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## Reading the Mind in the Touch: Neurophysiological Specificity in the Communication of Emotions by Touch

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### ABSTRACT

Touch is central to interpersonal interactions. Touch conveys specific emotions about the touch provider, but it is not clear whether this is a purely socially learned function or whether it has neurophysiological specificity. In two experiments with healthy participants (N = 76 and 58) and one neuropsychological single case study, we investigated whether a type of touch characterised by peripheral and central neurophysiological specificity, namely the C tactile (CT) system, can communicate specific emotions and mental states. We examined the specificity of emotions elicited by touch delivered at CT-optimal (3cm/s) and CT-suboptimal (18cm/s) velocities (Experiment 1) at different body sites which contain (forearm) vs. do not contain (palm of the hand) CT fibres (Experiment 2). Blindfolded participants were touched without any contextual cues, and were asked to identify the touch provider's emotion and intention. Overall, CT-optimal touch (slow, gentle touch on the forearm) was significantly more likely than other types of touch to convey arousal, lust or desire. Affiliative emotions such as love and related intentions such as social support were instead reliably elicited by gentle touch, irrespective of CT-optimality, suggesting that other top-down factors contribute to these aspects of tactile social communication. To explore the neural basis of this communication, we also tested this paradigm in a stroke patient with right perisylvian damage, including the posterior insular cortex, which is considered as the primary cortical target of CT afferents, but excluding temporal cortex involvement that has been linked to more affiliative aspects of CT-optimal touch. His performance suggested an impairment in 'reading' emotions based on CT-optimal touch. Taken together, our results suggest that the CT system can add specificity to emotional and social communication, particularly with regards to feelings of

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