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Running head: Gesture comprehension in pain communication

Title: I see how you feel: Recipients obtain additional information from speakers' gestures about pain

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Abstract

Objective: Despite the need for effective pain communication, pain is difficult to verbalise. Co-speech gestures frequently add information about pain that is not contained in the accompanying speech. We explored whether recipients can obtain additional information from gestures about the pain that is being described.

Methods: Participants (n = 135) viewed clips of pain descriptions under one of four conditions: 1) Speech Only; 2) Speech and Gesture; 3) Speech, Gesture and Face; and 4) Speech, Gesture and Face plus Instruction (short presentation explaining the pain information that gestures can depict). Participants provided free-text descriptions of the pain that had been described. Responses were scored for the amount of information obtained from the original clips.

Findings: Participants in the Instruction condition obtained the most information, while those in the Speech Only condition obtained the least (all comparisons $p<.001$).

Conclusions: Gestures produced during pain descriptions provide additional information about pain that recipients are able to pick up without detriment to their uptake of spoken information.

Practice implications: Healthcare professionals may benefit from instruction in gestures to enhance uptake of information about patients’ pain experiences.

Keywords: co-speech gesture; nonverbal communication; pain communication

1. Introduction

Recent research has revealed that when describing pain, co-speech gestures (spontaneous movements of the hands, arms and other body parts that are closely synchronised with speech [1-5]) contain additional information over and above that contained in speech [6-8], potentially making an important contribution to the communication of this experience. In the present study we use experimental methods to explore whether recipients are able to pick up the additional information from the gestures that accompany another person's pain description.

1.1. Pain communication

Pain is a frequent feature of medical consultations and healthcare professionals need to understand the presence and nature of pain to provide appropriate management and support. However, pain is a private, internal experience, directly accessible only to the sufferer, making it vital that sufferers communicate their pain effectively to others. Despite this, pain is notoriously difficult to verbalise in a way that truly captures the experience [9-14]. Even when we find the words to describe pain, these may have different meanings to different people and even to the same person across time, leading to potential miscommunication (see [15] for a more detailed discussion of these issues).

The problems of verbal pain communication have led researchers to consider additional channels through which sufferers may communicate their pain experience to others. These include facial expression [16-18], rating scales and questionnaires [19, 20], and drawings and photographs [9, 10, 21-23]. More recently, research has considered the role of co-speech gestures as a means of sharing the private pain experience with others.

1.2. Gestures and pain communication

The gestures that are the focus of this article are those which represent (or depict) semantic information directly related to the topic of speech (known as representational [24], or topic gestures [25, 26]). For example, a gesture in which a circular movement is made while saying “she ran all the way around the block” is related to the topic of speech and depicts the path that the runner has taken. It has been well established through basic gesture research that such gestures not only contain semantic information related to the verbal message, but often add a substantial amount of information that is not contained in the accompanying speech [5, 27-29], and that recipients glean meaningful information from gestures over and above that obtained from speech (see [30] for a meta-analysis). Taken together this indicates that gestures make an important contribution to communication, providing recipients with a more complete message than would be obtained from speech alone. Moreover, instructing participants to attend to gestures while watching videos of children explaining solutions to math problems increased the accuracy and amount of information obtained about the strategies used to solve the problems [31]. This provides preliminary evidence that it is possible to increase the uptake of information from gestures through instruction, with specific instruction about the types of information that gestures can convey providing the most benefit [31].

Despite this ability of gestures to communicate semantic content related to the topic of speech, within the clinical communication literature gestures have typically been grouped with ‘nonverbal behaviours’ (e.g. posture, gaze, facial expression and touch) involved in relational and emotional expression (e.g. communicating feelings, desires, personality, and attitudes) [32-34]. Such a view overlooks the semiotic contribution of gestures, and present study is part of a growing body of work which recognises the value of gestures in conveying detailed information within a clinical context [35-39].

Recent research exploring the role of gestures in pain communication has revealed that gestures are frequently used to depict information about pain, including sensation, location, size, and cause [6-8, 37, 39]. Heath [37] reported that when describing a tension headache, one patient said, “it’s like a band,” while using a gesture to depict the feeling of a band tightening around the head. Gestures contribute a substantial amount of information about pain that is not contained in the accompanying speech [6-8], for example using the words, “quite sharp, it felt quite sharp,” while producing a gesture in which the fingers of both hands tensed and squeezed inwards towards the palms in a single slow clenching motion [8]. Here, the gesture contains additional information about the nature of the sensation (i.e. that it was clenching or squeezing) that was not contained in the speech.

Taken together, this research demonstrates that co-speech gestures contain information about the subjective, perceptual experience of pain. Given the difficulties inherent in the verbal communication of pain, the information contained in gestures may contribute to a fuller understanding of the pain experience. Preliminary evidence that recipients pick up the information contained in speakers’ gestures during pain communication comes from Heath [37] who provides an example and qualitative analysis of a GP repeating a patient’s gesture back to her to establish understanding in a consultation. However, experimental, quantitative studies of whether recipients benefit from the information contained in the gestures that accompany pain descriptions do not exist.

1.3. The present study

As the first study to explore whether gestures can contribute to recipients' understanding of another person's pain experience, we used experimental methods adapted from basic gesture research. First we examined whether recipients are able to glean the additional information contained in the gestures that accompany spoken pain descriptions, and, second, whether brief instruction about gestures leads to further increases in the information obtained.

2. Method

2.1. Participants

Participants (N = 135) were University staff and students. All were female, native English speakers and had normal or corrected to normal vision, and none suffered from any language or hearing impairments. The mean age was 20 years (SD = 4 years; Range = 18-53 years), and 84% were right handed.[1] The study was granted approval by the University Research Ethics Committee and all participants provided written informed consent prior to participation.

2.2. Design

A between-participants design was used in which participants were randomly allocated to one of four clip presentation conditions:

1) Speech Only (SO; video stilled with gesture and facial information obscured) (n = 33)

2) Speech and Gesture (SG; facial information obscured) (n = 34)

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[1] Comparisons revealed no significant differences in the amount of information obtained by left and right-handed participants in any of the conditions (all $p > .05$), and one-way ANOVAs conducted separately for left and right-handed participants revealed the same pattern of results for both groups. Therefore, the data for both left and right-handed participants is reported together.

3) Speech, Gesture, and Face (SGF) (n = 34)

4) Speech, Gesture, and Face plus Instruction (SGF-Instruction) (n = 33)

The SG condition was included to control for the possibility that differences between the SO and SFG conditions may be due to presence of facial (rather than gestural) information. The dependent variable was the amount of information contained in participants' responses that was directly traceable to the gestures contained in the clips (see Analysis section for more information).

2.3. Stimulus development

Video clips were created from interviews with 21 female participants (21 right handed; M age = 23 years; SD = 8.31 years) who took part in a previous study in which they were filmed while describing a recently experienced physical pain [40]. The types of pain included back/neck/shoulder pain, headache, stomach pain, and leg/hip/foot pain, and there was a mixture of chronic and acute pain with pain durations ranging from less than 1 month to over 10 years.

To establish whether recipients could glean additional information from gestures, it was necessary to produce clips in which gesture(s) added pain information that was not contained in speech. Thus, for the 21 videos, we first identified all representational gestures (i.e. those containing semantic information) that occurred during participants' pain descriptions. We then used a 'redundancy analysis' [7, 27, 41, 42], which involves considering the information contained in each gesture with respect to the information contained in the accompanying speech and assessing whether the gesture contributes any additional information that is not contained in the speech (i.e., is non-redundant with respect to speech; see Figure 1 for an example; see Reliability section for reliability procedures). This analysis yielded 48 clips in which the gesture(s) contained additional information about pain. We randomly selected one clip from each speaker, yielding 21 clips (Mean length = 7.48 seconds; Range = 2-17 seconds). One clip was randomly selected to be used in the practice trial of the experiment, while the other 20 appeared in the experiment proper.

The video clips were edited so that they were in the condition-specific presentation format. Blurring of the facial area (for the SO and SG conditions) was performed using Gaussian and Fast Blur settings in Adobe® Premier Pro® [43]. Blurring was applied to the whole of the facial area, including a sufficient amount of the surrounding area to account for movements of the head (see **Figure 1**)[2]. For the 'Speech Only' condition the video clips were freeze-framed while the hands were in a rest position (e.g., on the lap) so that no gestural information was available. In the SGF and SGF-Instruction conditions, the video clips were presented in their original format with both gestures and facial expressions visible.

FIGURE 1 ABOUT HERE

2.4. Stimulus Presentation

A computer programme was used to present the video clips. Each clip was preceded by a fixation cross in the centre of the screen (displayed for 1 second) and immediately followed by a screen containing a free-text description field. There was no restriction on the length of description that could be provided. Clips were presented on a 17" Dell Monitor placed on a computer desk

[2] None of the gestures produced within the stimulus clips passed through this blurred area and therefore no gestures were obscured.

approximately 50cm in front of the participant. Sound was played through Sennheiser HD201 closed-cup headphones.

2.5. Instruction video

For the SGF-Instruction condition, a presentation was prepared using PowerPoint® [44] and consisted of a brief overview of what gestures are, how they interact with speech, and the types of pain information they may contain (including location, sensation, and cause). Example clips of gestures (performed by an actor, none of which matched the gestures in the experimental stimuli) were included to illustrate this information. Narration was recorded directly onto the presentation so that all participants heard the same information. The presentation lasted for 5 minutes 28 seconds and ended with an instruction to attend to gestures as well as speech when viewing the clips in the main experiment (see Appendices A and B).

2.6.Procedure

Participants took part one at a time in a quiet testing cubicle. The study instructions were displayed on screen and participants completed a practice trial to familiarise themselves with the program and give them the opportunity to ask questions. Participants then began the experiment proper in which they viewed the remaining 20 clips (order of presentation randomised). Following each clip, participants were required to provide a free-text description of the pain that had been described. Participants were encouraged to provide as much detail as possible and a list of types of information to consider (e.g., pain location, sensation, cause, duration, intensity) was provided on the screen. A break was included after every four clips and participants could choose to begin again when they were ready. In the 'Instruction' condition, participants viewed the presentation before beginning the experiment, but all other procedural details remained the same.

2.7. Analysis

2.7.1. Identification of spoken and gestural information in clips

The analysis was primarily concerned with whether participants were able to pick up the additional information contained in gestures, using an adapted form of the 'traceable additions' analysis developed by Kelly and Church [45, 46]. We prepared a coding manual that could be used to score the information in participants' free-text descriptions against the information in the original clip. For each clip, we created lists of the information contained in speech and gestures, and compared these lists to allow the identification of any 'additions' that were traceable to gestures (i.e., information contained in gestures that was not contained in the speech). The analysis of the original video clips revealed that thirteen dimensions of pain were depicted within the speech and/or gestures (see Table 1).

TABLE 1 ABOUT HERE

Figure 2 displays a clip in which the participant says *"it'll usually come on like quite suddenly"* while performing a gesture in which she clenches the hands, suggesting a squeezing or cramping sensation. Here, the information 'traceable to speech' was identified as Onset (sudden), while the additional information traceable to gesture (i.e. that was only contained in gestures) was Sensation (cramping/squeezing/tight).

FIGURE 2 ABOUT HERE

The category of 'traceable to gesture' concerned only the information gestures added over and above the information contained in the accompanying speech. On average there were 3.74 (SD =

1.19) items of information coded as ‘traceable to gestures’ and 4.26 (SD = 1.39) items of information ‘traceable to speech’ per clip.

2.7.2. Scoring of participant responses

The coding manual was used to score participants’ free-text responses according to how much information was traceable to speech and how much was traceable to gestures (i.e. contained uniquely in gesture; see Table 2 for an example of how a participant response to the clip presented in Figure 2 was scored using this system). In order to be scored as containing information traceable to speech or gestures, the information in the response had to match the information identified within the original clip. For example, if a participant viewing the clip presented in Figure 2 identified the sensation of pain as ‘tingling’, this would not be scored as traceable to gesture or speech as there is no indication in either modality that the sensation is of this nature.

TABLE 2 ABOUT HERE

2.7.3. Reliability

All data analysis was performed by SR. To ensure reliability second coding was performed on 20-25% of data at each stage of the analysis by an independent analyst blind to the study aims. Agreement scores are presented in Table 3. High levels of agreement were obtained at each stage of analysis [47].

TABLE 3 ABOUT HERE

2.7.4. Statistical analysis

For each participant, the scores for information ‘traceable to speech’ and ‘traceable to gestures’ for each clip were averaged across the 20 video clips to give two overall scores per participant (one for information obtained from speech, and one for information obtained from gesture). One-way ANOVAs were used to compare the scores for amount of information obtained from gestures and speech across the four conditions (SO, SG, SGF, and SGF-Instruction). Tukey HSD post-hoc comparisons were performed, and an alpha criterion level of $< .05$ (two-tailed) was employed throughout. Data analysis was performed in SPSS v.20 [48].

3. Results

The main analysis focused on participants’ scores for information traceable to gestures and revealed a significant difference between the conditions, [$F(3, 68) = 100.48$, $p < .001$, $n_p^2 = .64$] (see Table 4 for descriptive statistics).

TABLE 4 ABOUT HERE

Post hoc comparisons indicated that participants in the conditions where gestures were visible (SG, SGF and SGF-Instruction) obtained significantly more information than those in the SO condition, with this additional information directly traceable to gestures (SG: $p < .001$, $d = 2.79$; SGF: $p < .001$, $d = 2.32$; SGF-Instruction: $p < .001$, $d = 4.00$). **There was no difference in the scores of participants who saw speech and gestures in the presence (SGF)** or absence (SG) of facial information ($p = .921$, $d = 0.15$). Participants who received instruction in attending to and interpreting gestures prior to viewing the video clips (SGF-Instruction) obtained significantly more information traceable to gestures than those who saw gestures but had not received this instruction (SG: $p < .001$, $d = 1.61$; SGF: $p < .001$, $d = 1.63$). There were no significant differences between the conditions in terms of the amount of information directly traceable to speech, [$F(3, 130) = .90$, $p = .444$, $n_p^2 = .02$].

Of the thirteen categories of information contained in the original clips (see Table 1), gestures contained additional information (i.e., information traceable to gestures) about five aspects: Location, Sensation, Movement, Size, and Cause. Concerning the type of information that participants were able to obtain from gestures, the data in Figure 3 indicate that participants were able to glean at least some information about all five categories from gestures. Statistical analysis was not conducted on these data due to the amount of missing data (as not all clips contained information about all five aspects of the pain). However, the data show that participants were most proficient at gleaning information from gestures about pain location, and least proficient for information about movement and size of the area affected by the pain. Concerning the impact of instruction, there were increases in the amount of information obtained following instruction for all but one category (cause).

FIGURE 3 ABOUT HERE

4. Discussion and Conclusion

4.1. Discussion

Participants obtained a significant amount of information about pain from speakers' gestures, and receiving brief instruction about gestures led to increases in the amount of information obtained. There were no differences across conditions in the amount of information obtained from speech, indicating that recipients benefit from gestures without detriment to the uptake of spoken information. Finally, the beneficial effect of gestures was independent of any effect of seeing the speaker's face and was therefore directly attributable to the gestural movements.

While a growing body of research suggests that speakers produce gestures depicting various dimensions of the physical pain experience (e.g., location, sensation, cause) [6-8, 35, 37-39], this is the first to experimentally demonstrate that recipients can use this information to aid their understanding of pain. Healthcare professionals may benefit from brief instruction about the role of gestures in pain communication, and an important next step will be to establish whether the additional information contributed by gestures has any demonstrable impact on clinical or patient outcomes, diagnostic accuracy, and empathy towards patients. In addition to increasing information uptake, instruction to attend to gestures may increase overall attention towards the pain sufferer, positively influencing patient satisfaction [49, 50] and perceptions of recipient involvement in the interaction [51-53].

These findings may also have implications for healthcare interactions more generally. Recent studies have highlighted the role of gestures in a range of healthcare encounters, particularly when clinicians and patients do not share a common language [35, 38], and gestures may also play a role in the communication of non-pain-related symptoms. Our study strengthens the argument for attending to gestures in health-related encounters indicating that not only are gestures produced in such contexts, but they can be utilised by recipients to obtain more information about speakers' experiences. Moreover, the benefit of instructing people to attend to gestures within an experimental setting with minimal distractions highlights the potential importance of explicitly encouraging recipients to attend to gestures during clinical interactions where there may be other factors competing for their attention. Research indicates that clinicians spend considerable portions of the consultation looking at computerised medical records [54-58] and thus may miss out on information contributed by gestures.

The use of short video clips is common in gesture comprehension research [31, 45, 46, 59-61] as it allows for fine-grained analysis, demonstrating that the effect of gestures is directly attributable to the information they contain, rather than, for example, participants just guessing more information when gestures are present. However, these are not representative of the longer, more complete pain descriptions that occur within clinical interactions, limiting the applicability of the findings. Further, the lack of interactional demands and social constraints on gaze when viewing clips may allow recipients to devote more attention to gestural information within this study than would be possible in face-to-face interaction. Holler and colleagues [62] found that participants in a face-to-face condition were equally effective at gleaning information from the speakers' gestures as those in a video condition, providing some support for the applicability of these findings to face-to-face communication. However, further work is needed to demonstrate the applicability of these findings within the context of face-to-face clinical interaction.

The generalizability of the findings is further limited by the fact that the participants viewing the clips were university staff and students rather than health professionals. While subsequent pilot work with medical students has suggested that this population is not knowledgeable about the role of gestures in pain communication beyond indicating pain location and therefore may benefit from instruction in gestures to improve information uptake, more work is needed to determine the beneficial effect of gestures for healthcare professionals interacting with patients. A further limitation to the generalisability of the findings is the use of an all-female sample and a relatively narrow age range. It is well established that males and females differ in their perception [63-66] and communication [60] of pain, and an all-female sample (both for the video clips and the participants in this study) was used to control for these differences. However, more work is needed to understand the possible variations in gesture usage and uptake during pain communication by males and females, and by different age groups (who, for example, may differ in pain tolerance and stoicism). While the present study represents an important first step in demonstrating the potential value of gestures in communicating information about the private, subjective experience of pain, future work is needed to replicate these findings within a more representative sample during real clinical interactions.

Within this first attempt to explore recipients' uptake of gestural information about pain, we were primarily concerned with whether recipients were able to glean the additional information from gestures that was not contained in the accompanying speech. However, it is well established that as well as adding information, gestures often duplicate the content of speech, potentially emphasising and reinforcing the spoken information, increasing clarity, and aiding recollection. Thus, gestures may benefit recipients beyond the addition of extra information about pain, with the duplicated information in gestures also making a contribution to recipient uptake and understanding. While an analysis of the contribution of gestures that duplicate spoken information was beyond the scope of the present study, this represents an important avenue for further investigation.

The present study used a brief presentation to provide information to participants about gestures. This format could be easily integrated into communication skills training for healthcare professionals, either as part of online or didactic teaching. While the results indicate that such instruction is beneficial for increasing the uptake of gestural information, it is not clear whether this is due to specific knowledge gained about gestures or simply from raised awareness of this modality as a result of being instructed to attend to gestures. However, Kelly and colleagues [31] showed that increasingly explicit instruction (no instruction, hint, general instruction about gestures, and specific instruction about task-relevant gestures) resulted in incremental gains in accuracy, suggesting that the benefit of instruction is not simply related to raising awareness. Finally, a key question for future work is whether such brief instruction about gestures gives rise to a lasting effect or whether intermittent refreshers are needed to give rise to a sustained effect on the uptake of gestural information.

4.2. Conclusion

The present study demonstrates that recipients are not only able to benefit from the rich, visual information about pain contained in speakers' gestures, but also that their ability to glean this information is enhanced through brief instruction. These findings add weight to the idea that we should be looking as well as listening to those in pain in order to ensure that pain communication is as successful as possible. While follow-up work is needed to establish the validity of these findings within clinical contexts, this study provides a strong starting point for such investigations.

4.3. Practice Implications

Providing brief instruction to healthcare professionals about the role of gestures in pain communication may increase uptake of information about the pain experience, providing a clearer picture of a sufferer's pain and potentially reducing the risk of misinterpretation. Highlighting the role of gestures within clinical communication training may prove beneficial for improving healthcare professionals' ability to glean additional information from this modality during pain communication.

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Figure 1

Clip in which the speaker produces a gesture containing information about the location of the pain (lower back) that is not contained in the accompanying speech (“it just aches it's a dull ache all the time across my back”).

Figure 2

Clip in which the speaker produces a gesture containing information about the sensation of pain (cramping/squeezing/tightening) that is not contained in the accompanying speech (“it’ll usually come on like quite suddenly”).

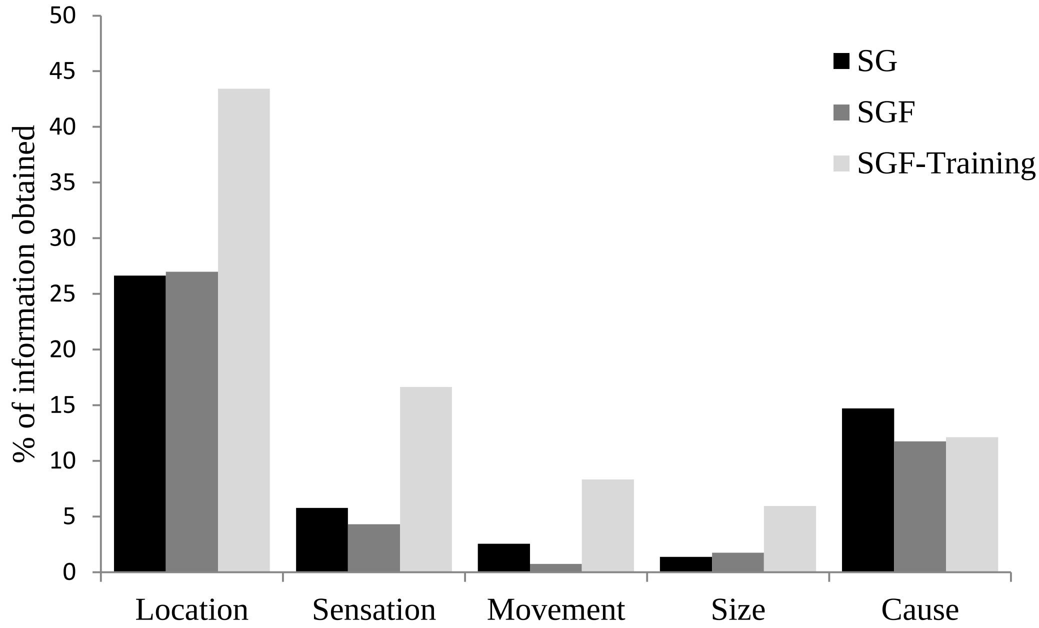


Figure 3

Percentage of information about each aspect of pain contained in gestures in original video clip that participants were able to glean from gestures across the three gesture conditions (SG, SGF, and SGF-Instruction)

Table 1

Thirteen categories of information about pain that were identified from speech and gestures

Category	Definition
Sensation	What the pain feels like (e.g. throbbing, stinging, shooting)
Location	Where the pain is located (e.g. arm, upper back)
Duration	How long the pain lasts (e.g. persistent, short-lived)
Frequency	How often the pain occurs (e.g. occasionally, everyday)
Intensity	How strong the pain is (e.g. really strong pain, mild pain)
Onset	How the pain comes on (e.g. suddenly, gradually)
Appearance	Any physical signs of pain (e.g. bruising)
Movement	Whether the pain moves around (e.g. moves up the neck, across the stomach)
Area/Size	How large the pain is (e.g. whole head, small area of stomach)
Effects	Physical or emotional effects of pain (e.g. difficultly engaging in activity, worrying)
Cause	What caused/causes the pain (e.g. lifting something, accident)
Progression	Changes in the pain over time (e.g. it started off throbbing then just ached)
Type	What kind of pain it is (e.g. headache, backache)

Table 2

Example scoring of participant response: “sudden onset but also tightening or spasms that might indicate that the pain feels like a spasm or twinge”

	Score	Details
Traceable to speech	1	Sudden onset
Traceable to gesture	1	Tightening/spasm/twinge

Note: This was a participant’s description of the pain description presented in Figure 2.

Table 3

Agreement scores between original (SR) and second coder at each stage of analysis

Analysis	Second coder	Agreement
Identification of representational gesture	SH	k = .84 (93%)
Identification of non-redundant gestures	SH	k = .84 (93%)
Identification of pain information in speech and gesture	MN	Speech: 81% Gesture: 80%
Scoring participant responses	MN	Traceable to speech: k = .83 (93%) Traceable to gestures: k = .72 (93%)

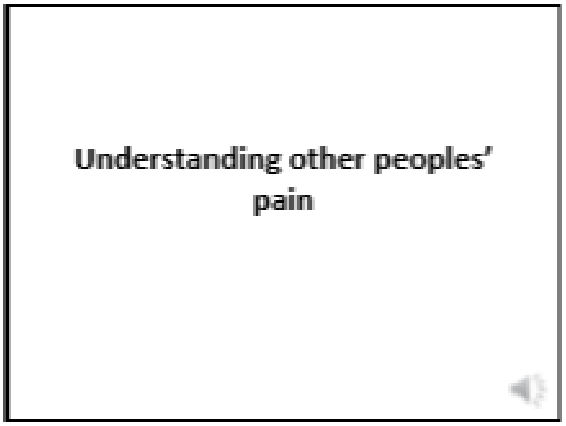
Note: SH is experienced in gesture analysis while MN is experienced in qualitative analysis

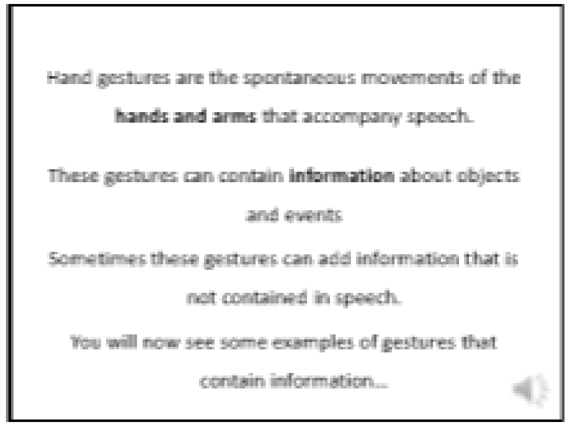
Table 4

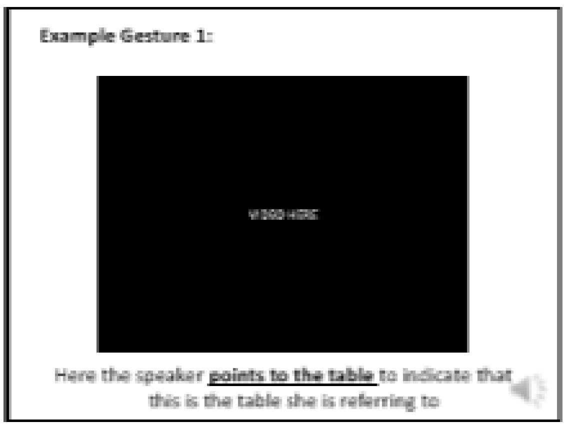
Means (and standard deviations) for amount of information obtained (traceable to speech and gesture) per clip across the four presentation conditions

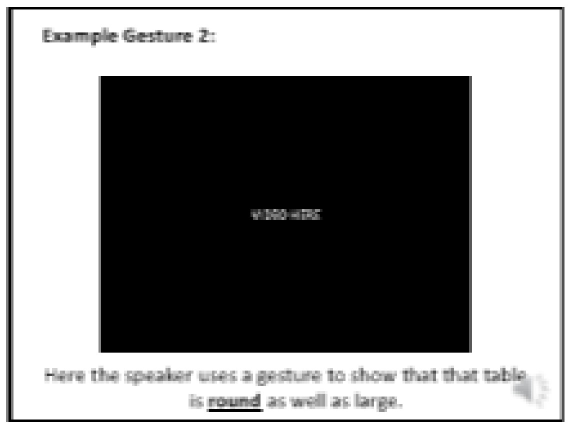
	SO	SG	SGF	SGF-Instruction
Traceable to speech	2.70 (0.33)	2.58 (0.41)	2.66 (0.40)	2.57 (0.34)
Traceable to gesture	0.10 (0.10)	0.49 (0.18)	0.46 (0.21)	0.86 (0.28)

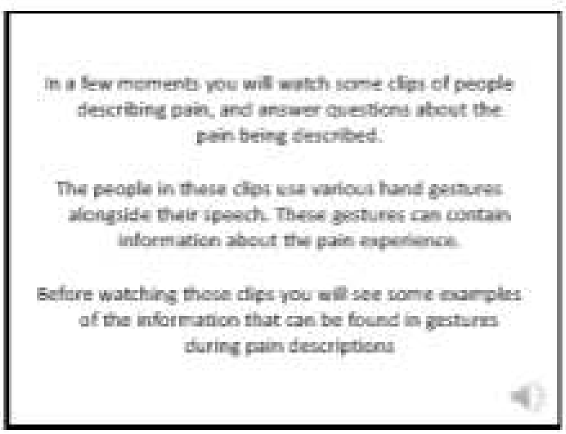
Appendix A: Presentation slides for gesture instruction condition

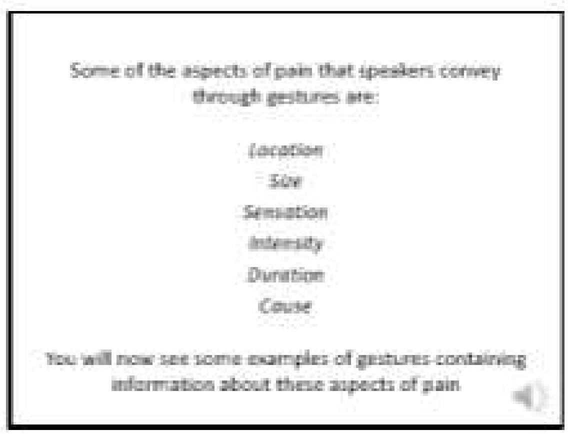


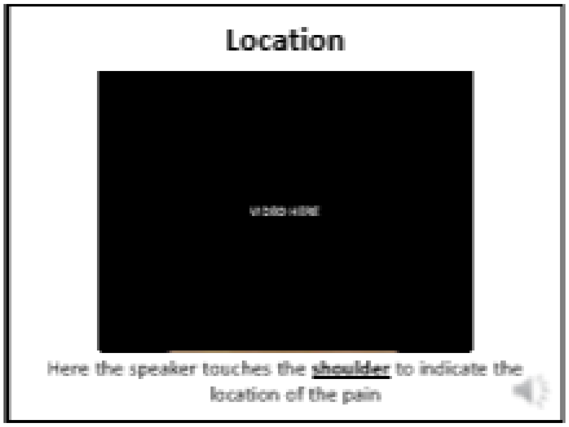




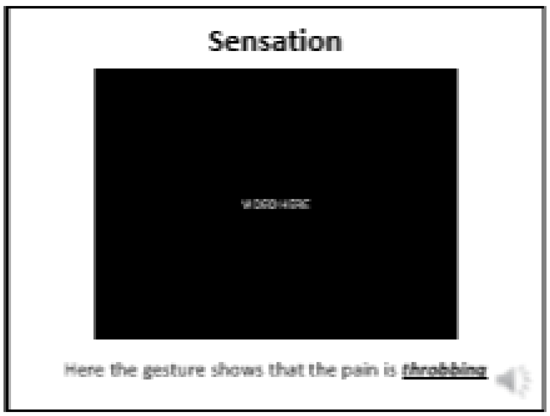


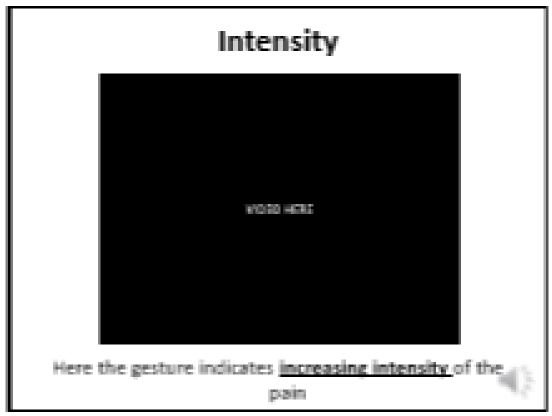


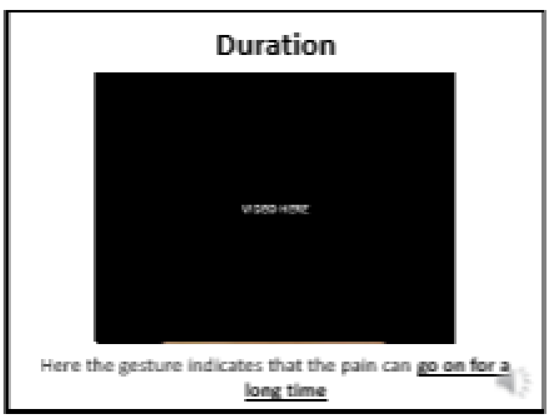



Location
Here the speaker touches the shoulder to indicate the location of the pain


Size
Here the gesture shows that the pain covers quite a large area (across the shoulders)


Sensation
Here the gesture shows that the pain is throbbing


Intensity
Here the gesture indicates increasing intensity of the pain


Duration
Here the gesture indicates that the pain can go on for a long time


Cause
Here the gesture indicates that the pain was caused by lifting things


When you are viewing the video clips try to pay
attention to the **gestures as well as the speech**
so that you can obtain as much information as
possible about the pain
You will now move on to the experiment…

Appendix B: Script for gesture instruction presentation

The narrator's speech is indicated in italics, with descriptions of the accompanying video clips in **[bold text inside square brackets].**

Slide 1: Hand gestures are the spontaneous movements that we make with our hands and arms while speaking. These gestures can convey visual information about the objects and events that we are talking about, for example by depicting the size and shape of an object or the way in which an action is carried out. Some of these gestures convey information that is not contained in the accompanying speech and therefore can add to our understanding of the overall message. You will now see some examples of gestures that contain information.

Slide 2: Example gesture 1

[video clip in which the speaker points to the table in front of her while saying "we have a table like this in our house"]

In this clip, the speaker uses a pointing gesture to indicate that the table she is referring to is the one in front of her.

[video clip is repeated]

These pointing gestures can be used to identify objects and entities in our environment as well as indicating where things are located.

Slide 3: Example gesture 2

[video clip in which the speaker moves hand in a large circular motion while saying "it's a really big table"]

In this clip, the speaker uses a gesture in which she makes a large circular motion to depict the table as large and round. This gesture adds information that is not contained in the accompanying speech as the speech only refers to the size of the table, not its shape.

[video clip is repeated]

Slide 4: In the main experiment, you will view a series of video clips of people describing pain and answer questions about the pain being described. You will notice that in these video clips people use gestures alongside their speech and that these gestures often contain information about the pain that they are describing. Before moving on to the main experiment, you are going to see some examples of the types of information contained in gesture when people talk about pain.

Slide 5: Some of the kinds of information that speakers convey through gestures are: location, i.e., where on the body the pain is located, the size of the pain, the sensation of the pain, for example stinging or throbbing, the intensity of the pain, the duration of the pain, including how long the pain lasts for and any changes in the pain over time, and the cause of the pain, for example actions that cause pain. You will now see some clips of gestures containing information about these aspects of pain.

Slide 6: Location

[video clip in which the speaker touches the left shoulder with the right hand while saying "it's just a really persistent pain"]

In this clip, the speaker uses a gesture in which she touches her left shoulder to indicate that this is where the pain is located.

[video clip is repeated]

Slide 7: Size

[video clip in which the speaker brings the hands up to the back of the neck and then moves them outwards across the shoulders while saying: "it's all across my shoulders"]

In this clip, the speaker uses a gesture to indicate that the painful area is large and covers the area across the top of the back and the shoulders.

[video clip is repeated]

Slide 8: Sensation

[video clip in which both hands are held in front of the chest and clenched and unclenched repeatedly, with the speech: "it's like a really strong achy pain"]

In this clip, the speaker uses a gesture to indicate that the pain has a throbbing sensation. **[video clip is repeated]**

Slide 9: Intensity

[video clip in which the right hand is moved in a diagonal across and upwards motion with the speech: "it just gets more intense"]

Here the speaker brings the hand across the body and up to indicate that the pain increases over time.

[video clip is repeated]

Slide 10: Duration

[video clip in which the both hands are held together in front of the speaker before left hand is moved horizontally across the body with the speech: "once it starts it can go on for ages"]

In this clip, the speaker uses a horizontally moving gesture to indicate that the pain can go on for a long time

[video clip is repeated]

Slide 11: Cause

[video clip in which the speaker reaches forward with both arms before bending the arms upwards from the elbows as if lifting an object, accompanied by the speech: "I think it's from lifting heavy stuff at work"]

In this clip, the speaker uses a gesture in which she mimes picking up a large object to indicate that lifting things is what has caused the pain.

[video clip is repeated]

Slide 12: You have now seen some examples of the ways in which speakers may use gestures to depict information about their pain. The examples presented are not exhaustive and the speakers in the clips that you are about to see may use various gestures to depict a range of information about their pain. Hopefully, this demonstration has given you an indication of how gestures can be used to communicate pain. When you are viewing the video clips in the main experiment, please try to pay attention to the gestures as well as the speech so that you are able to obtain as much detail as possible about the pain being described. You will now move onto the experiment.