Editorial Manager(tm) for Behavioral and Brain Sciences
Manuscript Draft

Manuscript Number:

Title: Could embodied simulation be a by-product of emotion perception? Commentary on Niedenthal, Mermillod, Maringer & Hess BBS target article, "The Simulation of Smiles (SIMS) Model: Embodied Simulation and the Meaning of Facial Expression."

Short Title: Could embodied simulation be a by-product of emotion perception?

Article Type: Commentary Article

Corresponding Author: Dr. Julian Daniel Kiverstein, Ph.D

Corresponding Author's Institution: University of Edinburgh

First Author: Julian Daniel Kiverstein, Ph.D

Order of Authors: Julian Daniel Kiverstein, Ph.D; Edoardo Zamuner, PhD

Abstract: The SIMS model claims that it is by means of an embodied simulation that we determine the meaning of an observed smile. This suggests that crucial interpretative work is done in the mapping that takes us from a perceived smile to the activation of one's own facial musculature. How is this mapping achieved? Might it depend upon a prior interpretation arrived at on the basis of perceptual and contextual information?

Target Article: Niedenthal, Mermillod, Maringer & Hess BBS target article, "The Simulation of Smiles (SIMS) Model: Embodied Simulation and the Meaning of Facial Expression."

Word counts
Abstract: 70 words
Main Text: 960 words
References: 69 words
Entire Text: 1196 words

Title: Could embodied simulation be a by-product of emotion perception?

Julian Kiverstein
University of Edinburgh
School of Philosophy, Psychology and Language Sciences
Dugald Stewart Building
3 Charles Street
Edinburgh, Scotland, EH8 7PU

Telephone: +44 (0)131 651 6333
E-mail: j.kiverstein@ed.ac.uk

Edoardo Zamuner
LaTrobe University
Department of Philosophy
Victoria 3086
Australia

Telephone: +61 3 9479 2453
E-mail: e.zamuner@latrobe.edu.au

Abstract

The SIMS model claims that it is by means of an embodied simulation that we determine the meaning of an observed smile. This suggests that crucial interpretative work is done in the mapping that takes us from a perceived smile to the activation of one's own facial musculature. How is this mapping achieved? Might it depend upon a prior interpretation arrived at on the basis of perceptual and contextual information?

Main Text

Smiles can be used to communicate a range of different psychological phenomena including positive emotions, complex social intentions, and even a person's social status. Given this diversity of possible meanings, how do we succeed on a given occasion in working what a particular smile means? To do so we must single out which of these many nuanced psychological phenomena the smile expresses. Niedenthal and colleagues say we solve this problem in part by "simulating" the nuanced states that we observe in others. We agree that embodied simulation may make an important contribution to the type of understanding we have of a smile. However the exact nature of this contribution seems to us to remain an open question. In the spirit of friendly critics it is this question we will take up in our commentary.

The SIMs model claims that we work out what a smile means in three interrelated stages. Given the work that motor mimicry and its effects is being asked to do in the determination of a smile's meaning, something important is clearly happening in the transition from perception at stage 1 to motor mimicry or action at stage 2. There are a number of possible affective states the smile you are producing might be expressing, but when I copy your facial expression this results in me expressing the very same affective state. Thus the process that allows me to map the perception of your behaviour onto the activation of my own facial musculature must somehow be singling out the meaning of the smile I am seeing. We don't wish to deny that this might be possible, but the SIMS model, so far as we can tell, doesn't tell us how this mapping is supposed to be effected.

The authors appeal to eye contact to explain how an embodied simulation gets triggered. Hence they clearly think that at least sometimes the embodied simulation is sufficient for us to arrive at an interpretation of a smile. Supposing this is so, this makes it all the more urgent to know how the problem of determining what a smile means is solved by producing an embodied simulation. In order for me to mimic a smile that is affiliative mustn't I have already some how worked out that the smile is affiliative? If so, how?

Consider now cases in which facial mimicry is blocked or socially inhibited (ms, p.38-43). The absence of motor mimicry has the consequence that "activation of motor systems

and emotion systems will be absent". Hence if recognition is achieved it must be some other means than embodied simulation. Niedenthal and colleagues suggest this could be achieved by matching visual input to a stored perceptual representation. If we sometimes have recourse to this strategy, why don't we always use this strategy? Niedenthal et al go on to allow that embodied simulation could still occur in this scenario, but it would have to be triggered by the use of conceptual knowledge since it does not arise from eye contact. However if an interpretation of a smile has already somehow been achieved by matching visual input to a perceptual representation, what work is left for the embodied simulation to do?

Furthermore how is the perceptual representation selected that is used to give meaning to the visual input? Niedenthal et al have endorsed an embodied or grounded account of perceptual processing. Thus when they talk about conceptual knowledge triggering an embodied simulation, they must mean some reactivated multi-modal representation is what triggers an embodied simulation. However they don't explain how visual input leads to the reactivation of the specific multi-modal representations that provide us with the interpretation of a smile. Once again an appeal is made to a mapping from visual input but this time to a multimodal representation, and it is by means of this mapping that we come to assign a meaning to a smile. However there is no account given of the mechanisms that might bring about such a mapping.

Could it be that the problem of interpreting the smile is already settled at stage 1 in perception, and this perceptual interpretation is what subsequently causes motor mimicry and its associated effects? Consider a parallel problem of determining the goal of an instrumental action. Csibra (2007) has argued that prior to an embodied simulation of an instrumental action is a stage of processing in which a visual analysis is formed of an action and the context in which the action is taking place. He hypothesises that it is on the basis of this visual analysis that the goal of the action is determined. Perhaps a comparable visual analysis takes place in the case of smiles in which contextual information is combined with information gathered from complex visual cues to arrive at an interpretation of a smile's meaning.

This is not to say that embodied simulation makes no contribution to our understanding of expressive behaviour. It might make it possible for us to respond to a smile warmly and share in the emotion the smile expresses. In the absence of an embodied simulation our response to and understanding of an emotion is by comparison "pale, colourless and destitute" to paraphrase William James. The Hennenlotter et al 2009 study (cited by the authors in §3.22.) would seem to provide some support for this suggestion. Subjects prevented from mimicking expressions of sadness and anger by means of a

BOTOX injection exhibited less limbic system activation than controls. Thus mimicry certainly plays a causal role in generating emotion and that may, in turn, affect the character of a person's affective understanding. What remains unclear however is whether we understand smiles by sharing another's feelings, or whether we can share in another's feeling only because we have already understood the meaning behind their smile.

References

Csibra, G. (2007). Action mirroring and action interpretation: An alternative account. P. Haggard, Y. Rossetti, & M. Kawato (Eds) The Sensorimotor Foundations of Higher Cognition. Attention and Performance XXII. Oxford: Oxford University Press

Hennenlotter, A., Schroeder, U., Erhard, P., Catrop, F., Haslinger, B., Stoecker, D., Lange, K.W., & Ceballos-Baumann, A. O. (2005). A common neural basis for receptive and expressive communication of pleasant facial affect. Neuroimage, 26, 58