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Gestures in spatial descriptions

Marianne Gullberg

Introduction

Most studies of gesture production to date have been based on analyses of narrative discourse in face-to-face interaction. Issues such as the relationship between gesture types and the content of speech, as well as the distribution of particular gesture types across given narrative sequences have been investigated. Depictive gestures, e.g., are frequent where the content concerns the description of concrete objects or actions at a narrative level (McNeill 1992). Little is known about the gesture production in other discourse types, however. Just as different discourse genres have oral characteristics, they are likely to result in different gestural characteristics.

In this small-scale study, a preliminary analysis is presented of the gestures produced during a spatial description task during which interlocutors were prevented from seeing each other. This paper will discuss the impact of the discourse type on the use of specific gesture types, especially on deictic gestures. In addition, the traditional issue of why speakers gesticulate at all will be briefly addressed in relation to the question of how visibility conditions affect speakers' gesture production.

The data

An experiment was designed in which a drawer was assigned the task of reproducing a stimulus picture. The drawer was not allowed to see the picture, but had to rely solely on the oral description of the picture provided by a describer. The describer and the drawer were separated by a screen such that the drawer could neither see the stimulus picture nor the describer. All communication of (spatial) information was thus restricted to the oral channel. The interlocutors were encouraged to interact freely, however, asking questions of clarification, etc. The stimulus picture represented an unknown object, a 'pachydermobile', or a vehicle in the shape of an elephant (Maple 1983). A five minute limit was imposed for the comple-

tion of the task. Two dyads participated in the experiment. For further descriptions of the data collection, see Gullberg, Morén & Stenfors 1997.

In this paper, *gesture* has been defined as the spontaneous movements of the hands/arms performed by a speaker during speech. This definition delimits mano-brachial behaviour which is equivalent to Kendon's 'gesticulation' (Kendon 1988), and to McNeill's 'speech-associated gestures' (McNeill 1992). Emblems and self-regulators are excluded. The gestures produced by the interlocutors have been coded using McNeill's taxonomy into the categories *iconics, metaphorics, deictics*, and *beats*.

In the quantitative analysis, gestures have sometimes been counted as 0.5 instances of a particular gestures type. This occurs when gestures are blends of two gesture types, or when there is no global rest between movements which could be categorised as belonging to two different gesture types. For instance, the speaker may perform an iconic gesture outlining an object. The hands are then immobilised in the air (local rest), and the configuration of the hands is maintained when a beat is performed. There is no global rest, as the hands are not put to rest in the lap, and yet two different gesture types are involved. In such cases, the gesture is counted as one, each gesture type contributing 0.5.

The discourse genre

The assessment of the characteristics of narratives is a research field in its own right, and a number of the typical features have been established. General narrative structure is often said to consist minimally of an *orientation* of the background in which the characters, the time, and place of the story are introduced; a *complication* or a description of the events which are often presented in a linear chronological order; a *resolution* and a *coda* (Labov & Waletzky 1967).

Spatial descriptions, on the other hand, have received much less attention. The most typical property of spatial descriptions, however, seems to be the alternation between the introduction of referents and expressions which give spatial orientation to these referents. In contrast to narratives, spatial descriptions usually do not contain descriptions of events, but rather of states. The growing literature on spatial descriptions also seems to suggest that the characteristics of the output is highly task-dependent. Specifically, the spatial perspectives employed influence the oral output. For instance, the bird's-eye view applied in descriptions of maps results in different oral constructions than route directions (e.g. Tversky et al. 1994, Taylor & Tversky 1996).

The output from the picture description task on which the present study is based displays both general features and individual variation, as shown in Gullberg et al. 1997. In both descriptions, there is an initial *overview* phase where a survey perspective is employed by which the picture and the object it represents is described in its totality. The general outline of the vehicle and its overall orientation are described in this phase. Two different approaches can then be detected. On the one hand, Describer1 applies a 'componential view', in which the different objects or sub-structures in the pachydermobile are presented in an ordered and nested fashion to construct a whole, complex object. Describer1 starts by first naming objects in the pachydermobile, then goes on to specify their spatial location, and finally adds detailed information about the properties of the objects. Describer2, on the other hand, employs a flat survey perspective, in which the vehicle is seen as simple container with unordered items. Describer2 restricts herself to listing the objects present within the vehicle without providing any spatial information at all. Spatial expressions are thus a dominant feature of Describer1's production, whereas referential, nominal expressions make up the brunt of Describer2's output.

An interesting side-effect of the no-sight condition of the task is how the spatial expressions in the discourse are interpreted. The expressions referring to the elephant have intrinsic spatial meaning, once the elephant as a whole has been given an orientation. 'At the front' is interpreted as the region of the trunk or eyes, etc. Interestingly enough, all other spatial expressions also become absolute in some sense, as does the perspective applied to space in general.

Since the piece of paper has been established as the centre of attention for both interlocutors at the beginning of the task, it becomes a stable reference point, a landmark, or a frame of reference (Haviland 1996, Levinson 1996). The contextual element needed to interpret adverbials such as 'left' or 'on the side' is thus given. Specifically, there is no need to perform complicated left-right mirroring operations, as is done in narrative discourse. In narratives, discourse space is shared by both interlocutors and when the listener refers to a location originally located by the speaker to his or her left, then the listener has to indicate a point to his or her own right (Gullberg 1998). In the task in this study, however, 'left' means left to both interlocutors on both sides of the screen, since both interlocutors have a paper in front of them.

Table 1. Gestures in the two dialogues across gesture types.

Dialogue	Subjects	Iconic	Metaphoric	Deictic	Beat	Total
Dialogue1	Describer	12 (23%)	6 (11%)	29 (56%)	5 (10%)	52 (100%)
	Drawer	2	2	4.5	1.5	10
Dialogue2	Describer	–	–	–	–	–
	Drawer	–	1	5	–	6
Total		14	9	38.5	6.5	68

The distribution of gestures

Just as the two describers in the data have individual ways of solving the oral part of the task, so their gestural behaviour is distinctively individual. Describer1 gesticulates freely during the description phase, and produces gestures of all types. Describer2, in contrast, does not perform any gestures at all during the description.

In both dyads, the drawers perform a few gestures in connection with asking questions of clarification.

The total number of gestures in the dialogues are shown in table 1. In the following, only the describers' gestures will be analysed, which means that, in practice, only the gestures performed by Describer1 will be addressed.

The relative frequency of gestures across types in Decriber1's gesture production largely corresponds to the distribution of gestures reported elsewhere. However, the high proportion of deictic gestures (56% of the total number of the describer's gestures) is striking. The majority of these deictic gestures are gestures pointing to the stimulus picture, or gestures of movement up, down, or across the picture.

The distribution of these gesture types over the co-occurring oral expressions is also essentially in accordance with that reported by McNeill 1992, for instance. Describer1's iconic gestures coincide with expressions for concrete referents, such as 'wheel'. His metaphoric gestures predictably co-occur with expressions that are approximations, and serve as meta-comments on the accuracy of the utterance. Beats co-occur with self-corrections. Describer1's deictic gestures, finally, coincide with adverbial or prepositional spatial expressions, as exemplified in figure 1. These spatial expressions are either locative, relational or directional: 'left/right', 'next to', 'inside', 'in the middle of', 'moves along toward'. In figure 1, the locative expression, 'which is furthest to the left' is accompanied by a gesture indicating the left part of the stimulus picture.

Descr1: å i de finns en motor me en eh en fläkt [... som e längst ti vänster i kammarn]
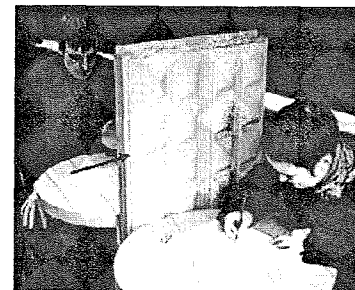
Descr1: and in there is an engine with a uh a fan [... which is furthest to the left in the chamber]

Figure 1. Gesture co-occurring with spatial expression. []=gesture stroke.

Deictic gestures in spatial descriptions

The deictic gestures in the data are particularly interesting, not only because of their numeral dominance, but for qualitative reasons. They differ from the deictics considered in most other studies both with regard to their reference and to their timing relative to the oral expressions.

As stated earlier, the literature on gestures is largely based on data from narratives. Deictic gestures in such data are generally pointing gestures which indicate seemingly empty space. However, these deictic gestures are in fact used to locate and track discourse referents in space. When a new referent is first mentioned, it is accompanied by a deictic gesture which locates and anchors the referent in space (e.g. Marslen-Wilson, Levy & Tyler 1982, McNeill 1992). The referent can later be tracked in space gesturally when the location is referred to again. These deictic gestures which co-occur with referential expressions are referred to as *abstract deictics* (McNeill, Levy & Cassell 1993).

In contrast to this, all deictic gestures in the present material have a concrete target and make clear reference to the actual picture/paper lying on the desk in front of the describer, as shown in figure 2. The deictic gestures are examples of *concrete* rather than abstract *deictics*. Figure 2 illustrates not only the *concrete* target of these gestures, but also how the paper serves as the point of departure for, or origo of, a deictic gesture. In this passage there is mention of a periscope sticking out of the pachyder-mobile. Describer1 is indicating how the periscope sticks out of the back of the elephant, and while doing so, he moves his hands up- and outwards *away* from the paper. The drawer on her side applies a strikingly similar
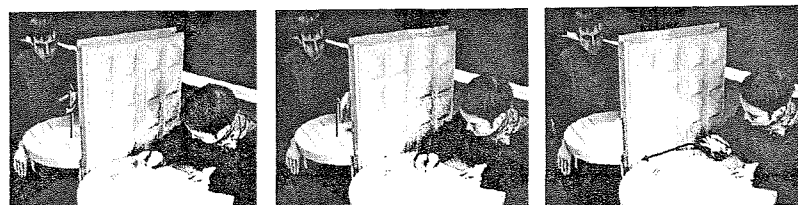
Descr1 du har ett peryskop ... precis [ovanför]	som [sticker upp] ur elefantens rygg om man säger så	**Drawer1** [ut ovanför elefanten också] **Descr1** aa prec utan u uppåt genom ... spränger igenom ryggen på elefanten kan man säga
Descr1 you have a periscope ... just [above]	that [sticks out] of the elephant's back as it were	**Drawer1** [out above the elephant as well] **Descr1** yeah prec but u up through ... breaks through the elephants' back you might say

Figure 2. Deictic gesture with the picture as its origo.

perspective, performing a deictic gesture which is also directed up and out away from the paper.[1]

Similar concrete deictic reference to a stimulus picture was reported in Marslen-Wilson et al. 1982. In that study, narrators were instructed to look at a cartoon in a comic book, and then to retell the story, while keeping the closed comic book on their laps. The narrators repeatedly pointed to the comic book in front of them, rather than at empty space. However, although the narrators in the Marslen-Wilson et al. study used deictics which were concrete in a broad sense, these gestures still coincided with the introduction of referents and served to anchor these. In other words, although the deictics indicated the concrete comic book, their reference was still abstract in the sense that they were referring to discourse referents. In the present study, on the other hand, the deictic gestures never coincide with referential expressions for discourse referents, but always with spatial expressions. Their co-occurrence with spatial rather than referential expressions is

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[1]In fact, the direction of Describer1's movement is interesting in itself. The describer moves his hand upwards towards the ceiling, rather than forward, which would correspond to 'upwards' in the perspective applied to the elephant in the picture. The direction of the movement seems to suggest that the describer is thinking of the periscope as it would be were he actually sitting in the pachydermobile. It is an absolute spatial perspective, in some sense. The drawer, on the other hand, seems to apply a spatial perspective closer to that of the picture.

paralleled by their truly concrete reference. The difference both in reference and timing in this study, then, is likely to be an effect of the discourse genre.

The spatial task results in discourse of a clearly instructional nature. There is no narrative structure to respect, no sequence of events to consider, but simply a listing of elements and their spatial orientation and direction. The spatial information is of greater importance here than the tracking of referents. Moreover, once the drawer has reproduced the referent being talked about, this referent assumes an unequivocal position, and need not be tracked further. The concrete deictic gestures are used to map out the spatial relationships explicitly, and coincide with the oral spatial expressions. Although the connection between pointing gestures and spatial expressions may seem straightforward enough, given that pointing gestures are there to indicate directions (*indicatio ad oculos*, Bühler 1934), it is still interesting that speakers perform such gestures even when they cannot be seen.

The visibility issue, or why we gesticulate

A recurring question in gesture research is why speakers gesticulate at all. The issue is re-actualised by data where the interlocutors gesticulate even if they cannot see each other.

It is well-known that speakers gesticulate when there is no eye-contact between interlocutors or even when there is no interlocutor present at all (although speakers gesticulate more in the presence of interlocutors) (e.g. Aboudan & Beattie 1996, Bavelas, Chovil, Lawrie & Wade 1992, Bavelas, Chovil, Coates & Roe 1995, Cohen 1977). It has been proposed that this is because gestures are part of the linguistic encoding process and, specifically, a reaction to obstacles in the verbalising process (e.g. Butterworth & Hadar 1989, Rimé 1982). In other words, gestures occur when the speaker cannot find an appropriate lexical item. It has also been suggested that gestures are a reflection of the conceptual image- and action-schemata underlying the verbalisation process (McNeill 1992). In this view, gestures are part and parcel of the expressive efforts and will normally occur with speech, and not only at points of encoding difficulties.

Without favouring or disfavouring either proposal, a third suggestion is feasible which would take cognitive as well as pragmatic aspects into account. From a cognitive point of view, it is reasonable to assume that gesticulation is a way for the describer to order and keep track of the
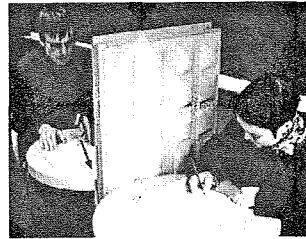
Descr1 dra linjen   ungefär i höjd me ögat
... aa rakt upp en linje från vänstra benet
Descr1 draw the line   about level with the eye
... yeah straight up a line from the left leg
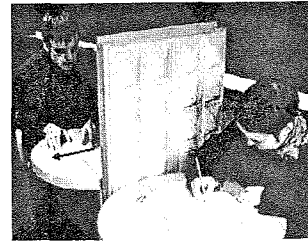
Figure 3. The describer tracing a line as if drawing.

transferral of visual data to an oral mode. One way for the speaker to achieve this would be to imagine what it is like to actually draw the picture. It is clear that the describer in a number of cases is "taking the other fellows point of view" (Fillmore 1971:41), or adopting the perspective of the other. A number of the gestures produced in this task are clearly performed against the paper as if the describer was drawing the picture himself.

Figure 3 illustrates this 'taking the perspective of the other' in action. Describer1 is seen executing the same movement that he is simultaneously instructing the drawer to perform, namely to draw a line upwards along the leg of the elephant. The second picture shows him tracing a line to indicate the upper cut-off point of the first line, towards a landmark, viz. the elephant's eye, which is an intrinsic direction. The drawer can be seen following the instructions with some delay. She is still drawing the line upwards from the leg when Describer1 is talking about the cut-off point.

The describer thus appears to be basing the selection of what information to transfer on the imagined experience of what it would be like to draw the picture. This would explain a number of the iconic gestures in the data. The concrete deictics may be accounted for in a similar manner. By accompanying the oral expression with a brachial movement towards the selected item, the speaker may reinforce the selection process on which the verbalising effort is based. Cognitive and pragmatic aspects would then be working in unison.

Visibility may also help explain the intriguing question of why there are no abstract deictics at all in the data. Since the construction of the descriptions in the present task is such that a new referent is first

introduced, and is then given an orientation in space (Gullberg et al. 1997), deictic gestures might have been expected to coincide with new referents accordingly. In figure 1, for instance, a deictic gesture would have been expected to occur with the introduction of the fan.

In narrative face-to-face discourse, where reference tracking is essential to comprehension, speakers can track referents gesturally by referring deictically to common discourse space which is seen by both interlocutors. However, in the spatial task, discourse space cannot be established as common ground between interlocutors who do not have eye contact. It would therefore not make sense to refer to discourse space using abstract deictics, and the interlocutors restrict their use of deictics to the concrete kind.

This analysis can be compared to the proposal by Bavelas and her colleagues (1992, 1995) that gestures are either topic gestures or inherently interactive. Topic gestures relate to the content of speech, whereas interactive gestures are said to be performed for the other person to see. It is suggested that interactive gestures do not occur in no-sight conditions. Although it is not altogether clear from the studies what gesture categories are to be considered as interactive, abstract deictics appear to make excellent candidates based on the observation of their distribution in this – admittedly restricted – material. When they cannot be seen, they do not occur. An interesting effect of this analysis would be that abstract deictics, which indicate empty/discourse space, are more interactive in nature than concrete deictics, which indicate real, present objects for the interlocutor to see. This opens up interesting perspectives, and deserves to be studied in greater detail.

Conclusion and summary

This study has briefly shown that both the discourse genre and the visibility condition has a pronounced effect on what type of gestures a speaker produces.

Spatial descriptions in a no-sight condition seem to generate more deictic gestures than other kinds of gestures, and specifically, more concrete than abstract deictics. In addition, these concrete deictic gestures tend to co-occur with oral spatial expressions rather than with referential NPs, as is the case for abstract deictics. It was suggested that the lack of abstract deictics in the data is a result of the no-sight condition. Abstract deictics refer to discourse space which is common to interlocutors. In the absence of a common visual

space, there are no such gestures. In contrast, the production of concrete deictics appears to be a reflection of the describer's effort to take the perspective of the other in solving the task.

The validity of the tentative results presented here obviously needs to be tested against a bigger set of data. More subjects should be included in order to ascertain that the results from this study truly reflect effects of the discourse type and not individual gestural preferences. However, the tendencies detected suggest that it would be worthwhile to collect data systematically covering combinations of discourse genres and visibility conditions. By analysing and contrasting narrative and spatial description data in both visibility conditions, more facts should be uncovered about how and why speakers use their gestural repertoire.

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