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Mirroring in Dance/Movement Therapy: Potential mechanisms behind empathy enhancement

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ABSTRACT

Mirroring, an exercise practiced in Dance/Movement Therapy (DMT), is considered by practitioners and patients to enhance emotional understanding and empathy for others. Mirroring involves imitation by the therapist of movements, emotions, or intentions implied by a client's movement, and is commonly practiced in order to enhance empathy of the therapist for the client. Despite enthusiastic claims for its effectiveness, a clear theoretical framework that would explain the effects of mirroring on empathy has not yet been presented, and empirical research on the topic is generally lacking. In this review, we propose that mirroring in DMT enhances understanding of others' emotional intentions through enhanced use of mirror neuron circuitry. Research on the mirror neuron system (MNS) suggests that the brain areas involved in perception and production of movement overlap, and that these brain areas are also involved in the understanding of movement intention (Rizzolatti & Craighero, 2004). One important route to emotion recognition involves a neural simulation of another person's emotional actions in order to infer the intentions behind those actions, and empathize with them. Future research is proposed in order to systematically explore the effectiveness of mirroring in dance therapy, the neural mechanisms behind it, and its applicability to patient populations who have problems with empathy.

Introduction

It has been hypothesized that unconscious and automatic imitation of another's motor processes, referred to as mimicry, modulates emotional understanding through muscle feedback to the brain (Berrol, 2006; Dimberg & Petterson, 2000; LeDoux, 2003; Levenson, Ekman, & Friesen, 1990; Livingstone, Thompson, & Russo, 2009; Molnar-Szakacs & Overy, 2006). Mirroring, which involves imitating qualities of movement, is an exercise employed in Dance/Movement Therapy (DMT) to enhance emotional understanding between a therapist and client or among members of a group (Adler, 1970; Berrol, 2006; Mills & Daniluk, 2002). DMT is a form of therapy which focuses on movement behavior as it emerges in the therapeutic relationship, in order to promote emotional, cognitive, physical, and social functioning (ADTA, 2010). Mirroring occurs when two people make similar body movements that are coordinated or slightly echoed in time. The therapist may echo the exact movements of a client, or may imitate the quality of the movement; for example, if a client is moving with a slumped posture, the therapist may adopt these movement qualities as well. The DMT is trained in movement analysis, and is able to study a client's movements, and extract and imitate particular movement qualities. At the finest level, the client may be unaware that imitation is occurring, and at its most obvious level, exact movements are imitated or movement themes are exaggerated. The end result is an enhanced degree of somatic and emotional understanding in the therapist for the client. The client may also be encouraged to engage in mirroring for the purpose of enhancing empathy in the client for others. The effects of mirroring on empathy enhancement are considered important by DMT therapists, but have not been extensively researched (Berrol, 2006; Mills & Daniluk, 2002). A critical examination of the underlying mechanisms involved in mirroring and empathy has the potential to provide insights that may be used to enhance the effectiveness of DMT.

Growing research suggests the presence of neural circuitry called the mirror neuron system (MNS) that is activated to a similar extent when an individual performs or simply observes an action (Rizzolatti & Craighero, 2004), leading some researchers to believe that the same processes underlie movement production and perception. This system appears to be sensitive to the intentionality of movement (Rizzolatti, Fogassi, & Gallese, 2001), responding similarly for different movement patterns where the intention is unequivocally the same. The present paper proposes a neuropsychological model, involving motor simulation and the MNS, which can elucidate the benefits of mirroring in DMT on empathy. This model leads into suggestions for future research and possible clinical applications.

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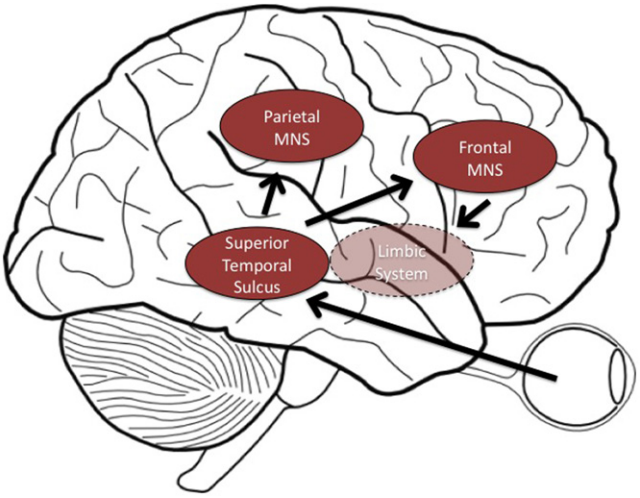

Fig. 1. The human mirror-neuron system. Sensory input is relayed to the premotor cortex and parietal cortex via the superior temporal sulcus. This activity leads to greater activation in the limbic system during observation of and participation in emotional action.

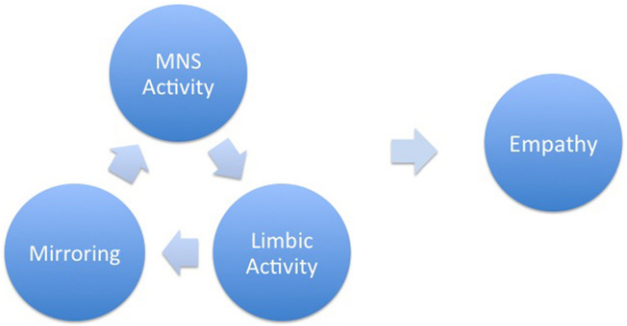

Fig. 2. Schematic figure depicting the proposed relationship between MNS activity, mirroring, limbic activation, and one's capacity for empathy. We suggest that practice engaging in mirroring enhances MNS functioning, which in turn supports greater capacity for empathy.

Empathy, mirroring, and the mirror neuron system

In the present paper, we choose to define empathy using the parsimonious definition of Wispé (1986). Empathy, for our purposes, is a visceral and cognitive understanding of another's emotions or motivations. Empathy allows a person to take another's viewpoint to understand the intentions behind their actions more fully; in other words, "feeling what they feel". Along these lines, Titchener (1909) originally referred to empathy as using "the mind's muscle" as a tool to project oneself onto another in order to understand his or her feelings (Wispé, 1986). Thus, from its conception, empathy has been closely tied to motor mimicry, though research has only recently begun to support this relationship (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003; Dimberg & Petterson, 2000; Livingstone et al., 2009; Riskind & Gotay, 1982).

Recent research postulates that the MNS plays a critical role in this action-simulation process (Rizzolatti & Craighero, 2004). First discovered in single cell recordings of area F5 in the monkey premotor cortex (di Pellegrino, Fadiga, Fogassi, Gallese, & Rizzolatti, 1992; Gallese, Fadiga, Fogassi & Rizzolatti, 1996; Rizzolatti, Fadiga, Gallese, & Fogassi, 1996; for a review see Rizzolatti & Craighero, 2004), numerous neuroimaging studies suggest that a similar system of mirror neurons is present in the human brain, involving the posterior inferior frontal gyrus, adjacent ventral premotor cortex, and the inferior parietal lobule (Buccino et al., 2001; Rizzolatti & Craighero, 2004; see Fig. 1). In monkeys, different movements leading to the same endpoint (e.g., reaching for a glass using a pincer or palm grip) are correlated with similar firing patterns in the same neuron, supporting the assumption that mirror neurons are involved in intention processing (Umilta et al., 2001).

Carr et al. (2003) assert that the neural correlates of empathy can be found in activation patterns of human mirror neurons. In their study, human participants either observed or imitated an emotional facial expression while brain activation was measured using functional Magnetic Resonance Imaging (fMRI). Observation and imitation of emotion activated corresponding brain networks involving the MNS, as well as areas associated with emotion, such as the insula and amygdala. In a related study, Wicker et al. (2003) found that the insula and amygdala were activated to a greater extent when participants smelled a pleasant or disgusting scent compared to a neutral scent. The same pattern of activation was seen when participants viewed someone else smelling the same scents. Carr et al. (2003) hypothesized that in order to understand the intention behind another's emotional actions we need to create a representation of that action within our own brain, as it would be created if we were engaging in the experience ourselves. This generation of emotional action presumably causes feedback via the MNS to the limbic system, a primitive belt-like structure that forms the inner border of the cortex, including the amygdala and other areas involved in processing and regulating emotions (LeDoux, 1992; LeDoux & Phelps, 1993).

DMT therapists engage in a mirroring process with their clients, sometimes mirroring or echoing exact movements, and at other times echoing qualities of movements that reflect their emotional tones. For example, two people might walk using the same steps, but one may engage in stiffer movements while the other's may be more fluid, reflecting more anxious or relaxed emotional states. In a DMT session, the therapist mirrors the quality of a client's movements in order to relate to the client and open an empathic dialogue. The therapist is trained to pay attention to the client' movements on a very subtle level. Mirroring can also take the form of mimicking the intentions behind one's movements, as when a therapist mirrors a posture or general emotional quality behind a set of movements, rather than exact motor movements themselves. It seems feasible that both types of mirroring in DMT may lead to shared activation in MNS networks between a therapist and client, and be responsible for reported enhancement of emotional connections following a DMT session (Berrol, 2006; Mills & Daniluk, 2002). As depicted in Fig. 2, we propose that practice engaging in mirroring leads to enhanced MNS functioning in the person mirroring, as well as in the mirrored individual. In turn, MNS activity during the observation or execution of emotional movement will enhance activation in the limbic system, leading to a greater empathic response.

A body-movement feedback system

The facial feedback hypothesis states that generation of an emotional facial expression can lead to a visceral experience of the emotion associated with that expression (Zajonc, Murphy, & Inglehart, 1989). While most research and discussion of this hypothesis has involved facial musculature (Dimberg & Petterson, 2000; Levenson et al., 1990; McIntosh, 1996; Zajonc et al., 1989), Riskind and Gotay (1982) demonstrated that embodying postures can also influence emotion. Researchers have suggested that this process occurs through feedback from motor areas in the brain to emotion areas, influencing our experience of the expressed emotion (LeDoux, 2003; Levenson et al., 1990). During motor simulation, we re-create another person's emotional movements in similar motor areas of our own brain (Dimberg & Petterson, 2000). This process allows us to project how we feel during execution of a simulated movement onto the person being simulated, allow-