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Different Toolkits for Different Mind-Readers

A Social-Cognitive Neuroscience Perspective on Personality and Social Relationships

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During an interview, Kurt Vonnegut once advised young writers as follows. "If you describe a landscape, or a cityscape, or a seascape, always be sure to put a human figure somewhere in the scene. Why? Because readers are human beings, mostly interested in human beings" (Vonnegut, 1965). This insight has been shared by both psychologists and (more recently) cognitive neuroscientists, who have remarked on the centrality other people hold in our mental lives. People are astoundingly efficient at gaining information about the contents of other people's thoughts and spend a great deal of their time inferring and responding to them. One group of researchers who recorded, transcribed, and categorized everyday conversations has found that gossip (defined as "anything that has to do with explicit social activities, personal relationships, and personal likes and dislikes") accounts for about two thirds of the time people spend talking to each other, further underscoring the importance of social cognition (Dunbar, 2004).

Our preoccupation with the other people's minds makes sense because thinking about mental states is the easiest, most effective way to predict what other people will do (Reis & Downey, 1999). Daniel Dennett (1987) first pointed out that we can think about people's actions with respect to their physical characteristics

and capabilities (*design stance*), or by treating them as rational agents with beliefs and desires and then predicting their actions based on these internal states (*intentional stance*). While the design stance is most efficient in predicting that a person will wince after being kicked in the shins, we gain significantly more insight about complex human behaviors by instead using an intentional stance.

Social psychology research has concerned itself with mental state inference for several decades, usually in the context of stereotyping and attribution theory (Allport, 1954). Much of this work has emphasized the automaticity with which we attribute the actions of another person (target) to stable traits (Uleman & Moskowitz, 1994; Winter, Uleman, & Cunniff, 1985). Correcting these attributions by appealing to information about a target's current mental state, on the other hand, requires more of our attentional resources, and under cognitive load people are unable to make these corrections (Gilbert, Pelham, & Krull, 1989). These data have led social psychologists towards several dual-process models of social cognition, in which automatic attribution heuristics and controlled mentalizing both contribute to a perceiver's ideas about targets. In this way, an observer can use fast, automatic processing of social cues to gain information about a target with relatively little effort, or to gain more detailed information using controlled processes if they have the resources and inclination to do so. This ability to adapt in a flexible and discriminative way to various situations is vital to survival.

We know, however, that people vary in characteristic ways in their responses within and across situations. The essence of the trait or structural approach to personality is that people differ on average from one another on a limited number of dimensions, such as agreeableness, conscientiousness, neuroticism, extraversion and openness. Another way of characterizing individual differences is in terms of the distinctive and consistent ways in which people process and make meaning of particular situations. In this view of personality, people behave in ways that are consistent with the meaning that situations have for them, meanings that reflect their individual biology and their history. Mischel (1973) developed this view of personality to explain why people intuitively describe themselves and others as aggressive, agreeable, neurotic despite evidence that people do not behave in consistent ways across diverse situations. Rejecting the assumption of classic theories of personality that consistency meant similar behavior across different situations, he proposed that consistency could be found by analyzing behavior in its situational context. He predicted that such an analysis would reveal that people have consistent *if-then* situation-behavior patterns, that they have contextualized personality signatures. This view locates the essential building blocks of personality in the cognitive and affective processes people use to mentally represent situations and to shape their efforts to behave adaptively and discriminatively. The Cognitive-Affective-Processing System (CAPS) model (Mischel & Shoda, 1995) formalizes Mischel's view of the type of processing system that would allow a person to show both stability in behavior as well as lawful variability with changes in context and/or mental representation.

Mischel's view of personality is highly compatible with the view of how the mind operates that is emerging from cognitive neuroscience as well as experimental social psychological approaches to social cognition. However, as we will see

below, cognitive neuroscience research reminds us that people differ not only in the content and ease of accessibility of the expectancies, values, and goals and other cognitive-affective building blocks of personality that they use to make meaning of a particular situation. People also differ, as a result of biology and experiences, in the availability of particular types of processing tools. Thus, problematic social behavior may reflect the absence or compromised development of particular processing tools and the consequent over reliance on other tools that may be situationally inappropriate. Personality researchers are, of course, aware of the possibility that some people may be predisposed to use certain types of processing tools rather than others, and there are several excellent examples of research based on this premise. For example, Metcalfe and Mischel have proposed that individuals who are unable to delay gratification in the face of temptation (e.g., when viewing marshmallows) are cued by desirable stimuli to use "hot" automatic processing streams, whereas people with higher self-regulation ability may employ a more controlled "cool processing stream," allowing them to avoid succumbing to temptation (Metcalfe & Mischel, 1999). However, personality researchers have not paid as much attention to the ways people may differ in their approach to understanding other minds.

COGNITIVE-NEUROSCIENCE APPROACHES TO INDIVIDUAL DIFFERENCES

Cognitive-neuroscience approaches to individual differences have roots in animal models of behavior, which are tested by selectively removing or otherwise manipulating brain structures or neural pathways hypothesized to underlie aspects of behavior. Until the advent of functional neuroimaging, establishing the generalizability of animal findings to humans depended on patients with brain damage. By specifying neural structures that a patient's injury had affected, and matching it to behavioral deficits, neuropsychologists made inferences about the function of those structures. With the development of neuroimaging techniques, scientists were given a window into the functioning of the live, alert human brain. This allowed cognitive neuroscience studies of individual differences to move away from neurological patient studies and, instead, focus on whether patients with specific behavioral disorders (e.g., autism, depression, anxiety disorders, Alzheimer's) under- or overused specific brain structures.

More recently, personality research has begun to use neuroimaging approaches to study normal variation in personality dispositions (e.g., Canli, 2004; Canli, Sivers, Witfield, Gotlib, & Gabrieli, 2002; Kross, Egner, Ochsner, Hirsch, & Downey, under review). The marriage of the traditional logic of cognitive neuroscience with that of the trait and process approach to personality suggests some interesting ways for considering how individuals may differ from one another in the context of social relationships. In particular, new techniques highlight the need to think about dispositional differences as the tendency to use one type of processing tool rather than another and to develop research paradigms that can pinpoint under what circumstances and in whom shifts in the use of particular processing tools will occur.

Distinguishing Cognition that is Uniquely Social

The purpose of this chapter is to suggest reasons why cognitive neuroscience can help us understand social cognition and especially individual differences in social-cognitive processing and resultant social behavior. First, however, we should be clear about the boundaries that define cognition that is uniquely social as distinct from generic cognition applied to the social world. If we used the same mental processes to understand the internal states and predict the actions of our friends and our computers, then merely pointing those processes towards people does not qualify them as being social cognition. Instead, social cognition must be defined as a type of thought, feeling, or perception that we can *only* have with respect to another person. As we will see below, neuroimaging data have helped to clarify and classify two core mental processes that fit this description as uniquely person-oriented: *mental state inference* and *empathy*. The first refers to processes by which we use the intentional stance to understand the complex mental states of other people; the second refers to the alignment of our emotional (and perhaps cognitive) states with those of others. These two types of uniquely social mental processes have distinct neural substrates and are uniquely affected by our states and traits. For the purposes of this chapter, social cognition will be the term applied to both empathy and mental state inference.

A third, orthogonal process—*motivation to attend* to social cues—will be included in our analysis of individual differences in social cognition. While not a cognitive process per se, socially motivated attention critically impacts people's ability to infer mental and emotional states from others. Furthermore, social motivation may be at the root of several types of individual differences in social cognition. For example, while autistic children have difficulty identifying mental states in others, if their attention is explicitly directed at relevant cues (i.e. sincerity or irony in auditory speech), their performance improves. Furthermore, attention-related improvements covary with the social functioning capacity of children with autism (Wang, Lee, Sigman, & Dapretto, 2006), suggesting that the use of motivated attention critically interacts with more reflexive social-cognitive processes to produce social behavior. It has recently been suggested that socially motivated attention is served by the oxytocin neurotransmitter system and that administering oxytocin to autistic individuals increases their attention to social cues, perhaps because the system increases the reward value of these cues (Bartz & Hollander, 2006). Other dispositional differences, such as rejection sensitivity (RS; Downey & Feldman, 1996), and personality disorders such as borderline and avoidant personality disorder (BPD), involve *increased* attention to social cues, especially those involving relationship-threatening information.

Linking Cognitive Neuroscience and Personality Research

Two conceptual bridges are necessary to demonstrate the utility of neuroimaging for personality research: *modularity* and *situational accessibility*. To establish modularity, we need to document that mental state inference and empathy are "special," in that they do not merely represent social expression of more general

processes (e.g., attention). To establish situational accessibility, we need to demonstrate that the way perceivers deploy social-cognitive processes can differ across situations. If both of those ideas hold, then we can hypothesize that individual differences could express themselves as chronic tendencies towards using one or another social-cognitive process.

Modular Nature of Social Cognition.

One of neuroimaging's great hopes is that by examining the brain's engagement during two or more cognitive processes, experimenters can use differences and overlaps in neural activity to infer that these processes are similar or different from each other (Henson, 2005). For example, a long debate over the difference or similarity of basic vision and visual imagery was resolved when, using positron emission topography (PET) and functional magnetic resonance imagery (fMRI), researchers found that the same brain regions were involved in both imagining and seeing objects (Kosslyn & Ochsner, 1994; Kosslyn, Thompson, & Alpert, 1997). Similarly, neuroimaging has shown that, instead of being unitary, social cognition is made up of a constellation of processes that together shape our interpretation of social cues. Each process is modular, such that it can work with limited input from other systems.

Situational Influences on the Use of Social-Cognitive Processes.

The other contribution that neuroimaging has provided to social cognition research is new insight into how the internal and external contexts can alter the deployment of social-cognitive processes. Recent neuroimaging studies have shown that perceivers use different cognitive and neural mechanisms when thinking about the mindsets of different types of people—our parent's, our own, or those of a stranger. When we think about a person's mind, her relationship to us, alliance towards or against us, familiarity, and perceived trustworthiness color the processes we use and the conclusions we draw about her. Similarly, our moods and cognitive busyness or stress level, as well as our expectancy about another person (is he likely to accept or reject us, to view us as higher or lower in status) change the way we employ available social-cognitive processes. In sum, whether and to what extent we employ either mental state inference or empathy or attend to social cues changes in a fluid way to reflect changes in the situation and in our internal states.

GOALS OF THE CHAPTER

The chapter reviews evidence for a model of fluid, situation-dependent deployment of social-cognitive processes and considers how the model can inform personality research. Particular attention is given to personality dispositions and disorders that have a strong impact on social relationships. An example of such a *relational* disposition is rejection sensitivity, the disposition to anxiously expect, readily perceive, and intensely react to rejection. An example of a relational personality disorder is borderline personality disorder characterized by marked instability in relationships, mood and identity, and by impulsive self-destructive behavior typically triggered by real or imagined rejection.

Though several experiments have documented the ways in which our *states* can affect the way we think about other people, little work has attended to dispositional differences in how we use mental state inference and empathy. Thus an under-explored but potentially important question in understanding how personality shapes relationships is: How do individual differences in established personality dispositions emerge in average levels of use of particular social-cognitive modules and in their situational accessibility?

Personality Disorders Characterized by Specific Deficits in Social Cognition

Viewing mental state inference and empathy as separate processes implies that there should be patient populations who lack the ability to infer the mental states of other targets, but who suffer no more general cognitive impairment, including no deficits in empathic processes. Furthermore, another population should have intact mental state inference abilities, but lack normal emotional empathy. Autism and psychopathy provide just such cases (Blair, 2005). Autism spectrum disorder is characterized by lack of interest in social cues and deficits in understanding mental states, but intact sensory and cognitive function (Baron-Cohen, 1994; Dakin & Frith, 2005). From an early age, autistic individuals do not attempt to draw the attention of others, nor are they drawn to human faces and eyes the way other children are. Their inability to use mental state information in understanding the actions of others is even more profound. The classic example of mental state inference deficits in autism is their failure at simple problems such as the *false belief task*. In this task, subjects read vignettes describing social situations. One of the characters in each vignette has the wrong idea about some aspect of the story (for example, "Sally places a ball inside toy box A, but while she turns her back Anne moves it to toy box B"), and subjects are asked to infer what the character's mistaken mental state is ("Where will Sally look for the ball?"). Though normal children can easily infer that Sally will mistakenly look for her ball in box A, autistic children instead project their own knowledge onto Sally, guessing that she will look for her ball in box B, and failing to allow Sally her own, independent mental state.

The continued failure of autistics in the social world underscores the modularity of social cognition (Frith & Happe, 1994), and led to the theory that one core process, called "theory of mind," underlies our social-cognitive abilities. Leslie and his colleagues (1994, 2004) have argued that a single theory of mind mechanism is disrupted in autistics and accounts for most of their difficulties interpreting the social world. Beyond arguing for modularity, however, the case of autistics also suggests that other dispositional differences can uniquely affect social cognition. For example, while not failing at mental state inference, psychopaths cannot easily identify or respond to the emotions of other people. Circumscribed failures in empathy covary with psychopaths' levels of violent behavior, and with volumetric loss in a prefrontal cortex region involved in emotion identification (Raine, Lencz, Bihrle, LaCasse, & Colletti, 2000). Borderline personality disorder is also characterized by difficulty in interpreting others' emotions accurately and researchers are beginning to explore the possibility of altered mental state inference or

empathic processes in these populations (Bateman & Fonagy, 2004). The fact that the impulsive behavior characteristic of borderline personality disorder (e.g., self-harm, binge eating, hostility, abruptly terminating relationships) is typically triggered by perceptions of threatened or actual rejection suggests the utility of viewing borderline personality disorder as involving situationally cued changes in mental state inference in anif-then fashion, as used by Mischel and Shoda (1995) to discuss personality more generally.

Using Neuroimaging to Show Modularity in Social Cognition

The first neuroimaging studies of social cognition used paradigms from autism research to search for brain regions uniquely engaged by mental state inference. Most commonly, participants were scanned using fMRI or PET while performing some variant of a false belief task using either vignettes or pictures (Brunet, Sarfati, Hardy-Bayle, & Decety, 2000; Castelli, Happe, Frith, & Frith, 2000; Fletcher, Happe et al., 1995; Gallagher et al., 2000; Saxe & Kanwisher, 2003). Later, these studies expanded to include asking participants to make inferences about targets' *knowledge* (Goel, Grafman, Sadato, & Hallett, 1995), *traits or abilities* (Harris, Todorov, & Fiske, 2005; Mason & Macrae, 2004; Mitchell, Heatherton, & Macrae, 2002; Mitchell, Macrae, & Banaji, 2005), or *affective states* (Baron-Cohen et al., 1999; Hynes, Baird, & Grafton, 2006; Ochsner et al., 2004; Vollm et al., 2006). Studies of *real-time social interactions* most often ask participants to compete in economics games that require attending to their competitor's mental state in order to predict his or her actions (Decety, Jackson, Sommerville, Chaminade, & Meltzoff, 2004; Gallagher, Jack, Roepstorff, & Frith, 2002; McCabe, Houser, Ryan, Smith, & Trouard, 2001; Montague et al., 2002; Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004a, 2004b; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003).

Across different paradigms and experimental tasks, researchers have identified a consistent set of brain regions that is preferentially engaged when thinking about other people's minds (see Figure 6.1). This network includes dorsal and ventral

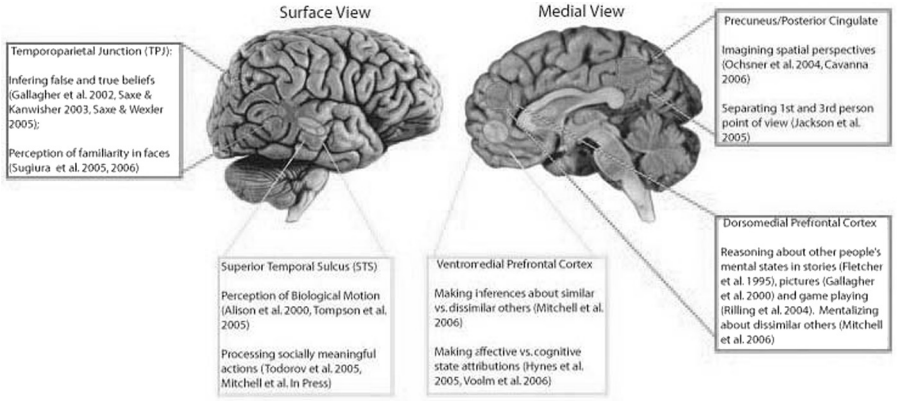

Figure 6.1 Brain regions contributing to Theory of Mind.

medial prefrontal cortex (MPFC), bilateral superior temporal sulci (STS), right temporo-parietal junction (TPJ), posterior cingulate cortex (PCC), and the temporal poles. Although theory of mind was initially thought to be a largely unitary process, neuroimaging suggests that, instead, several brain regions (and presumably associated cognitive processes) go into social cognition, with each region preferentially engaged for different aspects of social-cognitive processing. For example, while the medial prefrontal cortex and temporo-parietal junction are specifically involved in mental state inference, the superior temporal sulci responds to the presence of people per se in subjects' visual fields. The superior temporal sulci also respond to perceptions of human movement (Allison, Puce, & McCarthy, 2000; Pelphrey, Morris, & McCarthy, 2004; Thompson, Clarke, Stewart, & Puce, 2005) and descriptions of socially significant actions (Mitchell, Cloutier, Banaji, & Macrae, 2006). The posterior cingulate cortex and adjacent parietal cortices are engaged for imagining spatial perspectives and reflecting on the relevance of social information (Cavanna & Trimble, 2006; Fletcher, Frith et al., 1995; Vogt, Vogt, & Laureys, 2006).

Many of the regions involved in social cognition are also engaged when people reflect on their own traits, preferences, or emotions (Mitchell, Banaji, & Macrae, 2005; Ochsner et al., 2004; Vogeley et al., 2001). Some researchers have concluded that people use *shared representations* to understand mental states of others by imagining what they (the observer) would feel or think in a target's position. This is especially the case for more implicit forms of social cognition, such as empathy (here defined as our tendency to become aligned with the bodily and emotional states of others) for pain, disgust, and other emotional states. In support of this view, Singer et al. (2004) has shown an overlap in brain activation between experiencing a state and observing it in others. The study involved scanning participants while they either got a mildly painful electric shock or watched their romantic partner receive an identical shock. The researchers used the overlap in brain regions that were activated by both "self" and "other" pain to made inferences about the extent to which people use shared representations for thinking of themselves and others.

Most experiments on empathy have focused on self/other overlaps for sensory states: these overlaps in the brain have been explored for feeling and perceiving *pain* (Botvinick et al., 2005; Jackson, Brunet, Meltzoff, & Decety, 2006; Jackson, Meltzoff, & Decety, 2005; Morrison, Lloyd, di Pellegrino, & Roberts, 2004; Saarela et al., 2006), *disgust* (Wicker et al., 2003), and *touch* (Keysers et al., 2004), and facial expression of *basic emotions* such as anger, fear, amusement (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003; Leslie, Johnson-Frey, & Grafton, 2004). Together, this work has identified a second network of brain regions whose activity tracks overlap at this level (see Figure 6.2). This network, which includes anterior cingulate cortex (ACC), anterior insula (AI), inferior frontal gyrus (IFG), amygdala, and inferior parietal cortex (IPC), is largely non-overlapping with the social-cognitive network described above for mental state inference, suggesting that these networks represent dissociable processing streams.

All of us can remember cringing when we saw someone hurt himself, or how contagious laughter can be. There is evidence that imitating emotional expres-

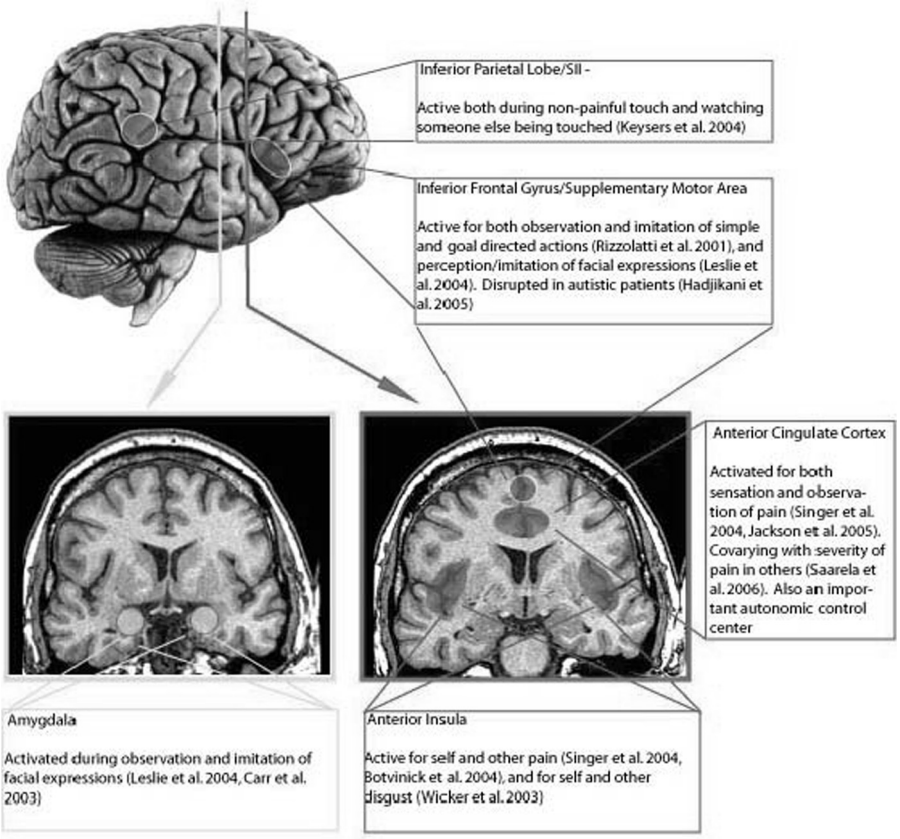

Figure 6.2 Brain regions contributing to "Shared Representations."

sions increases our ability to perceive them in targets (Niedenthal & Brauer, 2001) and can make us feel congruent moods (Neumann & Strack, 2000). Furthermore, patient evidence suggests that brain lesions to the insula and amygdala (brain regions often associated with processing disgust and fear, respectively) selectively damage patients' abilities both to feel certain emotions and to identify them in others (Adolphs et al., 2005; Calder, Keane, Manes, Antoun, & Young, 2000). Based on these findings, researchers have proposed a "motor theory of social cognition" which posits that observers infer mental and emotional states of targets by covertly imitating the posture, facial expression, and other physical cues they give off,\ and inferring which internal states correspond with those cues (Gallese, 2003b; Gallese, Keysers, & Rizzolatti, 2004). This idea is also supported by studies of so-called "mirror neurons," a group of neurons first found in the inferior frontal gyrus of macaque monkeys. Remarkably, these cells respond not only when a monkey performs an action, but also when they observe another monkey performing the same action (Rizzolatti, Fogassi, & Gallese, 2001). An analogous mirror neuron system exists in humans and becomes engaged during both action and facial

expression imitation (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003; Iacoboni et al., 1999). Neuroimaging studies have revealed that autistic patients have both structural and functional abnormalities in their mirror neuron system (Dapretto et al., 2006; Hadjikhani, Joseph, Snyder, & Tager-Flusberg, 2005). If one's own behavior and one's observation of other's emotional displays are as intimately connected as these data suggest (c.f. Decety & Jackson, 2004), personality researchers could use similar paradigms to explore whether relational personality dispositions and disorders involve abnormalities in automatic mirroring or other aspects of empathic processing.

Researchers studying either shared representations/empathy or mental state inference have tended to draw pictures of social cognition that are overly dependent on one of these processes. That is, motor theorists believe that mental state inference is accomplished through self/other overlap (some low level empathic process), and proponents of theory of mind believe all social cognition is a result of complex inferences (Gallese, 2003a; Saxe, 2005). Such accounts, however, have trouble both functionally and neuroanatomically. First, neither pure theory nor pure simulation could alone represent the highly varied ways in which humans understand each other. For example, when we read about a natural disaster that has taken the lives of a thousand people in a country we have never been to, we may feel sadness and even despair, but this emotion is driven by abstract representations of what those people are enduring. On the other hand, when significant others accidentally cut themselves a few feet from us, we respond to the visceral and visual cues we receive from them, and not to any rule-based processing. Different situations call for different patterns of deployment of social-cognitive processes (in these cases, mental state inference or empathy). We recognize that something is the matter when one or another of these processes is used indiscriminately, as when a depressed person responds with visceral intensity to reading about a natural disaster in a faraway region or when a schizophrenic person shows no visceral reaction on learning of a loved one's death. Furthermore, temporal, spatial, or social distance between people can moderate the extent to which we tend to use each of these processes in a manner similar to that outlined in Trope's levels of construal theory (Fujita, Henderson, Eng, Trope, & Liberman, 2006). Construal theory proposes that temporal distance changes people's responses to future events by changing the way they mentally represent them. The greater the temporal distance, the more likely people are to represent events in terms of a few abstract features rather than in terms of more concrete and nuanced details. In a similar manner, a perceiver unable to pay attention to the sources of someone else's behavior may make simplified, trait level attributions about that other person instead of making a situational correction ofr judgment. Similar changes in construal may be created by other situational factors, such as whether a perceiver likes the other person who is being focused on, or shares group identity with them, or is under stress while making judgments. Elaborating on how and in which cases internal and external context influences use of mental state inference and empathy will help provide an avenue to studying individual differences in the use of social-cognitive processes.

CONTEXTUAL INFLUENCES OF THE USE OF SOCIAL-COGNITIVE PROCESSES

Recent views of how social cognition operates have appealed to the idea of a "toolbox," comprised of multiple component processes that can be engaged flexibly depending on the cognitive and affective state and the relational context of a perceiver (Ames, 2004; Cloutier, Mason, & Macrae, 2005). The toolbox model, unlike single process conceptualizations, does not suffer the woes of that proverbial hammer owner who sees everything as a nail. We may employ different types of social cognition when thinking of our uncles, our spouses, and the British Prime Minister. Additionally, we may use different processes to understand a friend who is upset by their impending divorce and another who is upset about losing a parking space to a more aggressive driver. Finally, our thinking about a friend's divorce may take on a different flavor, depending on whether we have experienced divorce ourselves. These examples represent context-dependent or if-then shifts in mental state inference and empathy based on one's relationship with the observed other, one's available psychological resources and expectations, and interactions between the perceiver and the observed other. In what follows, we will explore a growing literature on these context effects.

Effect of Relationship Between Self and Other on Social Cognition

Effects of In- versus Out-Group Membership of Other. People ascribe more flexibility and subtlety to the mental states of those they consider members of their own group—those they include in "we"—than those they view as members of different groups—those they view as "they." If a member of our family is rude to a waitress one night, while we may be nonplussed, we will probably seek out mitigating factors to explain their behavior (e.g., they just had a stressful day at work). That is, we will make a situational correction. On the other hand, we are more likely to attribute similar actions engaged in by distant or dissimilar others to permanent traits (i.e. ignorance, aggressiveness). We are also less likely to perceive secondary emotions such as embarrassment and pride in outgroup members (Leyens et al., 2000). These attributional distinctions not only apply to members of specific established outgroups, but also to novel groups. Gathering together several strangers and separating them according to their preference for Klee or Kandinsky is enough to create ingroup and outgroup biases. Minimal group paradigms demonstrate just how readily situational factors guide how we make inferences about others' behavior (Brewer, 1997).

One theory about the way in which group membership can affect social cognition is that people may use themselves as a template (hereby referred to as "simulation") to understand *some, but not all* other people. That is, while trying to infer the mental state of similar or close others, observers will spontaneously employ simulation, using themselves as a template to guide their perceptions of that target's state. Ames (2004) gave participants information about a target person's group

membership (e.g., business school student) and preferences (e.g., being a fan of the television show South Park, enjoying a particular painting over another). These preferences either matched (similar other) or did not match (dissimilar other) those of the participant. In a subsequent social judgment task, participants read socially meaningful vignettes about the target and attributed mental states and motivations to them. When asked how they themselves would feel in such a situation, and how the stereotypical member of the target's group would feel, participants attributed their own mental states and motivations to similar targets, but used stereotypes to infer the mental states and motives of dissimilar others. The time that participants spent judging similar others was shorter if they made a judgment about themselves immediately beforehand than if they had made a judgment about a stereotypical member of their target's group. This effect was reversed for dissimilar others. Judgments about targets were wholly independent of the dimensions of similarity/difference along which they were primed, suggesting that once the use of simulation or stereotyping is primed, it remains engaged as the dominant method of inferring mental states in that target.

Are the processes we use to mentalize about similar and dissimilar others different in degree, or in kind? Ames' study leaves open the idea that people may be using both simulation and stereotype information for both in- and outgroup others, but using these in different *proportions* depending on the prime. A recent neuroimaging study sought to tease apart the processes underlying such mentalizing differences (Mitchell, et al., 2006). After being primed to believe that targets either did or did not share their political beliefs, participants were scanned while they guessed targets' opinions on various political issues (e.g., "would this person support their roommate if he/she came out as gay?"). Two regions in subjects' medial prefrontal cortex responded preferentially to similar and dissimilar targets, respectively. The more ventral area (vMPFC) engaged during inference about similar others has previously been identified during affective vs. cognitive mentalizing (Vollm et al., 2006). Thus, the findings of Mitchell et al. dovetail with the idea that affective attribution may rely more heavily on simulation than does cognitive attribution, which could also explain the relative infrequency of attributing emotions to outgroup members. This finding also suggests that people typically do not attend to distant others at a depth necessary to feel emotional empathy.

Competitiveness/Cooperativeness. Whether we view the other person as friend or foe, as on our side or against us, will likely affect our mental (and especially affective) representations of, and empathy toward, him or her. After leading subjects to expect cooperation or competition from a confederate, Lanzetta & Englis (1989) examined the subjects' emotional responses to videotapes of the confederate's displays of pleasure and distress. Skin conductance, heart rate and EMG data showed that expectations of cooperation promoted empathy, with subjects tensing when the confederate winced and relaxing when the confederate smiled. By contrast, expectations of competition promoted counterempathy, with subjects relaxing when the confederate winced, and tensing when the confederate smiled.

Neuroimaging experiments suggest similar effects of social stance towards a target on empathy and emotional processing (Singer, Kiebel, Winston, Dolan, & Frith, 2004). When subjects viewed pictures of faces they believed represented their partners in an economics game, activity in bilateral amygdala and insula (as referred to above, brain regions associated with fear and autonomic arousal) increased if the partner associated with that face cheated in the game. This finding dovetailed with studies of economics games in which unfair play by supposedly human confederates (but not by computers) correlated with insula activity (Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004b; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). In a subsequent study (Singer et al., 2006), subjects watched confederates who had proven to be either fair or unfair receive mild shocks. Brain areas previously seen to engage during "empathic pain" (including the insula and anterior cingulate cortex) were less engaged while subjects watched an unfair other receiving shocks. This finding converges with prior evidence that areas of the brain related to reward may become engaged while punishing unfair others (de Quervain et al. 2004).

These data suggest that our emotional reactions to and empathy towards others are crucially affected by whether they are for or against us. It remains unclear, however, whether mental state inference is affected in the same way. Does social threat make people think more or less deeply and with greater or lesser effort about the mental state of the threat source? Does keeping our enemies at arm's length cognitively, and thus making little effort to individualize them, help us compete with them efficiently? Studies probing whether fairness/unfairness affects the use of effortful mental state inference or stereotyping could explore whether social stance towards a person affects social cognition in the same way as group membership.

Familiarity. Neuroimaging research suggests that personal familiarity with someone else engages special processing steps. Consistently, brain areas in the social-cognitive network described above engage preferentially to pictures of familiar others, such as (female) subjects' children (Leibenluft, Gobbini, Harrison, & Haxby, 2004; Nitschke et al., 2004) or close friends. Seeing personally familiar faces more robustly engages parts of the mental state inference network described above than does viewing famous (known, but not personally familiar) faces (Haxby, Hoffman, & Gobbini, 2002; Hoffman & Haxby, 2000). Some (but not all) of these areas even respond to the acquired familiarity of a face presented repeatedly over the course of a scanning session (Kosaka et al., 2003). Increased engagement in these regions for familiar faces even occur in autistic patients, suggesting autistic patients' well-documented social-cognitive abnormalities may attenuate when they think of people who are familiar, and thus more salient, to them (Pierce, Haist, Sedaghat, & Courchesne, 2004). Perhaps, as Pierce et al. suggest, the need for help and support from familiar others makes their faces more important to autistic people, and this need could drive increased motivation to attend to those faces.

Increased activity for familiar, relative to unfamiliar, faces in the social cognition networks serving mental state inference is compelling. However, it is still

unclear precisely what this differential neural activity means. Do we think about familiar others in a fundamentally different way? Or, do we simply pay more attention to them, thereby enhancing processing in the same cognitive and neural networks used to think about less familiar others? Are familiar others simply ingroup exemplars, or do we access information about them (i.e., personal knowledge and episodic memories) to engage in social-cognitive processes only possible with personal familiarity? Work in social psychology suggests that we may see people close to us as similar to us, as indexed by overlapping self-other representations (Mashek, Aron, & Boncimino, 2003). Having shared representations with familiar others may also be what buffers close others from stereotyping or attributional biases. For example, one study found that situational corrections (as described above) occur more for familiar than for non-familiar targets, but that familiarity only caused a difference in attribution patterns if targets were important to subjects (Idson & Mischel, 2001). It is still unclear how a familiar adversary, such as a former close friend who has betrayed one's trust, would affect social cognition. These data suggest that it is not just familiarity, but the motivation that familiarity can create, that makes us think more carefully about people we know well. In addition to influencing mental state inference processes, there is reason to speculate that familiarity may facilitate simulation and empathy.

HOW FEATURES OF THE PERCEIVER AFFECT SOCIAL COGNITION

The perceiver's use of social-cognitive processes is likely to be influenced by what the perceiver brings to the situation as well as by the nature of his or her relationship with the target. Our expectations about how people should think and feel may cause us difficulties in understanding or empathizing with them if their actions conflict with these expectations. Additionally, our moods, motivations, and available cognitive resources may all affect our ability to, and preference for, employing particular social-cognitive processes.

Perceiver Expectancies.

Within neuroimaging, perceiver expectancy effects have only been examined for the detection of distress. Sommerville and colleagues (Somerville, Kim, Johnstone, Alexander, & Whalen, 2004) demonstrated that anxious observers were more likely to show amygdala engagement while looking at neutral faces and also more likely to attribute fear to these faces. In a complementary study (Kim et al., 2004), subjects were shown pictures of surprised faces, and each was prefaced with either a positive (she just won $500) or negative (she just lost $500) context. Perceivers' expectancies influenced their ratings as to whether the surprised face was positive or negative. Furthermore, amygdala activity was only present for trials in which perceivers rated the faces as negative, suggesting that brain activity was again influenced by the perceiver's expectations.

Kim et al.'s paradigm has a precedent in work on the power of expectancy in affecting the emotions we attribute to others. Carrol and Russell (1996) showed

subjects emotionally salient vignettes, followed by faces showing incongruent emotional expressions (such as an anger-invoking story followed by a fearful face), and asked them identify what emotion the target was displaying. Participants' judgments reflected a greater reliance on vignettes that they had heard previously than on the actual facial display of emotion. We do not yet know whether expectancies alter our attention to a target's low-level cues (e.g., facial expressions, prosody) or exert their effect in a top-down fashion, biasing our judgment independent of the actual stimulus presented. Additionally, it is unclear how many facets of social cognition are affected by expectations. As the Lanzetta and Englis (1989) study described above suggests, empathic processes may also be affected by expectancies in that we may be more empathic toward people we expect to be on our side and less empathic, or even counter empathic, to those who pose a threat. Expectancy effects may not only apply to the labeling of affective cues, but also influence other aspects of mental state inference, such as inferences about the other person's motivation or the information to which the person has access. At least some evidence suggests that the ability to infer how much knowledge other people have is affected by how much knowledge perceivers have about a situation. When a target and perceiver's knowledge are incongruent, perceivers have to make effortful adjustments to correctly identify what the other person would know, and they often fail to do this effectively (Epley, Keysar, Van Boven, & Gilovich, 2004). Examining anchoring and adjustment through neuroimaging could provide information as to which components of mental state inference and empathy are affected by perceiver expectancy.

Cognitive Busyness and Stress. How we think about others is influenced by the amount of attention we have available to pay to them. Mental state inference is effortful and slow and cannot occur unless we have the resources to apply to it. One important example of attention-related shifts in social cognition is correction of the fundamental attribution error. When seeing someone behave a certain way, we tend to ascribe his or her behavior to a stable trait. Situational corrections do not occur as quickly or automatically as trait attributions. Gilbert et al. (1989) demonstrated this by showing participants silent films of a woman acting anxiously at an interview. Some were told that she was talking about a recent trip to Disney World (implying trait anxiety). Others were told she had just been asked an awkward and personal question (implying situational factors). The woman was rated was as less anxious in general when the situation explained her behavior, but this effect disappeared when raters were under competing cognitive load, suggesting that corrections require more cognitive resources than initial, trait judgments. Perhaps unsurprisingly, people tend to reserve effortful, situational corrections for similar others, individuating them and affording them dynamic motives and influences. Most of all, however, they use situational corrections when thinking about their own actions. Increased tendencies to simulate ingroup members, as well as to attending more closely to them are likely to underlie more complex judgments of their behavior.

Relational Motivation. Though our brains may be tuned by evolution towards understanding other intentional agents (Cosmides, 1989), the work cited above shows that a large part of social cognition involves controlled processes that are turned on and off as our cognitive foci vary. For example, purposefully attending to the mental states of others can make us think of them as more similar to ourselves (Davis, Conklin, Smith, & Luce, 1996), and make us more likely to engage in prosocial behavior towards them (Batson et al., 1988; Batson et al., 2003) as well as able to attune our emotions and attitudes toward them. We do not give these top-down benefits to all of our interaction partners. We may pay close attention to every postural shift and mannerism of a job interviewer, attempting to mine any relevant cues from their behavior, but ignore such information in the person sitting next to us on the train. We may also ignore the same interviewer's off-color joke, choosing not to form lasting opinions that may conflict with the relationship we are interested in maintaining with him or her. In other words, the social-relational goals we bring to a particular situation can importantly bias the information we choose to process about other people, changing our accuracy and resulting judgments as well as our emotional, attitudinal, and behavioral alignment with the interaction partner.

Here we will focus on two examples of motivated biases in social cognition: motivation to attend more closely to social cues during situations of high rejection threat, and motivation to ignore social cues when they threaten valued relationships. Though these examples may initially seem contradictory, they can be conceived of as different sides of the same general task: motivated cognition aimed at facilitating our social goals.

The need to be accepted and avoid rejection socially is among the strongest forces guiding our actions (Baumeister & Leary, 1995), and it makes sense that this same need should affect mental state inference and empathic processes. The task in social connection is to remain close to a potential source of harm. Those we view as most important to us can best satisfy our need for acceptance but also have the potential for inflict to the most harm if they reject us. Situations in which our social goals are at stake (e.g., job interviews, first dates) provide strong motivation to use all of our social-cognitive skills to accurately infer the mental states of those around us and accommodate our behavior accordingly. Some support for this claim is provided by a series of studies by Pickett and colleagues in which participants were induced to feel a high sense of social risk by being rejected by other players in a game. In subsequent interaction tasks, participants thus threatened were more accurate at decoding mental and emotional cues from facial expressions, and the quality of the interactions improved (Pickett, Gardner, & Knowles, 2004). Memory for what happened during the social interactions also improved (Gardner, Pickett, & Brewer, 2000).

Many high-risk social encounters afford us opportunities to advance goals and as such merit close attention to social cues. On the other hand, accurately perceiving the thoughts of others may sometimes be counterproductive. For example, knowing the negative or relationship-threatening thoughts of a romantic partner may cause negative patterns of thoughts and actions, and ultimately strain the

relationship. With this in mind, Simpson and Ickes (1995) explored relationship situations that motivated social-cognitive *inaccuracy*. In one paradigm (Simpson, Orina, & Ickes, 2003), members of a couple were asked to make and discuss attractiveness ratings for opposite sex others in the presence of their partner. Afterwards, they watched videotapes of their session and noted their thoughts and feelings at different points. Their partners then viewed the videotapes and guessed the thoughts and feelings that the first member of the couple had reported. Inaccuracy was highest when the level of threat was *high* (pictures being judged were of very attractive others), the couples were *interdependent*, and the partner's actions were *ambiguous* and thus open to alternative explanations, including explanations that gave the partner the benefit of the doubt. *Inaccuracy* predicted greater satisfaction four months later, implying that under these circumstances inaccuracy was adaptive.

Simpson and Ickes framed motivated inaccuracy in terms of mechanistic social cognition, arguing that inferring relationship threatening information from a partner's behavior in a particular situation could lead perceivers to overattribute negative traits to that partner, or to disengage from situational corrections because of overpowering negative affect. Our previous discussion of the cognitive implications of viewing the target as an in- versus out-group member would suggest accurate identification of the situationally negative mind-set of a partner from threatening cues could reflect a perceiver's shift from viewing the partner as being in the ingroup (us) to the outgroup (them) and thus into stereotyping their behavior and becoming negatively biased in interpreting their subsequent actions. Perhaps motivated inaccuracy is a tool that maintains and is maintained by viewing the self and partner as interdependent components of a single unit versus as separate independent individuals. Accordingly, people who react maladaptively to relationship threat (e.g., women high in rejection sensitivity or with borderline personality disorder) may have trouble viewing others as consistently part of the in-group perhaps because they cannot easily "turn down" their attention to social cues in high-threat situations.

A person's dispositional tendency to attend to negative social information probably interacts with more general regulatory capacities to determine their response to particular social situations. For example, those individuals high in rejection sensitivity (and thus highly attentive to social threat) who could delay gratification as preschoolers demonstrated normal social functioning as teenagers and adults, whereas people high in rejection sensitivity and low in delay of gratification suffered from more social and self-esteem problems and showed features of borderline personality disorder (Ayduk, et al., 2000; Ayduk et al., under review). Furthermore, hostility after rejection has been found to increase when subjects reflect on that rejection in a "hot" vs. "cool" manner, suggesting a mechanism through which emotion regulation can help people overcome negative social outcomes (Ayduk, Mischel, & Downey, 2002). Studies probing the brain activity associated with processing negative social experiences will further guide understanding of how regulatory and social-cognitive mechanisms interact in low and high RS individuals.

INTEGRATING INDIVIDUAL DIFFERENCES INTO THE MODEL: A 3-FACTOR MODEL

Could individual differences in relational dispositions—attachment style, rejection sensitivity, need to belong, self-esteem—involve individual differences in people's tendencies to deploy mental state inference or empathy to understand others or in their motivation to attend to social cues? Could severe abnormalities in one or other of these "uniquely social" cognitive processes underlie the difficulty with relationships suffered by borderline, avoidant, or antisocial personality disorders? Our contention is that research probing individual differences in the use of these social-cognitive processes will provide new insights about mechanisms giving rise to characteristic features of these dispositions and disorders. An especially intriguing idea is that particular contexts (such as social situations where the outcome is both important and uncertain, e.g., meeting a prospective dating partner or employer) could cause people to fail at adaptively deploying social-cognitive mechanisms. High arousal or anxiety, for example, can interfere with mental state inference or empathy in the same way that cognitive busyness does. People who feel threatened during social situations could, by this logic, revert to stereotyping the people around them in an if-then manner. Using neuroimaging and/or social-cognitive paradigms to study theoretically indicated contextual influences on the operation of social-cognitive processes in different personality dispositions and disorders will uncover mechanisms involved in creating and maintaining characteristic relationship patterns.

The focus thus far has been on identifying some ways in which the social and psychological context can influence the three dimensions of uniquely social cognition: simulation or empathy, mental state inference, motivated attention to understand a target. To tie together the effects of relatively stable individual differences and relatively transient context effects on these dimensions, we can think of them as constructing a three dimensional "social-cognitive space" in which we can plot different types of thinking about other people (Figure 6.3). For example, thinking about someone's false belief (as revealed by autism research paradigms) could recruit mental state inference and not empathy, whereas thinking about their pain could recruit empathy but not mental state inference (see Figure 6.3a). Furthermore, contextual factors (related to either the perceiver or target) pull people through this three-dimensional space in an if-then manner, causing the same individual to infer mental states in different ways at different times.

Figure 6.3b shows how we can depict examples from earlier in the chapter in terms of altering the use of different processes within this 3-D space. Rejection can cause people to attend more closely to social cues by increasing the motivation to be socially included (Pickett et al., 2004). Thinking of someone as fair or cooperative makes empathizing with that person's pain reflexive, whereas competitive and unfair others inspire less (or even reversed) empathic responses (Singer et al., 2004, 2006). Thinking about others while under cognitive load lessens our ability to make mental state inferences and increases our reliance on more automatic stereotyping or trait attributions (Gilbert et al., 1989).

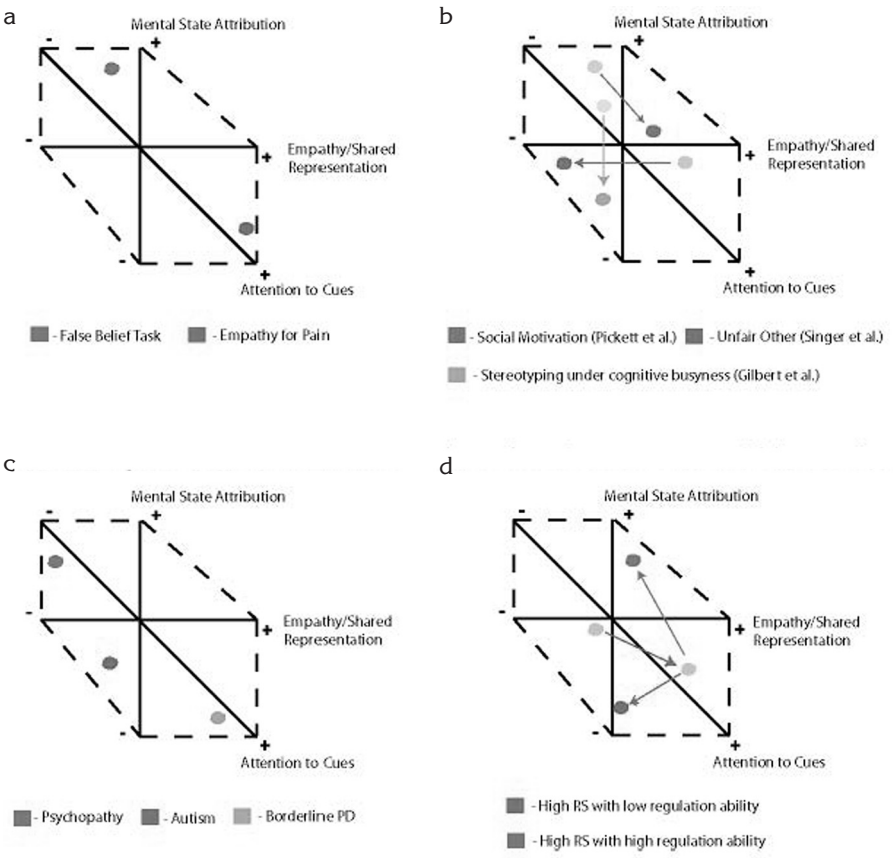

Figure 6.3 "Social-cognitive Space" as defined by presence/absence of mental state representation, empathy/shared representations, and attention to social cues. Several levels of state and trait influences over social cognition are overlaid on the space as follows. 3a: Some basic social cognitive phenomena; 3b: state level effects that can alter the expression of these basic phenomena; 3c: clinical disorders that can alter the expression of basic social cognitive processes; 3d: an example of how multiple between trait-level variables can interact to determine the expression of social outcomes.

Link to Personality Dispositions and Disorders. The forgoing discussion makes the case that the typical person's position on each axis of the social-cognitive space is sensitive to context. However, people vary in how sensitive to context their position in social-cognitive space is. Some people's behavior may be highly responsive to context, whereas others may be much less responsive, being, for example, chronically irritable or chronically calm. People can also differ in the type of cues to which they are sensitive. Whereas narcissists may be highly motivated to attend to whether others are giving them the adulation to which they view themselves as entitled, those high in rejection sensitivity may be particularly motivated to attend to cues about whether others dislike them. Answers to the following questions are

also likely to differ across individuals: How similar or familiar does someone have to be for me to empathize with them? How threatening does a social cue have to be for me to increase my attention towards it? Individual differences can shift people along social-cognitive axes in at least two ways: through affecting *set points* and *lability*.

Set Points. Some personality dispositions affect the *chronic* level or set-point of one or another social-cognitive variable. That is, some personality dispositions or disorders may make it more difficult or nearly impossible for people to move away from their social-cognitive set points on some dimensions. Autistic people are chronically poor at mental state inference and attention to social cues, but there is some evidence that their motor empathy (ability to imitate) is less affected. On the other hand, psychopaths, while able to attend to and understand mental states, are chronically unable to understand or react to the emotions of others. Thus dispositional differences in social behavior are likely to reflect differences in the depth and subtlety with which individuals assess other people's mental and emotional states. These dispositional differences in set point are displayed in Figure 6.3c.
Lability Some personality dispositions involve variability or lability in one or another social-cognitive variable. For example, borderline personality disorder is characterized by unstable mood, identity, and relationships, with shifts in these keys aspects of functioning frequently triggered by social events. It is useful to consider this disorder in terms of Mischel's if..then model of personality with extreme shifts in the deployment of specific social-cognitive processes being triggered by subtle contextual shifts (as plotted in Figure 6.3d).

Link to Combinations of Dispositions. In addition to thinking about how individual relational dispositions can be mapped in social-cognitive space, it is also useful to consider how such dispositions can interact with other non-social forms of individual differences to influence position in social-cognitive space. Adapting the work of Ayduk and colleagues (2000, 2002) to our social-cognitive framework, we can consider high rejection sensitivity as a tendency to increase attention to negative social cues and perceive them more readily and more intensely. Once a rejection has been perceived, rejection sensitive people who are low in self-regulation ability respond "hotly," reducing their empathy towards the rejecting other and stereotyping them while responding with hostility. However, rejection sensitive people who are high in self-regulatory ability are able to avoid this, either by paying less attention to the cues or by considering the mental states/situations of their interaction partner.

A neuroimaging study by Taylor et al. (2006) finds evidence that converges with that of Ayduk et al. (2000). They explored emotion regulation ability as a function of the type of early experiences thought to give rise to rejection sensitivity and to poor self-regulatory competencies. People who had experienced risky childhoods (characterized by neglect and negative emotional patterns; see Repetti, Taylor, & Seeman, 2002) failed to show a previously documented negative correlation between right inferior frontal and amygdala activity during an emotional labeling task. For these individuals, thinking about emotional stimuli intensified

rather than dampened their emotional responses to them. That is, they appeared at the neural level to be unable to impose a "cool" framework on "hot" stimuli, consistent with Ayduk et al.'s (2000) characterization of individuals high in rejection sensitivity and low in self-regulatory abilities.

A RESEARCH AGENDA FOR CHARACTERIZING PERSONALITY IN TERMS OF SOCIAL-COGNITIVE PROCESSES

A combination of behavioral and neuroimaging studies is needed to increase our understanding of how personality dispositions reflect the social-cognitive tools we have, as well as the contextualized way in we use these tools to understand and interact with other people. Individual difference measures could track the amount that people stereotype rejecting others, or employ situational corrections. Considering constructs such as rejection sensitivity in terms of the "if…then" use of different social-cognitive processes will inform our understanding of cognition, personality, and context by looking directly at their intersection. Dispositional differences in behavior almost certainly reflect patterned differences in cognition, and exploration of these cognitions is crucial to marrying these two disparate literatures (Bateman & Fonagy, 2004). The data analytic tools needed to capture Person X Context X social-cognitive process are now available in the form of multilevel models (Kenny, Kashy, Bolger, 1998). A richer account of the use of social-cognitive processes as they relate to both context and individual differences could help create assessment and treatment methods more tailored to particular social-cognitive difficulties, which would increase the clinical relevance of social cognition research.

The field reviewed in this chapter is growing explosively. Newer, richer accounts of the cognitive processes evolved to facilitate and manage social interactions are emerging as social-psychological and neuroscientific approaches are integrated more subtly and completely. Our hope is that soon this literature will become relevant not only to studies of general social cognition, but to individual differences in the ways that social-cognitive processes operate across situations. By increasing sensitivity to both the power of the situation and the dispositions that people bring into them, social-cognitive neuroscience can continue enriching its account of the most uniquely human thought processes that we possess—those involved in understanding what is going on in the minds of other humans. These processes are the tools of social relations.

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