3 The influence of addressee location on spatial language and representational gestures of direction

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1 Introduction

How do speakers refer to their experiences of spatial relations? Verbal language is one modality through which we can express spatial relations. However, speakers' expressions of spatial relations are not limited to those of the verbal modality but are often accompanied by so-called 'iconic' or 'representational' gestures (McNeill 1992; Kendon 1980). For example, when a speaker is expressing a motion upwards, she can say "the cat climbed up the drainpipe" and move her hand upwards to represent the direction of a cat's motion upwards during her utterance.[1] If this is the case, then we have to understand speakers' use of representational gestures along with their use of spatial language in order to understand how speakers refer to spatial relations.

One way to understand spatial reference by spatial language and gestures is to assume that speakers' verbal and gestural expressions of space *represent* or *encode* the spatial relations as experienced. That is, there is a one-to-one coding relationship between the linguistic form and the representational gestures on the one hand and preexisting spatial experiences on the other. For example, some researchers argue that representational gestures derive from spatially encoded knowledge and help conceptualize the spatial relations that will be expressed in speech (Rauscher, Krauss & Chen 1996).

However, in this chapter I am going to argue and show empirically that speakers' verbal and gestural expressions of space, and specifically those of direction, cannot simply be explained by a one-to-one coding relationship between these expressions and the preexisting world of spatially encoded knowledge. Rather I will argue that reference by spatial language and gestures has to be explained *in relation to the social and spatial context* in which they are produced. I will demonstrate this by showing that speakers change their gestural and verbal expressions to refer to the same spatial content, depending on where their addressees are located during the speech event.

I will start with an example from my data to specify the nature of the problem. A speaker is talking about a cartoon event she has watched on a video screen. In this particular scene, a character (Granny) is throwing a cat (Sylvester) out of a window onto the street. As the speaker saw the cartoon on the video screen, the window was located on the left side of the screen and the street was on the right side. During her telling, the speaker had two addressees, one to her left and one to her right, and the three participants were sitting at the three points of a triangular space (see Figure 3.1).

The way this speaker expresses Granny's motion of throwing Sylvester out onto the street in her speech is as follows: "She throws him out." If we look at her gesture, we notice that she expresses additional information about this motion event. While she is uttering this sentence her arm moves from the triangular space in front of her towards the space behind her. In this way she expresses the direction of the motion in her gesture as well as in her speech.

This narrator could have expressed the same direction of motion in many different ways. For example, she could have used a different choice of preposition (e.g., "she throws the cat *across* the street") or a different gesture orientation. Instead of moving her arm from the space in front of her towards her back, she could have moved her hand forwards and towards the space in front of her. Actually, this would have corresponded to the action performed by the character, for Granny did her throwing by moving her hands forward and down.

What, then, could have motivated this speaker to choose this particular preposition of direction ("out") along with this particular gesture orientation (backwards), which did not necessarily represent the information as it is observed? If we look at her speech and gesture in relation to the extralinguistic spatial context, we notice that while she was saying "She throws him out," her gesture was not only moving backwards but also moving *out of* the triangular space shared by all the participants. That is, in order to refer to the spaces in the cartoon, she might have used the extralinguistic spatial context by moving her gesture out of the space shared by the three participants. This way, she could have created a context for the interpretation of the linguistic expression "out" and thus referred to the represented event. Therefore, this narrator may have adapted her speech and gesture orientation to the extralinguistic spatial context shared by the addressees instead of *mapping* her expression onto the information observed on the video screen.

This example illustrates the questions this chapter focuses on: Do speakers use spatial language and representational gestures of direction in relation to the social and spatial context of the utterance, specifically to the location of their addressees? If spatial context has an impact on how spatial
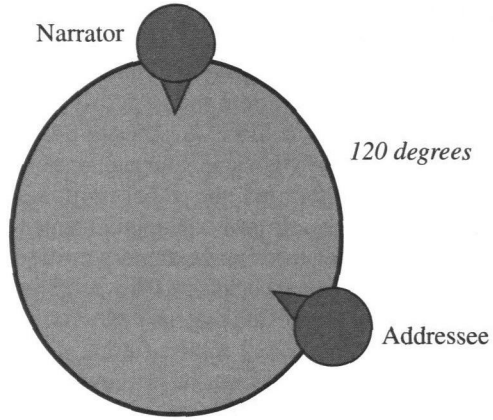
Dyadic condition
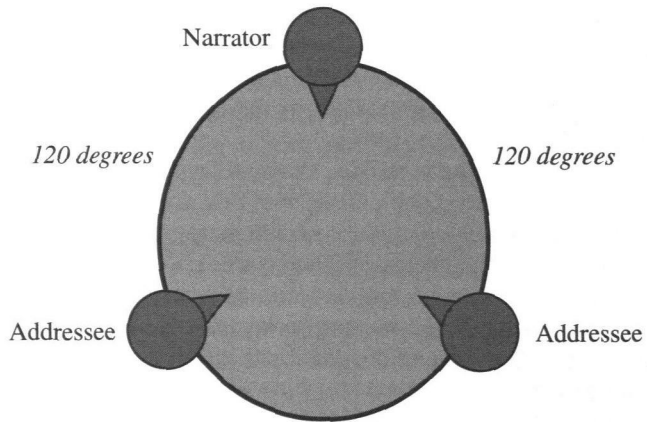
Triadic condition

Figure 3.1. Dyadic and Triadic addressee configurations used in the experimental group.

relations are expressed, then spatial reference needs to be explained with a theory of spatiality where these three aspects of the communicative event are taken into account. Speakers' construal of spatial meaning might be dependent on the integration of verbal spatial expressions, representational gestures, and the extralinguistic spatial context of the utterance.

1.1   Relationship between speech and gesture: an integrated system of two modalities

The word 'gesture' is used for a number of distinct phenomena that involve body movements in communicative situations (Kendon 1997). However, in this paper the focus will be on what McNeill (1992) has called the "spontaneous gestures" that accompany speech. These gestures are mostly hand movements performed during speaking[2] and are related in meaning to the linguistic segment they accompany. For example, when a speaker is expressing motion upwards, she can say "the cat climbed up the drainpipe" while moving her hand upwards and in this way convey the meaning of UP also in her gesture. These spontaneous gestures have characteristics different from those used in sign languages (e.g., ASL) or so-called emblems (e.g., the OK sign in American culture), where the form–meaning relationships of the gestures are socially determined and fixed. Spontaneous gestures do not have a preestablished form–meaning relationship; their meaning is determined on-line with each performance.[3]

McNeill (1992) has identified four kinds of relation between spontaneous gestures and speech used in narrative communication: iconic, metaphoric, beat, and abstract deictic. Some spontaneous gestures are 'iconic' (representational), that is, they represent objects and events by virtue of their resemblance to them. 'Metaphoric' gestures represent images of abstract referents. 'Beat' gestures are rhythmic movements of the hand that do not resemble the objects and events mentioned but index the pragmatic function of the speech they accompany, such as introduction of a new episode, and so on. 'Abstract deictics' point to locations of entities or characters within the gesture space.

1.1.1   Reference to direction by speech and gesture. This study will focus on iconic/representational gestures, especially those that accompany verbal expressions of motion events[4] and depict the direction or trajectory of the moving figure. In English, the direction of the motion event is expressed mostly by spatial prepositions or path adverbials that express the path of the moving figure (Talmy 1985). However, in many cases not only speech but also representational gestures give information about the directionality

of the motion event.[5] For example, in the utterance "the cat was running forwards," "forwards" gives information about the direction of the motion event. In uttering this sentence, the speaker might also move her gesture forwards and away from herself to refer to the direction of the cat's motion.

Representational gestures of direction can also convey meaning that is not expressed in speech. They express the viewpoints of the speakers who describe the direction (McNeill 1992). For example, describing the motion of a figure observed as going from right to left, a speaker's gesture can convey an 'observer' viewpoint if the gesture also goes along a right-to-left axis (representing the motion as it was observed). It conveys a 'character' viewpoint if it moves along a sagittal axis, that is, away from the speaker's body (representing the motion from the viewpoint of the moving figure). In most cases, the viewpoint and the direction are not expressed in speech but only in gesture. For example, the utterance "the cat was running ø" can be accompanied by a gesture in a forward orientation (character viewpoint) even though there is no mention of direction or viewpoint in speech.

Thus both speech and gesture contribute in a complementary way to the achievement of reference to direction. That is, they "express different aspects of the same meaning unit and comprise together a more complete unit of meaning than either does alone" (McNeill 1997: 2). In this chapter I will address the issue of whether the extralinguistic spatial context also has an effect on the way reference to direction is established by gesture and speech. That is, do speakers represent the direction as they have observed it, or do they change their verbal and gestural expressions of direction in relation to the spatial context of the speech event?

1.2   Relationship between language and extralinguistic spatial context

Among many others, Goffman (1974), Duranti (1992), Duranti & Goodwin (1992), Hanks (1990, 1992), and Agha (1996) have shown that the extralinguistic spatial context in which communicative activities are performed is never neutral but rather is meaningful for the encoding and interpretation of linguistic forms. For example, Duranti (1992) has shown that the performance and interpretation of the words used in Samoan ceremonial exchange are contingent upon the participants' occupation of particular positions in the house. Furthermore, with regard to spatial reference, Hanks' (1990) study of Yucatec Maya deictic particles shows that linguistic forms both encode and are dependent upon a socioculturally organized space, that is, the social space defined by the bodies of the participants in the speech event. According to Hanks, each deictic category encodes a *relation*, between some *referent* and the *indexical ground*, of the utterance. In the use of verbal deictic expressions, speakers make reference to spatial

locations in relation to an indexical ground, that is, to the here-and-now of the utterance. Hanks has shown that social space among the participants is an important aspect of how the indexical ground is organized and thus determines the meaning of the deictic expressions used.

The present study attempts to go beyond the recent findings on spatial reference by gesture, speech, and spatial context in two ways. On the one hand, in contribution to McNeill's (1992) framework of speech and gesture, it tries to show that extralinguistic spatial context also serves as an important component of how speakers convey spatial meaning using speech and gesture. On the other hand, in relation to studies of language and spatial context, it attempts to show that representational gestures might also serve as a context for the use and interpretation of linguistic forms (see Agha 1996 for a similar view). Thus this study links the gap among these two lines of research by investigating whether or not speakers use their verbal and gestural expressions in relation to the extralinguistic spatial context of the utterance. Speakers' choice of representational gestures and spatial language in expressing directionality can depend upon an indexical relation to the spatial positioning of the participants in the speech event.

If speakers use their gestures and spatial language in relation to the spatial context, then they might use different spatial language and gesture orientations to express the same referential content, depending on the relative positioning of the participants in the utterance context. In order to test this hypothesis I will examine the effect of changes in addressee location on gesture orientation and spatial language using a narration task that has been extensively used in research on gesture production (the cartoon narration task used by McNeill 1992).

2   The present study

The present study tests the hypothesis that speakers use different spatial language and gesture orientation to express direction, depending on where their addressees are located. In the study, participants watched an animated cartoon and were asked to narrate it twice. The participants were assigned to two groups, one experimental and one control group. In the experimental group the addressee location was varied from having one addressee to the side of the narrator (Dyadic condition) to having an addressee on each side (Triadic condition). In the control group the addressee location was kept constant each time the narrator told the story. It was expected that the narrators would express information about the direction of motion events differently in speech (i.e., with different spatial prepositions) and gesture orientation (i.e., with different axes) in each telling of the cartoon, and that this change would be greater in the experimental than in the control group.

2.1   Method

2.1.1   Subjects.

A total of sixteen speakers participated as narrators, and an additional forty served as addressees in the experimental and control groups. All the participants were native speakers of English and were chosen from among University of Chicago undergraduates.

2.1.2   Procedure.

The participants were randomly assigned to the experimental and control groups. Later, participants in each group were randomly assigned to the narrator and addressee roles. Each narrator watched the seven-minute action cartoon.[6]

The task was presented as storytelling. The instruction sheet explained that a cartoon would appear on the TV screen and that the narrator would watch the cartoon and then tell it to different addressees two different times. While the narrator watched the cartoon, the addressees waited outside the experiment room. Following the cartoon, the addressees were brought in for each telling. Both tellings were videotaped.

In the Triadic experimental condition, one addressee was seated to each side of the narrator. For the Dyadic condition, a new addressee was seated on only one side of the narrator (see Figure 3.1 for the seating arrangements).

The order of conditions was counterbalanced for each narrator. Four narrators told the cartoon first when there were two addressees (Triadic condition) and retold it when there was one addressee (Dyadic condition). The remaining four narrators told the cartoon first when there was an addressee on one side (Dyadic condition) and retold it when there were two addressees (Triadic condition). Furthermore, during the tellings in the Dyadic condition, four addressees were seated to the right of the narrators, and the remaining four addressees were seated to the left of the narrators.

In the control group, one addressee was seated to one side of the narrator during each telling. The seating arrangement was exactly same as in the Dyadic condition of the experimental group. After the narrator watched the cartoon, the first addressee entered and was seated on the left or right side of the narrator. After the first telling, the other addressee was brought in and was seated at the same place as the first addressee. That is, if the first addressee was seated on the right side, the second addressee was also placed on the right side. The order of conditions was counterbalanced. Four narrators told the cartoon when their addressees were seated to their left. The remaining four narrators told the cartoon when their addressees were seated to their right.

2.1.3   Coding.

Each narration was transcribed and segmented into clauses. From all clauses, those that described motion events (e.g., Granny

throws Sylvester out of the window) were sorted out. (See the appendix for the list of the motion-event scenes coded in the cartoon.) For each motion-event clause, its accompanying gesture phrase was coded.[7]

Subsequently, each gesture phrase was coded for the orientation of its trajectory. Gesture orientations were classified into four categories: (a) *Lateral* (left/right), (b) *Vertical* (up/down), (c) *Frontal* (forwards/backwards), and (d) *Diagonal* (two types were identified: (i) Vertical Diagonal: from one upper side (left/right) of the body to the opposite lower side (left/right), and vice versa; (ii) Horizontal Diagonal: from one side (left/right) closer to the body to the opposite side (left/right) away from the body, and vice versa). To help obtain consistency and objectivity of classification, each gesture motion was drawn on a transparency placed on the TV screen.

For each narrator, the speech and gesture combinations that expressed the same motion-event scene (e.g., Granny throws Sylvester out the window) in both narrations were identified. If a narrator mentioned Sylvester's being thrown out of the window in both narrations, those speech and gesture combinations were selected. Next, within each gesture and speech combination, each gesture phrase was coded for whether it retained the *same* orientation or *differed* (e.g., Frontal vs. Lateral) across the two tellings for each narrator. Also, each verbal expression was coded for whether the narrator used the same or different spatial prepositions or path adverbials to refer to the same motion event in both narrations. For example, if the narrator said, "She threw him *out onto* the street" in one narration but said, "She threw him *across* the street" in the other narration, this was coded as *different*.

2.2   Results and discussion

For the first analysis, the mean percentage of total speech and gesture combinations that changed across narrations were calculated across narrators. Table 3.1 summarizes how frequently narrators changed their speech and gesture together, changed speech only, or changed gesture only, across narrations in the experimental and control groups.

The table shows that while narrators in the experimental group changed 73% of all their speech and gesture combinations across narrations, the control group changed only 53% of their speech and gesture combinations. Therefore, narrators changed their speech and gesture combinations more frequently when the addressee location varied than when it remained constant. The table also shows that the difference between the groups was mostly due to changes in gesture only. While the percentage changes in both speech and gesture (23% vs. 20%) and speech only (10% vs. 20%) were similar between groups, changes in gestures only (40% vs. 13%) were more

Table 3.1. *The mean percentage of total speech and gesture combinations that changed across narrations in the control and experimental groups*

	Both speech and gesture (%)	Speech only (%)	Gesture only (%)	Total change (%)	Total no. of speech–gesture combinations
Experimental group	23	10	40	73	103
Control group	20	20	13	53	88

frequent in the experimental group than in the control group. Thus this showed that the total difference between the experimental and control groups was mostly due to changes in the narrators' gestures only.

For a further analysis, percentage changes in gesture and percentage changes in speech were calculated separately for each narrator in the experimental and control groups. Narrators in the experimental group changed 63% of their gestures but only 33% of their speech across narrations. That is, they changed their gesture orientations more than half the time, but not their speech. However, in the control group, percentage change in gestures was similar to that of speech, and both changes happened less than half of the time; overall 33% of the gestures and 40% of the speech changed across narrations. This analysis also showed that variation in the addressee location influenced narrators' change in gesture orientation but not their speech.

Therefore, narrating a story in different addressee locations changed narrators' expressions of the same content. Yet this change was due mostly to changes in gesture rather than in speech. This was contrary to the initial expectation that spatial language would also be influenced by the changes in the addressee location. If changes in addressee location change speakers' gesture orientations, then what is the nature of these changes, and how can they be explained in relation to where the addressees are located?

2.2.1   How did narrators change their gesture orientation? Further analysis was conducted to see which gesture orientations were influenced by the changes in addressee location and how these influences were manifested. Mean proportions of total gestures perfomed along the Lateral, Frontal, Diagonal, and Vertical axes were calculated for the experimental group (see Figure 3.2).

Paired sign tests on these proportions showed that changing the addressee location between the Dyadic and Triadic conditions had an effect mainly on the Frontal (forwards/backwards) and Lateral (left/right) gesture
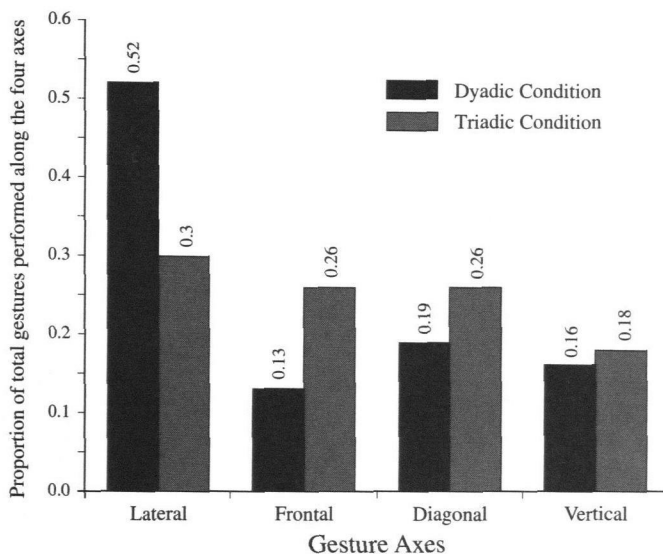
Figure 3.2. The effect of change in addressee location (Dyadic vs. Triadic) on the use of gesture orientations.

axes. Speakers used significantly more Lateral gestures in the Dyadic condition than in the Triadic condition (p < .001). On the other hand, they preferred Frontal gestures more in the Triadic condition than in the Dyadic condition (p < .001). There were no significant differences found between the Vertical and Diagonal orientations. Thus, changing the addressee location between the Dyadic and Triadic conditions influenced gesture orientation mostly along the Lateral and Frontal axes. That is, the same motion event was represented with a gesture with Lateral orientation in the Dyadic context but with a Frontal orientation in the Triadic context.

However, it is possible that the Frontal and Lateral axes are orientations that are the most likely to be altered by speakers in general, and preferences are not necessarily related to where the addressees are located. In order to rule out this factor, a similar analysis was conducted on narrators' changes of gesture orientation in the control group. Even though changes of gesture orientation occurred less than half the time in the control group (33 percent), the question still remained whether the changes that did occur were along the Frontal and Lateral axes, as in the experimental group.

For this analysis, the mean proportions of total gestures performed along the four axes were calculated for the control group (see Figure 3.3). Paired sign tests showed that repeating motion events with an addressee in
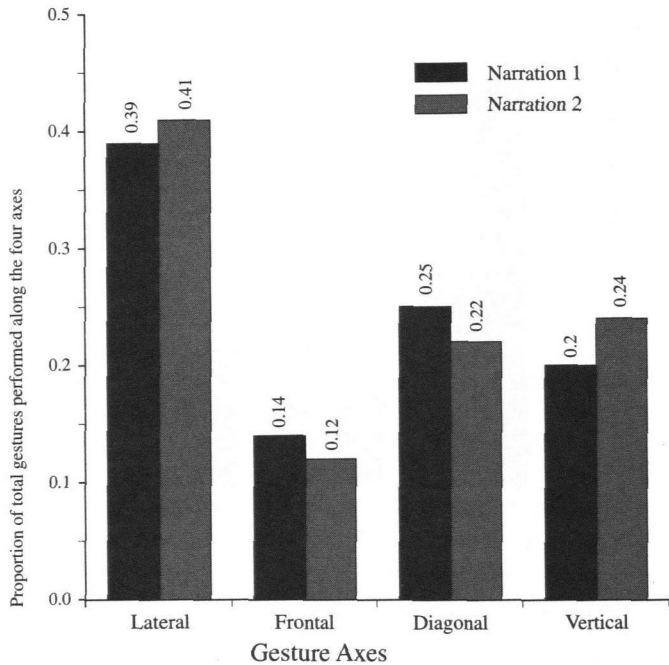
Figure 3.3. The effect of retelling in the same addressee location on gesture orientation.

the same location did not have an effect on the orientation of the gestures ($p > .05$). That is, narrators used similar proportions of Lateral (0.39 and 0.41), Diagonal (0.25, 0.22), Vertical (0.20, 0.24) and Frontal (0.14, 0.12) gestures in two narrations. Therefore, the shifts in gesture orientation along the Frontal and Lateral axes in the experimental group were not due to having told the narration twice, but were due to changes in the addressee location. Narrators in the experimental group were adjusting their gesture orientations according to where their addressee(s) were positioned.

2.2.2   Are changes in gesture orientation and speech related? How, then, can we explain the changes in gesture orientation from Lateral to Frontal axes? Why, for example, did narrators choose to express the direction of motion with a backwards (Frontal axis) gesture while saying "she throws him out" when the addressee context was Triadic but with a right-to-left gesture (Lateral axis) when there was one addressee located at the right side?

Following McNeill's theory about the integration of gesture and speech

meaning, one would expect changes in gesture orientation to be related to the meaning conveyed in speech. However, we have found that speech did not change significantly with changes in addressee positioning and that only gesture did. Yet changes in gesture orientation might still be related to what is conveyed in speech and also to the spatial configuration of the space shared by the narrator and the addressees. For example, while the narrator says "she throws him out," her gesture might move backwards in the Triadic context. In this sense, her gesture would be not only moving backwards but also moving *out of* the triangular space shared by all the participants. Similarly in the Dyadic context, the space shared by the participants could be located to the side of the narrator, and her gesture could convey the meaning of "out" by moving laterally out of this shared space.

If shifts in gesture orientation are related to what is conveyed in speech and also to the space shared by the participants, then these shifts could occur when gesture accompanies certain spatial prepositions but not others. That is, gesture shifts might occur more frequently accompanying some prepositions such as *in* or *out*, where the gesture orientation could also convey meaning (e.g., OUT) by moving into or out of the shared space, but occur less frequently when they accompany such prepositions as 'across'.

However, there might be another explanation for the shifts in gesture orientation. That is, shifts in gesture might not be related to meaning conveyed in speech at all, but to their visibility by addressees. For example, one might say that the narrators used Frontal gestures in the Triadic context rather than Lateral gestures because gestures along a Frontal axis were perceived more easily by both addressees on each side. On the other hand, Lateral gestures could not have been perceived efficiently by both addressees in the Triadic context (the gesture would have been performed towards one of the addressees but away from the other at the same time). Therefore narrators could have shifted from Lateral to Frontal gestures in the Triadic context so that they could be seen better by both addressees. If this were the case, then shifts in gesture orientation would occur no matter which spatial preposition was used and thus would not be specific to what is expressed in speech.

In order to answer these questions, I selected eight motion-event descriptions in which the motion was represented along a right-to-left axis on the video screen. These motion events could be expressed along a front-to-back axis as well as on a right-to-left axis, depending on the viewpoint chosen by the narrator. (See the appendix for the description of these motion events with the orientation represented in the cartoon.) Three of these scenes represented a character's motion IN to a building or window (motion from right to left), two of them represented motion OUT of a building/window

Table 3.2. *Mean proportions of total gestures performed along Lateral and Frontal axes used for describing motion* IN

	Lateral axis	Frontal axis	Total no. of gestures
Dyadic condition	0.57	0.21	17
Triadic condition	0.21	0.61	15

(motion from left to right), and three of them represented motion ACROSS from one building to another (motion from right to left). Verbal clauses where the narrators described these scenes using spatial prepositions (*in*, *into*, *out*, and *across*) were located in all narrations. Analysis was made of Lateral and Frontal gesture orientations that accompanied verbal descriptions of these scenes.

The mean proportions of total gestures performed along Lateral and Frontal axes were found for descriptions of motion IN (see Table 3.2). Wilcoxon Signed Rank tests of these proportions showed that narrators used significantly more Lateral gestures when the addressee context was Dyadic than Triadic ($p < .05$) and more Frontal gestures when the addressee context was Triadic than Dyadic ($p < .05$). All the Frontal gestures were in the forwards orientation, that is, moving away from the narrator's body and towards the addressee.

Furthermore, an analysis was made of the location of the Lateral gestures in the gesture space in the Dyadic condition. The aim was to find out whether the location of Lateral gestures in the gesture space would change in relation to whether the addressee was seated to the right or to the left. In all the IN motion scenes, the figure in the cartoon event was moving from the right to the left on the video screen (Sylvester running into Tweety's building on the left), and all the narrators' Lateral gestures also moved from right to left. However, where the gestures were performed in relation to the narrator's body differed along with changes in the addressee location. When the addressee was seated to the left, the narrators moved the hand from the mid-sagittal line of the body towards the left (5 out of 6 Lateral gestures and three out of four narrators preferred this location). In contrast, when the addressee was seated to the right, the narrators moved the hand from the peripheral right side towards the mid-sagittal line of the body (4 out of 6 Lateral gestures and three out of four narrators). Thus, most of the gestures describing IN motion were performed *towards* wherever the single addressee was located.

A similar analysis was conducted on the mean proportions of total ges-

Table 3.3. *Mean proportions of total gestures performed along Lateral and Frontal axes used for describing motion OUT*

	Lateral axis	Frontal axis	Total no. of gestures
Dyadic condition	0.60	0.20	17
Triadic condition	0.12	0.66	15

tures performed along Lateral and Frontal axes for the descriptions of OUT motions (see Table 3.3). Wilcoxon Signed Rank tests of these proportions showed that narrators used significantly more Lateral gestures when the addressee context was Dyadic than Triadic ($p < .05$) and more Frontal (backwards) gestures when the addressee context was Triadic than Dyadic ($p < .05$). Thus, the shift between the Frontal and Lateral axes occurred for descriptions of OUT motion as well as for descriptions of IN motion. However, one difference was that all the Frontal gestures in the descriptions of OUT motion were moving backwards and away from the addressees rather than moving forwards and toward them. Even though the motion on the TV screen could not be represented by a backwards motion, narrators consistently performed backwards rather than forwards gestures.

Further analysis was made of the location in gesture space of Lateral gestures in the Dyadic condition. In all OUT motion scenes the figure in the cartoon was moving left to right across the video screen. Again, the narrators' Lateral gestures also moved from their left to their right, but the location of their gestures changed in relation to their bodies depending on where the addressee was located. When the addressee was seated to the left, the narrators moved the hand from the left side of their bodies towards the right side of their bodies (4 out of 5 gestures and three out of four narrators). In contrast, when the addressee was seated to the right, the narrators moved the hand from the right side of their bodies towards their peripheries and further right (4 out of 6 gestures and three out of four narrators preferred this location). Thus, most of the gestures describing motion OUT were performed *away* from wherever the addressee(s) was located.

Last, a similar analysis was conducted on the mean proportions of total gestures performed along Lateral and Frontal axes used for the descriptions of ACROSS motion (see Table 3.4). Wilcoxon Signed Rank tests conducted of these proportions did not show a significant difference in the use of Frontal or Lateral gestures across the conditions ($p > .05$). Furthermore, the location of the Lateral gestures in the Dyadic condition did not change consistently in relation to the addressee's location on the right or the left.

Table 3.4. *Mean proportions of total gestures performed along Lateral and Frontal axes used for describing motion ACROSS*

	Lateral axis	Frontal axis	Total no. of gestures
Dyadic condition	0.34	0.55	21
Triadic condition	0.32	0.38	16

Thus, unlike the descriptions of IN and OUT motions, the gesture orientations that accompanied verbal descriptions of ACROSS motion did not change with differences in addressee location.

These results show first of all that narrators change their gesture orientations in relation to the meaning conveyed in speech. They changed their gesture orientations accompanying their descriptions of IN and OUT motions but not ACROSS motion. Therefore, changes in gesture orientation with changes in addressee location cannot be explained by the visibility of the gestures. If the gestures had been changed to be better seen by the addressees, then we would also observe changes in the descriptions of the ACROSS motion, but we did not. Furthermore, we saw that in descriptions of OUT motion, gestures were moving *away* from the addressees and thus were *less* visible to them. Thus, narrators were monitoring the changes in their gesture orientation in relation to what they expressed in their speech rather than trying to make them more visible to their addressees.

Furthermore, these kinds of change in gesture orientation in verbal descriptions of IN and OUT motions suggest that speakers were taking the space shared by the participants into account. Gestures describing IN motion were performed *towards* wherever the addressee was located. On the other hand, gestures accompanying verbal descriptions of OUT motion were performed *away* from wherever the addressee was located (even though the backwards gestures in the Triadic condition violated what was observed on the TV screen). These findings can be interpreted to suggest that speakers' gesture orientations conveyed meaning both in relation to what was expressed in speech and also in relation to the space shared by the participants in the speech event. That is, gestures accompanying the verbal descriptions of IN motion were not only moving towards the addressees but also *into* the space shared by all the participants. For example, by saying "in" and moving the arm forwards in the Triadic condition, the narrators could also mean 'into the space we share together', in order to represent Sylvester's motion in the building. On the other hand, in the Dyadic context, the space shared by the participants could be to the side of the narrator, and a gesture could convey the meaning of "in" by moving laterally

into this shared space. Similarly, gestures accompanying verbal descriptions of OUT motion were not only moving away from the addressees, but also *out of* the space shared by all the participants. For example, in the Triadic condition, backwards gestures were moving out of the space shared by the two addressees, but in the Dyadic condition they were moving laterally out of the shared space that was to the side of the narrator. In contrast, gesture orientations that accompanied verbal descriptions of ACROSS motion did not convey meaning in relation to the shared space and thus were not influenced by changes in addressee location. One explanation for this is that speakers could not convey the meaning of ACROSS by moving their gestures into or out of the space shared by the participants. That is, the meaning of ACROSS does not change with respect to shared space.[8]

3   Conclusions and general discussion

The initial aim of this chapter was to understand how speakers achieve spatial reference by using spatial language and gestures. I have shown that speakers' use of spatial language and gestures is motivated not only by spatial relations as experienced or encoded but also by the social and spatial contexts in which they are produced. That is, speakers' construal of spatial meaning is dependent upon and can be understood in terms of the way verbal spatial expressions and gestures are used in relation to the spatial context of the utterance. I demonstrated this by showing that speakers' representational gestures and the spatial language of direction can be influenced by changes in addressee location.

How did changes in addressee location influence the speakers' spatial language and representational gestures? The results of the two studies have shown that changes in addressee location changed gesture orientation but did not change what is expressed in speech directly. However, the changes in gesture orientation were not obvious. That is, they could not simply be explained by the speakers' mere global adaptation of their orientations to wherever their addressees were located. The changes could be understood, in line with McNeill's theory, only by taking into account what was expressed in speech. That is, speakers changed their gesture orientation when they were expressing in their speech the spatial relations of IN and OUT motions but not when they were expressing ACROSS motion in speech. Furthermore, the detailed analysis of the gesture shifts and the type of spatial configuration of the addressees suggested that speakers were taking the 'shared space' among the participants into account. They were changing their gesture orientations so that their gestures were moving *into* the shared space when they accompanied expressions of "in." Similarly, speakers were changing their gesture orientations so that their

gestures were moving *out of* the shared space when they accompanied expressions of "out." That is, even though the narrators' speech remained the same, their gesture orientations changed in different contexts to keep the meaning conveyed by speech and gesture the same (i.e., IN, OUT). This shows that it is neither speech alone nor gesture alone but the meaning they convey *together* that is sensitive to addressee location in the speech event.

These results have further implications for, on the one hand, theories of spatial reference and, on the other, understanding cognitive processes during speech and gesture production. Theories explaining spatial reference by spatial language only (e.g., Talmy 1985; Langacker 1987; Jackendoff 1983) have to take into account not only the linguistic categories of spatial relations but also the features of gestures (such as orientation) and the features of extralinguistic spatial context (e.g., shared space). Gesture orientation was found to map onto speech semantics and not only onto the visual image of the observed event. That is, speakers' gesture orientations accompanying verbal expressions of "in" and "out" represented the direction of the motion in ways integrated to how the motion was encoded in speech instead of merely mirroring the observed event. Furthermore, the socio-spatial context is part of how this meaning is conveyed, in this case serving as a bounded region for the trajectory of the gesture to move into or out of. Last, the results of this study show that gestures and the spatial prepositions of IN and OUT motions do establish reference, at least for the scenes I have analyzed, by transposing the spatial context of the speech event, in a particular relation, to the spaces of the narrated event. That is, oriented gestures and spatial prepositions of IN and OUT motions might serve the function of 'transposition' or even 'lamination' (Goffman 1981; Haviland 1993) of the two grounds (that of the narrated event and that of the speech event). In this sense they serve the same function as that of *linguistic shifters* (Jakobson 1971 [1957]; Silverstein 1976). Thus, all these findings suggest that we can learn more about how speakers construe meaning with spatial language by taking gestures and the sociospatial context into account.

The results also have implications for theories of the cognitive processes underlying gesture and language use. Some researchers argue that representational gestures derive from spatially encoded knowledge (Rauscher, Krauss & Chen 1996; Krauss, Chen & Gottesman, this volume) or from spatio-temporal representations (de Ruiter, this volume). However, here I have shown that gestural expressions do not represent spatio-temporal representations by a one-to-one mapping onto how images are encoded. Rather they change depending on the linguistic expressions they accompany and the contexts in which they are produced. Among the models pro-

posed so far in this volume, only the Growth Point (see McNeill & Duncan, this volume; McNeill, this volume) model seems to take into account context – that of the narrative context – as a feature that might influence the production of verbal and gestural expressions. However, this chapter has shown further that not only the narrative but also the extralinguistic spatial context influences the way spatial relations are expressed by gestures and speech. Spatial reference by gestures or language has to be explained as an integration among speech, the gestures that accompany speech, and the context of the utterance.

Appendix

Motion events in the cartoon	Direction of the motion event on the TV screen
Episode 1	
*1.1 Sylvester runs across the street from his building	Right to Left
*1.2 Sylvester runs into Tweety's building	Right to Left
*1.3 Sylvester flies out of Tweety's building (he is kicked)	Left to Right
Episode 2	
2.1 Sylvester climbs up the drainpipe	Vertical (upwards)
*2.2 Tweety flies in the window	Right to Left
*2.3 Sylvester flies in the window after Tweety	Right to Left
*2.4 Granny throws Sylvester out of the window	Left to Right
Episode 3	
3.1 Sylvester climbs up inside the drainpipe	Vertical (upwards)
3.2 Tweety drops a bowling ball down the drainpipe	Vertical (downwards)
3.3 Sylvester falls down the drainpipe with a bowling ball inside	Vertical (downwards)
3.4 Sylvester falls out of the drainpipe	Motion towards the watcher
3.5 Sylvester rolls down the street.	Left to Right
3.6 Sylvester rolls into a bowling alley	Motion away from the watcher
Episode 6	
*6.1 Sylvester swings across from his building to Tweety's building with a rope	Right to Left
6.2 He hits the wall next to Tweety's window	Motion away from the watcher
6.3 He falls down the wall	Vertical (downwards)
Episode 8	
*8.1 Sylvester runs across the wires from one building to another	Right to Left

Note:
* Motion events used in the analysis of descriptions of motion IN, OUT, and ACROSS.

NOTES

1 It has also been shown that speakers use representational gestures more frequently during phrases of spatial content than with other content (Rauscher, Krauss & Chen 1996).

2 Furuyama (this volume) has shown that in conversational data some gestures are produced without speech accompaniment. However, this is almost never the case in narrative communication.

3 See McNeill & Duncan (this volume) for more on the integration of linguistic and gestural meaning.

4 A motion event has been defined by Talmy (1985) as a directed motion that results in the change of a location.

5 In the narrations studied by McNeill et al., 90 percent of the motion events expressed in speech are accompanied by directional gestures (McCullough 1993).

6 For a detailed scene-by-scene description of the cartoon, see McNeill (1992).

7 Gesture coding was carried out using McNeill's (1992) conventions. According to these conventions, gestures have three phases in their production: a preparation phase, a stroke, and a retraction phase or hold. All three phases constitute a gesture *phrase* (Kendon 1980). In the preparation phase, the hand(s) move from a rest position to the position where the gesture stroke is to be executed. This is followed by the stroke, which is the main part of the gesture and is identified in both semantic and kinetic terms. Semantically, it is the main meaning-bearing part of the gesture. Kinesically, it is the part of the the gesture that is carried out with the most effort or tension. The retraction phase is when the hand returns to its rest position.

8 It is possible that speakers pointed to the locations of landmarks (e.g., buildings) in the gesture space by using abstract deictics and performed their ACROSS gestures in relation to these spaces previously pointed at. Thus space previously created by the narrator in the gesture space could have provided a context for the meaning of ACROSS, rather than the shared space among the participants.

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