“Atypical touch perception in MTS may derive from an abnormally plastic self-representation”

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Abstract: Mirror Touch Synesthetes (MTSs) feel touch while they observe others being touched. According to the authors, two complementary theoretical frameworks, the Threshold Theory and the Self-Other Theory, explain Mirror Touch Synesthesia (MTS). Based on the behavioral evidence that in MTSs the mere observation of touch is sufficient to elicit self-other merging (i.e., self-representation changes), a condition that in non-MTSs just elicits self-other sharing (i.e., mirroring activity without self-other blurring), and on the rTPJ anatomical alterations in MTS, we argue that MTS may derive from an abnormally plastic self-representation and atypical multisensory integrative mechanisms.

COMMENTARY

Ward and Banissy (2015) provided a comprehensive review of recent literature concerning Mirror Touch Synesthesia (MTS), i.e., the feeling of touch on one’s own body while observing others being touched (Banissy & Ward, 2007).

The authors explain MTS according to two complementary theoretical frameworks: (1) Threshold Theory, which posits that a specific hyperactivation of the mirror system for touch leads MT synesthetes (MTSs) to the conscious feeling of being touched; (2) Self-Other Theory, which posits that MTS relies on alterations in the ability to distinguish the self from others. More specifically, Ward and Banissy suggest that self-other distinction might act as a gating mechanism for neural activity within the mirror system for touch, and an atypical self-other representation in synesthetes may amplify their vicarious responses to observed touch.

Interestingly, the authors’ interpretation may explain the range of atypical behavioral (extending to domains other than touch perception, such as empathic and emotion recognition abilities) and neural phenomena occurring in MTS. However, based on the evidence that MTSs experience self-other merging in conditions where non-MTSs experience just self-other sharing, we argue that abnormally plastic self-representation may underlie MTS.

As a matter of fact, mere observation of touch elicits in non-MTSs self-other sharing, i.e., resonant activity in neural structures (e.g., somatosensory and insular cortices) involved in the first person experience of sensory and affective qualities of touch (Bufalari & Ionta, 2013; Keysers et al., 2010), which might sub-serve the understanding of others’ sensory and emotional states (Preston & De Waal, 2002). Also, observation of a facial tactile stimulus spatio-temporally congruent with the felt touch (Interpersonal Multisensory Stimulation; IMS) induces in non-synesthetes self-other merging, i.e., alters the ability to discriminate self from other face (Sforza, Bufalari, Haggard, & Aglioti, 2010; Tsakiris, 2008). Multisensory temporal congruency makes it possible to build and maintain a coherent representation of one’s own body (a person’s mirror reflection, for example, moves/is touched at the exact time when he/she moves/feels touch; Rochat, 2003).

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During synchronous IMS the felt touch is surprisingly mirrored in compatible visual events on another’s face presented in front. Since participants cannot move and thus prove themselves the observed face is not their own, the brain attempts to minimize surprise by including facial features of others into the self-face representation (Apps & Tsakiris, 2014; Tajadura-Jiménez, Grehl, & Tsakiris, 2012).

We suggest a basic distinction between self-other sharing and self-other merging mechanisms. More specifically, while the former may allow one to understand the “other” without the risk of self-other misattribution, the latter blurs the distinction between self and others and changes the representation of the self.

This fundamental difference may possibly explain why affective and sensorimotor sharing mechanisms are modulated by both positive and negative interpersonal perception of the observed other (for a review, see Bufalari & Ionta, 2013; Van Baaren, Janssen, Chartrand, & Dijksterhuis, 2009), whereas self-other merging heavily depends on positive (but not on negative) interpersonal perception of the synchronously stimulated other (Bufalari, Lenggenhager, Porciello, Serra-Holmes, & Aglioti, 2014; Sforza et al., 2010). We posit that the absence of the self-other merging with undesirable others may index a strategy for defending the self from the risk of losing individuality derived from merging processes.

Interestingly, in MTS mere observation of touch is sufficient to elicit self-representation changes similar to those induced in non-synesthetes by synchronous IMS (Maister, Banissy, & Tsakiris, 2013). At a neural level, in non-MTSs the right Temporo Parietal Junction (rTPJ) responds as a “function of the extent to which, self or other, perspectives are being processed” during facial IMS (Apps, Tajadura-Jiménez, Sereno, Blanke, & Tsakiris, 2015), possibly by detecting the conflict between tactile afferents and visual signals that, although temporally and spatially congruent with self-percept, instead originate from another person’s face (Bufalari, Porciello, Sperduti, & Minio-Paluello, 2014). Intriguingly, rTPJ show less gray volume in MTS population relative to non-synesthetes (Holle, Banissy, & Ward, 2013), a difference that may cause defective self-other control mechanisms (i.e., inability to determine “who” is the subject of touch), and consequent atypical somatosensory activations to touch observation. Thus, developmental MTSs may experience much more frequently than non-MTSs self-other merging and consequent changes in self-representation in conditions that in non-MTSs simply elicit self-other sharing.

All in all, we suggest that atypical touch perception in MTS may derive from an abnormally plastic self-representation (as revealed by self-other merging phenomena). Such suggestion brings us to several testable hypotheses. For example, if MTSs show aberrant multisensory integrative mechanisms relevant for building self-representations, self-other merging in MTSs may not only be elicited by observing touch but also by different types of interpersonal visuo-sensorimotor congruency (without touch being involved). Moreover, it would be interesting to test the “abnormal” malleability of self-representation in MTS people by investigating whether they show the same self-defensive strategies that controls use to prevent self-other merging with undesirable others.

REFERENCES


