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# Handling pain: The semantic interplay of speech and co-speech hand gestures in the description of pain sensations

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**Abstract**

Pain is a private and subjective experience about which effective communication is vital, particularly in medical settings. Speakers often represent information about pain sensation in both speech and co-speech hand gestures simultaneously, but it is not known whether gestures merely replicate spoken information or complement it in some way. We examined the representational contribution of gestures in a range of consecutive analyses. Firstly, we found that 78% of speech units containing pain sensation were accompanied by gestures, with 53% of these gestures representing pain sensation. Secondly, in 43% of these instances, gestures represented pain sensation information that was not contained in speech, contributing additional, *complementary* information to the pain sensation message. Finally, when applying a specificity analysis, we found that in contrast with research in different domains of talk, gestures did not make the pain sensation information in speech more specific. Rather, they complemented the verbal pain message by representing different aspects of pain sensation, contributing to a fuller representation of pain sensation than speech alone. These findings highlight the importance of gestures in communicating about pain sensation and suggest that this modality provides additional information to supplement and clarify the often ambiguous verbal pain message.


*Keywords:* Co-speech gesture; Gesture–speech redundancy; Pain communication; Pain sensation; Semantic interplay of gesture and speech

## 1. Introduction

### 1.1. Co speech hand gestures

It is well established that co-speech gestures play an important role in face-to-face communication and interact with speech to communicate the intended message of the speaker (Kendon, 1980; Kendon, 2004; Bavelas and Chovil, 2000). Co-speech gestures are thought to emerge from the same underlying mental representation as speech, thus constituting an integral component of human language (McNeill, 1992; McNeill, 2005). They can be defined as the spontaneously produced movements of the hands, arms and other body parts that are closely linked with speech in a temporal fashion and can serve both semantic and pragmatic functions within the discourse (McNeill, 1992). To date, a plethora of research has explored the semantic interplay between gesture and speech in concrete domains of talk (such as spatial descriptions and cartoon narratives), revealing that gestures frequently complement the information contained in speech. However, little is known about how the two modalities semantically interact in the communication of more abstract, perceptual domains, such as pain. Given the importance of effective pain communication within both medical and everyday settings, and the difficulties that pain sufferers face in verbalising their pain experience, we sought to explore the semantic interplay between co-speech gestures (henceforth 'gesture' for brevity) and speech with a focus on whether (and in

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what ways) gestures can complement the verbal pain message.

'Representational' (or topic) gestures (Alibali et al., 2001; Bavelas, 1994; Jacobs and Garnham, 2007) are closely linked to the semantic content of speech and can be used to depict or refer to a range of entities within the real or imagined environment of the speaker (McNeill, 1992). For example, a speaker may use a pointing gesture to indicate the location of an object or use a gesture in which they move their hand in a wide circular motion at hip level to depict the size, shape and height of a table. These gestures allow the speaker to visibly express information in a way that is often not permitted by speech, providing an additional window into the speaker's mind (McNeill, 1992).

A number of studies have investigated the use of representational gestures (primarily 'iconic' gestures, i.e. those which depict concrete events, objects, and entities (McNeill, 1992), with findings indicating that speakers distribute information across gesture and speech. Moreover, these analyses have shown that while the information in gesture and speech often overlaps, gestures can also complement speech by providing additional information that is not contained in speech at all (Kendon, 1980; Kendon, 2004; McNeill, 1992; Holler and Beattie, 2002; Holler and Beattie, 2003; Kendon, 1997; McNeill, 1985; Bavelas et al., 1992; Bavelas et al., 2008; Bavelas et al., 2002; Gerwing and Allison, 2009; Beattie and Shovelton, 1999; Gerwing and Allison, 2011). Further, through providing additional information gestures have been found to disambiguate spoken information, make the verbal meaning more precise, add specificity to the information provided by speech, and exhibit information that is difficult to convey by verbal means alone (McNeill, 1992; Bavelas et al., 2002; Gerwing and Allison, 2009; Bergmann and Kopp, 2006; Emmorey and Casey, 2001; Holler and Beattie, 2003; Kendon, 1985). Finally, it has been shown that the information speakers encode in their gestures is meaningful to recipients and that in trying to understand speakers' messages, recipients benefit significantly from receiving the additional information contained in gesture (Beattie and Shovelton, 1999; Alibali et al., 1997; Beattie and Shovelton, 1999; Cook and Tanenhaus, 2009; Holler et al., 2009; Hostetter, 2011; Graham and Argyle, 1975). However, all of this work has focused on speakers' use of speech and gesture in the communication of rather concrete information, typically cartoon stories or descriptions of spatial patterns and layouts (such as line drawings, dot configurations, shapes and patterns of items of clothing, apartment floor plans, furniture arrangements and so forth). What we still know very little about is how information from speech and gestures combines when communicating about more abstract and perceptual concepts, such as the subjective experience of pain.

### 1.2. Pain communication

Pain is a sensation with which we are all familiar and is one of the most frequently reported symptoms in medical consultations (Loeser and Melzack, 1999). Despite this, the communication of pain presents a challenge within medical and everyday interactions because it is a private, subjective experience, directly accessible only to the sufferer. Pain often occurs in the absence of visible signs of injury (such as a wound), and even when visible signs are present they do not necessarily indicate what the pain feels like to the sufferer and degree of tissue damage does not directly correlate with self-reported pain intensity (Turk and Melzack, 2001). Thus, to make their pain known and receive understanding, treatment and support, sufferers must communicate the characteristics of their pain experience to others.

Although verbal communication about pain is seen as the 'gold standard' within medical settings (Craig, 2009; National Cancer Institute, 2011; Tian et al., 2011), there are a number of problems with a reliance on this modality alone. First, there is no generally established vocabulary for describing non-extrinsic phenomena or sensations such as pain (Ehlich, 1985; Ryle, 1949) and patients frequently report difficulties in finding the words to adequately convey their experience to others (Wagstaff et al., 1985; Frank, 1991; Padfield, 2003); "what pain achieves it achieves in part through its unsharability...its resistance to language" (Scarry, 1985, p.4). Further, the language evoked to describe pain, particularly its sensory or qualitative dimension, is primarily based on analogies relating to external actions or stimuli, e.g. "it is *as if* someone is stabbing me" (Wagstaff et al., 1985; Schott, 2004). As such, these descriptions may not map directly onto the internal sensation, for example, while a 'stabbing' pain may have certain qualities associated with the sensation of being stabbed, it is unlikely that it would directly resemble the experience. Further, this description does not distinguish whether the 'stabbing' sensation is like that of receiving shallow punctures to the skin or of something sharp being driven deep into the body, or that occurs rapidly or more slowly, with more or less force, or with different degrees of repetitiveness.

This leads to the second key difficulty in verbal pain communication, the potential for misunderstanding the experience. It is difficult to unequivocally name sensations within a shared public language because we cannot point to our pain and say "*that* is a stabbing pain" in the way that we can with things in the external world (e.g., "*this* is a table" or "*that* is a chair"). Thus, we cannot be sure that the way we intend for 'stabbing' to be understood matches the understanding of the recipient. This is supported by Salovey et al. (1992) finding that participants named on average ten different pain experiences when asked to indicate which types of pain they thought were best described by a series of adjectives. Treasure (1998) notes that the