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Emotional Response during Human-Virtual Partner Interaction

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Emotion and coordinated movement complimentarily depicts our social experiences. How is motion colored? This study investigates variations in emotional responses during social coordination. Subjects were instructed to coordinate their finger movement with a Virtual Partner (VP), whose homologous movement was displayed as a video on the computer screen. The partner was driven by the Haken-Kelso-Bunz equations, an empirically validated model that captures behavioral and social coordination. It has been shown that people perceive VP as an intentional human agent. In each of 80 trials, subjects coordinated for 8 sec inphase or antiphase with VP, and then rated the partner's intention (cooperation -VP intend same coordination pattern as human-, or competition) and subjective response to a Turing test of partners' humanness. VP cooperated for half of the time, and could change its intention in the middle of a trial. Skin potential response (SPR) quantified the intensity of emotional responses. After validating the SPR measurements, we compared emotional responses by coordination pattern, cooperative~competitiveness, and humanness attribution. Subjects experienced higher emotional responses when they believed that their partner was human. This was observed both during coordination (ANOVA, $p=0.020$), and during rating ($p=0.012$). Furthermore during the rating period, higher emotional responses were found for cooperative behavior ($p=0.012$), modulated by VP's change of intention and coordination pattern. This study suggests that emotional responses are strongly influenced by features of the partner's behavior associated with humanness, cooperation and change of intention. Implications for mental health (e.g. autism) and design of socially cooperative machines will be discussed.