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Revisiting the Sovereignty of Social Cognition: Finally Some Action

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> We see persons engaging in actions that have a psychological content.
>
> Asch (1952, p. 151)

For lay psychologists, airport bookstores have traditionally been an uninspiring place to hang out. While perusal of the shelves reliably reveals the secrets of wealth management, dietary restraint and enviable abdominal muscles, it rarely returns much in the way of genuine psychological wisdom. Or at least that was the case until quite recently. Now, outlets are packed with products offering insights into the nature and vagaries of the human condition. For example, if you want to know why winning the lottery makes you feel less happy than you had imagined, what the contents of your bedroom reveal about your inner personality, and how to overcome the perils of procrastination, simply pay a visit to the bookstore next time your flight is delayed (e.g., Ariely, 2008; Gilbert, 2007; Gosling, 2008). Social psychology is everywhere, with much of the available material focusing on the topic of the current chapter (and indeed book) – *social cognition*.

That the general public display a thirst for social-cognitive knowledge is unsurprising. Social cognition, after all, is the medium through which our worlds are construed and actions initiated (Fiske, 1992; James, 1890). As Ostrom famously opined, "The field of social cognition reigns sovereign" (1984, p. 29). Unable to cut the mustard on our own, we thrive and succeed via communal living (Dunbar, 1993). The demands of such a lifestyle, however, are many. Sometimes our goals and objectives are achieved through mutual cooperation, other times by the manipulation and deception of conspecifics. Sometimes it is advantageous to raise one's head above the parapet and show dissent, on other occasions to sit anonymously and go along with the crowd. Little wonder, therefore, that people are fascinated by the stuff of social cognition, the tactics and strategies that facilitate social interaction and how these are supported in the brain (e.g., Beer & Ochsner, 2006; Fiske, 1992; Mitchell, 2009).

Underpinning current interest in social cognition is around 30 years of research and theorizing on the topic (see Fiske & Taylor, 1984; Hamilton, 1981; Macrae & Bodenhausen, 2000; Wyer & Srull, 1984). Our objective in the present chapter, thankfully, is not to review this enormous body of work, as such an undertaking would be impossible and decidedly soporific. Instead, our goal is to take a broad overview of social cognition and raise some issues and observations that have prompted us to pause for thought and reflection in the course of our own recent research. As a guiding route map, in the course of the current chapter we will touch upon: the nature, basis and function of social cognition; why action serves as the bedrock of social cognition; and how work in social cognition can be integrated with broader themes across the sciences. The views and opinions expressed in this chapter are entirely personal

and will likely fall short of universal appeal. Nevertheless, they reflect insights and opinions distilled from numerous conversations with colleagues in coffee shops, wine bars and yes, you guessed it, airport bookstores.

THINKING ABOUT SOCIAL COGNITION

So what exactly is social cognition and why does it (allegedly) reign supreme (Ostrom, 1984)? As it turns out, this delicious question has generated passionate debate for years, most conspicuously at major social-psychological conferences and conventions. Indeed, were it not for the rapid intervention of dinner, visits to the restroom, or unconsciousness, fist-fights may have broken out between social psychologists during these verbal jousts. The problem, we think, can be identified quite easily. Over the years some rather unhelpful definitions of social cognition have been advanced which, in turn, have caused difficulties for individuals working in field, particularly experimental social psychologists. As comparison cases, consider how social cognition has advanced in other branches of psychology, notably developmental psychology and neuropsychology. After much scratching of heads, we cannot think of a single occasion on which researchers in either of these fields has been witnessed arguing by the water cooler about the definition of social cognition. Moreover, it is nothing peculiar about babies or brains that has precipitated this state of affairs. Elsewhere in the discipline, research has been guided by the working assumption that social cognition is an *activity* that enables people to understand and interact successfully with others (Adolphs, 1999; Frith, 2007; Olson & Dweck, 2008). It is regrettable that, on occasion, experimental social psychologists have diverged somewhat from this viewpoint.

In his seminal article on the sovereignty of social cognition, Ostrom (1984) identified a messy definitional landscape that continues to hamper integrative progress in the field. From the clutter of definitions available, one in particular has arguably been problematic. For many researchers, social cognition is not so much an activity or area of inquiry, but rather a methodological approach to the study of human social interaction. Ironically, an influential community of scholars, the International Social Cognition Network, advances just such a position. As stated on their website,

> We view social cognition not as a content area, but rather as an approach to understanding a wide variety of social psychological phenomena pertaining to many content areas … the major concerns of the approach are the processes underling the perception, memory and judgment of social stimuli; the effects of social, cultural, and affective factors on the processing of information; and the behavioral and interpersonal consequences of cognitive processes.
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> (International Social Cognition Network, 2011)

This overtly cognitivist (and individualistic) approach is not without virtue. By borrowing terminology (e.g., encoding, representation, retrieval), tasks (e.g., lexical decision tasks, dual-task procedures) and measures (e.g., reaction times, recognition accuracy) from cognitive psychology, researchers have been able to provide a process-oriented account of core aspects of social-cognitive functioning (e.g., impression formation, person categorization, self, attitudes; see Fiske, 1992; Higgins & Bargh, 1987; Macrae & Bodenhausen, 2000). As Ostrom himself remarked, "Principles of interest to cognitive psychologists are directly pertinent to understanding the phenomena of social psychology" (1984, p. 29). In the eyes of many, however, the strengths of this approach fail to conceal some fundamental limitations, a couple of which are worthy of passing mention.

First, immersed in the world of information-processing metaphors and terminology, social cognition can appear to be little more than reheated cognitive psychology – specifically, cognitive psychology with different (albeit more interesting) stimulus materials. Indeed, such an observation has prompted several wise minds to raise the question of what is actually "social" about social cognition at all (e.g., Forgas, 1983). Second, and closely related, a reliance on cognitive methodologies has resulted in the worrisome disappearance of a critical dependent measure from the investigative landscape – meaningful behavior (Fiske, 1992). That is, despite universal acknowledgement that behavioral relevance is critical to the empirical enterprise, the majority of contemporary research continues to measure only social cognitions, in the form of impressions, judgments and memories (see Baumeister, Vohs, & Funder, 2007; Patterson, 2008). The pitfalls of this approach are obvious. By moving away from meaningful behavior, social-cognitive research creates an explanatory gap between the measuring instruments it employs (e.g., questionnaires, reaction times) and the phenomena it strives to explain (e.g., stereotyping). The result is the generation of phenomenon-specific theories that necessarily fragment a unified account of social-cognitive functioning. To be sure there is nothing inherently wrong with participants making "pencil marks"

and "computer keystrokes," one must simply exercise caution and restraint when generalizing from these responses to meaningful social action.

In proclaiming the sovereign status of social cognition, Ostrom (1984) identified issues that continue (perhaps unnecessarily) to engender debate and discussion. Two in particular are worthy of consideration as they pertain to the nature of social understanding: (i) differences between social and non-social knowledge; and (ii) action as the foundation of social knowledge. To set the stage for the second section of this chapter, attention now turns to these issues.

Social vs non-social knowledge

Whereas Ostrom (1984) remained agnostic about potential differences in the operations that support social versus non-social perception (see Brewer, 1988), he offered valuable insights into the different properties that social and non-social objects possess. Take, for example, his prototypical object of choice, a rock. The first and perhaps most obvious difference between rocks and persons pertains to the stability of their physical appearance through time. Ordinarily, a rock in the garden will look pretty much the same next year as it did over a decade (or perhaps even a century) ago. The same, however, cannot be said of Aunt Peggy, Bill Clinton, and for that matter either of the current authors. While objects retain their general appearance and composition for years, persons are in a constant state of flux (as evidenced by moment-to-moment changes in their posture, expression and movements, not to mention longer-term shifts in size, shape and appearance). This, of course, has important implications for the acquisition of knowledge. Whereas person knowledge is gleaned from the perception of behavioral events that unfold over time (Heider, 1958), object knowledge is often garnered from a single, discrete sensory-motor experience. Herein resides a critical insight into the conceptualization of social cognition and the primacy of action (Ostrom, 1984). In order to elucidate the acquisition of person knowledge, it is essential to model social cognition in a dynamic manner (Marsh, Richardson, Baron, & Schmidt, 2006).

A second fundamental difference between persons and non-social objects resides in the forces that produce change and the explanations that are offered for these effects. As Ostrom (1984) noted, "A vase may appear different in the sunlight versus the shadows, its color might fade if scrubbed with a strong detergent, it might break if pushed off the table. All these forces are external to the object" (p. 10). Critically, virtually all the changes that are observed in non-social objects reflect the operation of these forces. As such, transformations in the non-social world are characteristically attributed to the operation of external causal factors (Heider, 1958). For example, a house window cracks because of excessive frost, not because the pane was especially annoyed or frustrated. Whereas persons are similarly subject to the operation of external causal influences (e.g., ever fallen asleep while sunbathing?), change can also be fashioned by (supposedly) unobservable internal factors (Heider, 1958). To paraphrase Ostrom, unlike non-social objects, people act with agency.

This difference between social and non-social objects has well-stated implications for social-cognitive understanding. Compared to inert non-social objects, people are deemed to be purposive, self-initiating agents the behavior of whom is driven by an extensive inventory of psychological forces (e.g., goals, beliefs, intentions). For example, we punch the boss because we believe he flirted with our partner, not because a gust of wind propelled our hand toward his chin. Naturally, therefore, compared to non-social objects, people are viewed through a quite different explanatory lens. Whereas mechanistic explanations are sufficient for rocks, paper and scissors, purposive explanation is the currency of human social cognition. Through possession of a Theory of Mind (ToM) and adoption of what has been termed the *intentional stance* (Dennett, 1987), people ascribe the actions of others to their hidden mental states and unobservable behavioral proclivities (i.e., mental state attribution). Notwithstanding the psychological flavor of these social-cognitive explanations however, they must nevertheless be grounded in the lawful properties of the natural world. A vexatious problem for experimental social psychologists has therefore been to establish how internal psychological causation fits within the natural world order.

Differences between rocks and persons aside, our own particular viewpoint on this matter is quite straightforward – *all cognition is social*. Through natural selection, organisms adapt to the specific environmental challenges they face. For people, these challenges have primarily (though not exclusively) been social. When one's very survival depends on the ability to coexist successfully and harmoniously with other people, precise skills are required. In this respect, just as echolocation provides a fundamental "survival skill" for bats (i.e., locating and identifying objects in the environment), social cognition does so for people, in that it enables them to navigate the complexities of human social interaction. Put simply, social cognition is the medium through which daily exchanges are realized. The pivotal status of social cognition is revealed most directly when this

capacity is disrupted or absent. Take, for example, the difficulties encountered by individuals with autism or Asperger's syndrome. Without a fully developed ToM, these persons are unable to intuit the contents of other minds. In particular, they encounter considerable difficulty understanding and predicting people's emotional states and reactions (Baron-Cohen, 1997; Frith, 2003). Stripped of this essential ability, they are unable to comprehend or transmit the subtle signals that underlie successful (or for that matter unsuccessful) social interaction. A similar message emerges following insult to the brain, particularly damage to the orbitofrontal cortex (Damasio, 1996). Without social inhibitions, prefrontal patients exhibit behaviors that would make even the most liberal of individuals cringe. The message that emerges here then is illuminating. When social cognition is impaired, effective interpersonal exchange is near nigh impossible.

Action as the foundation of social knowledge

For Ostrom (1984), action is the critical element of social cognition. As he declared, "A priority concern… for… social cognition is to tackle the theoretical and empirical implications of action as the basis of social knowledge" (p. 19). In so doing, of course, Ostrom was reiterating a well-rehearsed argument in psychology (James, 1890). Developmental psychologists have long maintained that knowledge derives from our actions on the world (e.g., E. J. Gibson, 1969; Piaget, 1954). In social psychology, however, this viewpoint has taken longer to gain a significant foothold (see Fiske, 1993). For many years, despite Ostrom's clarion call, social-cognitive research largely ignored the concept of action (Markus & Zajonc, 1985; Wyer & Srull, 1984). It did so, moreover, even when the importance of action was articulated in some of the field's most influential writings. Asch (1952), for one, was an advocate of this position. As he argued:

> Our problem of relating actions to inward experiences would be solved if we could abandon the assumption that phenomenological facts and the actions that correspond to them are utterly heterogeneous, if we could reverse this assumption and say that the organized properties of experience are structurally similar to those of the corresponding actions (p. 158).

Interestingly, with these words, Asch was clearly arguing for a non-mentalistic account of social knowledge, a viewpoint that was later expanded on in Gibson's work on the direct perception of affordances (J. J. Gibson, 1979).

Inspired in no small part by J. J. Gibson's (1979) influential writings, the last 25 years have witnessed something of a sea change in the character of social-cognitive research. Building upon early ecological accounts of social perception (e.g., McArthur & Baron, 1983; Valenti & Good, 1991), recent theoretical treatments have emphasized the situated and embodied nature of social knowledge (e.g., Marsh, Richardson, Baron, & Schmidt, 2006; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Smith & Semin, 2005). Guiding these viewpoints is the assumption of the reciprocity of perception and action, with social cognition characterized as a dynamic transaction between the person and their (social) environment. From this perspective, the critical relationship between knower and known is one of mutuality and interdependence. Thus, it may have taken some time, but finally social-cognitive research has responded to the sage advice of Asch (1952) and Ostrom (1984) and elevated action to a position of theoretical prominence. Reflecting this renewed interest in action as a core component of social cognition, attention now turns to a consideration of how action-oriented theorizing can integrate social-cognitive research with broader themes across the sciences.

THINKING ABOUT ACTION

If Ostrom's (1984) "call for action" is to be given genuine consideration as a guiding principle for researchers exploring social cognition, the nature of action must be taken seriously. Psychological approaches to understanding how people act traditionally postulate a mechanistic view whereby so-called motor programs or commands are issued to relevant body parts by either neural structures or some form of executive controller. However, aside from the missing homunculus and a reliance on a theoretically dubious mind–body dualism, critics of this thesis suggest it is computationally untenable – the degrees of freedom required to capture the complexity and flexibility of action cannot be accommodated by a discrete set of motor programs (e.g., see Berstein, 1967; Kelso, 1995; Kugler & Turvey, 1987; Turvey, 1990, 2007). Instead, there is growing enthusiasm for psychologists to adopt the more general stance of dynamical systems theory (DST) in order to best characterize the organization of motor behavior.

In the following sections we will briefly outline aspects of DST that provide a foundation for viewing patterns of behavior through a more

general theoretical lens.[1] Our goal is to point out how human action can be subject to the same lawful principles that guide change across a range of living and non-living systems. Using examples from both our own and other labs, we hope to demonstrate that by viewing action in this manner, core aspects of social cognition do not have to be reduced to hidden mental processes, but can be grounded in the lawful properties of the natural world (Richardson, Marsh, & Schmidt, 2010).

The promise of dynamics

In essence, a dynamical system is one that changes over time as a consequence of the interactions between its elements. To this end, DST attempts to describe the nature of such change. With origins in mathematics, DST provides a foundation for modeling events across all domains of science, from physics and chemistry (e.g., Tel, de Moura, Grebogi, & Karolyi, 2005) to meteorology (e.g., Lorenz, 1963), population ecology (e.g., Hanski, 1998) and epidemiology (e.g., Anderson & May, 1991). Moreover, psychological phenomena have not been entirely overlooked. Neural activity (e.g., Buzsáki & Draguhn, 2004), emotion and development (e.g., Lewis & Granic, 2000), personality (e.g., Shoda, LeeTiernan, & Mischel, 2002), cognition (e.g., Spivey & Dale, 2006), mental illness (e.g., Johnson & Nowak, 2002) and social psychology (e.g., Vallacher & Nowak, 1994) are among a range of topics that been viewed from a dynamical perspective. Of significance, a key concept to emerge from the science of dynamics is that of *self-organization* – namely, the fact that patterns of activity can occur solely through the interactions of the components of a system without the need for external input. Here then is the utility of a dynamical approach to action – ordered behavior can be understood without appealing to commands or motor programs issued by a source external to the behavior itself (e.g., executive controllers, homunculi).

Coordination dynamics

To date, perhaps the most influential application of DST to psychological activity has been with respect to coordination dynamics (for recent overviews, see Kelso, 2009; Schmidt & Richardson, 2008). This field has sought to identify the lawful principles that underlie instances of coordinated activity. Take, for example, a pair of pendulum clocks hung on a common wooden support. Huygens (1665, as cited in Pikovsky, Rosenblum, & Kurths, 2001) observed that regardless of their starting positions, after a period the pendula would synchronize: that is, their respective oscillations would coincide in time, and remain that way. With a little poetic license, Huygens described this phenomenon as the "sympathy of two clocks," and went on to hypothesize that motions of the common support communicated the movement trajectories of the pendula. As it turns out, Huygens' speculations were on the money. Contemporary accounts of synchrony point to the necessity of some form of *coupling* between the elements of a system in order for coordination to emerge. In the case of the clocks, the two swinging pendula were coupled via vibrations transmitted through the wooden support, with each pendulum's motion influencing the other until they fell into a stable, coordinated pattern. In this way, the synchronous motions of the respective pendula were self-organized – no external force or controller was necessary for coordination to emerge. Curiously, precisely the same effects have been observed, and formalized, with respect to human movement.

Kelso (1981, 1984) reported a series of studies in which participants performed rhythmic bimanual movements: for instance, moving their index fingers at a common frequency. Just as Huygens had observed with the clocks, people's finger movements showed spontaneous coordination. Specifically, despite there being an infinite number of possible patterns this coordination could take, only two forms emerged, *in-phase* (where the respective fingers are at equivalent points of the movement cycle at a given time) and *anti-phase* (where the fingers are at opposite points of the movement cycle at a given time). Moreover, as the frequency of movements was increased, individuals who were coordinated in the anti-phase mode spontaneously transitioned to the in-phase mode (but never the opposite).[2] In effect, Kelso had demonstrated self-organized coordination between movements of a finger on each hand, coupled by the nervous system. Soon after, these effects were modeled mathematically, reproducing the precise pattern of coordination observed by Kelso (and for that matter Huygens over 300 years earlier). The outcome of this model, the Haken–Kelso–Bunz (HKB) equation (Haken, Kelso, & Bunz, 1985), has formed a basis for the science of coordination dynamics.

The examples of coordination detailed so far have involved a physical coupling (e.g., a wooden beam, a nervous system) between effectors (e.g., pendula, fingers). But what happens when there is no such mechanism present? Is it possible that, for example, the rhythmic movements of two individuals (in effect two distinct nervous systems) may be subject to the same dynamics that bring about coordination in physically coupled systems?

The answer to this question is a resounding "yes." Early hints of just such an effect came from observations of South-East Asian fireflies, which, when congregated in groups numbering in the thousands, produce a spectacular display of rhythmic and coordinated flashing (Buck & Buck, 1976). Of note, there is no physical coupling between the fireflies, nor is there any "leader" to set a pace or rhythm. Instead the timing of each flash is thought to inform, and be informed by, the others; that is, to be self-organized (Strogatz, 2003). Might then, interpersonal coordination, a mainstay of social interaction, also be organized in this way? Again, the extant research is in support of this view. In the first such demonstration, Schmidt, Carello, and Turvey (1990) reported that pairs of participants, who were instructed to synchronize the swinging of their legs, spontaneously transitioned from anti-phase to in-phase coordination as movement frequency increased. The predictions of the HKB equation were again borne out, but this time in a system with no physical coupling. Instead, the participants were visually coupled, yet the same dynamic applied and synchrony emerged. It is in this way that dynamics provide general, lawful principles that universally describe the emergence of self-organized coordinated activity (Schmidt & Richardson, 2008).

As it turns out, the self-organized nature of interpersonal coordination influences, and is influenced by, social factors. For example, imagine you are taking a stroll with a friend. Often your footsteps will spontaneously become entrained, resulting in the two of you walking in almost perfect step (Zivotofsky & Hausdorff, 2007). Now imagine you are taking the same stroll without your friend, but with others also using the same path. Will you coordinate to the same extent with the movements of strangers? We suspect not. At issue is the functional nature of coordination: specifically, the notion that synchronous actions form a foundation for, and display of, social bonding. It is probably no accident that rhythmic activities such as drumming, singing, and dancing are at the basis of social rituals across all cultures. Indeed, a number of theorists have suggested that engaging in these practices draws people together, uniting them via common experience (e.g., Freeman, 2000; MacNeil, 1995). Several lines of empirical evidence also support this view. Moving in time with others elicits feelings of connectedness, liking, and rapport (e.g., Berneiri, 1988; Hove & Risen, 2009; LaFrance, 1979), blurs self–other boundaries (Paladino, Mazzurega, Pavani, & Schubert, 2010), enhances cooperation (e.g., Wiltermuth & Heath, 2009), cooperative ability (e.g., Valdesolo, Ouyang, & DeSteno, 2010), and altruistic behavior (Valdesolo & DeSteno, 2011), and is accompanied by the release of endorphins (Cohen, Ejsmond-Frey, Knight, & Dunbar, 2010). Behavioral synchrony between parents and infants is indicative of an effective bond, while a lack of such coordination may signal developmental problems (Feldman, 2007). In short, synchronous activity promotes positive social outcomes.

Evidence from our own lab also testifies to this idea. We have shown that the characteristics of a social encounter can influence the emergence of synchrony. Participants who were made to wait for a tardy confederate synchronized less on a movement task than those who endured no such delay (Miles, Griffiths, Richardson, & Macrae, 2010). Similarly, an arbitrary difference between participants and a confederate led to enhanced levels of synchrony as a means to reduce this perceived social distance (Miles, Lumsden, Richardson, & Macrae, 2011). Importantly, in these studies participants were not instructed to coordinate in any way and their actions were incidental to the tasks at hand – yet coordination was manifest in a manner consistent with both a self-organized dynamic (i.e., when coordination was observed it was only in the in-phase mode) as well as social mores and conventions. In other words, social factors appear to be integral to the coordination dynamics that underlie the emergence of interpersonal synchrony.

Perhaps more relevant to the present volume, our own research has also revealed the converse relationship – synchrony can influence social cognition. Macrae, Duffy, Miles, and Lawrence (2008) had participants perform hand movements (i.e., extension/flexion about the wrist) in time with a metronome. Simultaneously, a confederate performed the same movements, intentionally coordinating with the participant in either an in-phase or anti-phase mode and spoke words aloud (allegedly as a distraction). Subsequently, participants were given a surprise recall test, whereby they were asked to recount as many of the words as they could, and to identify the confederate from a series of photographs. Remarkably, following the period of activity, participants who experienced in-phase coordination recalled more words, and were more accurate in recognizing the confederate than those in the anti-phase condition. That is, following the most *stable* mode of coordination (i.e., in-phase) participants demonstrated enhanced memory for central aspects of interaction – what others look like, and what they say. The dynamics of coordination shaped social cognition.

In a follow-up study, we explored further the role of coordination stability during social exchange (Miles, Nind, Henderson, & Macrae, 2010). Again, participants performed a repetitive action (i.e., arm curls) while a confederate

coordinated with them in either an in-phase or anti-phase mode. In addition, both the confederate and participant heard words played over headphones and were required to repeat them out loud, alternating between each other. Next, we measured the participant's incidental recall of self- and other-related information (i.e., words spoken by themselves or the confederate). Consistent with the memory literature (e.g., self-reference effect; Symons & Johnson, 1997), participants demonstrated an advantage for recalling more of the words they spoke compared to words the confederate uttered when coordination was anti-phase. However, this effect was eliminated when the confederate coordinated in an in-phase mode. In this condition, participants recalled an equivalent number of words regardless of the source (i.e., self or other). Of note, in other contexts an absence of the self-memory advantage is generally only seen for established interpersonal relationships (e.g., when the "other" is well known to the "self"). Here, however, the confederate was previously unknown to the participant and their interaction was limited to the exchange described above, yet stable coordination led to shifts in social cognition consistent with those seen for more long-standing relationships. Furthermore, measurements of coordination stability (i.e., standard deviation of relative phase) within each dyad were shown to be related to the ratio of self-to-other words recalled by the participant. More stable coordination was associated with a greater attenuation of the self-memory advantage. Once again, properties inherent to self-organized coordination seem to be intimately entwined with the very core of social-cognitive functioning.

Perceiving the dynamics

To this point, we have focused primarily on the application of the science of coordination dynamics to understanding how interpersonal synchrony can emerge spontaneously and without recourse to any form of external or executive controller. In doing so, we have briefly detailed how action can be self-organized, and how the characteristics of self-organized systems (e.g., phase relationship, stability) have been shown to influence, and be influenced by, social cognition. However, a skeptical reader might still question the general utility of this approach for psychologists. After all, there is a lot more to social cognition than apparently quirky parallels between fireflies and flapping hands (Macrae et al., 2008). If we are to take "action as the basis of social knowledge" to be a guiding principle for social cognition, what becomes of genuinely psychological constructs – the attitudes, beliefs, biases, emotions, feelings, goals, intentions, motives, moods, thoughts, and whims that color everyday behavior? Surely, these are "special types" of natural phenomena, beyond the purview of a general dynamical approach to order? Perhaps not. Drawing heavily from the Gibsonian notion of information (e.g., J. J. Gibson, 1979; Michaels & Carello, 1981), Runeson and Frykholm (1983) set out the kinematic specification of dynamics (KSD) principle, a theoretical framework for incorporating dynamics into our more general understanding of social knowing.

In short, the KSD principle states that movements specify their causes (Runeson & Frykholm, 1983): i.e., *kinematics* (i.e., spatio-temporal patterns of movement) reveal *dynamics* (i.e., the forces that cause and constrain movement). Take the (relatively) simple example of human gait. By attending to gait patterns (i.e., kinematics) we can glean a host of socially relevant information. We can tell if someone is male or female (Kozlowski & Cutting, 1977), what actions they are performing (Dittrich, 1993), and who they are (Cutting & Kozlowski, 1977). Runeson and Frykholm argue that such information is available for perception, as the form that movements take is structured by the forces that determine (and constrain) them. Differences between, for instance, the anatomical make-up of males and females (e.g., hip and shoulder width) lead to sex-specific differences in the center of movement (i.e., a kinematic property) that in turn is used by perceivers when determining sex from gait (Cutting, Proffitt, & Kozlowski, 1978). From this perspective, social knowledge can be veridically specified as patterns of movement.[3]

Returning to the case of interpersonal synchrony, work in our lab has revealed that perceivers utilize kinematic patterns that are consistent with self-organized coordination dynamics when making social judgments (Miles, Nind, & Macrae, 2009). We simulated dyads (i.e., pairs of walkers) using either stick figure animations or audio recordings of footsteps. Importantly, we varied the relative phase relationship between the strides of the walkers in equal increments, ranging from in-phase to anti-phase. This manipulation had the effect of systematically changing the mode of coordination while keeping the amount of coordination constant (i.e., phase relationship did not vary within trials). Participants were asked to view (or listen to) each trial and rate the rapport they associated with the simulated interaction. As it turned out, these ratings followed a curvilinear relationship, whereby perceived rapport was highest when the kinematics revealed stable modes of coordination (i.e., in-phase and anti-phase), and lowest at the intermediate phase relationships (i.e., the least stable modes). In line with the KSD principle, perceptions of the quality of a social

exchange corresponded with the kinematic properties that result from self-organized coordination dynamics.

Importantly, the KSD principle extends beyond biomechanical factors and coordinative structures to include inherently psychological constructs such as emotions, intentions, and expectations. As Koffka (1935) illustrates:

> The slow dragging movements of the depressed, the jerky, discontinuous movements of the irritable, correspond, indeed, to the leaden state of depression or the disrupted state of irritability … characteristics of overt behavior will map characteristics of the field in which this behavior is started (p. 658).

In this way, Heider's (1958) apparently unobservable internal causes of behavior are the very forces that give rise to overt, perceivable, patterns of movement. Furthermore, consistent with DST, these kinematic patterns are thought to be self-organized (e.g., Lewis, 2000) – no homunculus or executive process is required to register, for example, a depressed mood and issue the motor command to be slow. Instead, the shape of action is thought to unfold by virtue of the interactions between the factors that support and constrain such action. Here again, the utility of understanding the characteristics of action as emergent, self-organized properties of the dynamics that order behavior is evident. Knowing what form actions take can equate to knowing precisely how those actions came about: i.e., in a social context, knowing what those actions mean.

REVISITING THE SOVEREIGN STATE

Over the course of this chapter we have touched, albeit lightly, on several issues that we believe are central to situating social cognition at the forefront of psychological science. First, we see it as critical that researchers abandon the view that social cognition is an approach or set of methodological tools, but rather recognize social cognition as an activity that keeps us in contact with our social worlds. One important implication that arises from this perspective is the need for social-cognitive research to (re)focus on action as the basis of social knowledge (Ostrom, 1984). Although much has been learned from viewing social cognition as a set of internalized processes, less consideration has been given to the extent such mentalizing is borne out in the things people do – their behavior. However, rather than lament this apparently narrow focus, we suggest it is time to reinvigorate Ostrom's call for action in order to best capitalize on what we now know. To do so, we have advocated casting the theoretical net somewhat wider than social scientists are typically accustomed, in order to locate social-cognitive research within a more general understanding of the natural world.

Second, we have briefly introduced dynamical systems theory as a general framework for understanding the nature of change, or more specific to the current work, how actions are ordered. To this end, we have considered how action can be self-organized, thereby relegating so-called hidden mental processes to be, at best, descriptive constructs rather than causal factors in the patterning of behavior. This approach also helps situate psychological phenomena within the realm of the natural sciences whereby universal, scale-free principles can be employed to guide our understanding of social behavior. Of course, we have only brushed the surface: there is much work to be done here – knowing that coordination dynamics underlie the spontaneous emergence of synchronous activity does not directly inform quite how, for example, emotions guide the self-organization of goal-directed action (but see Lewis, 2000). It does, however, provide researchers with a general set of principles that can, at the very least, guide theorizing and experimentation. To this end, we remain resolute that social cognition can, and should, be viewed from a more general perspective, one that is in keeping with the lawful principles of the natural world.

Finally, we return to Ostrom's (1984) declaration that social cognition stands sovereign. With over a quarter of a century of theory and research under our collective belts, it may now be time to revisit this issue. Has social cognition retained its sovereign status? Our response is twofold. On the one hand, the phenomena continue to reign supreme. Psychologists and lay persons alike spend much of their waking hours trying to figure out the intricacies of social behavior. On the other hand, it may be time to renounce social cognition as an approach, and instead plump for more general explanatory tools. In this way, the intricacies of human social behavior can be firmly embedded within a scientific, principled, and lawful understanding of the natural world.

ACKNOWLEDGMENTS

Portions of this work were supported by a Royal Society Wolfson Fellowship awarded to C.N.M., and a Research Councils of the United Kingdom Academic Fellowship awarded to L.K.M. We are

grateful to Michael J. Richardson for helpful discussions and insights regarding several of the main themes of this chapter and to Joanne Lumsden and Louise Nind for their contributions to this work.

NOTES

1 A comprehensive treatment of DST is beyond the scope of this chapter; however, we refer readers to any of several excellent accounts of dynamics as a set of organizing principles for psychological activity (e.g., Kelso, 1995, 2009; Lewis & Granic, 2000; Marsh et al., 2006; Marsh, Richardson, & Schmidt, 2009; Nowak & Vallacher, 1998; Oullier & Kelso, 2009; Richardson et al., 2010; Schmidt & Richardson, 2008; Vallacher & Nowak, 1994; Warren, 2006).

2 Importantly, although in-phase and anti-phase are both stable modes of coordination (i.e., attractor states for coordinated activity), in-phase is relatively more stable than anti-phase and therefore tends to dominate at higher movement frequencies.

3 A good deal of work in this area has employed Johansson's (1973) point-light technique as a means to isolate and display kinematic information. Some contemporary examples of this approach appear, however, to ignore the relationship between dynamics and kinematics, instead employing point-light displays that, in all likelihood, simply caricature aspects of biological motion. For instance, actors in these displays are often asked to move "as if" they were experiencing emotion, performing an action, engaging with others, etc. Given deceptive intent can be revealed in kinematics (e.g., Runeson & Frykholm, 1983, E3) we suggest that dynamical factors be recreated (e.g., via emotion induction procedures, the actual performance of actions, presence of others, etc.) rather than relying on stereotyped approximations of kinematic information when generating displays using this technique.

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