Commentary

PAIN

AQ:5 # Interactive process of facial communication of pain

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Facial expression is a fundamental channel for communication and is well recognized as a critical element regulating social interactions and interpersonal relationships. In the context of pain, we know that there are subsets of facial movements that occur reliably when individuals are experiencing pain. Although facial expressions of pain are to some degree reflexive, people are able to regulate (eg, inhibit and exaggerate) them to adjust to the situational and social context in which they unfold.[2] When trying to understand how, when, and why social context shapes the facial expression of pain, it is important to not only focus on the facial expression of the person experiencing pain but also to recognize that the facial communication of pain is a complex, highly dynamic, and interactive process. This process might start with a person experiencing pain (pain recipient) and AQ:3 communicating this directly through the face to his/her social interaction partner. Observing this facial expression of pain, the social interaction partner, in turn, is likely to show facial expressions of pain, due to facial mimicry and empathy.[6,8] To close this circle of communication, these facial expressions of pain displayed by the interaction partner are likely to affect, in [F1] turn, the facial expression of the pain recipient (**Fig. 1**). In this interaction between pain recipient and interaction partner, it is possible that the facial expression of the interaction partner may precede or follow the facial expression of the pain recipient. Thus, the facial expression of the interaction partner may serve as a social model (observational learning), a socially conditioned stimulus (classical conditioning learning), or a social reinforcer (operant conditioning learning). This opens the interaction up to all kinds of mutual modifications by social learning (**Fig. 1**) and makes it adaptive as well as flexible.

To date, research has largely ignored this interactive aspect of facial pain communication and focused exclusively on the individual expressing pain or on the observer who is responding to the facial display of pain. The study by Gagnon et al. ([1]this issue of PAIN) is noteworthy for attempting to capture the complete interactive process of nonverbal communication of pain through facial expressions. They investigated the process of facial communication of pain in couples, when one partner underwent an experimental heat pain task while the other partner observed the pain application. During the painful stimulations, the faces of both partners were filmed and were later analyzed using the Facial Action Coding System (FACS). Given the very time-consuming nature of FACS coding, it is impressive that the authors studied 131 couples (262 participants), with 66 of these couples including 1 partner suffering from chronic pain. To better understand the mechanisms affecting the facial communication of pain in couples, the authors also assessed sex, relationship quality, and pain catastrophizing.

Interestingly, the best predictor of the facial expression of pain was the partner's facial expression. This was true both for predicting the facial expression of the pain recipient as well as for predicting the facial expression of the interaction partner. In other words, the stronger a partner facially expresses his/her pain, the stronger is the facial response of the observing partner, and potentially vice versa. By contrast, none of the other predictors (chronic pain, sex, relationship quality, and pain catastrophizing) came close to the explanatory strength of the "partner's facial expression."

An important next step is to identify the learning mechanisms (**Fig. 1**), that explain covariation in the facial expression of pain in such couples, which is likely not present in pairs of individuals not knowing each other for a long time.

Another interesting finding relates to sex differences in the facial expression of pain. Although previous studies found contradictory findings, with most studies finding no sex differences in facial expressions of pain,[5] Gagnon et al. report that female pain recipients were facially more expressive than male partners. Thus, women might not facially express pain more strongly in general but only do so in a couple's context. This would be in line with previous findings that women adjust their facial expression of pain more to the social context in which they unfold than men do.[4]

In conclusion, the study by Gagnon et al.[1] points out how important it is to investigate the facial communication of pain not only in a rather solitary laboratory setting but also in more ecologically valid social contexts, which promotes nonverbal interactions.[3] We know that the facial communication of pain is a critical factor in regulating social interactions and interpersonal relationships as well as regulating–through facial feedback mechanisms–the emotional experience of the sender himself or herself. In addition, facial expression plays an important role in pain assessment of nonverbal individuals.[7] To better understand and make better use of facial expressions of pain, we need more studies that try to capture the complete, interactive nature of facial communication of pain. Furthermore, research needs to disentangle the learning mechanisms by which the pain recipient and her/his interaction partner synchronize their facial expressions in the course of their relationships. This synchronization of facial expressions of pain could lead to a fine-tuned communication between partners that might stabilize the relationship, or at

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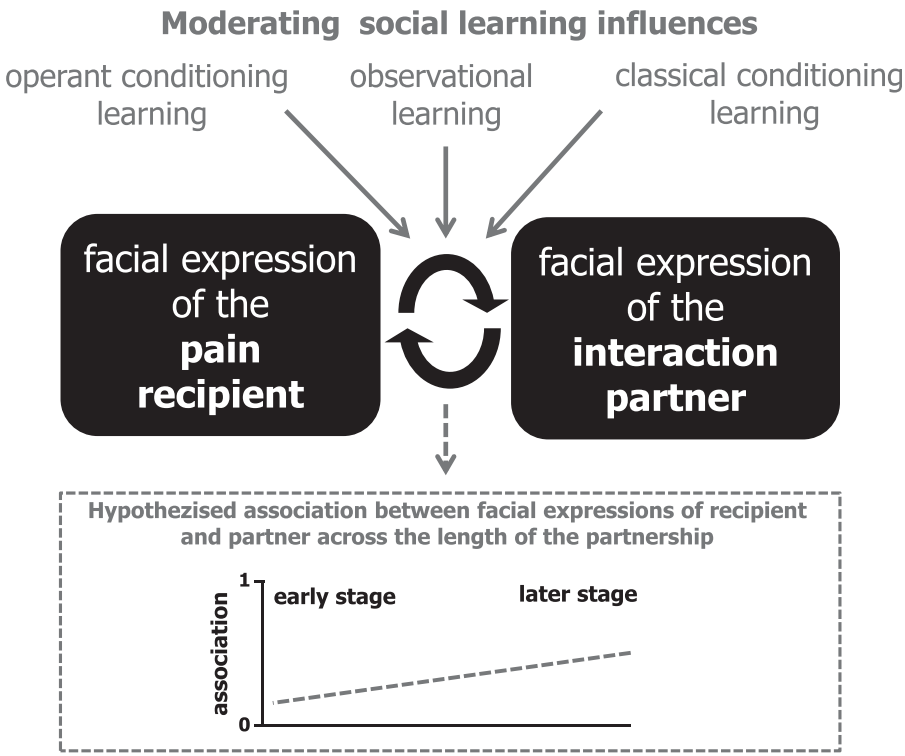

Figure 1. Model of facial pain communication between pain recipient and interactive partner, considering the modulation by learning mechanisms and its development over time.

worst might result in maladaptive social interactions that contribute to the maintenance of pain.

Conflict of interest statement

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References

[1] Gagnon MM, Hadjistavropoulos T, Ying C. Contextual influences on pain communication in couples with and without a partner with chronic pain. AQ:4 PAIN 2017.
[2] Hadjistavropoulos T, Craig KD, Duck S, Cano A, Goubert L, Jackson PL, Mogil JS, Rainville P, Sullivan MJ, de C Williams AC, Vervoort T, Fitzgerald TD. A biopsychosocial formulation of pain communication. Psychol Bull 2011;137:910–39.
[3] Hess U, Banse R, Kappas A. The intensity of facial expression is determined by underlying affective state and social situation. J Pers Social Psychol 1995;69:280.
[4] Karmann AJ, Lautenbacher S, Bauer F, Kunz M. The influence of communicative relations on facial responses to pain: does it matter who is watching? Pain Res Manag 2014;19:15–22.
[5] Kunz M, Gruber A, Lautenbacher S. Sex differences in facial encoding of pain. J Pain 2006;7:9–928.
[6] Lamm C, Porges EC, Cacioppo JT, Decety J. Perspective taking is associated with specific facial responses during empathy for pain. Brain Res 2008;1227:153–61.
[7] Lautenbacher S, Kunz M. Facial pain expression in dementia: a review of the experimental and clinical evidence. Curr Alzheimer Res 2017;14: 501–5.
[8] Sun YB, Wang YZ, Wang JY, Luo F. Emotional mimicry signals pain empathy as evidenced by facial electromyography. Sci Rep 2015;5: srep16988.