BEHAVIORAL AND BRAIN SCIENCES (2002) **25,** 461–462

Pain facial expression: Individual variability undermines the specific adaptationist account

Christine R. Harris and Nancy Alvarado
Center for Brain and Cognition, University of California, San Diego, La Jolla, CA 92093-0109. **charris@psy.ucsd.edu alvarado@psy.ucsd.edu**
http://psy.ucsd.edu/%7Echarris/
http://www.csupomona.edu/~nalvarado/

Abstract: The proposal that there are specific adaptations for the expression and detection of pain appears premature on both conceptual and empirical grounds. We discuss criteria for the validation of a pain facial expression. We also describe recent findings from our lab on coping styles and pain expression, which illustrate the importance of considering individual differences when proposing evolutionary explanations.

We applaud Williams' goal that pain be adequately recognized and treated, and her cross-disciplinary synthesis of several literatures. However, there are pitfalls to such an effort, and the fit between her theory and the empirical findings appears questionable.

Williams argues that natural selection shaped specific adaptations for the production and decoding of pain expressions. According to her logic, the inclusive fitness benefit to the sender is the receipt of succor from conspecifics, while the benefit to the observer is awareness of potential dangers. Logically, this would require that the facial expression of pain be clear and distinct from other emotional expressions and that observers be able to reliably detect such expressions. Therefore, pain action units (AUs) must be: (1) co-occurring; (2) evident among some percentage of subjects; (3) elicited by a variety of pain-evoking stimuli; and (4) differentiated from other expressions. Williams does not analyze the most relevant data (frequency, percentages of subjects displaying each AU, co-occurrence of AUs), which are essential in evaluating the robustness of a proposed pain expression. Also problematic is that people are poor at reliably detecting another's pain and do not necessarily rely on the AUs implicated in the proposed pain expression (e.g., nasolabial furrow [AU 11]; Chambers & McGrath 1998, as cited by Williams).

To address these difficulties, Williams proposes selective pressures for the detection of faked pain expressions to prevent "social cheating." As evidence, she points out that physicians with incentives to avoid unnecessarily prescribing analgesics are particularly prone to underestimate pain. This illustrates a general weakness in her theoretical approach, namely, insufficient consideration of other possibilities besides operant behaviorism and evolutionary psychology. It is gratuitous to propose specific adaptations for behaviors that would be expected to emerge from general processes of means–end problem solving (Harris & Pashler 1995). People are alert to cues that are relevant to their goals and interests in many different domains, including activities that only emerged in recent human history and for which no specific adaptations could exist. To achieve their goal of accurate diagnosis, health care professionals must be able to detect misleading pain expression; hence, they will develop strategies for doing so (whether valid or invalid). There is no need to invoke "evolved propensities or inference rules" for detecting pain or the dissimulation of pain to explain this, and such behavior may have little to do with the types of "social contracts" that occurred in the Pleistocene era.

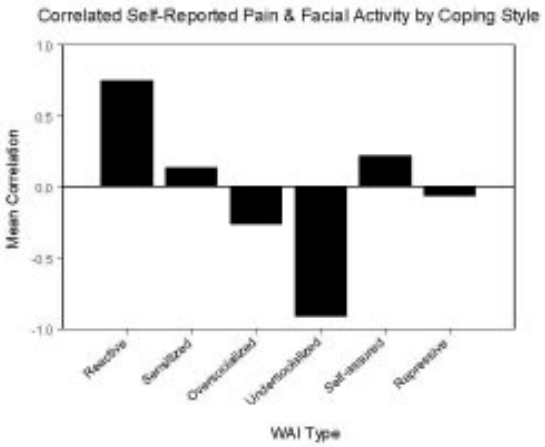

Figure 1 (Harris & Alvarado). Correlated self-reported pain and facial activity by coping style

From Williams' review, the pain expression appears subject to the same complexities as emotional expression. Like emotional expressions (Alvarado & Jameson 2002), pain expressions are reliably decoded only when extreme, and they convey amplitude of experience poorly. Their interpretation varies with context and can be biased by suggestion. Pain expressions are influenced by display rules, and show large individual differences in both production and decoding. As with emotional expressions, the relationship between facial activity, physiological response, and self-report is poorly understood and difficult to demonstrate. These similarities suggest that pain expressions belong to a more generalized phenomenon of facial expressive behavior best studied together with, and in the same manner, as emotional expressions. Such work demands greater rigor than is usually possible in clinical or naturalistic settings.

Williams shows little recognition of the controversies among those studying facial behavior. She claims that the Facial Action Coding System (FACS) cannot be used to record durations, onset or offset times, asymmetries, co-occurrence of AUs, or other subtleties present in dynamic stimuli. Studies by Ekman and Rosenberg (Ekman 1997a; Ekman & Rosenberg 1997) contradict this assertion, as does the FACS manual. Williams overemphasizes the potential impact of posing, deception, anxiety, and embarrassment on the behavior of lab participants. In this, she uncritically accepts arguments raised by critics of Ekman's approach (Russell & Fernandez-Dols 1997), without showing that they matter in the empirical studies reviewed. Such "methodological" criticisms, if valid, work against her argument: An expression so fragile as to be disrupted by subtle lab-induced anomalies cannot have evolved a survival-related meaning sufficiently reliable to be useful in

clinical situations.

What else can be made of the empirical work reviewed in Williams' article? Her proposed pain expression includes "lip corner stretch" (AU 12), better known as a smile in other contexts. Is this a grimace, or help-seeking through ingratiation? If a pain expression communicates to conspecifics, then perhaps it arose not during threat or trauma but as a means of keeping rough-and-tumble play from becoming dangerous. It may signal "stop hurting me," not "help me." Its intensity may reflect the message's urgency, not the amount of pain. Its appearance during other injury may be incidental to this more frequent scenario.

Williams acknowledges that no gold standard exists for measuring pain, and then uses self-report as the measure of accuracy for those judging facial behavior. We suspect the relationship between self-report and expressivity is too complex to be explained by physician bias. In our research, we classified individuals using the Weinberger Adjustment Inventory (WAI) (Weinberger 1990; 1997; Weinberger & Schwartz 1990) and found that the correlation between facial expression and self-report varied with coping style (Alvarado & Harris 2003; Harris & Alvarado 2003). Figure 1 shows the mean correlation by WAI type between scores on the McGill Pain Inventory (sensory scale) and facial activity.

No significant differences in either measure were found across WAI types (ruling out amplification or suppression by type), but correlations between the two varied considerably. This is obscured in many studies, where a low mean correlation typically emerges from the averaging of divergent patterns. Those highest on Weinberger's restraint scale (repressives) showed the least correlation, suggesting idiosyncratic control of facial expression. The over-socialized and undersocialized subjects both showed an inverse correlation, smiling or grimacing while reporting little pain. These findings suggest that facial expression is difficult to interpret without knowing a person's habitual coping style, knowledge normally inaccessible to clinicians. Perhaps an increase in expressivity when others are present results from a switch from emotion-focused or cognitive coping to reliance on social support. These individual differences suggest that clinicians should not consider facial expressions alone a reliable measure of pain, much less use them to determine medication dosages.

ACKNOWLEDGMENT NSF Grant BCS-9983487 and NIMH Grant R01-MH61626 supported this work.