

# Effects of Task and Object Configuration on Perspective Choice in Spatial Descriptions

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## Abstract

In three different tasks, people described the location of one of two identical objects in a simple scene. When their addressees had the harder task, they usually adopted their addressee's point of view in order to facilitate communication. When the cognitive burden between subject and addressee was more balanced, subjects often used their own perspectives. Subjects often used landmarks or cardinal directions instead of personal perspectives when these were available. Terms like *near* indicating close proximity were preferred to *far* and to terms indicating direction. Describing spatial location reflects the interplay of social and cognitive factors.

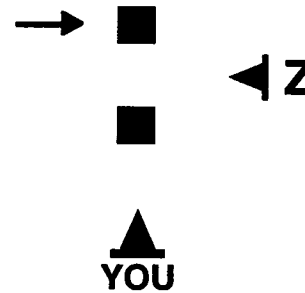
## Introduction

When people observe objects in space, they necessarily do so from their own perspective. However, when they think or talk about space, they are able to adopt other perspectives. This perspective-taking ability is useful both for making one's way in the spatial world, such as returning to a starting point from a new destination, and for making one's way in the social world, where it is often necessary in conversation to consider another's point of view.

There are many possible ways to describe even the simplest spatial scene (this discussion rests on the analyses of previous researchers, including Buhler, 1934/1982; Clark, 1973; Fillmore, 1982; Levelt, 1984, in press; Levinson, in press; Miller and Johnson-Laird, 1976; Talmy, 1983). Describing the location of an object (figure in Talmy's (1983) terms) in space requires at the minimum a reference object or frame (ground in Talmy's (1983) terms) and terms of reference. Reference objects or frames include a person in the scene, another object or landmark in the scene, or an environmental framework, such as the cardinal directions. Terms of reference vary across languages (cf. Levinson, in press). In many languages there are at least three common sets of reference terms, those depending on a viewpoint or the intrinsic sides of an object, such as left, right, front, and back, and those depending on an environment, such as north, south, east and west.

Consider the scene depicted in Figure 1, taken from the present experiments, which were adapted from a task developed by Schober (1993). The scene includes two

*You've received word that a vat of wine at Welles Vineyards has been poisoned. Agent Z meets you there with an antidote to add to the vat to neutralize the poison. The squares are wine vats, the arrow points to the poisoned one.*



*Agent Z looks at you and signals: Where is the poisoned wine?  
You signal back to him:*

*Figure 1. A baseline scenario adapted from Experiment 1. Locations of target (indicated by arrow) presumed to be described more easily from "your" perspective than from Z's.*

identical objects and the viewpoints of the subject and Agent Z, the subject's partner in secret missions. The subject knows which of the objects is the target; here, a poisoned wine vat. The subject's task is to tell Z the location of the target by writing a brief description. In the minimal baseline scene depicted here, there are limited ways to describe the location of the target, indicated by an arrow. The subject can adopt the subject's own perspective, saying, "it's the one directly in front of me," or can adopt Z's perspective, saying "it's the one on your right."

Schober's (1993) task was designed to allow only two possibilities, using the speaker's perspective or the addressee's perspective. Schober found that most of the time, speakers took addressees' perspectives, especially when the addressees were absent and could not request clarification. In a similar task, Herrmann (1989; cited in Schober, 1993) also found that speakers tended to take the perspective of their addressees. As Schober explains, there are several intertwined reasons why speakers may take their addressees' perspectives. For one thing, it seems more polite to recognize the addressee's perspective in directing

a message to an addressee (Brown and Levinson, 1987). For another, it seems that constructing a message from the addressee's viewpoint would increase the likelihood that the message is understood. This is especially true when the speaker has the critical information so the cognitive burden of the addressee is greater. The addressee must both understand the language of speaker's statement and use that information to determine the critical object in the scene.

Providing other ways to describe the location of the target object may reduce the frequency of taking the addressee's perspective. The real world typically includes other objects or landmarks that can be used as reference objects. The real world always comes with the cardinal directions, though they may not always be known. In the present experiments, some of the scenes included landmarks and/or indicated the direction of north. The landmarks and cardinal directions provide the opportunity to use perspectives that are neutral, that is, neither the speaker's nor the addressee's, and that may be used instead of the personal perspectives (see also Schober, in press). Calling these ways of describing space "neutral perspectives" is to speak loosely, as they may not literally involve a point of view.

In Schober's task, speakers always relayed the critical information to addressees. Yet, there are other situations requiring construction of spatial messages. Two of them have been added here to Schober's original situation, in which the subject tells an addressee which object is critical, a task we have termed the "tell other" condition. The second situation we have explored, the "ask other" situation, is one in which Agent Z—but not the subject—knows which object is critical. Here, the subject must ask Z a yes/no question whose answer will reveal the critical object's location. In this situation the cognitive burden is more balanced than in the "tell other" situation. In the "ask other" situation, the subject must construct an utterance that Z will understand, but Z has the critical information which the subject must then use to figure out which object in the scene is the target object. If speakers take addressees' perspectives primarily to be polite, then subjects should take addressees' perspectives equally often in the "tell other" and "ask other" situations. However, if speakers take addressees' perspectives because of considerations of relative cognitive burden of the partners in communication, then speakers should take the perspectives of their addressees less often in the "ask other" than in the "tell other" situations. The third situation we have investigated, the "tell self" situation, is one in which the subject records a brief description of the location of the target object for the subject's own later use. In this third situation, Z's location in the scene is known, but the communication is not for Z, so politeness to Z is not a consideration.

In addition to politeness or communication effectiveness, the cognitive difficulty of the situation also affects perspective-taking. In a more difficult task, Schober (in press) found that speakers were more likely to use neutral or speaker perspectives when speakers and addressees had

different perspectives on the scene than when they shared the same perspective. In our task, speakers and addressees always had different perspectives on the scene: they either faced each other or were offset by 90 degrees. Difficulty of constructing a description was varied in another way. Left-right discriminations are more difficult than discriminating other spatial dimensions, such as front/back or near/far discriminations (e. g., Farrell, 1979; Franklin and Tversky, 1990). To the extent that difficulty is a factor, neutral perspectives and/or speaker perspectives should be used more frequently to avoid left/right distinctions than to avoid other spatial distinctions in each of the three situations.

## Experiment 1: Tell Other

In Experiment 1, each scenario required the subject to produce for Agent Z a locative expression which would distinguish which of two identical objects concealed a target item.

### Method

**Subjects.** 71 undergraduates in introductory psychology courses at Stanford University participated for credit towards fulfillment of course requirements. Data from one subject was excluded from analysis because she did not answer many (the last 13) of the 28 scenario questions.

**Materials.** 30-page questionnaire packets were assembled, consisting of a cover page, 28 scenario pages, and finally a page of background questions

The cover page was in the form of a memo from the "Secret Operations Agency" to "Agent U" (the subject) explaining "your mission... is to help Agent Z accomplish various dangerous but essential tasks in a variety of environments." Subjects were told that for security reasons communication would be by "Encoder Pads" which would allow Agent Z "to send you a simple question and you to answer with a single short message." Agent Z would not be able to respond to ask for clarification so they should "make each of your messages clear and concise." Subjects were informed that the information available would vary across scenarios, and specifically that "sometimes you and Agent Z will know which direction is North, sometimes you won't." Subjects were told that there might be alternate ways to describe the correct action (for Agent Z), so to "choose whatever way you think would be clearest, based on the situation and the information available, on a case-by-case basis."

Each scenario page consisted of a paragraph describing the situation, a map depicting it, a question from Agent Z, and a single line for the subject's response. The opening descriptions were written with the goal of entertaining subjects in order to keep them engaged with the task (see Figure 1).

Descriptions also gave a brief key to the diagram below them (e.g., "the squares are the containers, the arrow points

Table 1  
Schematic Diagrams of the 20 Copresent Scenarios

relationship of		referential resource condition				
addressee to speaker	containers to speaker	baseline	landmark/equidistant	landmark/skewed	compass/north-up	compass/north-side
facing	near/far					
facing	left/right					
perpendicular	near/far					
perpendicular	left/right					

Note. A and S represent icons for the addressee (Agent Z) and the subject (Agent U), respectively; the squares represent containers, the target in white and the non-target in black; and the circles represent landmarks.

to the radioactive one”), and—when appropriate—an indication of the compass direction corresponding to the top of the diagram.

*Copresent* and *remote* scenarios were used. In copresent scenarios, subjects were asked to imagine being in a situation along with Agent Z, and icons for the subject and for Agent Z appeared in the accompanying diagrams. For remote scenarios, subjects were asked to imagine that they were in a control room looking at a map of an area towards which Agent Z was travelling, and that they were communicating with Agent Z remotely.

In all scenario maps, the two containers were shown as identical filled squares. An arrow pointed to the one holding the target. If the scenario included a landmark, it was shown as an unfilled circle. For copresent scenarios, maps were drawn from the subject’s point of view (the subject’s icon at the bottom center of the map, oriented upwards).

Below the map, the question from Agent Z always began “Agent Z looks at you and signals:” followed by a question such as “Where’s the waste?” or “Which couch has the money?” that again mentioned the target. Above the response line was the tag, “You signal back to him:” or “You signal back to her:”.

**Design.** Three within-subject variables were crossed in a 2 x 2 x 5 design to produce 20 copresent scenario maps. Two

other within-subject variables were crossed in a 2 x 2 design to yield 4 remote scenario maps. In addition, 4 more remote scenario maps were produced as filler items. Maps were paired with descriptions to form the 28 scenario pages in the questionnaire.

For the 20 copresent scenarios, the first of the within-subject variables was the position and orientation of Agent Z, either facing or perpendicular to the subject’s Agent U. The second was the arrangement of the two containers (filled squares) with respect to the subject, either aligned with or perpendicular to the direction the subject was facing. The third, 5-level variable coded the referential resources available in the scenario: baseline (the two agents and the two containers only), landmark/equidistant (baseline plus a landmark equidistant to the containers), landmark/skewed (baseline plus a landmark nearer to one of the containers), compass/north-up (baseline plus inclusion in the description that North is towards the top of the diagram), and compass/north-side (baseline plus inclusion in the description that East or West is towards the top of the diagram—this non canonical direction of North was predicted to make compass perspectives less attractive). Table 1 shows schematic scenario maps of the 20 resulting conditions.

The 4 remote scenarios included both landmark and compass information. The location of the landmark

(equidistant or skewed) was crossed with the direction of North (up or sideways).

Due to limitations in the number of subjects that could be run, we chose not to counter-balance several variables in the present design. These include which container was designated the target, which side (left or right) a perpendicular addressee was placed, which container was put near a skewed landmark, and which side (left or right) corresponded to North in compass/north-side conditions.

Three between-subject variables were crossed: the gender of the subject, the gender of Agent Z, and the ordering of scenarios in the questionnaire (one of four constructed). A constrained-random ordering was constructed by randomly ordering the four baseline copresent scenarios (plus four filler remote scenarios) and then appending a random ordering of the remaining 16 non-baseline copresent scenarios and 4 remote scenarios.

**Procedure.** Subjects were run in groups of up to 10 individuals. They were given 30 minutes to complete the questionnaire.

Table 2  
*Perspectives Codes and Examples*

Code	Basis	Examples
S	speaker	"the one nearest myself" "the cage closest to me"
A	addressee	"info booth on your left" "2nd one directly in front of you"
L	landmark	"the one farthest from the grape press" "the sandbox closer to the jungle gym"
C	compass	"the west one" "the eastern-most barn"
S&L	speaker & landmark	"start at the iguana exhibit and walk towards me. The rat is in the snake cage on your right" "back to cabinet, facing me, on left"
S&C	speaker & compass	"couch southwest of me" "entrance due east of me"
A&L	addressee & landmark	"right of the grape press" "go to the display then keep right"
A&C	addressee & compass	"the entrance southwest of you" "go southeast"
L&C	landmark & compass	"if the ticket booth is north of you, it's in the tent to your left" "southwest of booth"

### Data Analysis

Each written response was analyzed as a description of the target container's location, followed possibly by one or more redundant re-descriptions. Each description was coded as taking the speaker's, the addressee's, a landmark, or a compass direction perspective, or some combination of these. Table 2 shows some examples of each.

In most analyses, re-descriptions were excluded, the first description produced being considered primary. For example, if a subject wrote "it's the one to my left and your

right," this would be counted as a speaker-perspective description with the listener-perspective re-description excluded.

### Results and Discussion

**Overall Results.** 12 of the 70 subjects (17%) produced an incorrect or ambiguous description, and of these 9 did so for only 1 of the 24 scenarios. 59% of the subjects produced at least one re-description, and on average subjects produced 27.0 descriptions in total for the 24 scenarios.

Table 3  
*Overall Perspective Use, Experiment 1*

A. Overall Use of Perspective Elements in Subjects' Initial Descriptions			
perspective element	observed frequency	maximum freq.	% of max. freq.
speaker	1.8	20	9
addressee	15.2	20	76
landmark	3.3	12	28
compass	6.0	12	50

#### B. Perspective Usage by Type of Copresent Scenario

scenario type	mean % respondents using perspective					
	S	S&N	A	A&N	N	other
Baseline	8		88			4
Landmark/equidistant	9	1	73	14	1	1
Landmark/skewed	7	0	61	8	23	1
Compass/north-up	9	0	58	5	27	0
Compass/north-side	3	1	60	6	28	1

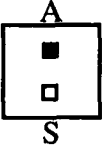
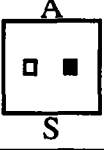
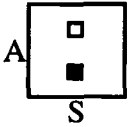
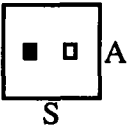
Note. See Table 2 for perspective codes, substituting L or C for N where appropriate.

Table 3A shows the overall frequency with which subjects used various perspective elements in their initial descriptions. (Note that each element occurs in multiple perspective categories, as outlined in Table 2; for example, landmarks are involved in the L, S&L, A&L, and L&C perspective categories.) When scenarios specified the addressee's location, subjects made use of this information most (76%) of the time. Compass direction and landmark information were used less often, but not infrequently. However, speaker information was used in only 9% of the scenarios in which it could have been.

Table 3B shows for each perspective the proportion of subjects who used it, averaged over the four scenarios in each of the five copresent scenario types. In each scenario type, a majority of subjects used their addressee's perspective, with about a quarter using neutral perspectives (based on landmarks or compass directions) when available, excluding the landmark/equidistant scenarios (in which the landmark's location did not easily distinguish between the two containers). In no scenario type was the speaker's perspective used by more than 10% of subjects. Overall, Schober's (1993) finding that in non-interactive

situations most speakers use their addressee's perspective was replicated. Also, differences in the direction of north (distinguishing between the two compass conditions) had no apparent effect on use of compass directions.

Table 4  
*Perspective Usage, Baseline Scenarios, Experiment 1*

relationship of		schematic diagram	% respondents using perspective	
addressee to speaker	containers to speaker		S	A
facing	near/far		0	100**
facing	left/right		6	94**
perpendicular	near/far		23	77**
perpendicular	left/right		4	96**
means:			8	92**

Note. The pattern of results varied with scenario,  $\chi^2(3) = 26.27$ ,  $p < .001$ . \* indicates a value  $> 50\%$  with  $p < .05$ , \*\* with  $p < .01$  (sign test).

**Baseline scenarios.** As shown in Table 4, most subjects in each of these scenarios used their addressee's perspective. However, the pattern of responses for the third scenario, in which the target is closest to the subject, differs from the others; it is the only scenario in which a substantial proportion of subjects used the speaker's perspective. This could be an effect of discriminability (the addressee-based description but not the speaker-based description requires a left/right distinction) or of a preference for nearby points of reference.

**Landmark scenarios.** As in the baseline scenarios, most subjects used their addressee's perspective. Neutral landmark "perspectives" were used about 23% of the time in skewed scenarios but only 1% of the time in equidistant ones (in which the landmark is less informative). Perspective choice varied with the geometry of the scene (as in the baseline case), but could not be accounted for by a preference for near/far over left/right discriminations.

Variation was instead consistent with a preference for nearby points of reference, i.e., for the perspective of the person closest to the target.

**Compass scenarios.** Results were similar to those for the landmark scenarios. Addressee perspectives were most often used, with neutral compass perspectives adopted about 25% of the time. The direction of north in the diagram had no apparent effect.

**Remote scenarios.** When both kinds of neutral perspectives were available, most subjects used only compass perspectives in their initial descriptions. Equidistant landmarks were rarely used as the only reference point in descriptions, though they were often used in conjunction with compass directions.

**Discussion.** There are two main findings of this first experiment, in which subjects wrote brief messages specifying the location of one of two identical objects for a person with a different perspective on the scene. First, we replicated Schober (1993) in finding that subjects usually take the perspective of their addressees (as was summarized in Table 3), and found this even when neutral perspectives were available.

Second, we found that choice of perspective can be sensitive to configural aspects of the situation in which the speaker and addressee are embedded. Perspective choices varied considerably and fairly consistently over different scenarios within each category. However, we found little support for our initial hypothesis that advantages in the discriminability of near/far over left/right relationships were the configural aspects that would influence subjects' choice of perspective. Instead, the distance between potential points of reference and the target object appeared to be a critical aspect, sometimes counteracting the general trend to take the addressee's perspective. The perspective of whoever was closer to the target item apparently became more attractive by virtue of this proximity. Such proximity effects were not apparently operative on the distances between landmarks and targets, however.

## Experiment 2: Tell Self

In Experiment 1, the task was to explain to another the location of a target item. We hypothesized that subjects were expending mental effort to find a descriptive strategy that their addressee would easily understand. Experiment 2 tested this hypothesis by providing a condition in which subjects were not communicating to another, but describing the scene for themselves. We expected subjects generally to keep their own point of view in such descriptions, making use of other perspectives only when doing so would allow for a simpler representation.

## Method

**Subjects.** 24 undergraduates from the same subject pool used in Experiment 1 participated.

**Materials.** A variant of the questionnaire used in Experiment 1 was prepared. The cover story was changed to explain that they, Agent U, would be undergoing pre-mission briefings in which they would be shown where they, Agent Z, and the relevant objects would be located in upcoming actual missions. Their task was to make a brief note to themselves of the location of the hidden target; they would bring this note with them on the mission to help them remember. Individual scenario descriptions were slightly modified to place verbs in the future tense. Scenario maps were identical to those used in Experiment 1. Below these maps, subject's responses were prompted with a statement like "The Encoder Pad asks: Where's the waste?" followed by the tag "You write for yourself:".

**Design.** The design was identical to that used in Experiment 1, with the exception that since Agent Z's gender was never specified this was not used as a between-subjects variable.

**Procedure.** As in Experiment 1, subjects were run in groups and given up to 30 minutes to complete the questionnaire.

### Data Analysis

The same coding scheme was used as in Experiment 1 (refer to Table 2), with the appropriate changes to take into account that the subject was addressing him- or herself, not Agent Z. It was still possible for the subject to take Agent Z's perspective, so code A should now be taken to stand for Agent Z, and instances of *addressee* in Table 2 replaced with *Agent Z*.

### Results and Discussion

**Overall Results.** 4 of the 24 subjects (16%) produced an incorrect, ambiguous, or null description; and all 4 did so for only 1 of the 24 scenarios. 83% of the subjects produced at least one re-description, and on average subjects produced 30.7 descriptions in total for the 24 scenarios.

Table 5A shows the overall frequency with which subjects used various perspective elements in their initial descriptions. References to Agent Z are dramatically lower and to the speaker's dramatically higher than in Experiment 1, although Agent Z was not infrequently referenced, and the speaker was in only half the possible scenarios. References to landmarks and compass directions were popular, with compass information being mentioned in more than two thirds of scenarios in which it was given; and relative to Experiment 1, mentions of landmarks and compass directions apparently increased.

Table 5B shows the proportion of subjects using each perspective type, averaged over each block of scenarios (excluding remote scenarios). Overall, speaker perspectives were most popular in the baseline and landmark/equidistant scenarios, and neutral perspectives in the other three types (at the expense of the use of addressee perspectives). Compared to Experiment 1 (Table 3B), speaker and neutral

perspectives are used much more and addressee perspectives much less.

Table 5  
*Overall Perspective Use, Experiment 2*

A. Overall Use of Perspective Elements in Subjects' Initial Descriptions

perspective element	observed frequency	maximum freq.	% of max. freq.
speaker	10.0	20	50
agent Z	3.7	20	18
landmark	4.9	12	41
compass	8.2	12	68

B. Perspective Usage by Type of Copresent Scenario

scenario type	% subjects using perspective					
	S	S&N	Z	Z&N	N	other
Baseline	66		31			3
Landmark/equidistant	56	6	23	10	10	4
Landmark/skewed	38	4	14	0	44	1
Compass/north-up	34	12	1	3	50	1
Compass/north-side	24	5	9	3	57	1

*Note.* See Table 2 for perspective codes, substituting L or C for N where appropriate.

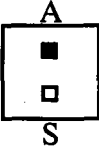
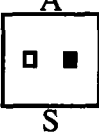
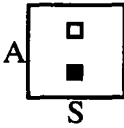
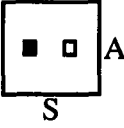
**Baseline scenarios.** As shown in Table 6, in three of the four scenarios a large majority of subjects used their own perspective, in direct opposition to the results from Experiment 1. However, in the first scenario, the only in which Agent Z was closer to the target, yielded the opposite pattern of results, with Agent Z-based perspectives much preferred (though, unlike Experiment 1, substantial use of speaker perspectives still occurred). Use of Agent Z perspectives was also noticeably higher in the last scenario, in which the target was to the left of the subject; this would be consistent with a preference for near/far discriminations over left/right discriminations.

**Landmark scenarios.** As in the baseline scenarios, most subjects used their own perspective. However, in those cases where Agent Z was closest to the target, Agent Z's perspective was preferred. Use of neutral landmark perspectives was higher than in Experiment 1: 10% for equidistant and 44% for skewed landmarks.

**Compass scenarios.** In 7 of the 8 scenarios, neutral compass perspectives were used by at least 50% of respondent. Such impersonal perspectives were used at much higher rates than in Experiment 1. Agent Z scenarios were almost never used, except in one scenario in which Agent Z was closest to the target.

**Remote scenarios.** Overall, the results replicated Experiment 1, as expected (since the recipient of the description was removed from the scenario itself in both conditions): compass directions were favored by the largest proportion of subjects, with landmark and mixed perspectives about equally used by the remaining subjects.

Table 6  
*Perspective Usage, Baseline Scenarios, Experiment 2*

relationship of		schematic diagram	% respondents using perspective	
Agent Z to speaker	containers to speaker		S	A
facing	near/far		13 (0)	87** (100)
facing	left/right		96** (6)	4 (94)
perpendicular	near/far		91** (23)	9 (77)
perpendicular	left/right		71 (4)	29 (96)
means:			68** (8)	32 (92)

Note. The pattern of results varied with scenario,  $\chi^2(3) = 45.64$ ,  $p < .001$ . \* indicates that  $S \neq A$  with  $p < .05$ , \*\* with  $p < .01$  (sign test). Amounts in parentheses are corresponding results from Experiment 1.

**Discussion.** This experiment, in which subjects wrote brief messages specifying the location of one of two identical objects for themselves, replicated some aspects of the first experiment. However, it also demonstrated large differences between subjects' choice of perspectives when making notes to themselves and their choices when communicating to another. Subjects were like those in Experiment 1 in exhibiting large proximity effects (choosing to use the perspective of whoever was closest to the target). They differed in generally preferring neutral perspectives, except when these were not available (in the baseline condition) or difficult to use (in the landmark/equidistant condition), in which case they generally preferred to use their own character's perspective (as shown in Table 5). Use of another's perspective occurred for the most part only when this afforded use of the relationship *near*, consistent with a preference for proximal reference points; and never exceeded in magnitude the corresponding use of addressee perspectives in Experiment 1, consistent with a bias towards taking the perspective of the information user.

### Experiment 3: Ask Other

In this experiment, subjects were asked to imagine being in scenarios much like those in Experiment 1, in which a target was hidden in one of two identical objects. But rather than being told (by an arrow on the map) which of the two was the target, subjects had to obtain this information from their imagined partner, Agent Z. They were asked to produce a question which could be answered with a simple yes or no. Thus, subjects had to pick out by means of a locative expression one of the two potential targets and ask Agent Z if it did (or did not) contain the target. Either a yes or a no response would unambiguously specify the target, since there were only two to choose from.

Since subjects were free to refer to either object, it was predicted that they would select the object that was the easier to describe from the perspective they had chosen. If, as in the previous experiment, subjects were continuing to express a preference for the relation *near* over *far*, a perspective and an object would be picked between which this relation held. For example, subjects would prefer to ask "Is the bomb in the suitcase near you?" rather than "Is the bomb in the suitcase to my left?" or "Is the bomb in the suitcase further from you?"

### Method

**Subjects.** 64 Stanford undergraduates (33 men, 31 women) participated in order to fulfill course requirements or for a small cash stipend.

**Materials.** A variant of the questionnaire used in Experiment 1 was prepared. The cover story was changed to explain that Agent Z would be helping them to accomplish various missions, and that their Encoder Pads would only allow a simple question to be transmitted to Z and a yes or no response returned. Scenario descriptions were modified to be consistent with the subject's character having the means but not the information to solve the problem at hand, whereas the converse was true for Agent Z. Landmark or compass information was added to scenario descriptions to be consistent with a revised set of scenario schemas. Subjects were prompted for their responses by the tag, "You signal to Agent Z, asking him:" or "You signal to Agent Z, asking her." Below each response line subjects were told, "Remember, Agent Z can only reply 'YES' or 'NO.'"

**Design.** The design was similar to that used in Experiment 1, although there were several main differences. One was that the location of landmarks was systematically manipulated. Also, a condition was included in which there was both landmark and compass direction information available to the subject. The ordering of scenarios in the experiment booklets was somewhat different, as the 4 filler scenarios used in Experiment 1 were replaced by an initial sample scenario.

A total of 28 scenarios (not counting the initial sample) were constructed. These divide into three groups: 8 scenarios in which Agents U and Z but no landmarks were

present; 16 scenarios in which Agents U and Z were copresent, and in which a landmark was near one of the two containers; and 4 scenarios in which neither Agent U nor Z were present yet in the situation.

The 8 no-landmark scenarios conform to a 2 x 2 x 2 design, the factors being: the orientation of Agent Z (facing or perpendicular to Agent U), the orientation of the containers (aligned with or perpendicular to the direction Agent U was facing), and whether or not compass directions were specified (baseline vs. compass conditions). The 16 copresent, landmark scenarios conform to a 2 x 2 x 2 x 2 design. The first three factors are the same as those used for the no-landmark scenarios. The fourth factor specifies which of the two containers was near the landmark. Finally, the four remote scenarios were constructed by placing the landmark near each of the four possible container locations.

As in Experiment 1, a 2 x 2 x 4 between-subject factorial design crossed the gender of subject, the gender of Agent Z, and the ordering of scenarios in the questionnaire (one of four constructed). Unlike Experiment 1, the baseline scenarios were intermixed with the others, rather than appearing among the first eight.

**Procedure.** As in Experiment 1, subjects were run in groups and given up to 30 minutes to complete the questionnaire.

### Data Analysis

The same coding scheme was used as in Experiment 1 (refer to Table 2). (The complex mixed perspectives A&L&C, S&L&C, and A&S&L&C, though possible, did not appear in the results.)

### Results and Discussion

**Overall Results.** 25 of the 64 subjects (39%) produced an incorrect or null description, and subjects on average produced 1.05 such errors over the 28 scenarios (4%). This error rate was much higher than that for the previous two experiments, and appears to consist primarily of subject's assuming incorrectly that north was at the top, rather than at the left or right, of situation diagrams.

30% of the subjects produced at least one re-description, and on average produced 29.1 descriptions in total for the 28 scenarios. These figures are much lower than in the previous experiments. It may be that it is more awkward to ask questions containing redundant descriptions than it is to produce an assertion with redundancies.

Table 7A shows the overall frequency with which subjects used various perspective elements in their initial descriptions. Both persons (speaker and Agent Z) were referred to proportionately less often than either landmark or compass information, unlike the pattern in either of the previous two experiments.

Table 7B shows the proportion of subjects using each perspective type, averaged over each block of scenarios. Overall, neutral (compass and landmark) perspectives were most popular, addressee perspectives second most, and

Table 7  
*Overall Perspective Use, Experiment 3*

A. Overall Use of Perspective Elements in Subjects' Initial Descriptions			
perspective element	observed frequency	maximum freq.	% of max. freq.
speaker	3.4	24	23
addressee	8.9	24	37
landmark	9.2	20	46
compass	7.8	16	49

### B. Perspective Usage by Type of Scenario

scenario type	% subjects using perspective								
	S	S&N	S&L	A	A&C	A&L	C	L	C&L
Baseline	31			69					
Compass	15	0		34	4		47		
Landmark	13		0	38		0		49	
Landmark & Compass	7	0	0	22	2	0	30	29	13
Remote							42	40	18

Note. See Table 2 for perspective codes.

speaker perspectives least. Unlike previous experiments, mixed personal/neutral perspectives were rarely used.

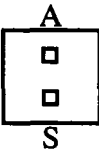
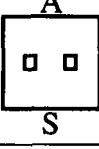
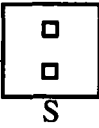
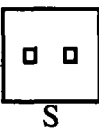
**Baseline scenarios.** Overall, the results shown in Table 8 resemble Experiment 1 (compare Table 4) more than Experiment 2 (compare Table 6): the addressee's perspective was favored overall, and in three of the four scenarios. However, the proportion of subjects using speaker perspectives was noticeably larger, evidence (though not as extreme as Experiment 2) that a tendency to take the information-user's point of view was counteracting somewhat the prevailing tendency to take the addressee's perspective. Indeed, subjects were evenly split in the third scenario over whether to use the speaker's or the addressee's perspective. In this scenario, not only does the speaker differ from the addressee in being the information-user, but also in having an easier vantage point that affords talking in terms of proximity. Conversely, in the last scenario, the addressee had the easier of the two vantage points, and correspondingly use of addressee perspectives is most frequent.

Table 8 also shows that which container is referred to in the question depends strongly on which perspective the subject has adopted; for example, in the first scenario, the container lower in the diagram was probed by 100% of subjects who choose the speaker's perspective, but by only 2% of subjects who choose the addressee's perspective. For all perspectives in all scenarios, it appears that if the choice is between a near and a far container, the near container is probed, whereas if the choice is between a left and a right container, subjects show no preference.

**Landmark scenarios.** For all 8 scenarios, neutral landmark perspectives were used most often (49% overall) with addressee perspectives used by the next largest



Table 8  
*Perspective Taken and Container Referenced, Baseline Scenarios, Experiment 3*

relationship of addressee to speaker		schematic diagram	perspective	
addressee to speaker	containers to speaker		S	A
facing	near/far		33 near: 100**	67** near: 98**
facing	left/right		25 left: 60	75** right: 67*
perpendicular	near/far		51 near: 90**	49 left: 53
perpendicular	left/right		17 left: 60	83** near: 100**
means:			31	69**

Note. In each cell, line 1 = % Ss using perspective, line 2 = relation from that perspective of container referred to most, line 3 = % Ss in that cell referring to that container. The pattern of perspectives taken varied with scenario,  $\chi^2(3)=18.13, p < .01$ . \* indicates a value > 50% with  $p < .05$ , \*\* with  $p < .01$  (sign test).

number of subjects (38% overall). Only for those 4 scenarios in which the speaker's perspective afforded use of the term *near* did more than 10% of subjects adopt that perspective.

Again, which container subjects probed with their question depended strongly on the perspective used for that question. If a landmark perspective was chosen, almost always the subject referred to the container nearer the landmark. For example, subjects very rarely asked, "is it the one further from the [landmark]?" If a personal perspective was chosen, subjects strongly preferred to probe the nearer rather than the farther container, but exhibited were generally indifferent between leftmost and rightmost containers.

**Compass scenarios.** Neutral compass perspectives and addressee perspectives were about equally preferred, with 47% and 38% of responses overall using each, respectively. Again, only when it afforded use of the term *near* did more than 10% of subjects use the speaker's perspective.

As in the baseline condition, when a personal perspective had been adopted, there was a strong

preference to refer to the nearer of two containers is evident, but not for the rightmost or leftmost of two equidistant containers. When subjects framed their question in terms of compass directions, they consistently preferred to refer to the northern rather than the southern container, but had no preference between eastern vs. western containers. This may be due to the fact that the scenario descriptions always specified the direction of north, making northern containers especially salient.

**Compass & landmark scenarios.** Given multiple resources for construction viewpoint-independent descriptions, subjects exhibited an even stronger preference to use such a neutral perspective—the average proportion of subjects using some kind of neutral perspective (C, L, or C&L) across all 8 scenarios in this condition was 69%. For 5 of 8 scenarios, and somewhat overall, compass perspectives were used more than landmark perspectives, though this difference is not striking. Also, in 5 of 8 scenarios addressee perspectives were used significantly ( $p < .05$ ) more often than speaker perspectives, although in all 8 the trend was in this direction. Only when the speaker's perspective afforded use of *near* and addressee's perspective did not did more than 15% of subjects use speaker perspective.

As in previous analyses, a strong preference to refer to nearer of two containers is evident, both from personal and landmark perspectives. And again, in compass scenarios, a preference for north over south, but not east over west, is evident, though not as strongly as in the compass scenarios.

**Remote scenarios.** As in the compass & landmark scenarios, about 18% of subjects used a combined compass/landmark perspective, and between pure compass and pure landmark perspectives there was no clear preference. The pattern of containers probed by perspective taken again indicates that subjects preferred to refer to near or north containers, but not left or east ones.

**Discussion.** As in the "tell other" condition, subjects in this experiment were communicating with another person, and so it was in their interest to make their messages easily understood. On the other hand, as in the "tell self" condition, subjects would themselves be using the spatial information, and so it was also in their interest to make their questions so as to yield answers that they could easily understand. Perhaps as a result of this conflict, the overall use of neutral (compass and/or landmark) perspectives was greater than in the prior experiments. Those subjects choosing not to use a neutral perspective (in their first descriptions—recall that subsequent re-descriptions produced by a subject were not included in these analyses) tended as in Experiment 1 to favor the perspective of their addressee. Apparently in these cases the need to make oneself understood to another took precedence over the need to make oneself understood to oneself.

As in previous experiments, subjects were influenced considerably by the geometry of the situation, being biased in favor of perspectives from which the target object was near or (equivalently, in this experiment) in front. Strong

interactions between perspective chosen and term of reference used within that perspective further supported subjects' bias towards the relation *near*. (Apparently neither *left* nor *right* is favored, and the preference for the term *north* seen in certain conditions is most likely an artifact of the instructions mentioning this compass direction exclusively.)

### Comparison of the 3 Experiments

We pause to consider some general trends across the three situations under which spatial descriptions were produced: tell other, tell self, and ask other. The three fall on a continuum of relative cognitive burden in communication, with more of the burden on the addressee for "tell other," all of the burden on the speaker for "tell self," and the burden more evenly distributed for "ask other." We expected the relative use of speaker and addressee viewpoints would follow the relative cognitive burden in communication. Figure 2 summarizes the results from the four baseline scenarios in each experiment. In these scenarios, subjects simply chose between using the speaker's perspective or adopting Agent Z's, since neither compass directions or landmarks were available. For each subject, the proportion of baseline scenarios in which Z's perspective had been used was calculated: Figure 2 plots the means of these proportions. The proportion taking Z's perspective diminished dramatically as the cognitive burden on Z diminished. Note, however, that even in the "tell self" condition, Agent Z's perspective continued to be used. In these cases, the subject seemed to be using Agent Z as a landmark, especially to avoid using *left* or *right*.

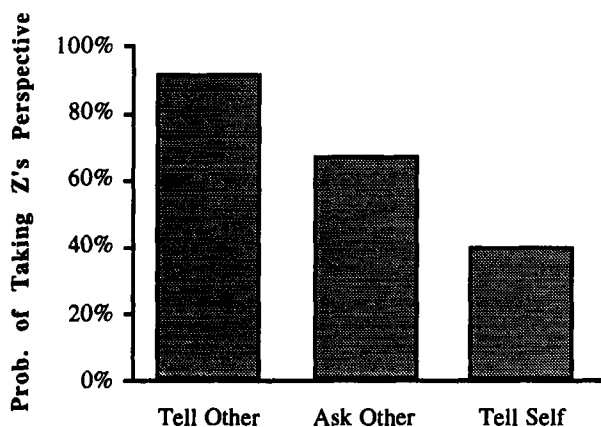


Figure 2 For each of the three experiments, probability that subject adopted Agent Z's perspective in a baseline scenario (in which only alternative was to use the speaker's perspective). Experiments are ordered in decreasing task demand on Agent Z.

We also expected the three situations to affect the relative use of personal versus neutral perspectives. Neutral perspectives avoid the question of whose personal perspective to use. Thus, use of neutral perspectives should be greater in the "ask other" than the "tell other" situation.

There are different reasons for using neutral perspectives in the "tell self" situation vs. in the "tell other" situation. In the former, subjects are writing a memory aid for a future situation, and so may be attracted more to neutral perspectives since they remain valid even if the speaker's and Agent Z's locations should change in the mean time.

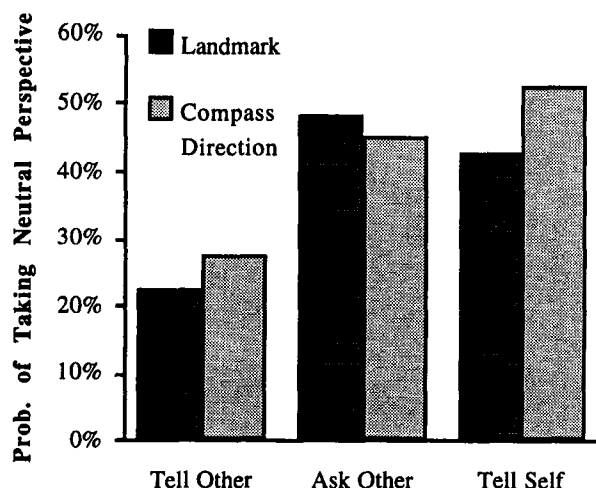


Figure 3. For each of the three experiments, probability that subject adopted a neutral perspective in a scenario in which the choice was to take a personal perspective (the speaker's or Agent Z's) or a neutral perspective (based on landmarks or cardinal directions). (Scenarios in the "ask other" experiment (Experiment 3) in which both landmark and compass direction information was available were excluded from this analysis.) Experiments are ordered in decreasing task demand on Agent Z.

Figure 3 summarizes results from the scenarios in each experiment in which subjects had a choice between using a personal perspective and using either a compass-based or a (skewed) landmark-based neutral "perspective." Mixed perspectives, such as "the one southwest of me," were coded as personal in this analysis. There were 12 such scenarios in each experiment. For each subject, the proportion of these scenarios in which a pure neutral "perspective" was used was calculated; Figure 3 plots the means of these proportions. As expected, neutral as opposed to personal perspectives were more popular in the "ask other" and "tell self" situations. Neutral perspectives were used about half the time in the "ask other" and "tell self" situations, but only about a quarter of the time in the "tell other" situation, where use of personal perspectives dominated. Landmark and compass-based perspectives were equally appealing in all three experiments.

### General Discussion

How do people describe the location of one of two identical objects? This question was investigated in simple schematic scenes. The minimal scenes included only the two objects and the viewpoints of the subject and a partner. The enriched scenes also included a landmark or an

indication of the cardinal directions. In the minimal scenes, subjects' descriptions were limited to their own perspective or that of their partner. In the enriched scenes, subjects could use those perspectives or adopt a neutral perspective, one based on the landmark or the cardinal directions. Subjects described the location of the target object in one of three tasks. In the "tell other" task, subjects knew the target object and sent a brief message conveying that information to their partners. In the "ask other" task, their partners knew the target object, and subjects asked their partners a yes/no question whose answer would reveal the target object to them. In the "tell self" task, subjects recorded a brief description for themselves, to be used at a later time to identify the target object.

Several factors might be expected to affect perspective choice. One is politeness. It is polite to take into consideration the viewpoint of an addressee, both literally and figuratively. In work that inspired the present experiments, Schober (1993) investigated the minimal "tell other" condition, finding that in most cases, subjects took the perspective of their addressees. Another factor is the difficulty of describing a spatial scene. For example, descriptions using *left* or *right* are known to be more difficult than those using *front* or *near*. Using *left* and *right* requires discrimination of spatial symmetry whereas using *front/behind* or *near/far* do not.

For the "tell other" task, use of addressee's perspective dominated, but not for the "ask other" and "tell self" tasks. Mirroring these data were those for use of neutral perspective, which was lower for the "tell other" task than for the "ask other" and "tell self" tasks. Other salient phenomena in the present data were the use of the partner's location as a landmark and the bias toward *near*. These findings make it clear that choosing which of several ways to describe a situation is not simply adopting the point of view of one's addressee, nor selecting whatever point of view is simplest based on the spatial layout of the situation. If it were solely the former, differences in spatial layout would not have yielded the observed differences within each task situation or between different scenarios within a situation. If it were solely the latter, whether self or other was being addressed and whether declarations or questions were being produced would not have yielded differences within each scenario between the task situations.

In fact, there was no evidence for politeness per se. Taking the addressee's perspective can be fully accounted for by considerations of facilitating joint communication. Although subjects overwhelmingly took their addressee's perspectives in the "tell other" task, they did so to a far lesser extent in the "ask other" task, where politeness is no less a factor. Taking the addressee's perspective in the "tell other" task seems to be more in the interests of increasing the success of the communication than in the interests of being polite. In that situation, the addressee has the harder task, both to understand the message and to use it to determine the critical object. The subject can ease the task of understanding by framing an utterance from the addressee's point of view. In the "ask other" task, both

addressee and subject must understand each others' utterances, so the cognitive burden is more equally distributed. In that case, subjects were almost as likely to use their own perspective as to use their addressee's. That taking the perspective of addressees is primarily to insure successful communication is also supported by Schober's (1993) finding that speakers were less likely to adopt their addressees' perspectives in an interactive situation than when their addressees were absent. In an interactive situation, speakers know when they have succeeded in communicating and may easily discover that their addressees understand utterances from other perspectives. When addressees receive no feedback from speakers, then speakers go to extra lengths to guarantee that their message is understood.

Using Agent Z's perspective in the "tell self" condition is neither a matter of politeness nor of joint communication as the communication is for self only. These cases are not genuine cases of taking Z's perspective, but rather of using Z as a landmark. Using Z as a landmark increased when Z's position relative to the target made it easy to locate the target, most notably when the target was closer to Z and when using the subject's perspective would have required a left/right discrimination. The frequent use of Z's perspective in the "tell self" task suggests that many cases of using the subject's or the addressee's perspective were also cases of using the subject or the addressee as landmarks.

Use of a neutral perspective increased under circumstances similar to those that increased use of subject perspective, that is, when the cognitive burdens of speaker and addressee were more equal, when the message was for self, and when a personal perspective would have required a left/right discrimination. Some aspects of the data suggested that of the neutral perspectives, the cardinal directions were preferred to landmarks, though this did not happen consistently. Each of the neutral perspectives has its' advantages and disadvantages, in general and in this situation. Landmarks were visible in the diagrams of the scenes just as they are in real scenes. The cardinal directions were not, again, as they are not in real scenes. However, in real scenes the cardinal directions are unchanging and ever-present whereas landmarks, especially relatively small ones such as those in the present scenarios, are mutable.

Difficulty of discrimination did play a role in formulating spatial descriptions. Neutral perspectives and subject's perspective were more likely to be selected when the alternative was *left* or *right* than when the alternative was *closer* or *near* or *in front of*. A related phenomenon occurs in languages that use the cardinal directions to locate objects in space rather than personal direction terms. Speakers of those languages will occasionally use *front* and *back* instead of the cardinal directions, but rarely use *left* and *right* instead of the cardinal directions (Pederson, personal communication, 1995).

Difficulty of discrimination is related to the final phenomenon to emerge from this research, the bias to

locate objects using *near* or *closer* rather than *far* or *farther*. This cannot be due to language per se, as *far* is the neutral or unmarked member of the pair and is easier to process (Clark & Clark, 1977). Rather, terms like *near* seem to be preferred to their opposites because they are more informative in describing space. When an object is described as near a landmark, there is less uncertainty about its' location than when it is described as far from a landmark. An object described as near is within an understood distance from the landmark, depending on the nature of the object and landmark (Morrow & Clark, 1988); however an object described as far from a landmark may lie in any direction and at any distance. Of course, because there were only two alternatives in the present situation, the actual uncertainty was no greater for *far* than for *near*, making it all the more surprising that *near* was so greatly preferred.

Terms like *near* were preferred not just to terms like *far* but also to terms like *left*. This points to yet another advantage to locating objects as near to a landmark or person. *Near* conveys distance but does not specify direction, unlike left/right, north/south, and so on. It only requires discriminating an approximate region around a landmark and does not require determining a direction, a sometimes difficult task. Although *near* was used frequently in our tasks, it has not been considered in many treatments of deixis nor in most treatments of perspective. This may be because *near* does not indicate direction, and even with *far*, it does not partition space neatly into four quadrants, like the other sets of relational pairs. In addition, *near* and *far* lack the symmetry of the other relational pairs. *Near* suggests a relatively small region circumscribing a landmark whereas *far* does not suggest a readily understood spatial region.

Taken together, these experiments demonstrate that the context to which people are attuned in producing such descriptions intertwines both social and cognitive elements. Successful communication results from a collaboration between speaker and addressee (Clark & Wilkes-Gibbs, 1986). In order to insure that a message is communicated, the speaker needs to take into account the addressee's perspective, but also needs to take into account the relative cognitive burdens of all participants in both formulating and comprehending utterances. Ease of formulating and comprehending utterances depends in turn on the spatial situation and the various means to describe it.

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