A descriptive analysis of the role of co-speech gestures in the representation of information about pain quality

Samantha Rowbotham¹, Alison Wearden¹, Donna Lloyd¹ & Judith Holler¹,².

Correspondence to:
Samantha Rowbotham. School of Psychological Sciences, University of Manchester, Oxford Road, M13 9PL. Telephone: 0161 306 1750.
Email: samantha.rowbotham@manchester.ac.uk

Published in:
Health Psychology Update, Volume 22, Issue 1, Spring 2013

¹ School of Psychological Sciences, University of Manchester, Coupland Building 1, Manchester, M13 9PL, UK
² Max Planck Institute for Psycholinguistics, Wundtlaan 1, 6525 XD, Nijmegen, The Netherlands
Co-speech gestures and pain quality

Abstract

Effective pain communication is essential if adequate treatment and support are to be provided. However, the communication of pain is often problematic and carries the risk of misinterpretation, particularly when communicating about the character or quality of pain. Research indicates that co-speech gestures are frequently produced during pain communication and contain important information about the pain experience (Heath, 2002; Hyden & Peolsson, 2002; Rowbotham et al., 2012); recent work revealed that information about pain quality is most often represented in both speech and gestures together (Rowbotham et al., in press). In the present study, we used qualitative methods to investigate how co-speech gestures interact with speech in the representation of pain quality. The results revealed that when both speech and gestures contained information about pain quality, gestures contributed additional information in two key ways. Firstly, gestures represented more precise information about the same aspects of pain quality as are contained in speech, thus clarifying the verbal message, and secondly, gestures added information about different (and thus entirely new) aspects of pain quality than those contained in speech, providing a fuller overall representation of the pain sensation. This suggests that gestures play an important role in representing information about pain quality and need to be attended to if we are to obtain a fuller and more precise understanding of others’ pain.

Background

Pain is a private and subjective experience, often occurring in the absence of physical signs of injury or damage (e.g. a wound) and even when present, these signs tell very little about the sensation being experienced (Turk & Melzack, 2001). Thus, effective pain communication is essential if sufferers are to receive adequate treatment and support. However, like other internal sensations, pain is difficult to communicate verbally and is often at risk of misinterpretation due to the absence of a shared referent on which to base the description (Craig, 2009; Ehlich, 1985; Ryle, 1949). This problem becomes particularly apparent when attempting to describe the quality of pain (e.g. ‘throbbing’, ‘stabbing’), and pain sufferers frequently report frustration over their inability to convey what their pain feels like using the limited descriptors and analogies available in language (Frank, 1991; Padfield, 2003).

Co-speech gestures, the movements of the hands and arms that are produced spontaneously and ubiquitously alongside speech, semantically interact with speech to convey the intended message of the speaker (Kendon, 1985, 1997, 2004; McNeill, 1985, 1992). In particular, gestures can add unique information that is not contained in speech at all and can clarify ambiguous verbal information (e.g., Holler & Beattie, 2002, 2003a, 2003b; McNeill, 1992).

Qualitative investigations of gesture use during pain communication show that gestures can convey information about pain quality, for example, by rapidly striking the fingertips against the thumb to show ‘tingling’ (Hyden & Peolsson, 2002), or to indicate the sensation of a band tightening around the front of the head in tension headache (Heath, 2002). A recent quantitative study further revealed that information about pain quality was more often
Co-speech gestures and pain quality represented in speech and gesture together than in either modality alone (Rowbotham et al., 2012) but did not explore the semantic function of gestures in these instances, meaning that it is not clear whether gestures merely replicate the spoken information or complement the verbal pain message in some way. Therefore, in the present study we used a descriptive analysis to investigate whether gestures complement the verbal communication of pain quality in ways that could improve the transmission of this information, for example, by contributing additional information about pain quality that is not contained in speech.

Method

Participants

Twenty-eight undergraduate psychology students (23 females; M age=19.14 years, SD=1.08) took part in return for course credit. Twenty-six were right-handed, all were native English speakers, and none had taken part in a similar study or had any language impairments.

Apparatus

Experimental pain apparatus. A pneumatic force controller with a plastic probe of 1cm in diameter was used. A dial on the control box could be turned to adjust the pressure and the apparatus was fitted with an emergency release button.

Numerical Rating Scales (NRS). Participants were given an 11-point numerical rating scale (0=no pain; 10=worst pain), which they were asked to refer to when setting the pressure level on the pain apparatus (see Procedure).

Procedure

All participants provided written informed consent to participate and be video-recorded, and received an instruction sheet and explanation of how to operate the pain apparatus. Participants placed the middle finger of their non-dominant hand on the platform below the probe and gradually increased the pressure by turning the control dial clockwise. Participants’ subjective pain ratings were used to determine the amount of pressure that was applied to the fingernail bed, such that participants were asked to increase the pressure until the pain they experienced in their finger reached what they perceived to be a ‘5’ on the NRS for the practice trial, and a ‘7’ for the main trial. In the main trial, participants kept their finger underneath the probe for a further thirty seconds before releasing the pressure. Following

3 The mid-point on the scale (‘5’) was chosen for the practice trial to allow participants to get an idea of the nature of the pain sensation as well as practice using the apparatus (levels lower than ‘5’ may not necessarily be judged as ‘pain’). The level of ‘7’ was chosen for the main trial because the pressure was applied for 30 seconds and research indicates that ratings increase with prolonged application of painful stimuli (e.g. Stohler & Kowalski, 1999), thus, had we asked participants to apply pressure at the highest end of the scale the pain may have become unbearable during the 30 second period.
this, participants took part in a video-recorded, semi-structured interview about the pain they had experienced in the main trial.

Analysis

Identification of pain quality in speech and gestures. We transcribed the interviews verbatim and segmented the speech into ideation units Butterworth (1975) before identifying all co-speech gestures (movements of the hands and arms that are linked with speech in a temporal and pragmatic or semantic manner and interpretable as part of the speaker’s intended message, McNeill, 1992). We then identified all speech units and gestures that contained information about pain quality (the character of the pain sensation, e.g. throbbing, stinging). A second rater identified all speech units and gestures containing information about pain quality in six randomly selected video files (equating to 21 per cent of data), with values indicating a substantial level of agreement between raters for both speech (92 per cent agreement; k=.832) and gesture (91 per cent agreement, k=.711).

Descriptive analysis of gesture functions in the representation of pain quality. Based on the previous stage of analysis we identified (in the video data) all instances in which the verbal reference to pain quality was accompanied by a gesture that also contained information about pain quality. We then examined each of these instances in detail, making a note of how information about pain quality was represented in speech and gestures and drawing out themes or patterns in the ways in which the two modalities interacted to represent pain quality. Because we were interested in finding out whether gestures can complement the verbal message in any way, we paid particular attention to whether gestures contributed any additional information about pain quality that was not contained in the accompanying speech and whether gestures provided a clearer and more specific representation of pain quality than speech alone. Once all data had been analysed we refined the themes through discussion and checked them against our data.

Results

The analysis revealed various patterns of interaction between gestures and speech, and revealed that gestures complemented speech in two key ways: (1) by providing clarification of the verbal information; and (2) by representing additional information about pain quality that was not in speech at all. There were also instances in which gestures did not appear to add information in an explicit manner but may have served to provide a shared referent for the communication or emphasise the description.

---

4 Ideation units are segments of speech or text that express one semantic idea (e.g. ‘It was a really sharp, stabbing pain’). Ideation units were used to segment speech here because unlike clausal units, ideation units segment speech based on the semantic content such that is the same idea is elaborated across clauses it is kept as a whole unit of meaning rather than being split into segments according to grammatical structure.
**Gestures providing more specific information about the same aspect of pain quality**

In some instances, gestures contained information about the same aspect of pain quality that was contained in speech, but did so in a more specific manner, clarifying the spoken information. For example, in Figure 1 the gesture depicts the pain as a relatively heavy downward pressure (evidenced by the downward movement of the right hand underneath the left), clarifying the verbal component, which represents the pain only as ‘pressure’. This indicates that during the communication of pain quality gestures may function to provide greater clarity of the pain message and prevent misinterpretation.

---

**Figure 1: Example of a gesture containing additional information about the same aspect of pain quality contained in speech**

*Speech:* “it felt like, you could feel the pressure from it”

*Gesture:* left hand held flat with palm facing downwards above the right hand and then brought down onto the back of the right hand, pushing the right hand downwards

---

**Gestures representing information about a different aspect of pain quality**

Another function of gestures was to contribute additional information about pain quality that was not represented in the accompanying speech at all. For example, in Figure 2 the speech provides information about the type of pressure (something heavy pushing down on the hand), while the gesture depicts the sensation as having a throbbing, repetitive element. Although the idea of pressure is still present within the gesture (such that the gesture contains some of the same information as speech), the gesture goes beyond this to add information about an aspect of the sensation that is not contained in speech at all (throb
ing, hammering). Thus, the gesture provides additional information about the overall pain sensation (rather than providing clarification of the aspect of pain quality referred to in speech).
Figure 2: Example of a gesture containing additional information about a different aspect of pain quality to that contained in speech

*Speech:* “it was just like something really like heavy pushing down”

*Gesture:* right hand is clenched into a fist and brought down repeatedly onto the back of the fingers of the left hand

*Gestures not explicitly adding information about pain quality*

The analysis revealed some instances in which gestures and speech contained information about the same aspect of pain quality but gestures did not appear to clarify the spoken information in an explicit manner. For example, in Figure 3 the speech depicts the sensation of something sharp pushing down on the finger and the gesture depicts the idea of something being pushed into the fingernail bed. Thus, the gesture here does not serve to clarify or add to the verbal description of pain quality but instead replicates the quality information in speech.

Figure 3: Example of a gesture containing no additional information about pain quality

*Speech:* “just a kind of sharp, pushing down”

*Gesture:* thumb and forefinger of right hand used to squeeze and press down on the fingernail bed of the middle finger of the left hand

**Discussion**

This study represents a first attempt to examine the semantic interplay between speech and co-speech gestures in the representation of pain quality. Overall, the results revealed that gestures contributed to the representation of pain quality in two key ways: (1) by providing
information about the same aspect as speech but in a more specific manner, thus clarifying the verbal message; and (2) by representing information about different aspects of pain quality than speech, providing a more complete overall representation. The finding that gestures can provide a more specific representation is important as descriptions of pain quality are subject to misinterpretation due to the lack of a shared referent for the communication. Further, the fact that gestures can represent additional information about pain quality that is not in speech at all suggests that if we do not attend to gestures we risk missing potentially important information about the pain experience.

The finding that some gestures contained information about pain quality but did not add to or clarify speech deserves further investigation. It may be that these gestures serve alternative functions within the discourse, such as providing a visible referent to act as a joint focus of attention in the absence of visible signs of pain, to illustrate in a more salient manner the sensation being described, or to add emphasis to the communication. Thus, despite gestures not providing additional semantic information they may nevertheless serve important communicative functions.

The present findings extend those of Rowbotham et al. (2012) by showing that as well as representing unique information about different aspects of the pain experience, for example, location in gesture and intensity in speech, gestures also contribute unique information about the same aspect of the pain experience (i.e. about pain quality). This suggests that in addition to allowing for a fuller pain message overall, co-speech gestures provide a more precise representation of specific aspects of the pain experience. Although the present results focus on pain quality, previous work revealed that other aspects of the pain experience are also represented in both modalities together (Rowbotham et al., 2012); thus, gestures may serve an important function across various aspects of the pain experience.

Within the present study, we only considered the information contained within speech and gestures from the perspective of a trained gesture analyst, and did not investigate whether untrained individuals comprehend this information. Although a substantial body of work suggests that addressees are able to comprehend and use the information in speakers’ gestures (e.g. Beattie & Shovelton, 1999a, 1999b; Hostetter, 2011), no research to date has examined whether this is the case when talking about subjective experiences such as pain. Thus, for the present findings to be applicable within the context of ‘real-life’ pain communication, further research needs to assess whether being aware of speakers’ gestures when describing pain improves the accuracy of understanding others’ pain experiences. Studies investigating this issue have recently been initiated in our laboratory.

The finding that gestures contribute information that both clarifies and adds to the verbal representation of pain quality has important implications for pain communication within medical settings. In particular, a failure to attend to gestures may result in misinterpretation of the verbal description of pain quality or may cause information about other aspects of pain quality to be missed. This will likely have detrimental effects in terms of diagnosis and treatment decisions, as well as the ability of medical professionals to provide sufficient empathy and support to sufferers. As evidence shows that doctors often do not visually attend
to patients during symptom descriptions (e.g. Hartzband & Groopman, 2008; Heath, 1986; Margalit et al., 2006; Ruusuvuori, 2001), our results suggest that health care professionals should be encouraged to attend to both speech and gestures when communicating with patients about pain.

Conclusions

Overall, the present results indicate that gestures contribute to the representation of pain quality by providing a fuller and more precise representation than is provided by speech alone. This suggests that to obtain a more detailed understanding of others’ internal pain sensations and prevent misinterpretation it may be important to attend to gestures during pain communication in both medical and everyday contexts. Future research will build on the present findings by investigating whether untrained observers comprehend this information and whether attending to gestures in addition to speech improves understanding and empathy for pain and prevents misinterpretation of experiences.

Acknowledgements

Samantha Rowbotham would like to thank the Division of Health Psychology for the bursary to attend the 2011 Division of Health Psychology Annual Conference at the University of Southampton. The authors would also like to thank Mr Chris Dancer for building the pressure pain device, Dr Mark Tutton and Ms Anna Chisholm for second coding the data for reliability purposes, and the participants for taking part in this study.

References


New England Journal of Medicine, 358(16), 1656–1658.


