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Reports

Who syncs? Social motives and interpersonal coordination

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ABSTRACT

Interpersonal synchrony provides an important foundation for social interaction, as periods of temporal coordination lead to enhanced sociality. Moreover, synchronous actions are governed by lawful physical principles of coordination dynamics, suggesting some degree of inevitability. However, both anecdotal and laboratory evidence indicates that not all individuals synchronize. Here we explored whether differences in social motives (i.e., social value orientation) influence the propensity to coordinate with others. The results revealed that individuals with a pro-social orientation spontaneously coordinated with a confederate to a greater extent than those with a pro-self orientation, regardless of whether such orientations were assessed as dispositional characteristics (Study 1) or were the result of a priming manipulation (Study 2). These findings have important implications for both coordination dynamics and prominent accounts of social exchange.

Introduction

Synchrony is pervasive. We marvel at fireflies flashing in unison (Buck & Buck, 1968), rely on the coordinated firing of cardiac pacemaker cells (de Bruin, Ypey, & Van Meerwijk, 1983), and effortlessly fall into rhythm with others when singing, dancing or simply taking a stroll (McNeill, 1995). Importantly, however, although governed by the lawful physical principles of coordination dynamics, synchrony is by no means inevitable — not all rhythms conform. It is unusual, for example, to observe large numbers of pedestrians locked in step as if they were performing a military drill.[1] Why then is this so? Although previous work has identified physical variables (e.g., biomechanics; coupling strength) that modulate the emergence of interpersonal synchrony (e.g., Nessler & Gilliland, 2009; Richardson, Marsh, & Schmidt, 2005), less consideration has been given to the psychological factors that impact this form of joint action. In particular, little is known about whether there is variation between individuals in terms of their propensity to coordinate with others. Here we examine this question by exploring the relationship between people's general disposition towards social situations (i.e., social value orientation) and the spontaneous emergence of interpersonal synchrony.

Synchrony and social interaction

Synchrony between interaction partners has received considerable attention. On the theoretical side, modeling of coordination dynamics (e.g., Haken, Kelso, & Bunz, 1985) indicates that just like more general forms of synchronized activity, interpersonal synchrony is an inherently lawful, self-organized activity. Via an informational coupling (e.g., vision), over time the movements of interacting individuals become mutually entrained leading to the emergence of specific, stable patterns of coordination (i.e., in-phase and anti-phase synchrony[2]). Importantly, an expansive literature has confirmed this account (for overviews see Oullier & Kelso, 2009; Schmidt & Richardson, 2008). People spontaneously and unintentionally align their actions with others in precisely the manner predicted by these models (Schmidt & O'Brien, 1997). Furthermore, research exploring the consequences of synchrony reveals that this form of coordination results in increased liking and rapport (Hove & Risen, 2009), blurs self-other boundaries (Miles, Nind, Henderson, & Macrae, 2010; Paladino, Mazzurega, Pavani, & Schubert, 2010), facilitates person perception (Macrae, Duffy, Miles, & Lawrence, 2008), and enhances altruistic behavior and cooperation (Valdesolo & DeSteno, 2011; Wiltermuth & Heath, 2009). In short, synchronous activity promotes sociality (Marsh, Richardson, & Schmidt, 2009).

Where researchers have considered the converse relationship (i.e., the impact of social factors on the emergence of synchrony) comparable effects have emerged. For instance, Néda, Ravasz, Brechet, Vicsek, and

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[1] However, see Strogatz, Abrams, McRobie, Eckhardt, and Ott (2005) for one (potentially calamitous) example of pedestrian synchrony.

[2] In-phase synchrony (i.e., a 0° relative phase relationship) occurs when the actions of each individual are simultaneously at equivalent points of the movement cycle, while anti-phase synchrony (i.e., a 180° relative phase relationship) occurs when such actions are simultaneously at opposite points of the cycle.

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Brarbási (2000) reported that audiences spontaneously synchronized their applause in appreciation of fine performances. Moreover, in a laboratory context the introduction of an arbitrary participant-confederate difference led to enhanced levels of synchrony as a means to reduce perceived social distance (Miles, Lumsden, Richardson, & Macrae, 2011). In contrast, participants who experienced antipathy after being made to wait for a tardy confederate synchronized less on a subsequent movement task than those who endured no such delay (Miles, Griffiths, Richardson, & Macrae, 2010). These examples highlight that the dynamics underlying the emergence of synchrony are not impenetrable to (social) psychological influences. Indeed, Néda et al. (2000) speculated that cultural factors (e.g., group homogeneity) may shape synchronization, while close inspection of our own data (e.g., Miles, Griffiths, Richardson, & Macrae, 2010; Miles et al., 2011; Richardson et al., 2005) reveals considerable variation in the degree to which individuals synchronize.[3] So what may give rise to such individual-level variability?

Social value orientation

In an impressive body of work, social value orientation (SVO; McClintock, 1972) has been identified as a fundamental determinant of people's goals in interpersonal contexts (see Balliet, Parks, & Joireman, 2009; Bogaert, Boone, & Declerk, 2008; Van Lange, 1999, 2000). Developed to extend models of behavior based solely on notions of rational self-interest, the construct of SVO describes stable individual differences in preferences for patterns of interdependent outcomes during social exchange. Three primary orientations exist: (i) *pro-social*, whereby individuals are motivated to cooperate in order to achieve maximum outcome equality for themselves and interaction partners; (ii) *individualist*, whereby maximum outcomes for self are sought with little or no consideration of outcomes for others; and (iii) *competitive*, whereby outcomes for self are maximized relative to outcomes for others. In practice, individualists and competitors are frequently combined into a single *pro-self* category, as both orientations look to maximize their own outcomes in either absolute (individualists) or relative (competitors) terms. We adopted this convention in the current work.

Social value orientation has proven to be a powerful predictor of social behavior — pro-social individuals cooperate in mixed-motive economic games (Balliet et al., 2009), donate to charity (Van Lange, Bekkers, Schuyt, & Van Vugt, 2007), volunteer (McClintock & Allison, 1989), and use public transport (Van Vugt, Meertens, & Van Lange, 1995) more frequently than their pro-self counterparts. This propensity towards cooperation and sociality provides an important link to interpersonal synchrony. Following periods of temporal coordination, people act more cooperatively (Kirschner & Tomasello, 2010; Wiltermuth & Heath, 2009), are more able to cooperate (Valdesolo, Ouyang, & DeSteno, 2010), become more agreeable (Wiltermuth, 2011) and engage in more altruistic deeds (Valdesolo & DeSteno, 2011). Could it therefore be the case that cooperation is not only a beneficial consequence of synchrony, but also a predictor of its emergence?

Study 1

Coordination dynamics present synchrony per se as a cooperative phenomenon (i.e., involving the interaction of multiple elements of a system). Perhaps the tendency towards cooperation on the part of pro-social individuals can be appreciated not only with respect to psychological-level outcomes (e.g., pro-social behavior) but also in terms of a more general understanding of lawful, self-organizing systems. We explored this possibility by examining the spontaneous emergence of interpersonal synchrony as a function of SVO. Drawing from the extant literature, we anticipate pro-social oriented participants to synchronize their movements with those of a confederate to greater extent than those with a pro-self orientation.

Method

Participants and design

Seventy female undergraduates (mean age 20.3 years) took part in the study in exchange for course credit. The study had a single factor (SVO: pro-social vs. pro-self) between-participant design and was approved by the School of Psychology, University of Aberdeen ethics committee.

Procedure and materials

Participants arrived at the laboratory individually and were initially asked to complete the 9-item triple-dominance measure of SVO (see Van Lange, 1999). This scale has robust psychometric properties, is a valid predictor of SVO-linked behavior (Bogaert et al., 2008) and importantly is not influenced by social desirability (Platow, 1994). The task itself consists of a series of decomposed games in which participants must allocate 'points' to themselves and a hypothetical other. For instance, participants might be asked to choose between alternatives corresponding to a pro-social orientation (e.g., 480 points for self and 480 points for other), an individualist orientation (e.g., 540 points for self and 280 for other) or a competitive orientation (e.g., 480 points for self and 80 points for other). Participants are classified according to their SVO if they make at least 6 of the 9 choices consistent with one orientation. In line with previous work (see Au & Kwong, 2004), 17 participants could not be classified on the basis of 6 consistent choices and were therefore excluded.

Next, allegedly as preparation for a subsequent part of the study, the remaining 53 participants were asked to perform some light activity in the form of repetitive arm curls (i.e., arm extension/flexion) while holding a wooden rod (5 cm diameter, 60 cm long). Arm movements were recorded at 120 Hz using a magnetic motion tracking system (Polhemus Liberty, Polhemus Corporation, Colchester, VT) with a sensor attached to the end of the rod. The experimenter demonstrated the activity before asking the participant to perform the movement in time with an electronic metronome (1.4 Hz) for 60 s. At this point, the participant was corrected if she did not perform the arm curls correctly (i.e., limited range of movement, not keeping time with the metronome). Participants were then required to perform arm curls without the accompanying metronome for an additional 60 s. This served as the 'baseline' stage of the task and was included to measure any differences in chance coordination (see Data reduction for further details).

In the next phase, participants were informed that they would repeat the arm curl exercise for a further 3 min while simultaneously viewing another participant, via a live video-link, who was taking part in the same study in an adjacent laboratory. In reality, the video-link was a pre-recorded video of a 24-year-old female confederate performing arm curls (1.4 Hz), displayed at approximately life-size using a data projector. The participant was instructed to begin performing arm curls once the other person was visible via the video-link. This period served as the 'interaction' stage of the procedure. Importantly, no instructions were given with regard to coordinating with the other individual, but participants were asked to refrain from directly communicating (e.g., waving, talking) via the video-link.

Finally, participants were asked if they had noticed anything suspicious during the study. No participants suspected that they had been viewing a video recording or that the study was investigating interpersonal synchrony.

[3] For instance, in Miles, Griffiths, Richardson, and Macrae (2010), on average participants in the control (i.e., on-time) condition spent 51% ($SD = 14\%$) of the interaction period synchronized with the confederate, however individual levels of participant-confederate synchrony in this condition ranged from 4% to 97%. Similarly, in the late condition, on average participants spent 24% ($SD = 12\%$) of the interaction synchronized, but this value ranged from 1% to 74% when considered individually.