Metakinesis and the Neuroscience of Dance: Motor Expertise, Implicit Learning, and Average Viewers
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Recent research in both philosophy and neuroscience of dance supports the idea, common among choreographers, dancers, and dance theorists, that kinetic transfer, or metakinesis, is a key mechanism that underwrites the communicative engagement between choreographers, dancers, and dance audiences (Carroll & Seeley, 2013; Calvo-Merino, Glazer, Grèzes, Passingham, and Haggard, 2005; Christensen and Calvo-Merino, 2013; Jola, Abedian-Amiri, Kuppuswamy, Pollick, and Grosbas, 2012; Jola and Grosbas, 2013). This research demonstrates that premotor and somatosensory processing play a critical role in the perception of the goal directed actions and emotions of others in ordinary contexts. The suggestion is that these processes generalize to the more abstract context of dance, or that we come to understand the content of a dance by using our own bodies to model the movement qualities and expressive content of the dancer’s actions.

The current rapprochement between dance theory, philosophy of art, and neuroscience is promising. However, there are two significant difficulties for the way theorists in each of these fields have interpreted the relevant imaging studies. The original imaging studies demonstrating a role for sensorimotor processing in the perception of dance were motor expertise studies. This research demonstrated heightened activation in motor and somatosensory areas in professional dancers during the observation of movements that were in their professional repertoire and movements that they were visually familiar with from rehearsals. Critically, the later was the case despite the fact that the observed movements were not in their movement repertoire. The trouble in this case is that these effects were not observed in non-dancer controls, perceivers who had no dance related motor expertise (Calvo-Merino et al, 2005; Calvo-Merino, Grèzes, Glaser, Passingham, and Haggard, 2006). This makes sense. The power of kinetic transfer emerges from the fact that we are habituated to the purposive and expressive qualities of ordinary movements by virtue of their roles in the everyday activities associated with our shared apical and instrumental goals as social animals. Dance, on the other hand, often depends on abstract movement languages that are divorced from these everyday activities. This raises a question. How do non-dancer, non-expert members of dance audiences bootstrap their way to an embodied understanding of the kinesthetic, representational, and expressive features of choreographed dance movements. And if so, how.

Human biological motion is highly constrained by our shared anatomical structure. This fact suggests that one ought to find significant commonalities across motor programs for controlling basic movements that can be exploited for action understanding in novel contexts — shared generic motor programs that encode the kinesthetics and dynamics of everyday actions. It has been hypothesized elsewhere that pairing generic motor programs for basic movements with a visual familiarity of stylistic conventions governing different categories of dance might a) suffice to bias perception to sensorimotor cues diagnostic for the kinesthetic and expressive content of particular dance works and b) serve as a means to bootstrap perceptual learning on the fly in novel sensorimotor contexts (Carroll and Seeley, 2013). In the proposed chapter, I sketch an implicit learning model for how naïve dance audiences might bootstrap an embodied sensorimotor understanding of dance works derived from Carroll and Seeley’s suggestion and review a pair of studies that provide preliminary support the proposed model. Corrine Jola and her colleagues have recently demonstrated a positive correlation between visual familiarity and sensorimotor activation in non-expert, non-dancer dance audiences (Jola et al, 2012; Jola and Grosbas, 2014). Barbara Tillman and her colleagues have demonstrated implicit learning of artificial dance grammars in naïve dance audiences (Opacic, Stevens, and Tillman, 2009). The proposed chapter falls most clearly under the dance and perception heading but also has the potential to contribute to the dance and embodiment material.
References:


