Pragmatic aspects of representational gestures

Do speakers use them to clarify verbal ambiguity for the listener?

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Two studies are reported that investigate how speakers use gesture in association with verbal ambiguity in two communicational situations characteristic of everyday talk. The first study uses a design that mimics a speaker's self-repair initiated by the listener, while the second study involves speakers producing longer stretches of speech involving lexical ambiguity, without the listener interacting verbally with the speaker. The findings of both studies show that speakers do use gesture to clarify verbal ambiguity. Moreover, they suggest that the speaker's awareness of a potential communication problem, and the fact that this communication problem is associated with the speech itself, are crucial variables influencing speakers' gestural behaviour. Differences in the complexity of the form of the gestures are also observed and the theoretical implications of this are discussed. Overall, these studies provide important insights into semantic and pragmatic aspects of representational hand gestures and speech-gesture interaction in everyday talk.

Keywords: iconic hand gestures, pragmatic aspects of representational gestures, verbal ambiguity, gestures assisting communication.

Introduction

A fundamental issue in gesture research is how the two communicational channels, gesture and speech, interact. McNeill (1985, 1992, 2000) suggests that gesture and speech are two different dimensions of thinking, with gestures often representing information that is not represented in speech so that, jointly, they

provide a fuller insight into a speaker's thoughts. McNeill (1985, p. 353) provides the following example to illustrate this kind of gesture-speech interaction:

(1)   'she chases him out again'
       [hand, gripping an object, swings from left to right][1]

McNeill argues that the speech conveys here the idea of pursuit (chasing) and recurrence (again), while the accompanying gesture reveals something that is not contained in the speech, namely information about the instrument being used and how it is being done (swinging an umbrella). He explains that, in cases like these, the speaker's cognitive representation of the event is split into two parts so that gesture and speech cooperate by each representing aspects of 'a common cognitive representation, which neither exhibits completely' (McNeill, 1985, p. 353). He also claims that the gesture here 'is necessarily regarded as a symbol on an *equal* footing with the sentence' (ibid.; emphasis added). This view of gesture-speech interaction seems implicitly to suggest that gesture and speech are involved in the communication of meaning in a similar way in that they both contribute to the communication process by each representing certain aspects of a mental image. This issue will be discussed later in more detail.

According to McNeill, 'a gesture will occur only if one's current thought contrasts with the background discourse' (McNeill, 1992, p. 2), or, in other words, gestures occur with those aspects of thought that stand out against the immediate context of speaking. This type of argument is central to McNeill's growth point theory (1992, 2000), with which he attempts to explain the occurrence and form of gestures. With this theory, McNeill attempts to explain in great detail how and why gesture originates from thought, using illustrative examples. For example, he refers to a part of a cartoon narrative in which one cartoon character, Sylvester, climbs up a drainpipe, while Sylvester's antagonist, Tweety bird, suddenly drops a bowling ball down the drainpipe onto Sylvester, who then swallows the bowling ball. McNeill (2000) claims that a certain element of this event, namely the downward movement of the bowling ball, is likely to emerge as particularly significant, because through the downward movement -*towards Sylvester*- the bowling ball takes here the role of an antagonist to Sylvester. This contrasts with other parts of the narrative where the bowling ball was on a par with Sylvester. Growth points emerge from such 'fields of oppositions', as McNeill calls them, and trigger gestures. In this case, the field of oppositions is created through 'the various guises in which the bowling ball appeared in the role of an antagonist' (McNeill, 2000, p. 317) in the context provided by the narrative, which leads to contrasts emerging, for

example in terms of the bowling ball being on a par with Sylvester as opposed to being his antagonist.

However, one of the problems with McNeill's growth point theory is that his examples refer exclusively to parts of narratives, like the one described above. This provides a somewhat restricted view, however, since the natural context in which we communicate is not limited to aspects of the narrative as such. Also crucial is the social-interactional context that underpins everyday interpersonal communication. In two of his texts (1992, 2000) in which he discusses gesture production, McNeill comments on this aspect of communication only very briefly, for example when defining the kind of context that he is referring to when he talks about the contrasting of information from its discourse background. The context, McNeill argues, 'is the background from which a psychological predicate is differentiated. This background indexes and is constrained by external conditions, both *social* and material […]' (McNeill & Duncan, 2000, p. 146; emphasis added). However, McNeill does not provide any example of how exactly the social context has an influence on the emergence of growth points.

Interpersonal communication, however, never takes place in a social vacuum, but in social context where a speaker collaborates with one or more interlocutors. This context shapes the content of thought and in particular the speaker's intentions, because the communicational context creates a variety of communicational demands, which the speaker responds to. Therefore, it is important to take the social context into account in a more detailed and specified manner when talking about the communicational role of gestures. If speakers do use gesture to fulfil certain functions that are directly associated with facilitating the listener's understanding of what is being said, this would shed considerable light on how gesture and speech interact. Rather than the gesture contributing to the communication process simply by representing certain aspects of a speaker's mental representation, as described in McNeill's theory, the gesture would need to be considered as an adaptable resource that speakers *can* draw upon to assist communication. This idea does of course not contradict McNeill's theory, but could potentially be incorporated into it.

On the other hand, Kendon's (e.g., 1985) approach to gesture does consider such pragmatic issues. He claims that we get a better understanding of gesture 'if we look upon it as an available resource, and try to see how participants deploy it in the light of how they understand how its properties may best meet the current communicational requirements of the interactional situation in which they are taking part' (Kendon, 1985, p. 233). In line with this notion of

how speech and gesture interact, we want to suggest that gestures assist speech and facilitate the communication process by responding to immediate communicational demands that a situation poses, and for which the speaker considers the verbal channel as not sufficient.

One interesting test case for investigating how speech and gesture interact is that of verbal ambiguity. Ambiguity is a fundamental characteristic of spoken language (see, for example, Kendon, 2000), and attributable to the fact that we use a finite number of words in order to talk about an infinite number of things in the world. However, verbal ambiguity can pose a communication problem *for the listener*, and it would therefore be interesting to see whether speakers do indeed employ gesture in cases of ambiguity in order to get the message across.

In this paper we report two studies specifically designed to explore the association between gesture use and verbal ambiguity. The present studies investigate if and how speakers use gesture to clarify verbal ambiguity. More precisely, they use homonyms and lexically ambiguous sentences to investigate this topic. One example provided by Kendon gave rise to the idea of using homonyms (and his contribution is here duly noted). Kendon (1985) comments on the disambiguating function of gesture by referring to an example of a conversation he has had with his son. Kendon states that he possesses two types of Minolta cameras, an SLR camera and a super-8 movie camera. Hence, the linguistic label 'Minolta' on its own is ambiguous, since it can refer to two different kinds of cameras. Kendon describes how his son comments on his Minolta SLR camera by simply referring to it as 'your Minolta'. At the same time, however, he performs a gesture that is an imitation of someone holding a still camera in front of the eyes. This gesture, Kendon argues, disambiguates the accompanying speech in that it shows clearly that his son is referring to the SLR camera.

Like Kendon, Holler and Beattie (2003) also suggest that gesture might be used as a resource to fulfil different kinds of communicational functions and that one such function might be the disambiguation of speech, but they did not investigate this hypothesis further. Hence, the present studies investigate the role that gestures play with regard to verbal ambiguity in a systematic manner. Lexical ambiguity seems most suitable in this context. This is because participants tend to recognise this type of ambiguity rather easily, and they may use gestures that refer directly to the concepts described by the two different meanings of a homonym. Kendon's example refers to a very similar case, since the word 'Minolta' had two meanings in the Kendon household, and thus, in this case, could be classed as a homonym.

One way of generating a considerable amount of data in this domain is simply to ask participants to explain an ambiguous word, and this is the procedure that we follow in one of the experiments to be described later. Asking someone to explain an ambiguous word would create a situation not unlike one that commonly occurs in conversation in which a speaker notices a problem in communicating certain information in response to a question from the addressee and therefore clarifies what he or she means. Schegloff, Jefferson and Sacks (1977) offer a detailed discussion of such 'repairs' occurring in conversation, including a type of repair comparable to the kind of situation modelled experimentally here (see Method section, Study 1). Schegloff et al. differentiate between repairs being undertaken by the same person that has produced the 'trouble source' and those that are being undertaken by the addressee. Also, they distinguish between who originally initiated the repair, i.e. the person who has produced the 'trouble source', or the addressee. Based on this categorisation, the experimental situation is comparable to a '*self*-repair' due to '*other*-initiation'. Schegloff et al. provide the following example for this case (1977, p. 364):

> Ken: Is Al here today?
> Dan: Yeah.
>   (2.0)
> Roger: → He <u>is</u>? hh eh heh
> Dan: → Well he was.

With regard to the first of the experimental situations employed here, the experimenter asked the participants to explain the ambiguities (see Method section of Study 1 for an overview of the homonyms and ambiguous sentences used). This is comparable to a request for clarification (e.g., 'what do you mean?'), and thus an initiation of a repair by someone other than the participant who utters the ambiguity (= other-initiated). The participants had to explain the exact meanings. This is comparable to a speaker's repair clarifying what the listener asked about, i.e. by specifying what the exact meanings are (= self-repair). If it could be shown that the listener's request for clarification encourages the speaker to use hand gestures in order to help the listener understand what he or she means, this would suggest that speakers' hand gestures are indeed socially-interactionally motivated.

Study 2 investigates the same issue using a rather different, although equally common, communicational situation. In this study, the speakers were asked to tell picture stories to an interlocutor, and the speakers were induced to refer to certain actions and objects depicted in the pictures by words that are ambiguous

in their meaning. Hence, this experimental design resulted in the speakers producing longer stretches of speech involving ambiguous words, and the focus of the study was to see how the speakers clarified the meanings of these words. Because the listeners in this study did not explicitly ask for clarification, any attempt undertaken by the speakers to clarify the ambiguities would show that the speakers *anticipated* the listeners' understanding. The use of gestures in response to such anticipated problems of understanding associated with verbal ambiguity would be evidence that speakers do employ hand gestures for the purpose of disambiguating speech, and that this is true also for the resolution of verbal ambiguity not associated with a listener's specific request for clarification.

If these studies reveal that a speaker's gestural behaviour is influenced by verbal ambiguity, or the resolution of it, this would have major implications for the theory of gesture-speech interaction and our knowledge of the pragmatic uses of representational hand gestures.

Study 1

Method

Participants
The present analysis is based on data from 10 undergraduate students (all native English speakers) from the University of Manchester.

Procedure
The participants took part in the experiment in individual trials, and each participant was asked to sit down in a chair opposite the experimenter (JH). Sentences containing ambiguous words (see below) were projected on the wall opposite the participant, who was then asked to read each sentence out loud to the experimenter and to explain the meaning of the ambiguous word contained in each sentence.

The participants were video-recorded during the experiment. To prevent the participants from focussing on their hand gestures, they were told that the experiment focuses on interpersonal communication in general.

Stimulus material and experimental design
The stimulus material consisted of homonyms (see Table 1) embedded in sentences that provide a context which is equally appropriate with either meaning of the

homonym. With one exception (the word 'ring'), the ambiguous words were chosen from a range of words used in a study on lexical ambiguity by Foss and Jenkins (1973). The words were selected on the criterion that at least one of the interpretations had to refer to a concrete concept, which potentially allows for a gestural representation (see Analytic Procedure for more detail).

The following sentences are examples of the stimuli the participants were presented with:

> The old man's glasses were filthy.
> Ann took her housemate's pot without asking.
> Her pupils were examined to detect potential illnesses.
> John went through the records to see if anything was missing.

So, for example, a participant would read out the first sentence shown above, and the experimenter would ask 'what could this mean in one sense and what in the other?' which the participant responded to by saying 'it could be his reading glasses or a drinking glass'.

Analytic procedure

For the analysis, only attempts of speakers trying to resolve the ambiguities were taken into account. This included verbal repair constructions such as the one described above ('it could be his reading glasses or a drinking glass'), but also those cases in which both meanings were referred to but not necessarily disambiguated verbally ('glasses could be glasses or glasses as in drink', see Table 4). In short, the criterion was that the speakers had to have realised the potential communication problem associated with the verbal ambiguity, as the study is crucially based on this assumption.

Table 1. List of the homonyms employed in the present study and their alternative interpretations

Homonym	Interpretation A	Interpretation B
Glasses	Spectacles	Drinking glasses
Pot [2]	Pan	Marijuana
Ring [2]	Jewellery	Sound
Pupils	Part of the eye	School children
Records[2]	Music records	Files
Solution	Mixture	Answer
Arms	Limbs	Weapons
Toast	Piece of bread	Speech

The gestures that were included in the analysis were representational gestures. This includes iconic gestures, which, by definition, are 'gestures of the concrete' (see McNeill, 1992, p. 105). Most of the homonyms employed here have two concrete meanings, but two words have one concrete and one abstract meaning ('ring' and 'solution'). The abstract meanings, however, allow potentially for a metaphoric gestural representation ('gestures of the abstract', see McNeill, 1992, p. 145). Further, some of the homonyms allow for a representation by a kind of gesture, which can be considered as a sub-category of iconic gestures. These are gestures that use the speaker's body as a direct reference point (BARP [Body As Reference Point] gestures). According to McNeill (1992), iconic gestures can be differentiated into two types, character viewpoint gestures and observer viewpoint gestures. Character viewpoint gestures involve speakers transferring themselves into the role of the character being talked about, with the speaker's hands representing the character's hands. Observer viewpoint gestures involve the representation of semantic information from the viewpoint of an observer, i.e. without the speaker's hands representing the character's hands (for example, a speaker might refer to a character running quickly out of a house by moving the hand from left to right very quickly. In this case, the hand would represent the character as a whole (see also Beattie & Shovelton, 2001). BARP gestures are different from these two types of iconic gestures, because they involve the speaker transferring him- or herself into the role of a character, but without the speaker's hands representing the character's hands. An example of a BARP gesture has been described by Holler and Beattie (2002). In this example, the speaker talked about a cartoon character that had been involved in an explosion and was therefore covered in soot on certain parts of his body. To specify exactly where the character was covered with the soot, the speaker held the flat hand with the fingers spread close to the chest and moved it quickly up and down to indicate the area of the character's body covered in soot. Hence, the speaker transferred here into the role of the character and used her own body as a reference point, while she did *not* use her hands to show what the character's hands were doing (the character in the cartoon did not use his hands in this or a similar manner). With regard to the task that the participants were doing in this experiment, when referring to the meaning of 'arms' as in 'limbs', the speakers sometimes touched their own arm with the flat hand while moving the hand up and down the arm. In these cases, the speakers used their own body as a reference point, and the hand was used to indicate the body-part that they referred to and by moving up and down the arm, the gesture also provided the information that they were referring to

something oblong-shaped (and in this respect the gesture is 'iconic'). However, the hand was here not used to imitate the action of another person's (or character's) hand. Furthermore, some of the homonyms were referred to by pointing gestures (i.e. 'deictic' gestures, see McNeill, 1992) that use the speaker's body as a direct reference point, and these gestures have therefore been called 'BARP-deictics'. For example, speakers referring to the meaning of 'arms' in terms of 'limbs' would sometimes simply point to their own arm. Although the speakers use here their own body as a reference point, the gesture does only indirectly provide the information 'oblong-shaped', namely by pointing to the arm as such. In contrast to BARP gestures, the shape and movement of the gesturing hand itself does not represent the information 'oblong-shaped'. The analysis takes into account any of the above-mentioned gestures (i.e., iconic gestures (including BARP gestures), metaphoric gestures and BARP-deictics).

In considering the responses of the participants, we classified them in the following way:

Speech was classed as disambiguating if it unequivocally described one of the meanings of a homonym. This includes using a synonym, for example 'spectacles' for 'reading glasses', as well as more extensive descriptions such as 'arms as in limbs' or 'glasses, as in the ones that you drink out of'.

Gestures were classed as disambiguating if they unequivocally represented one of the meanings of a homonym. For example, in the context of differentiating certain meanings of 'pot', one speaker produced the following utterance:

(2)   'it could be many different things, it could be a flower pot, it could be [a pan], it

[right hand is held at about stomach height, the hand is clenched into a fist, the back of the hand is pointing down]

could be the [smoking pot, marijuana].

[right hand moves towards the speaker's mouth, the back of the hand is pointing away from the speaker, only the index- and the middle finger are extended, their tips are pointing upwards and they are held in a V-shape while the hand moves away from the mouth]

In this example, the gesture that the speaker uses to refer to the meaning of 'pot' in terms of cooking pot shows someone gripping the handle of a saucepan. This gesture was considered as possessing disambiguating value, as plant pots do usually not have a handle.

The next example describes a gesture that was *not* classed as dis-ambiguating:

(3)   'some people call like saucepans pots, don't they, [or it could be like a teapot that she's taken]

[both hands are held at about stomach height, the backs of the hands are pointing towards the sides, the hands are held in parallel and the fingers are spread and slightly bent so that a space is created between the hands]

The speaker refers here gesturally to the meaning of 'tea pot' by representing a round and bowl-shaped object. The gesture was not classed as disambiguating, because these characteristics of a container do not distinguish between the meaning of 'cooking pot' and 'tea pot'.

However, if the same gesture accompanied the description of a cooking pot while contrasting it to the concept 'marijuana' (i.e. 'pot to smoke'), the gesture was classified as disambiguating, because the round shape and the hollow space created between the hands can hardly be considered as associated with the meaning of 'marijuana'.

Some participants' responses were entirely excluded from the analysis. This concerned those cases in which the participant described only one possible meaning and did not appear to recognise the ambiguity of the target word. Cases where the speaker had difficulty in finding a word to explain the ambiguity were also excluded so that gestures that might have been involved in processes of lexical retrieval would not be considered (cf. Butterworth & Hadar, 1989). Finally, cases were excluded in which a participant did not use a disambiguating gesture, or used a gesture which it was not possible to classify.

Results and analysis

1. Do speakers use gestures to resolve verbal ambiguity?
Table 2 provides an overview of the data obtained from this study. The figures show clearly that people do use gesture more in relation to verbal ambiguity. Out of the 140 cases in which speakers resolved an ambiguity in terms of referring to one of the two possible meanings, either verbally, gesturally or both, they used gesture in 65 cases (46.4%). In 133 out of the 140 cases, the speakers provided verbal disambiguating information, and in 58 of these cases (43.6%), they additionally produced disambiguating gestures. Concerning the remaining 7 cases, the speakers did produce verbal utterances, but these were not of any disambiguating value (see Table 4). In these 7 cases, however, disambiguating

gestures were used. In addition, in one instance, speech remained ambiguous and there was no gesture used either (hence, this case has not been included in Table 2, which shows the number of ambiguity resolutions that the *analysts* considered to be successful).

The fact that in 43.6 percent of the cases the speakers employed disambiguating gestures despite providing verbal disambiguating information can in itself be considered a rather high percentage, but the relatively strong gestural response is underlined by the fact that *all* speakers produced representational gestures in this situation (just some speakers more and some less, see Table 3). Moreover, 9 out of the 10 speakers produced iconic gestures. This means that here 90 percent of speakers produced iconic gestures, whereas Holler and Beattie (2002) reported 86.8 percent concerning narratives involving conversational interaction (but no lexical ambiguity) and Beattie and Shovelton (1999a) 50 percent concerning narratives without any conversational interaction, except for limited backchannel responses (and also involving no lexical ambiguity). Furthermore, Table 3 shows that the majority of speakers (6 out of 10) resolved the ambiguities by using gesture and speech together, or gesture alone, rather than using only speech.

The fact that almost half of the ambiguity resolutions involved a gestural representation (in terms of an iconic, metaphoric or deictic gesture) is particularly interesting considering that the utterances are here not associated at all with the telling of a storyline or plot.

As we argued in the Introduction, the experimental situation is comparable to a self-repair. McNeill makes very few comments on this type of situation. In

Table 2. General overview of how the speakers resolved the lexical ambiguities using both modalities gesture and speech in different combinations

Total number of ambiguity resolutions produced (verbally, gesturally or both)	140
Number of ambiguities that were resolved by verbal means	133
Number of disambiguating gestures used in addition to disambiguating speech	58 43.6% (out of 133)
Number of cases in which speech remained ambiguous, but which were accompanied by a disambiguating gesture	7
Number of disambiguating gestures produced overall	65 46.4% (out of 140)

Table 3. Overview of how the individual speakers used gesture and speech in order to resolve the ambiguities

Speaker	Number of purely verbal ambiguity resolutions	Number of verbal and gestural ambiguity resolutions	Number of purely gestural ambiguity resolutions	TOTAL	Proportional gestural response
1	12	2	0	14	14.3%
2	8	7	1	16	50.0%
3	2	11	0	13	84.6%
4	5	5	0	10	50.0%
5	5	9	1	15	66.7%
6	7	9	1	17	58.8%
7	8	6	0	14	42.9%
8	13	0	1	14	7.1%
9	6	6	3	15	60.0%
10	9	3	0	12	25.0%
Total	75	58	7	140	46.4%

one such instance he comments only on the function of beats (these are gestures that do not represent any semantic information on their own, see McNeill, 1992) in association with a (self-initiated) self-repair (see McNeill, 1985), which is not of much help in explaining the present findings. In another instance, however, McNeill (1992) describes how gestures are used in association with verbal utterances that count as lexical repairs, and which can actually be considered as quite similar to the repair situation we are looking at here. He refers to an analysis by Pedelty and McNeill (1986), in which they shifted their participants' focus of attention between different narrative levels. One of these levels is what Pedelty and McNeill call the 'sub-propositional level of lexical repair'. To induce the participants' shift of attention onto this level, they asked them to correct verbal statements (resulting in the correction of a certain word), which referred to certain scenes of a cartoon the participants had seen, such as in response to the experimenter's statement 'the cat's foot gets smashed by the weight'. The experimenter specifies here the wrong body part, and the participant is supposed to answer, for example, 'no, it was his head' (see McNeill, 1992, p. 286). Their analysis reveals that a shift in attention onto the 'sub-propositional level' resulted in a decrease in the production of iconic gestures when compared to the number of gestures produced in association with the

'propositional' level. Concerning the latter, 65.1% of all gestures (i.e. iconics, metaphorics, deictics, beats) employed with the telling of propositional content were iconic gestures. Regarding gestures at the 'sub-propositional level', however, iconic gestures constituted only 16.7% of all hand gestures used with verbal utterances focussing on this level. Pedelty and McNeill (1986, pp. 339–340) thus conclude that 'statements with locutionary emphasis at the propositional level tend to be accompanied by representational iconic gestures, whereas statements with off-propositional emphasis, at either the discourse or sub-propositional level, tend to be accompanied by beatlike gestures'.

In the present study, however, the speakers produced mainly iconic gestures when making lexical repairs (as well as 'BARP gestures', which can be considered as a sub-category of iconic gestures, as they do represent semantic information but without the speaker's hand(s) representing what the hands of a certain person or character do, such as in the case of a speaker moving the hand up and down the own arm to specify the meaning of 'arms' as in 'limbs'. Out of the 65 gestures analysed here, 46 were iconic gestures of this kind, 18 were deictic gestures [using the speaker's body as a direct reference point by pointing towards the respective body-parts], and 1 gesture was a metaphoric gesture [referring to 'solution' in terms of 'idea']). Because beats were not included in the analysis, a proportional comparison of the different gesture types with regard to the total number of gestures produced is here not possible. However, considering that in 46 cases out of the 140 in which the speakers resolved an ambiguity the gestures they used were in fact iconic gestures (i.e. 32.9%), the findings are very different from those of Pedelty and McNeill who found that repairs were usually not accompanied by iconic gestures. Also, Pedelty and McNeill, who employed 36 questions designed to shift their participants' attention, and 18 of these involved the production of lexical repairs (as described above), found that, overall, the speakers used only 3 iconic gestures in association with the questions focussing at the sub-propositional level, i.e. in 16.7% of the cases. A proportional comparison with the data presented here therefore shows that in the present study, the speakers employed almost twice as many iconic gestures in association with their lexical repairs (as well as considerably more deictic gestures, namely 12.9%, as compared to none in Pedelty and McNeill's study).

Thus, Pedelty and McNeill's findings contrast markedly with the ones presented here. The conclusion must be that the two types of repair situations are different, and the only obvious difference is that the repairs made by the speakers in the present study involve the clarification of verbal ambiguity,

whereas the ones in Pedelty and McNeill's study do not. Accordingly, the communicational intent of the speakers was different, and the present findings therefore support the notion that gesture is employed as a resource to respond to the specific demands posed by a communicational situation.

2. How do speech and gesture interact in the resolution of lexical ambiguity?
The data analysis reveals two main patterns of gesture-speech interaction. One of these interaction patterns is characterised by speech providing no disambiguating information at all (only a reiteration of the homonym), while the accompanying gesture does (see Table 4).

In cases like these, the speakers seem to rely solely on the gestural representation providing disambiguating information, while not much effort seems to be made to produce verbal disambiguating information. This clearly illustrates the important role that gestures can play in the communication of meaning, and regarding the resolution of verbal ambiguity in particular.

The second type of interaction pattern involves speech providing disambiguating information, accompanied by a gesture that represents disambiguating information, too (Table 5).

Concerning these cases, the gestures cannot be considered as compensating for information that is not at all, or only implicitly, represented in speech,

Table 4. Examples of cases in which speech remains ambiguous but disambiguating gestures are used [3]

Speech	Gesture
'first *a ring* came [into my mind]'	[thumb and index finger of the right hand slide up and down the middle finger of the left hand]
'um…*arms in* […*arms or*]…weapons'	[right hand touches the right upper arm and the left hand the left one]
'glasses could be [*glasses* or…] glasses as in drink'	[left hand's index finger is extended and points towards the speaker's own spectacles]
'it could be the eyes, or it [could be *pupils…*] like…yeah…'	[right hand is held at about stomach height, the back of the right hand is pointing upwards, the fingers are spread and pointing forwards, the hand makes small movements from left to right, referring to the relatively small size of young children]

Table 5. Examples of cases in which speech resolves the ambiguity, accompanied by a disambiguating gesture

Speech	Gesture
'so [it could have been her *eyes*]…like an eye test, or…like children in a class…like when you're at primary school and the nurse is coming'	[right hand is held at about chest height, the index finger is pointing towards the speaker's face/eye]
'it could be their arms as in guns…that kind of arms, [or … *limbs*]'	[right hand briefly touches the left upper arm twice with the flat hand]
'could…uh..mean…um…just [obviously *a pot that..uh]…the physical object* or…it could mean something that you smoke'	[hands are held in parallel at stomach height, their backs point to the sides, the fingers are spread and point to the front, then they move together until the edges of the little fingers touch each other and the palms point upwards, then back, describing the bowl-shape of a pot]
'[the toast could be *a toast to*….um]..*they are at a dinner party and he made a toast to something*. And um "he left a- after he had made the toast" as in the bread…toast'	[right hand rises in front of the speaker to about shoulder height, the palm of the hand is pointing to the front/left side, the fingers are curled, only the index- and the middle finger are standing out a bit, as if holding a wine glass]

because the speakers are producing verbal utterances that themselves include disambiguating information. That disambiguating gestures are here employed anyway therefore provides interesting insights into the interaction of gesture and speech — the speakers obviously perceived the verbal information as not sufficient to achieve their communicational goal of resolving the ambiguity. This aspect will be discussed in more detail later.

3. On the form of the disambiguating gestures

McNeill argues that 'iconic gestures are typically large complex movements that are performed relatively slowly and carefully in the central gesture space. Beats are typically small simple movements that are performed more rapidly at or near the rest position of the hands' (McNeill, 1985, p. 359). While some of the representational gestures analysed here show this kind of complex, large and slow form as described by McNeill, quite a number of gestures performed in association with the resolution of lexical ambiguity are not very well captured by this description. Quite a few of the gestures that are described subsequently

are not iconic gestures, but they are representational gestures and fulfil here the same communicational function, namely to indicate or represent what interpretation a certain homonym is referring to. However, the form, in terms of elaborateness and complexity, of the gestures was shown to vary considerably, and this concerned iconic as well as deictic gestures.

For example, some speakers referred to the interpretation 'arms' in terms of 'limbs' simply by placing one hand on one of their arms and others by pointing at it. Another speaker, however, referred to the same meaning by raising both arms so that the hands touch the upper arms. Another speaker referred to the same meaning by moving one hand to the opposite arm and moving it up and down a few times. The first two gestures seem clearly more subtle and less complex than the latter two.

Concerning the homonym 'glasses' as in 'spectacles', one speaker moved both hands to the height of the face, the index fingers extended and pointing towards the eyes while moving each index finger in a circle in front of the eyes. Other speakers, however, used only one hand to refer to the same meaning and the gesture merely involved pointing towards the eye. Or, in other cases, the hand did not even rise to the height of the eye, but only to the height of the speaker's chest so that the hand or index finger pointed at the speaker's face. In this case the gesture can be considered as even less elaborate, since it simply indicates that the meaning the speaker is referring to is associated with the speaker's face. However, because the listener is here confronted with making a choice between two distinct meanings, a small cue like this might be sufficient to exclude the meaning of 'drinking glasses'.

Similarly, a difference in elaborateness or complexity can be found with regard to the gestures referring to the meaning of 'glasses' in terms of 'drinking glasses'. One speaker, for example, explained this meaning by imitating holding a tumbler, while, at the same time, the hand moved at the wrist quickly forward and back, drawing particular attention to the gesture. Another speaker, in contrast, also imitated holding a glass, but without moving the hand at the wrist, and with the lower arm remaining at rest on the leg so that the hand rose only very slightly and the gesture was not performed in the centre of the gesture space.

Thus, it seems that, in a number of cases, speakers used representational gestures that are subtle and quick and closer in form to gestures McNeill describes as 'beats'. However, in those cases in which gestures were employed as the only means of disambiguation, the gestures were always of the more elaborate kind. As can be seen in Table 4, the gesture referring to the meaning of 'ring' as in 'jewellery' involves the fingers of one hand sliding up and down the

middle finger of the other, while other gestures referring to the same meaning, but accompanying disambiguating speech, involved only a brief touch of the finger. The gesture referring to 'pupils' as in 'school children' shows the approximate height of primary school children with the hand held near the lap while moving slightly along the horizontal plane. A gesture of a different speaker referring to the same meaning, but accompanying disambiguating speech, also involved the hand being held near the lap in the same way as the former gesture, but only very briefly and without moving along the horizontal plane.

In all, this observation suggests that also the form of the gestures employed in association with the resolution of verbal ambiguity depends on how suitable the speaker perceives speech to fulfil the communicational task at hand, and thus that gesture must be directly linked to the speaker's communicational intent.

Discussion

This study provides a number of interesting insights into the communicational function of gestures, their interaction with the verbal system and the form of gestural representations.

Firstly, it can be argued that speakers do use gestures to disambiguate speech, at least in association with repair-like situations. A reason as to why speakers employ gesture in this context might be that speech itself is the cause for the communication problem. Thus, when trying to resolve the ambiguity, it makes sense to draw upon a communicational channel that represents the information to be communicated in a crucially different way to speech, namely imagistically, like gesture does. This way, the gestures can compensate for parts of speech that might still be perceived as ambiguous when trying to resolve the ambiguity verbally, and less attention has to be paid to producing speech that is maximally unambiguous. In other words, because speech is perceived as problematic here, speakers employ gesture as an additional means for securing the achievement of their communicational goal.

Regarding those cases in which the speakers did not attempt a verbal resolution of the ambiguities but relied on the gestural medium only, one could argue that this is because speech is here perceived as even more problematic and words as leading only to further confusion. To avoid this, the speakers may either take their time to think of verbal ambiguity resolutions that sound as unambiguous as possible, or they might simply use a disambiguating gesture instead. This makes additional sense because producing a gestural representation is considered as generally quicker than producing a verbal utterance (see, for

example, Kendon, 1980, p. 227, De Ruiter, 1998, p. 29). Therefore, employing a disambiguating gesture might seem the most efficient way to achieve the resolution of a lexical ambiguity. This notion of efficiency is in line with Clark's (1996) statement that 'people in conversation, in sum, are opportunistic in trying to reach closure on their actions. They try to repair problems as quickly and as efficiently as possible' (Clark, 1996, p. 285).

The analysis of the form of the gestures further shows that many of the representational gestures employed in association with the resolution of lexical ambiguities differ from the usually rather elaborate and complex form of iconic gestures described by McNeill (1985). From this observation one could conclude that something besides the type of gesture employed may have an influence on its form, namely the speaker's perception of the extent to which gestures are needed in order to achieve a communicational goal. If speech is perceived as only very slightly problematic, a speaker might consider only very subtle gestural cues as necessary to accompany speech in order to resolve the ambiguity successfully. This notion of how and why speakers employ gesture and speech to disambiguate lexical ambiguity is summarised in Figure 1.

So far, however, we have restricted our analysis to a very specific type of communicational situation where participants explain ambiguities. How do these processes change when participants use ambiguous words in discourse where they are not explicitly asked to clarify that ambiguity?

Study 2

Method

Participants
Originally, 18 English native speakers took part in the experiment. The data of 9 participants (11 narratives) were used in the analysis.
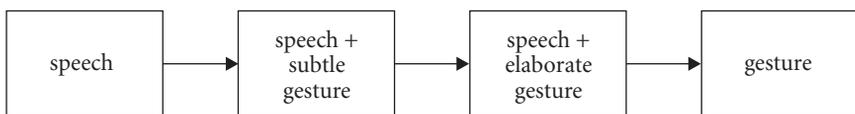
= Extent to which the speaker perceives speech as problematic regarding the resolution of lexical ambiguity, moving from 'low' to 'high'.

Figure 1. How speakers seem to use gesture and speech to resolve lexical ambiguity

Stimulus material

Four picture stories were used as the stimulus material, which had been drawn for the purpose of the experiment and consisted of 6 pictures each. The events and actions depicted in the stories were everyday events. Although the main plot was represented in the pictures, the stories were elaborated by inserting specific linguistic descriptors. In each story, two of these linguistic descriptors were homonyms (either 'glasses', 'records', 'toast' or 'pot'; all of these homonyms stem from Foss & Jenkins, 1973). The homonyms were inserted in the stories by writing them into the pictures with green pen and underlining them in red. The respective homonym that was inserted into a story was used in the same immediate pictorial context, once according to each interpretation, in order to draw the speaker's attention to the double meaning of the word and the potentially associated communication problem. The participants had been asked to tell the stories as clearly as possible so that the analysis could reveal if the speakers would mainly use either words or hand gestures, or both, in order to clarify the parts of their narratives that included the homonyms.

The fact that the lexically ambiguous words were inserted into the pictures could theoretically have placed particular emphasis on these linguistic items with regard to the context of the overall story. According to McNeill's (1992, 2000) growth point theory, speakers use hand gestures particularly with those aspects of a story that seem to be of particular significance in the context of the story that they are telling. Based on this argument, it could be claimed that the special salience that the linguistic insertions might place on the ambiguous items could be as much responsible for a possibly increased rate of hand gestures accompanying the respective words as the ambiguity of the words itself.

Consequently, control words were inserted into the stories (between 6 and 10 per story), which were made salient in the same way as the ambiguous items (i.e., written into the pictures with green pen and underlined in red). (A couple of control items, however, were directly incorporated into the drawings of some of the pictures, for example the word 'housekeeper' was drawn into a box shown on a page of the Yellow Pages that was visible in the picture, in order to represent an advertisement. In this case, the frame provided by the lines of the box were marked green as well instead of drawing a red line under the word.) Some of the overall number of control items were excluded from the analysis, however. To create conditions as similar as possible, only those control items were included in the analysis which were nouns, because most of the homonyms were also nouns. However, some of the homonyms were used by the speakers as verbs, for example, the homonym 'toast' was sometimes employed

in the context of 'she toasts the bride and groom' (as compared to 'she makes a toast'). Similarly, some of the control items included in the analysis could be used either as a noun or in close association with a verb. For example, speakers sometimes used the control item 'washing' by saying 'there is *a pile of washing*' or 'he wants *to do the washing*'. Furthermore, only those control items were chosen which were considered as allowing for a gestural representation of their meaning. For example, concerning the control item 'piles of food', referring to rather big piles of food in the picture, an accompanying gesture could involve the hands describing a semi-circle, referring to the shape of a pile, or they might be held parallel to each other at about shoulder width to emphasise the size of the pile of food. As studies by Beattie and Shovelton (see, for example, 1999a, 1999b, 2002 Study 1) show, iconic gestures communicate size information particularly well. Hence, a gestural representation referring to this control item was considered as possible.

Design and procedure
The participants took part in the experiment in pairs and sat facing each other at a comfortable conversational distance. One of the seats offered a view of a wall onto which the stimulus material was projected. The other seat was arranged so that its occupant would face a different wall. The participant who could see the projection was asked to tell two picture stories to his or her conversational partner. The speakers were given the instruction to use the pictures as a baseline, but to embellish the stories if they wanted to, and to tell them as clearly and with as much detail as possible. They were also told that they had to employ the words that were printed in green on the pictures in their narratives. After the first participant had told two stories, they were asked to swap seats and the other person told two further stories. It was explained to the participants that the experiment investigated how people communicate everyday events.

The experimental design is supposed to mimic the common conversational situation in which someone talks about a certain scene or an event that they have witnessed but which their conversational partner does not know anything about.

Criteria for selecting the data included in the analysis
First, all those speakers that did not use any hand gestures were excluded from the analysis. Further, only the data of those speakers who actually referred to a homonym according to both of its possible meanings in their narratives were included. The reason for this was that speakers who did not refer to both

meanings may not have recognised the ambiguity of the respective word and the fact that it referred to two different things represented in the picture. Thus, these speakers may not have recognised the potential communication problem associated with the ambiguity of the homonym either. However, it is a basic requirement for this study that they did.

Criteria for gestures included in the analysis
As for Study 1, in analysing the responses of the participants we took into consideration iconic, metaphoric gestures, so-called BARP gestures and BARP-deictic gestures.

We compared the number of gestures produced in association with the homonyms with the number of gestures produced in association with the control items, that is, words that were not homonyms. In this comparison, only gestures which expressed some aspect of the concept referred to by the homonym or by the control item were taken into consideration. Examples for gestures used with the control items are the following ones (the control items and homonyms in each example are italicised):

(4) 'he's actually forgotten how to do *washing* … or [how to turn the washing machine]'

[right hand is held at about stomach height, the back of the hand is pointing towards the right side, the tip of the thumb touches the side of the index finger and the hand turns at the wrist (2x)]

In this example, the speaker talks about someone having forgotten how 'to do washing' and then more precisely about what aspect about it he had forgotten, namely how to turn the dials on a washing machine. The accompanying iconic gesture represents exactly this aspect, i.e. the turning of the dials on a washing machine, and it thus refers directly to some aspect associated with the control item 'washing'.

(5) 'and [she looks at her] *watch*'

[left arm is held slightly above the lap while it turns so that the speaker's watch is pointing upwards]

The speaker in example 5 mentions the control item 'watch', which in the picture refers to a wristwatch. The gesture that the speaker uses in association with mentioning the watch is a re-enactment of the character (who is under immense time pressure) looking at her watch so that this gesture refers directly to an aspect associated with the control item 'watch'.

Examples 6 and 7 describe gestures, which were included in the analysis and produced in association with homonyms:

(6)   'she [*toasts* the bride and the groom]'

[right hand rises to about the height of the head, the tip of the thumb touches the tip of the index finger and the rest of the fingers are slightly curled, as if holding a champagne glass]

In example 6, the speaker mentions the homonym 'toast' (here used as a verb) and uses a gesture, which is a re-enactment of someone making a toast with a champagne glass in their hand. The gesture can therefore be considered as referring directly to one of the meanings of the homonym 'toast'.

In the following example, the speaker refers to 'glasses' in terms of 'spectacles' while pointing with both index fingers to his own spectacles. This gesture refers obviously directly to one of the meanings of the homonym 'glasses'.

(7)   '[he didn't wanna break his *glasses*]'

[both hands rise to the height of the cheeks, the index fingers extend and point towards the eyes]

However, in another case, a speaker said 'so he takes his glasses off' while using a gesture imitating gripping one holder of the speaker's spectacles, then swinging towards the side and slightly backwards. Although this gesture does not refer to 'spectacles' as directly as the gesture in example 7, it was classed as disambiguating, because it also occurred together with the homonym and referred directly to an aspect associated with one of its meanings which would allow for identifying which of the two meanings the speaker is talking about.

Results

The first part of the analysis involves a comparison of the total number of gestures produced with the number of disambiguating gestures that were produced (Table 6).

Table 6 shows that 25.5% of all gestures analysed were disambiguating gestures. Given that the homonyms constituted but a small proportion of the words in the narratives overall, this can be regarded as quite a high figure (on average, the homonyms were mentioned only 3.6 times per narrative, whereas the average length of the overall narratives was approximately 277.6 words, i.e. the homonyms constituted only 1.3 percent of the discourse). Furthermore, Table 6 shows that, out of the 9 speakers whose gestures were analysed, three speakers

Table 6. Overview of the number of gestures used with homonyms as compared to the total number of gestures produced

Speaker (S)/ story		Total number of iconic/metaphoric/ deictic gestures	Number of gestures used with the homonyms	Percentage of disambiguating gestures over total number of gestures
S1[4]	story a	22	5	22.73
S2	story d	3	0	0.00
	story b	8	1	12.50
S3	story b	1	1	100.00
S5	story d	1	0	0.00
S6	story a	5	1	20.00
S8	story b	4	1	25.00
S9	story b	2	1	50.00
S14	story b	1	1	100.00
S17	story b	1	1	100.00
	story c	3	1	33.33
Total		51	13	Overall percentage: 13/51 = **25.5%**

produced only one gesture overall (of those types that are included in this analysis), and this one was in all three cases a disambiguating gesture. This observation clearly underlines the robustness of the phenomenon investigated here.

In order to evaluate the extent to which the homonyms encouraged the use of gestures in contrast to non-homonyms in a systematic fashion, the number of times that the homonyms were mentioned was compared with the number of gestures accompanying them (Table 7), and the equivalent procedure was applied for the control words (Table 8).

A comparison of the figures presented in Tables 7 and 8 shows that more gestures were used with homonyms than with control items. Thus, 32.5% of the homonyms were associated with gestures as compared to 19.5% of control items. A Wilcoxon Matched-Pairs Signed-Ranks Test showed this difference to be significant (T = 5, n = 10, p< .02, two-tailed).

Theoretically, one could argue that the homonyms may have encouraged the speakers to gesture more than with the control items because the meanings of the homonyms were perceived as being very important in the context of the stories and the control items were not. This argument would make sense considering that gestures can also be used for lending additional emphasis to

Table 7. Overview of the number of gestures produced with the homonyms as compared to the number of times the homonyms were mentioned

Speaker (S)/ story		Number of disambiguating gestures produced with a homonym	Number of times homonyms were mentioned	Percentage of homonyms accompanied by disambiguating gestures
S1	story a	5	11	45.45
S2	story d	0	3	0.00
	story b	1	3	33.33
S3	story b	1	4	25.00
S5	story d	0	2	0.00
S6	story a	1	3	33.33
S8	story b	1	1	100.00
S9	story b	1	2	50.00
S14	story b	1	6	16.67
S17	story b	1	3	33.33
	story c	1	2	50.00
Total		13	40	Overall percentage: 13/40 = **32.5%**

Table 8. Overview of the number of gestures produced with the control items as compared to the number of times the control items were mentioned

Speaker (S)/ story		Number of gestures produced with a control item	Number of times control items were mentioned	Percentage of control items accompanied by a gesture
S1	story a	4	7	57.14
S2	story d	2	7	28.57
	story b	0	3	0.00
S3	story b	0	2	0.00
S5	story d	0	3	0.00
S6	story a	0	3	0.00
S8	story b	2	4	50.00
S9	story b	0	3	0.00
S14	story b	0	4	0.00
S17	story b	0	3	0.00
	story c	0	2	0.00
Total		8	41	Overall percentage: 8/41 = **19.5%**

something that is being said. However, it was observed that many speakers particularly emphasised the control item 'piles of food', for example, to make clear that the piles it referred to are very big. They did so by using intonational stress or by using certain words in association with the control item that added emphasis, such as 'there were absolutely piles of food', 'there are piles and piles of food). This special emphasis shows that the speakers must have perceived the control item (or rather the fact that the piles of food were very big) as somehow important in the context of the story. Thus, the larger amount of hand gestures used in association with the homonyms cannot simply be attributed to the fact that the meanings of the homonyms were perceived as important and the control items as unimportant.

In summary, we can conclude that speakers are more likely to use a gesture in association with an ambiguous word, not only when asked to clarify the meaning of the word but also when such a word is used in the course of an extended discourse such as a narrative.

General discussion and conclusions

Ambiguity is characteristic of everyday talk. The finding that speakers employ gesture in association with verbal ambiguity is therefore important regarding investigations into how people understand spoken discourse.

The results of the two studies reported here suggest that speakers use gesture and speech according to how effective they perceive these two modalities to be in meeting the demands of a given communicational situation. This supports Kendon's notion that gesture is used as a resource available to speakers and that there is flexibility in the way in which these two modalities interact with one another.

The findings have important implications for McNeill's growth point theory. Verbal ambiguity represents a potential problem for the listener, but not usually for the speaker. Yet the speaker's recognition of the problem for the listener that the use of a homonym might create seems to be a factor influencing the use of gesture. Hence, McNeill's notion of 'the context' that a speaker tries to contrast certain information against seems too narrow. 'Context' must include not only the immediate background of the narrative against which a speaker is developing the next part of his current utterance, but also how the speaker perceives the communicative needs of the interlocutor. The findings of the present studies therefore help to expand McNeill's (1992, 2000) growth point theory in that they specify at least one aspect of the social context that can influence the speaker's formation of thought in a way that it affects gesture production.

In short, the theoretical position we are arguing for suggests that gestures have a range of pragmatic uses, which is an aspect of functioning that McNeill's theory somewhat neglects. This is not because findings such as the present ones are not fundamentally compatible with his theory, but rather because McNeill seems to largely ignore the influence of the social context and focuses on the interface of language, gesture and thought instead. Of course, this focus is indispensable if we are to build a general theory of gesture. However, at the same time, it is necessary to expand his theory by attempting to understand what aspects of 'the context' in which communication takes place may encourage the use of gestures and influence their form, as well as the interaction of gesture and speech. Only then will we be able to further our understanding of the communicational role that these ubiquitous hand gestures play in everyday talk. The present analyses represent one small step in this direction.

Notes

1. Segments of speech analysed are marked using 'single quotes'. A short line of dots indicates small pauses in speech. The part of the verbal utterance that was accompanied by the gesture as a whole (including the preparation and retraction phase if present) is marked using [square brackets]. The iconic gesture that accompanied the verbal utterance is, except in the case of tabular presentations of the data, described underneath the extract of speech in each case and this description is also contained within square brackets.

2. These three items can be interpreted in a third way, namely 'pot' as in 'plant pot' or some kind of similar container, 'ring' as in the general geometrical shape of a ring and 'records' in terms of, for example, 'world records'. Strictly speaking, all three words can thus be classed as polynyms, but these additional meanings were considered as somewhat less likely to be mentioned than the respective other two, because they refer to less common concepts (e.g. the 'geometrical shape of a ring', or 'world records'), and because they share basic semantic features with one of the respective alternative meanings, such as 'cooking pot' and 'plant pot' (both are round and container type objects), or 'the shape of a ring' and 'finger ring' (both are round with an unfilled centre). In some cases, the speakers may thus not have perceived the respective two somewhat similar meanings as referring to crucially different concepts. Therefore these meanings were included in the analysis if the speakers referred to them, although they were not automatically expected to do so. Hence, these meanings were not included in the table (and in order to avoid unnecessary complication, we will include them under the label of 'homonyms' in the subsequent parts of this article).

3. Those parts of the verbal utterances that were accompanied by the disambiguating gesture are marked using square brackets. The respective other meaning that the speakers described might also have been accompanied by a gesture in some of the cases, but these gestures have

been omitted from the transcribed speech extracts to make clear what exactly the gestures described are referring to.

4. These are the original speaker numbers, before certain speakers were excluded from the analysis due to the reasons mentioned.

References

Beattie, Geoffrey & Heather Shovelton (1999a). Do iconic hand gestures really contribute anything to the semantic information conveyed by speech? An experimental investigation. *Semiotica,* 123, 1–30.

Beattie, Geoffrey & Heather Shovelton (1999b). Mapping the range of information contained in the iconic hand gestures that accompany spontaneous speech. *Journal of Language and Social Psychology,* 18, 438–462.

Beattie, Geoffrey & Heather Shovelton (2001). An experimental investigation of the role of different types of iconic gesture in communication: A semantic feature approach. *Gesture*, 1, 2, 129–149.

Beattie, Geoffrey & Heather Shovelton (2002). An experimental investigation of some properties of individual iconic gestures that mediate their communicative power. *British Journal of Psychology*, 93, 179–192.

Butterworth, Brian & Uri Hadar (1989). Gesture, speech, and computational stages: A reply to McNeill. *Psychological Review,* 96, 168–174.

Clark, Herbert H. (1996). *Using language.* Cambridge: Cambridge University Press.

De Ruiter, Jan-Peter (1998). *Gesture and speech production.* Doctoral Thesis. Nijmegen: MPI Series in Psycholinguistics.

Foss, Donald J. & Charles M. Jenkins (1973). Some effects of context on the comprehension of ambiguous sentences. *Journal of Verbal Learning and Verbal Behaviour*, 12, 577–589.

Holler, Judith & Geoffrey Beattie (2002). A micro-analytic investigation of how iconic gestures and speech represent core semantic features in talk. *Semiotica*, 142, 31–69.

Holler, Judith & Geoffrey Beattie (2003). How iconic gestures and speech interact in the representation of meaning: Are both aspects really integral to the process? *Semiotica.*

Kendon, Adam (1980). Gesticulation and speech: Two aspects of the process of utterance. In Mary R. Key (Ed.), *The relationship of verbal and nonverbal communication*, (pp.207–227). The Hague: Mouton.

Kendon, Adam (1983). Gesture and Speech: How they interact. In John M. Wiemann & Randall P. Harrison (Eds.), *Nonverbal Interaction*, (pp.13–45). Beverly Hills: Sage.

Kendon, Adam (1985). Some uses of gesture. In Deborah Tannen & Muriel Saville-Troike (Eds.), *Perspectives on silence*, (pp.215–234). Norwood, New Jersey: Ablex Publishing Corporation.

Kendon, Adam (2000). Language and gesture: Unity or duality? In David McNeill (Ed.), *Language and gesture*, (pp.47–63). Cambridge: Cambridge University Press.

McNeill, David (1985). So you think gestures are nonverbal? *Psychological Review*, 92, 350–371.

McNeill, David (1992). *Hand and mind: What gestures reveal about thought.* Chicago: University of Chicago Press.

McNeill, David (2000). Catchments and contexts: non-modular factors in speech and speech production. In David McNeill (Ed.), *Language and Gesture*, (pp.312–328). Cambridge: Cambridge University Press.

McNeill, David & Susan D. Duncan (2000). Growth points in thinking-for-speaking. In David McNeill (Ed.), *Language and Gesture*, (pp.141–161). Cambridge: Cambridge University Press.

Pedelty, Laura L. & David McNeill (1986). Gesture form changes with level of discourse focus. In Anne M. Farley, Peter T. Farley, & Karl-Erik McCullough (Eds.), *Papers from the 22nd Annual Meeting of the Chicago Linguistic Society*, (pp.336–343). Chicago: Chicago Linguistic Society.

Schegloff, Emanuel A., Gail Jefferson, & Harvey Sacks (1977). The preference for self-correction in the organization of repair in conversation. *Language*, 53, 361–382.

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