

# Spatial perspective choice in ASL

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Two studies investigated the ramifications of encoding spatial locations via signing space for perspective choice in American Sign Language. Deaf signers ("speakers") described the location of one of two identical objects either to a present addressee or to a remote addressee via a video monitor. Unlike what has been found for English speakers, ASL signers did not adopt their addressee's spatial perspective when describing locations in a jointly viewed present environment; rather, they produced spatial descriptions utilizing *shared space* in which classifier and deictic signs were articulated at locations in signing space that schematically mapped to both the speaker's and addressee's view of object locations within the (imagined) environment. When the speaker and addressee were not jointly viewing the environment, speakers either adopted their addressee's perspective via referential shift (i.e., locations in signing space were described as if the speaker were the addressee) or speakers expressed locations from their own perspective by describing locations from their view of a map of the environment and the addressee's position within that environment. The results highlight crucial distinctions between the nature of perspective choice in signed languages in which signing space is used to convey spatial information and spoken languages in which spatial information is conveyed by lexical spatial terms. English speakers predominantly reduce their addressee's cognitive load by adopting their addressee's perspective, whereas in ASL shared space can be used (there is no true addressee or speaker perspective) and in other contexts, reversing speaker perspective is common in ASL and does not increase the addressee's cognitive load.

Keywords: spatial perspective, shared space, classifiers

## 1. Introduction

When English speakers talk about locations within a scene that they are both viewing, they are often faced with a coordination problem with respect to reference frames. That is, speakers must choose a particular spatial perspective from which to describe the locations of objects. What is on the left from one person's point of view might be

in front of or on the right from another person's point of view. For example, speakers can describe object locations from their own viewpoint, e.g. "Pick the one that's farthest from me" or "It's the one on my right," or they can adopt the point of view of their addressee, saying "Pick the one closest to you," or "It's the one on your left." Speakers may also adopt a more neutral perspective by describing object locations with respect to other objects or landmarks, e.g. "Pick the one near the water cooler" or "It's the one next to the door." In the experiments reported here, we investigate the nature of spatial perspective choice in American Sign Language (ASL).

Signed languages generally convey spatial information using "classifier" constructions in which spatial relations are expressed by where the hands are placed in signing space or with respect to the body (e.g. Supalla 1982; Engberg-Pedersen 1993).<sup>1</sup> Classifier predicates are complex forms in which the handshape is a morpheme that encodes information about object type, and the movement and position of the hand may specify the movement and location of a referent (see papers in Emmorey in press a, for an in-depth discussion of classifier constructions in various signed languages). For these constructions, there is a schematic correspondence between the location of the hands in signing space and the position of physical objects in the world (e.g. Emmorey & Herzig in press). When describing spatial scenes, the identity of each object is usually indicated by a lexical sign (e.g. TABLE, T-V, CHAIR). The location of objects, their orientation, and their spatial relation vis-a-vis one another is indicated by where the appropriate classifier predicates are articulated. Where English uses prepositions and directional terms to express spatial relations, ASL uses the visual layout displayed by classifier signs positioned in signing space. Figure 1 provides an illustrative example of a room description in ASL.

In the example in Figure 1, neither the addressee nor the signer is currently observing the room that is being described. In this situation, spatial descriptions are almost always produced from the signer's (the "speaker's") perspective. "Speaker" will be used here to refer to the person who is signing, in order to parallel the speaker/addressee contrast for English. In Figure 1, the speaker describes a scene where a table is on his left as he enters a room. He uses the sign glossed as I-ENTER at the beginning of the discourse which signals that the scene should be understood from his perspective. The speaker indicates that the table is to the left by producing the classifier sign appropriate for tables at a spatial location on his left. Because the addressee is usually facing the speaker, the spatial location for *table* is actually positioned on the addressee's right. There is a mismatch between the location of the table in the room being described (the table is on the left as seen from the entrance) and what the addressee actually observes in signing space (the classifier sign for *table* is produced to the

1. The status of handshape as a classifier in these constructions has been recently called into question (see papers in Emmorey in press a).

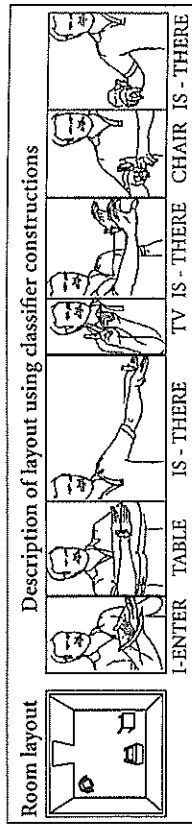


Figure 1. Example of an ASL spatial description. An English translation of the ASL would be "I enter the room. There is a table to the left, a T.V. on the far side, and a chair to the right."

addressee's right). The addressee must mentally transform the spatial location of the table in signing space to match the perspective of the speaker. Previous research has indicated that such a transformation is not difficult for ASL signers and that in this situation, addressees prefer spatial descriptions from the speaker's perspective (Emmorey, Klima & Hickok 1998).

Specifically, Emmorey et al. (1998) noted that spatial scenes are most often described from the speaker's perspective, such that an addressee facing the speaker must perform what amounts to a 180° mental rotation to correctly comprehend the description. However, scenes can also be described, non-canonically, from the addressee's perspective, in which case no rotation is required. To investigate whether mental rotation during sign language processing was difficult for signers, we asked Deaf ASL signers to decide whether a signed description matched a room presented on videotape. If the room description was introduced with the non-canonical sign glossed as YOU-ENTER, the signing space in which the room layout was described was "rotated" 180° so that the addressee was "at the entrance" of the room. In this case, the spatial arrangement of the signs, as viewed by the addressee, exactly matched the spatial arrangement of the objects in the room as viewed from the entrance. In contrast, when the room descriptions were introduced with the more canonical sign I-ENTER, the description was from the speaker's point of view, and the addressee had to perform a mental transformation to correctly comprehend the description (e.g., if the speaker described the table as on her left, the actual table in the room would appear on the right of the videoseen because the room was filmed from the entrance). The results revealed that subjects were more accurate when scenes were described from the speaker's perspective (even though rotation was required) than from the addressee's perspective (no rotation required). This result indicates that not only speakers but addressees as well prefer spatial descriptions from the speaker's point of view — despite the mental rotation requirements for the addressee when this viewpoint is adopted.

However, what happens when both the speaker and the addressee are in the environment, observing the same scene, as in the English examples cited earlier? We hypothesize that in such situations, ASL signers use what Emmorey (2002) has termed *shared space*. Figure 2 provides an illustration of what is meant by shared space. In the

situation depicted, the speaker (the signer) and addressee are facing each other, and between them are two boxes. Suppose the box on the speaker's right is the one that he wants to identify. If the speaker uses signing space (rather than just pointing to the actual box), he would indicate the desired box by placing the appropriate classifier sign on the right side of signing space. Note that in this situation, no mental transformation is required by the addressee. The speaker's signing space is simply "mapped" onto the jointly observed physical space — the right side of the speaker's signing space maps directly to the actual box on the left side of the addressee (see Figure 2a). However, if the speaker were to adopt the addressee's spatial perspective, producing the classifier sign on his left, the location in signing space would conflict with the location of the target box observed by the addressee (see Figure 2b). We predict that in such situations, signers will use shared space, rather than adopt their addressee's spatial viewpoint.

It is not impossible to adopt the addressee's viewpoint when physical space is jointly observed by both interlocutors. For example, the speaker could describe an action of the addressee. In this case, the speaker would indicate a referential shift through a break in eye gaze, and within the referential shift, the signer could sign LIFT-BOX using a handling classifier construction articulated toward the left of signing space. The signing space in this case would reflect the addressee's view of the environment (i.e., the box is to the addressee's left).

In general, however, for situations in which the speaker and addressee are both observing and discussing a jointly viewed physical environment, there is no true speaker versus addressee point of view in signed descriptions of that environment. The signing space is *shared* in the sense that it maps to the observed space and to both the speaker's and addressee's perspective of the physical space. Furthermore, the speaker's description of the box would be the same regardless of where the addressee was standing (e.g. placing the addressee to the signer's left in Figure 2, would not alter the speaker's description or the nature of the mapping from signed space to physical space). Thus, in this situation, an ASL signer (unlike an English speaker) does not need to take into account where his addressee is located and can simply describe what he sees. This difference between languages derives from the fact that signers use the actual space in front of them to represent observed physical space.

To investigate the nature of perspective choice in ASL, we adapted a task developed by Mainwaring, Tversky & Schiano (1996) to elicit spatial descriptions. In this experimental task (adapted from Schober 1993), subjects are invited to join a "Secret Operations Agency" in which the subject must communicate with another secret agent (Agent Z) about the locations of various objects (e.g. a bomb, microfilm). The subject is given maps of various simple scenes with a description of each situation (see Figure 3). English speakers in the Mainwaring et al. (1996) study were told that for security reasons they must communicate via an "Encoder Pad" which allows Agent Z to send the subject a simple question that the subject can answer with a short written

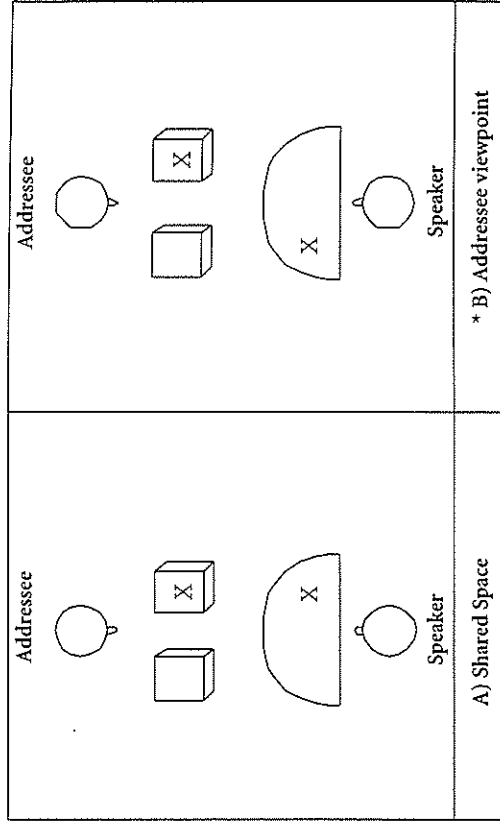
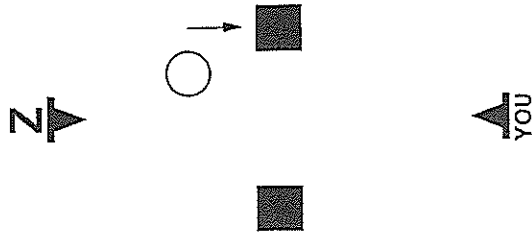


Figure 2. Illustration of a speaker using (a) shared space and (b) using the addressee's spatial viewpoint to indicate the location of the box marked with an "X" (the asterisk indicates that signers reject this type of description). By convention, the half circle represents the signing space in front of the speaker. The "X" represents the location of the classifier sign used to represent the target box (e.g. a hooked 5 handshape).

message. For the example situation shown in Figure 3, an English speaker might write "It's on my right," "It's on your left," or "It's near the water cooler." The results from Mainwaring et al. (1996) indicate that English speakers generally preferred to adopt their addressee's perspective. Overall, 81% of spatial descriptions adopted the addressee's viewpoint, and the percentage rose to 92% when no landmark was present in the environment. In contrast, we predict that ASL signers will not adopt their addressee's spatial perspective but will use shared space.

For English speakers, the presence of a relevant landmark in the environment altered the tendency to adopt the addressee's perspective (in these situations, 23% of the descriptions were perspective-neutral and used the landmark to locate the target object) (Mainwaring et al. 1996). We investigate whether the presence of a landmark also affects the nature of spatial descriptions for ASL signers. Another factor that affects perspective choice for English speakers is whether they are conversing with actual conversational partners or with imaginary addressees (Schober 1993). Speakers are less likely to adopt their addressee's perspective when their addressee is actually present, rather than imaginary: 2% versus 13% of spatial descriptions were from the speaker's perspective for present vs. imaginary addressees, respectively (Schober 1993). Our experiments also investigate the effects of real vs. imaginary addressees for spatial

Agent M is being blackmailed. The incriminating documents are hidden in a filing cabinet in the blackmailer's office. You and Agent Z have just broken into the office. On your map, the squares are the filing cabinets, the circle is the water cooler, and the arrow points to the filing cabinet with the documents. [English text was translated into American Sign Language]



Agent Z signs: "Where are the documents?"

Figure 3. An example scenario from Experiment 1.

perspective choice in ASL. Experiment 1 parallels the Mainwaring et al. (1996) study, except that the addressee is actually present in the (imagined) environment and asks the speaker for information regarding target locations (e.g. "Where are the documents"; Figure 3). However, in Experiment 2, the speaker communicates with an imaginary addressee via a videophone. We predict that, unlike English speakers, the presence of an addressee does not increase the use of speaker perspective. Rather, when the addressee is present, we predict that ASL signers are much more likely to use shared space.

Finally, it is important to point out that we are comparing communication in written English to signed communication with an actual addressee in Experiment 1.

Our previous research with English speakers producing spoken descriptions of environments revealed that speakers often use gesture to indicate perspective (Emmorey, Tversky & Taylor 2000). In their speech, subjects adopted either a route perspective (addressees were taken on a tour of the environment) or a survey perspective (the environment was described from one, unchanging, viewpoint). Speakers' gestures generally mirrored the spatial perspective of the spoken description; for example, 3-D gesture space was used for route descriptions as if moving through an environment, and 2-D planar gesture space was used for survey descriptions, as if illustrating the environment on a blackboard. In addition, there were no differences in perspective choice for the spoken descriptions from Emmorey, Tversky, and Taylor (2000) and the written descriptions of the same environments from Taylor and Tversky (1996). These results suggest that the ability to gesture does not change the nature of perspective choice for English speakers, at least when comparing route and survey perspectives. Thus, it is not unreasonable to compare the results from Mainwaring et al. (1996) with those of the present study, even though we are comparing a primary language mode (ASL) with a derived language mode (written English).

## 2. Experiment 1: Co-present situation

Experiment 1 was designed to test our predictions concerning perspective choice by ASL signers and to investigate the nature of spatial descriptions in ASL. As with the Mainwaring et al. (1996) study, we asked subjects to imagine themselves in various environments (e.g. an office, a zoo, a casino). However, unlike the English speakers, Deaf ASL signers communicated with an actual addressee who took on the role of Agent Z and moved to different locations within the room. For each environment and scenario, subjects were told to imagine that they were in a particular environment with Agent Z, as depicted on a set of maps.

### 2.1 Method

#### 2.1.1 Subjects

Twenty Deaf subjects participated in the experiment. 15 subjects had Deaf families and were native signers of ASL, and 5 subjects were near-native signers, exposed to ASL at a mean age of 6 years. 14 subjects were deaf from birth, and 6 became deaf before age 3. Subjects were tested either at Gallaudet University in Washington, D. C., at the Salk Institute in San Diego, or at California State University, Northridge.