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Moving attractive virtual agent improves interpersonal coordination stability



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ABSTRACT

Interpersonal motor coordination is influenced not only by biomechanical factors such as coordination pattern, oscillating frequency, and individual differences, but also by psychosocial factor such as likability and social competences. Based on the social stereotype of “what is beautiful is good”, the present study aimed at investigating whether people coordinate differently with physically attractive people compared to less attractive people. 34 participants were engaged in an interpersonal coordination task with different looking (virtual) agents while performing at the same time a reaction time task. Results showed that participants had more stable motor coordination with the moving attractive than with the less attractive agent, and that the difference in motor coordination could not be interpreted by a specific attention allocation strategy. Our findings provide the evidence that physical attractiveness genuinely affects how people interact with another person, and that the temporal-spatial coordinated movement varies with the partner’s psychosocial characteristics. The study broadens the perspective of exploring the effect of additional psychosocial factors on social motor coordination.

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1. Introduction

Motor coordination plays a fundamental role in our daily life. It enables individuals to efficiently synchronize with external environmental events as well as with other people during social interaction. Phenomena of motor coordination encompass for instances hand-clapping (Neda, Ravasz, Brechet, Vicsek, & Barabasi, 2000), two people walking together (van Ulzen, Lamoth, Daffertshofer, Semin, & Beek, 2008), and team sports such as basketball (Esteves et al., 2012).

In social context, our behavior is well coordinated temporally and spatially with the person(s) we are interacting with. Because of the cooperative nature of human relationship, two agents can be viewed as a single dyadic synergy (Schmidt, Carello, & Turvey, 1990). More than three decades' research on interpersonal motor coordination has investigated the movement dynamics between people by adopting the model of the dynamical entrainment of two coupled oscillators. Relative phase, which captures the angular difference between two oscillators as a function of time (Haken, Kelso, & Bunz, 1985; Kelso, Scholz, & Schöner, 1986), summarizes the temporal spatial difference between the interactants' movement. The standard deviation (SD) of relative phase depicts the variability of relative phases around their mean during the interaction process (Haken et al., 1985; Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007). Lower SD of relative phase indicates higher stability of the coordination, and higher SD describes lower stability.

The majority of the studies conducted in the context of the dynamical approach to interpersonal motor coordination have focused on the biomechanical and neuromuscular factors shaping pattern formation. As in the bimanual coordination context, two natural patterns of interpersonal coordination co-exist: in-phase (relative phase = 0°) and anti-phase (relative phase = 180°). In-phase coordination is more stable than anti-phase, and a (between-people) phase transition occurs from anti-phase to in-phase when the oscillating frequency is elevated to a threshold value (Schmidt, Bienvenu, Fitzpatrick, & Amazeen, 1998a; Schmidt et al., 1990). Moreover, when two interacting people share the same preferred frequency, coordination is the most stable, as large difference between two interactants' preferred frequencies is more likely to lead to breakdowns in motor coordination (Richardson et al., 2007; Schmidt, Bienvenu, Fitzpatrick, & Amazeen, 1998b).

As mentioned above, interpersonal motor coordination is influenced by biomechanical factors such as the type of coordination pattern (in-phase or anti-phase) (Schmidt et al., 1990), the oscillating frequency (Schmidt et al., 1990), and individual differences (Richardson et al., 2007; Schmidt et al., 1998b). Psychosocial factors, which are elements seemingly unrelated to biomechanical properties – such as social competence (Schmidt, Christianson, Carello, & Baron, 1994) and social motives (Lumsden, Miles, Richardson, Smith, & Macrae, 2012) – were reported to influence the performance of interpersonal coordination. Schmidt et al. (1994) explored whether social competence exerted any impact on visual interpersonal coordination of rhythmic limb movements. Participants were paired to form three types of combination of social competence: high-high (HH), high-low (HL), and low-low (LL). Results demonstrated that the HL combination produced fewer breakdowns in phase locking than the HH and LL pairs did (Schmidt et al., 1994). Lumsden et al. (2012) explored whether the degree of spontaneous synchronization with others can be modulated by social motives. People with a pro-social orientation showed a higher orientation to synchronize with others compared to the pro-self individuals (Lumsden et al., 2012). These two studies provide evidences that human beings' temporal-spatial coordinated behavior is influenced by psychosocial factors, and that the way we interact with others reflects some of our psychological features.

Interestingly, the relationship between interactants has been broadly reported to affect and to be affected by interpersonal coordination. For instance, higher perceived movement synchrony was found to be associated with higher rapport between teacher and student (Bernieri, 1988). Miles, Nind, and Macrae (2009) demonstrated that the way individuals coordinate with each other reflects their mental connectedness. In their study, participants evaluated the rapport level of two walkers either by looking at a video of two animated walking images or by listening to auditory recordings of walking steps. Results showed that the highest third-party judgment of rapport was obtained when perceiving the most stable forms of interpersonal coordination (i.e., in-phase or anti-phase coordination) (Miles et al., 2009). In another experiment, the same group of researchers indicated that rapport

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