Computer-Animated Faces Pain Scale: Commentary on Fanciullo et al. (2007)

The article by Fanciullo et al. [1], entitled “Development of a new computer method to assess children’s pain,” raises many important issues regarding measurement and implementation problems associated with various self-report faces scales designed to assess pain in children. The authors introduce a computer-based faces scale that enables children to rate their pain on a continuous scale by adjusting the facial expression (shape of mouth and eyes) to indicate their pain intensity.

We agree with the authors’ statements concerning the potential advantages of a computer-based, continuous faces scale, namely sensitivity, patient preference, and computer data acquisition and display. Our experience with such a scale developed in 1997 [2–4] largely supports these assertions.

The authors emphasized a presumed direct correspondence between pain intensity and the amount of curvature of the mouth and diameter of the eyes. However, in doing so, they seem to have ignored a basic rule of psychophysics. They assumed that physically equal changes (intervals) in facial expression are perceptually equal intervals. If that were the case, then Mona Lisa’s smile would be nothing special. Subtle changes in one dimension may be highly meaningful whereas large changes in another dimension may not. For example, a 50% change in the physical curvature of the mouth does not necessarily correspond to a 50% change in the perceived amplitude or meaning of that change. The methods needed to select perceptually equal intervals on any physical dimension are psychophysical methods, as outlined by Hicks et al. [4]. This approach has been well established since the work of Fechner, published in 1860, who demonstrated that variation in mental events could be measured in relation to variation in physical events [5].

Moreover, in the implementation by Fanciullo et al., eye closure is assumed to reflect greater pain. Although eye closure is a typical feature of the pain face in very young infants, children and adults are less likely to fully close their eyes during a painful experience [6]. Thus, the assumption that the degree of eye closure, from fully opened to fully closed, corresponds proportionally with pain intensity, seems problematic. On the other hand, valid facial indices of pain are not used in Fanciullo’s scale, namely brow furrow, mouth stretch, and increasing nasolabial furrow [6,7]. Faces pain scales may be improved by inclusion of validated rather than arbitrarily selected facial expressions of pain.

The authors provide a cogent critique of the Wong-Baker FACES Pain Rating Scale, but then, in the following sentence, make an unwarranted leap in generalizing this critique to other scales that were derived using entirely different methodology: “This confluence of measurement and implementation problems indicates that the Faces Pain Scale, as well as the closely related picture scales described in the works cited here, possess the properties of an ordinal scale.” In fact the Faces Pain Scale [8] and the Faces Pain Scale—Revised [4], in work cited by Fanciullo et al., were explicitly designed and tested using psychophysical methods to provide at least interval-level measurement. Fanciullo et al. thus gloss over important differences between the available faces scales.

In discussion of implementation of computer pain measurement on personal data assistants (PDA, e.g., Palm Pilot) rather than laptop computers, the authors assert “It would be more problematic to display electronic versions of any of the current paper-and-pencil series of faces on such a small screen.” The authors are correct in suggesting that a full linear array of faces cannot be displayed simultaneously on a small PDA screen. An alternative is to show one face at a time, giving the user the option to scroll across faces and select one. A group working in France has implemented such a PDA-based version of the Faces Pain Scale—Revised for use in clinical trials [9]. They showed that a majority of children preferred the PDA over the paper version of the Faces Pain Scale—Revised.

Other electronic, self-report, pain intensity assessment tools that have used a continuous rather than categorical response format with children and adolescents include the e-Ouch [10,11] and the Sydney Animated Facial Expression scale (SAFE; [2–4]). The e-Ouch, designed for children 8 years and older, uses a visual analog scale where the individual rating his/her pain is required to slide a marker on a ruler on a PDA screen from “no pain” to “very much pain”. The SAFE scale, like Fanciullo et al.’s Computer Face Scale,
utilizes a line-drawn facial expression that the individual rating his/her pain can change in a continuous way using scroll buttons or a stylus. Although the SAFE scale was rated by children as being easy to use, Goodenough et al. [2] did not find the SAFE to confer any significant psychometric advantage over nonelectronic measures such as the Faces Pain Scale or the Coloured Analogue Scale.

Do we need a new, improved, computer-based faces pain scale? In our opinion, yes. In a conference session at the 7th International Symposium on Pediatric Pain in 2006 [12], there was discussion of the desirability of creating a new faces scale taking advantage of everything that has been learned about this way of measuring children's pain since the first of these numerous scales [13] were published in the 1980s. The work of Fanciullo et al. is a step in this direction and we hope they will coordinate their efforts with those of the other groups around the world who are working on this topic.

References