cues such as body motion seem more promising. Establishing effects of one set of features while controlling for effects of others, including base rates, is essential.

(p. 426) Motivated Biases and Distortions

Motivational explanations can easily be post hoc circular "explanations" of phenomena rather than descriptions of mechanisms or processes, particularly if they merely rest on distinctions among preexisting groups. Manipulating motives experimentally avoids these problems. Granot, Uleman, and Balcetis (2017) recently showed that "blaming the victim" is most likely when both the self and justice concerns are activated. These were manipulated independently across several studies and scenarios and have often been confounded in prior research.

Mikulincer and Horesh (1999) showed that attachment style affects whether or not defensive projection (seeing in others what is unacceptable in oneself) occurs. In three studies, they found “that whereas anxious-ambivalent persons’ impression formation, memory retrieval, and inferences about others reflected the projection of their actual-self traits, avoidant persons’ responses reflected the projection of their unwanted-self-traits” (p. 1022).

Repressors show less evidence of STIs from negative (vs. positive) behaviors, but this bias disappears when they must respond quickly. This suggests that repressors attend to threat cues early in processing and engage in avoidance at later stages (Caldwell & Newman, 2005).

Krems, Neuberg, Filip-Crawford, and Kenrick (2015) studied functional projection and posited that women should be particularly alert to anger and verbal aggression from sexual rivals. In three studies, they found that “(a) women are biased to ‘see’ anger on neutral female (but not male) faces and that (b) women who are likely targets of intrasexual aggression (i.e., sexually desirable or available women) show an exaggerated bias” (p. 1655) (see the Simulation Theory and Other Self-Referential Bases of Impressions section that follows).

Features of Perceivers and Relations Between Targets and Perceivers

Uleman and Saribay (2012) reviewed target, perceiver, and relational features that affect initial impressions. This section provides an update of the last two topics.

Perceiver Features

There is controversy about the effects of women’s menstrual cycle on their perceptions of potential mates. Gildersleeve, Haselton, and Fales (2014) found “robust cycle shifts that were specific to women’s preferences for hypothesized cues of (ancestral) genetic quality . . . when women evaluated men’s ‘short-term’ attractiveness and absent when women evaluated men’s ‘long-term’ attractiveness” (p. 1205). However, W. Wood, Kressel, Joshi, and Louie (2014), in a meta-analysis of much of this same literature, reported that “fertile women did not especially desire sex in short-term relationships with men purported to be of high genetic quality. . . . The few significant preference shifts appeared to be research artifacts. The effects declined over time in published work, were limited to studies that used broader, less precise definitions of the fertile phase, and were found only in published research” (p. 229). They advocated a social role theory, in addition to an evolutionary approach, to any gender differences.

The ability of targets to accurately send nonverbal cues (“encoding”) and of perceivers to interpret them (“decoding”) varies. Perceivers with better psychosocial adjustment and higher intelligence generally decode nonverbal cues more accurately (Hall, 2010), while those higher in interpersonal dominance fare worse (Moeller, Lee, & Robinson, 2011). Research on emotional intelligence suggests it is unrelated to accurate emotion recognition (DeBusk & Austin, 2011) and even negatively related to detecting deceit (Baker et al., 2013).

Judgment standards can differ among perceivers. Kammrath and Scholer (2011) found that highly agreeable people make more extreme judgments because they are more attuned to both the prosocial and antisocial (vs. agentic) acts of others. Communal goals mediated the effects.

Reducing working memory capacity experimentally resulted in greater confusion of what the perceiver (self) versus the target knows during mental state inference (Maehara & Saito, 2011), while the mirror neuron system, thought to handle automatic behavior identification, was unaffected by load (Spunt & Lieberman, 2013). This supports a dual-system approach to impression formation. Emotions related to uncertainty, like anxiety and surprise, increased reliance on egocentric perspectives in understanding others (Todd, Forstmann, Burgmer, Brooks, & Galinsky, 2015).

Aging impaired theory of mind abilities (Henry, Phillips, Ruffman, & Bailey, 2013), establishing joint attention (Deroche, Castanier, Perrot, & Hartley, 2016), and recognizing emotions (Ruffman, Henry, Livingstone, & Phillips, 2008), although this last finding may be an artifact of using static stimuli (Sze, Goodkind, Gyurak, & Levenson, (p. 427) 2012). Diminished cognitive inhibition, flexibility, and motivational factors like the need for closure may produce more stereotyping in older adults (von Hippel, 2007), although only toward out-groups (Czarnek, Kossowska, & Sedek, 2015). Coats and Blanchard-Fields (2013) reviewed other effects of aging on impression formation.

The “social expertise” developed by older adults results in more efficient use of trait-diagnostic information (Hess & Kotter-Grühn, 2011). Socioemotional goals also shift with age, with older adults becoming more attuned to positivity, and this may lead them to develop more positive impressions from faces (Zebrowitz, Franklin, Hillman, & Boc, 2013). They are also more attuned to morality. Across three studies, “older adults had enhanced memory for morally charged story events and, relative to younger adults, were more likely to draw moral inferences during comprehension” (Narvaez, Radvansky, Lynchard, & Copeland, 2011, p. 422).

Relational Features

There can be many different relations between perceivers and targets, but the ones that have received the most attention recently are power and distance. Promising social neuroscience and behavioral methods for tracking interactions online are becoming

available. Schilbach et al. (2013) outlined “second-person neuroscience” for studying ongoing social encounters.

Magee and Smith (2013) argued that powerful people feel more distant from the powerless than vice versa and hence have a higher construal level. Because stereotypes (like traits) are abstract high-level constructs, powerful people stereotype the powerless more than vice versa, but only when goal-relevant stereotypes are available.

Hall, Schmid Mast, and Latu (2015) presented a fine overview of the literature on accuracy and power/status/dominance (verticality) and did a meta-analysis. They found that

> higher socioeconomic status (SES) predicted higher accuracy defined as accurate inference about the meanings of cues; . . . higher experimentally manipulated vertical position predicted higher accuracy defined as accurate recall of others’ words. In addition, although personality dominance did not predict accurate inference overall, . . . empathic/responsible dominance had a positive relation and egoistic/aggressive dominance had a negative relation to accuracy. (p. 131)

Both temporal distance and priming high-level construals make primacy (vs. recency) effects more likely when intentionally forming impressions from lists of traits by encouraging schema-driven integration processes (Eyal, Hoover, Fujita, & Nussbaum, 2011). And, power promotes social projection. Overbeck and Droutman (2013) found self-anchoring in recalling real groups’ traits, in describing anticipated groups’ attitudes, and in judging others’ emotions.

Reputations are impressions of targets shared by many perceivers. Smith (2014) specified the conditions under which perceivers use gossip to identify problematic targets while protecting themselves from the effects of false gossip. Solomon and Vazire (2014, p. 516) distinguished between “2 types of [romantic] partner-knowledge: insight into how their partners see themselves (i.e., identity accuracy) and insight into how others see their partners (i.e., reputation accuracy).”

Explanations

Explanations (vs. descriptions) of others' behavior often involve explicit extended narratives or causal theories. The difference between descriptions and explanations is often unclear and may be obscured when event descriptions are crafted to deflect responsibility or blame by omitting agency (Malle, 2004). But, the distinction can be important (Hamilton, 1998). Research in the mental models framework found that "given two sentences selected at random from different stories . . . [people] readily offer explanations of what's going on" (Johnson-Laird, 2013, p. 26). But within the mental models framework, clearly specifying mechanisms used to generate explanations is difficult because explanations draw on the amorphous "world knowledge" that differs for each case and each person. Fumero, Santamaria, and Johnson-Laird (2010) showed that the kinds of autobiographical memories participants recall (being open to experience vs. not) affects the kinds of explanations (inductive or deductive) they subsequently produce. Juhos, Quelhas, and Byrne (2015) showed that when reasoning about intentions, the counterexamples that come to mind (both alternatives and disablers) affect the inferences made and the extent to which they follow formal rules of logic.

There is significant research on children's explanations, which vary by culture (e.g., J. G. Miller, 1984) and social class (Kraus, Piff, & Keltner, 2009). For example, Rhodes (2014) found that 5-year-old American children

(p. 428)

> systematically referenced category memberships and social relationships as causal-explanatory factors for specific types of social interactions: harm among members of different categories more than harm among members of the same category. In contrast, they systematically referred to agents' mental states to explain the reverse patterns of behaviors: harm among members of the same category more than harm among members of different categories. (p. 1687)

Kraus et al. (2009) found that lower SES participants used more contextual explanations, and that "the sense of control mediated the relation between subjective SES and contextual explanations, and this association was independent of objective SES, ethnicity, political ideology, and self-serving biases" (p. 992). Once an explanation is generated, Thagard's (1989) connectionist model can describe criteria for theory coherence. Read and Marcus-Newhall (1993) showed that people can use these criteria appropriately to judge the coherence of social explanations.

Spelling out the mechanisms by which explanations are generated is the province of analogic and inductive reasoning. But, unlike the relatively unconstrained explanations that mental models theory and Thagard's (1989) model described, inductive explanations are typically studied by presenting people with novel categories, features, and often the causal relations among features. They then predict missing features or categorize new instances (e.g., Rottman & Hastie, 2014). Causality is conceived of in terms of Bayesian networks and interventions (Pearl, 2000) rather than the covariation and relatively high-level schemata of social psychology (e.g., Kelley & Michela, 1980). But by using novel categories and relations, these induction problems are stripped of the rich world

knowledge on which social explanations also depend. In addition, there are large individual differences in adherence to simple Bayesian inference (Cassey, Hawkins, Donkin, & Brown, 2016). In short, there is a gap between characterizing preexisting explanations based on familiar social content and specifying how explanations are generated from novel stimuli.

Attribution Theory

Cognitive psychologists often refer to "causal attribution" without referencing the social psychology literature. They use probabilistic, often Bayesian concepts and mathematics that are outside the discourse community of most social psychologists. For example, Meder, Mayrhofer, and Waldmann (2014) recently proposed a "structure induction model" of diagnostic causal reasoning. It predicts that "diagnostic judgments not only should vary as a function of the observed probability of cause given effect, but should depend on the plausibility of a causal relation from *C* to *E*" (pp. 292–293). Their model and behavioral data "distinguish between the (observable) data level and the (unobservable) causal level and . . . take into account alternative causal structures that may have generated the observed contingencies . . . [showing that] a purely statistical model of diagnostic reasoning is inadequate from a normative perspective" (p. 296). Meder et al. (2014) provided a good entrée to this extensive literature (see also Holyoak, Lee, & Lu, 2010). There is also a considerable developmental literature in the same vein (e.g., Griffiths, Sobel, Tenenbaum, & Gopnik, 2011).

Alicke (2000) showed that people's evaluation of causality in culpable events is affected by outcomes over which the target had little or no control. Lagnado and Channon (2008) compared the Shaver with the Alicke model in two studies and found "the data are more consistent with Alicke's model of culpable control" (p. 754). Cushman (2013) suggested how to integrate these as well as other dichotomies (active vs. passive harm, harm as intended vs. side effect) in this domain. Drawing on recent developments in computational neuroscience, he pointed to two mechanisms of reinforcement learning: one that assigns value to acts on the basis of leading to rewards in the past and the other that assigns value within computational models of how to attain the outcomes. Both mechanisms interact so that the degree to which moral reasoning appears to be emotional or rational depends on specifics of the task and the circumstances (e.g., time and cognitive load). Sloman and Lagnado (2015) provided a nice overview of current thinking about causality, moral thought, and more.

Theory of Mind

"Theory of mind" attempts to delineate how people (and other mammals) infer the mental events that occur in others' minds. Malle and Holbrook (2012) looked at the likelihood and speed of intentionally inferring various elements from both verbal and visual presentations of behaviors. "Five studies provide evidence for a hierarchy of social

inferences—from intentionality and desire to belief to personality—that is stable across verbal and visual presentations and that (p. 429) parallels the order found in developmental and primate research" (p. 661).

Another aspect of reading others' minds is knowing their visual perspectives. Samson, Apperly, Braithwaite, Andrews, and Bodley Scott (2010) showed that people spontaneously infer others' perspectives. Participants viewed an avatar standing in a three-sided room, looking at one wall. There were some spots on the walls, and the task was to quickly state how many spots the avatar, or you, see. When the avatar's count conflicted with the participants', response times slowed. Furlanetto et al. (2016) confirmed this by using a blind avatar in some conditions and showing that "automatic processing of another's visual perspective is influenced by experience-dependent beliefs about whether that person can see" (p. 158).

Saxe (2013) reviewed evidence that

> key [brain] regions support social cognition, thinking about people (medial prefrontal cortex [MPFC]), and ToM [theory of mind], or thinking about thoughts (right temporoparietal junction [RTPJ]). Although we do appear to "simulate" others' actions (e.g., motor repertoires) and experiences (e.g., pain), the MPFC and RTPJ do not support social cognition and ToM via simulation . . . activity in these regions is not modulated by first-person experience or similarity between self and target. (p. 1)

Simulation Theory and Other Self-Referential Bases of Impressions

One way to understand others is to simulate them or imagine ourselves in their place. Distinct processes are involved in simulating others' actions, emotions, and thoughts. Action simulation can occur spontaneously, as in unconscious mimicry (Chartrand & Bargh, 1999). Simply viewing another's acts triggers similar acts or muscle contractions. Others' actions can also trigger actions, for example, nose wrinkling triggers nose scratching (Genschow & Brass, 2015) and leads to unconscious goal contagion (Aarts, Gollwitzer, & Hassin, 2004). Therefore, one's own actions may contribute to "interpreting" another's acts without concepts and contribute more generally to the perception of visual events (Press & Cook, 2015).

Emotion simulation is seen in emotional contagion, in which we unconsciously "catch" others' emotions from facial and vocal expressions and gestures. Even social media can produce emotional contagion (Kramer, Guillory, & Hancock, 2014). Narcissists are less affected by emotional contagion (Czarna, Wróbel, Dunfer, & Zeigler-Hill, 2015). The Basic Empathy Scale (Jolliffe & Farrington, 2006) includes an affect factor. A. Wood, Rychlowska, Korb, and Niedenthal (2016) concluded that "when people simulate a perceived facial expression, they partially activate the corresponding emotional state in

themselves, which provides a basis of inferring the underlying emotion of the expresser" (p. 227).

Cognitive simulation (as distinct from theory of mind and emotion simulation) often takes the self as a starting point (Alicke, Dunning, & Krueger, 2005). In addition to the self-knowledge, noted previously, perceivers may also their relational behavioral schemas (Kammrath, 2011) and degree of political polarization (Van Boven, Judd, & Sherman, 2012) to understand others. Note that this literature writes about "projection," but it is not defensive in the psychoanalytic sense of preventing the recognition of forbidden impulses in oneself. But, this projection is egocentric.

Todd and Burgmer (2013) supported an "associative self-anchoring account" of the positive effects of perspective taking on evaluations of out-group members, in a nice series of six studies. The effect depends on having positive self-associations.

There are at least two problems with simulation theory as a basis for accurately understanding others. First, to the extent that it depends on accurate insight into oneself, Nisbett and Wilson (1977) famously showed that we tell "more than we can know" in describing our own mental contents (i.e., we often do not know about our internal states and processes). Wilson has provided many more examples (e.g., Wilson, Hull, & Johnson, 1981). "Choice blindness" (Johansson, Hall, Sikström, Tärning, & Lind, 2005) illustrated this problem. On each trial, participants chose between two female faces and then explained their choice when re-presented with their choice. On some trials, the re-presented face was actually the one they had *not* chosen. On 74% of these trials, participants did not notice the switch. Faces were only moderately similar. Furthermore, Johansson, Hall, Sikström, Tärning, and Lind (2006) found few differences between "explanations" of real versus switched choices.

The second problem is adults' egocentric inferences in the face of contrary information. Epley and Caruso (2009) outlined and documented three obstacles to accurately taking another's perspective.

(p. 430)

> At times, people will not recognize the need to activate their perspective-taking abilities and will therefore fail to take the first step toward understanding another's point of view. When they are able and motivated to take that first step, however, they may fall short of another's perspective because they are too heavily influenced by their own egocentric viewpoint. And, even when they manage to step beyond their own perspective, they may trip over the inaccurate or incomplete information of stored knowledge on which they rely when intuiting another's mind. (p. 307)

Simulation is a central component of "empathy," although not the only one. Baron-Cohen and colleagues studying autism focused on the E-S (empathize–systematize) cognitive style, which is the difference between self-report measures of empathy (EQ) and of

systemizing (SQ-R). Women have higher E than men (Wheelwright et al., 2006). Regardless of sex, students in the physical sciences showed S > E, and those in the humanities showed E > S (Billington, Baron-Cohen, & Wheelwright, 2007). Myers and Hodges (2009) reported that people cannot accurately report on how empathic they are. Zaki and Ochsner (2012) described two relatively distinct brain systems, for mentalizing ("the ability to explicitly reason and draw inferences about their mental states") and experience sharing ("the tendency to take on, resonate with, or 'share' the emotions of others," p. 676), as well as prosocial concern. They stressed that these systems interact in rich, complex, and yet-to-be-discovered ways.

"Synchrony" characterizes dyads or larger groups in terms of mutual mirroring and mimicking and forms another basis for simulation. Semin (2007) reviewed the long research tradition on synchrony. Wheatley, Kang, Parkinson, and Looser (2012) focused on behavioral and neural synchrony in social understanding and suggested that experiencing synchrony in dyads or groups is rewarding. Recently, Dikker (2016) used a portable EEG to study synchrony among a class of high school students. She "found that both student engagement (self-reported focus and class appreciation) and social cohesion (group affinity, closeness, and empathy) predicted the extent to which brain activity was synchronized across students." Synchrony and simulation may be largely unmediated by "cognitive" processes. Thus, understanding others maybe based on noncognitive systems (Carr & Winkielman, 2014).

Embodied Cognition and Metaphor as Bases of Impressions

Embodied cognition is more general than simulation, which relies on mimicking others' bodily states to understand them. "The main idea underlying all theories of embodied cognition is that cognitive representations and operations are fundamentally grounded . . . on the brain's modality-specific [perceptual] systems and on actual bodily states" (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005, p. 186). For example, Williams and Bargh (2008, Study 1) asked participants, while holding a cup of coffee, to rate a target described by a list of traits. The target was rated as socially warmer when the coffee was hot and socially colder when the coffee was iced. Even *imagining* holding hot or cold cups produces this effect, but only when it is done from a first-person rather than a third-person perspective (Macrae, Raj, Best, Christian, & Miles, 2013). So, real or imaginary experiences of one's own body are critical to embodied cognition. Meier, Moeller, Riemer-Peltz, and Robinson (2012) found that tasting sweet (vs. sour candy in Study 4) or chocolate (vs. crackers in Study 5) increased participants' self-reports of being agreeable and helpful, respectively.

Metaphors can also affect impressions through their effects on information processing. Meier et al. (2012) referred to their research as an "embodied metaphor approach." However, it may be useful to distinguish between embodied and metaphor effects in some cases. Landau, Keefer, and Meier (2011) and IJzerman and Koole (2011) discussed the relative utility of embodied and metaphoric approaches, citing several impression

formation phenomena. Kleiman, Stern, and Trope (2016) reported on “metaphorical conflict,” in which the metaphoric left–right political positions of Democrats and Republicans conflicted with the spatial locations of participants’ responses in making judgments. Conflict, relative to harmony between metaphor and movement, reduced perceived differences between groups.

Conclusion

In our view, person perception and impression formation lie at the very heart of social and personality psychology. Others' personalities are the targets of perception; perceivers' personalities affect their perceptions; and both of these classes of "personality" variables interact with each other and a variety of situational or "social" variables, as (p. 431) illustrated previously. Finally, the metaconcept of personality is constructed from our impressions of others. Initial impressions are the beginning of all these stories.

So, who are you, at least initially to strangers like us? There is no simple or complete answer. The answer depends on what you do as well as how we interpret it; on the social categories to which you appear to belong, on what we are interested in or attuned to, and on what concepts we have to construe you; on how you look and what that means to us; on who is asking and when and why; as well as what all of those involved are inclined to believe. Rather than a single answer, there is a Rashomon effect of realities and illusions (Kurosawa, 1950), each with its own truths and biases. Impressions are conjoint social constructions by targets and perceivers and their personalities, situations, and cultures. Understanding initial impressions requires analyses at multiple levels (cultural, personal, social, neuronal); in multiple time frames (lifetimes, years, immediate situations, and milliseconds) and degrees of awareness (explicit and implicit); and from multiple viewpoints (self, perceiver, consensus, and some future God's-eye view scientific framework that integrates all of these). There is no sword to cut this Gordian knot. And, what would be the intellectual fun in that? It must be unraveled and assembled one thread at a time. But, we hope you find, as we do, that the skeins and fabrics that have emerged so far are fascinating.

Since the first edition of this handbook, our picture of impression formation has become even more complex and contextual. Morality has emerged as a fundamental dimension of impressions. Categories are seen as dynamic rather than static, and mouse tracking shows how multiple cues and concepts combine. Processes of EF and attention play important roles in impression formation, and gaze following is both an important cause and an important effect. Priming effects are multiple and highly sensitive to contexts. Old beliefs about implicit attitudes are under challenge. Our picture of spontaneous inferences draws more heavily on cognitive and neuroscientific methods and literatures, provides a new perspective on cultural differences, and reflects an increasing array of individual differences. Competing conceptions of cognitive control are proving useful. Evidence for the CB, and the role of cognitive load in it, has grown. Sources and degrees of accuracy in first impressions are unexpectedly subtle, and disentangling them requires mathematical models. Motivated biases continue to be of interest. The range of perceiver features that affect impressions has grown (as has the range of target features, which were omitted here because of space limitations). Relational features, especially power and distance, have important effects. Understanding explanations (as distinct from

impressions) builds on cognitive and developmental research. Social psychologists' conceptions of causality (e.g., attribution theory) could benefit from current theory in cognitive psychology. Theory of mind and simulation theory provide important bases for generating explanations. And, neural synchrony between people, embodied cognition, and metaphor are not to be neglected.

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