Journal of Experimental Psychology: General
1987, Vol. 116, No. 1, 26-37

0096-3445/87/$00.75

References in Conversation Between Experts and Novices

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In conversation, two people inevitably know different amounts about the topic of discussion, yet to make their references understood, they need to draw on knowledge and beliefs that they share. An expert and a novice talking with each other, therefore, must assess each other's expertise and accommodate to their differences. They do this in part, it is proposed, by assessing, supplying, and acquiring expertise as they collaborate in completing their references. In a study of this accommodation, pairs of people who were or were not familiar with New York City were asked to work together to arrange pictures of New York City landmarks by talking about them. They were able to assess each other's level of expertise almost immediately and to adjust their choice of proper names, descriptions, and perspectives accordingly. In doing so, experts supplied, and novices acquired, specialized knowledge that made referring more efficient.

For success in conversation, people must continually appeal to their common ground—their mutual knowledge, beliefs, and assumptions (Clark, 1985; Clark & Carlson, 1981; Clark & Marshall, 1981; Cohen, 1978; Gazdar, 1979; Stalnaker, 1978). The problem is that the participants in a conversation inevitably know different amounts about any topic under discussion. As a result, they have to start at the level of the least knowledgeable person among them and build from there. Doctors, for example, ordinarily assume their patients know little anatomy, pathology, and pharmacology, so they believe they must use lay terminology, such as *heart attack* instead of *myocardial infarction*, and couch their explanations in a form that nonphysicians can understand. Yet the moment they discover their patient is also a doctor, they realize they can adjust their terminology and explanations to fit the broader common ground. Even when discrepancies in expertise are not as great, people have to adjust. In this article, we examine a proposal about how people in conversation deal with discrepancies in expertise.

The proposal we consider is concerned with the making of definite references in conversation, as characterized by the collaborative theory of reference (Clark & Wilkes-Gibbs, 1986). The theory, briefly, is that when speakers make such a reference, they try to establish with their partners the mutual belief that their partners have understood the reference to a criterion sufficient for current purposes. That requires a collaborative process, as illustrated here in A's reference to Monday (simplified from Schegloff, Jefferson, & Sacks, 1977, p. 369):

B. How long y'gonna be here?
A. Uh—not too long. Uh just til uh Monday.
B. Til—oh ya mean like a week from to*morr*ow.
A. Yah
B. [Continues]

A initiated the referential process by presenting the noun phrase *Monday,* but A and B didn't consider the process complete until they mutually accepted that B had understood A's reference. To reach that acceptance, they took several turns: B asked A to clarify which Monday he meant, A did so, and then B continued. Two people usually reach mutual acceptance simply by allowing the next contribution to proceed uninterrupted. Other times they need several turns, as A and B did here.

Discrepancies in expertise should influence the process in predictable ways. Suppose Dr. Cohen presupposes that her patient Mr. Baker is also a physician and says, "Contract your deltoid." If she is right about his knowledge, Baker will accept her reference and comply. If not, he might ask, "Uh, my deltoid?" to which she might respond, "Oh, raise your arm out to the side." If instead Cohen presupposes that Baker is not a physician, then she should begin, "Raise your arm out to the side." If she is right, Baker will simply comply. If not, he might add, "Oh, right, contract my deltoid." That is, as they complete the referential process, not only can they discover who is expert and who is not, but they also may supply or acquire a bit of expertise (the technical term *deltoid*).

Our proposal is that experts and novices accommodate to discrepancies in expertise in the very process of collaborating to complete a reference. Their accommodation divides into three processes—assessing, supplying, and acquiring expertise.

1. Assessing expertise: Any two people in conversation must assess each other's expertise on the topic they are talking about. One method Cohen might use, for example, is to ask Baker, "Are you a doctor?" (see Schegloff, 1972). Yet a person's pri-

The research was supported by a National Science Foundation Graduate Fellowship and by Grant BNS 83-20284 from the National Science Foundation.

We thank Terry K.-F. Au, Eve V. Clark, Sam Glucksberg, Edward F. Schaefer, Irwin M. Segal, Heather Stark, and Deanna Wilkes-Gibbs for helpful suggestions on the manuscript.

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mary source, we suppose, is the expertise their partner displays in passing as they collaborate in their references. Cohen could judge Baker to be a novice when he asks, "What's my deltoid?" but to be an expert when he adds, "Oh, right, contract my deltoid."

2. Supplying expertise: Experts who realize they are talking to novices should often fill in the needed expertise. If Cohen expects to refer several times to Baker's deltoids, it may be reasonable for her to try to broaden their common ground so that eventually she *can* refer to it as *your deltoid.* One way to do this is to select a noun phrase appropriate to the current common ground, but to add information instructive to her addressee, as in *your deltoid—the muscle you contract when you raise your arm out to the side.* Experts who are addressees may expand on the noun phrases used by novice speakers and thereby acquaint them with information useful for more efficient noun phrases. If Baker complains of the muscle that hurts when he lifts his arm, Cohen might respond, "Yeah, your deltoid." Thereafter Baker can use *my deltoid.*

3. Acquiring expertise: Novices who realize they are talking to experts should try to fill the gaps in their knowledge. They may try to elicit information from their addressees. They can also pick up incidental information that experts present in the course of their references.

Do people assess, supply, and acquire expertise in the process of referring, and if so, how? To investigate this question, we used a variation of a task pioneered by Krauss and Glucksberg (1969; Krauss & Weinheimer, 1964, 1966, 1967; Glucksberg, Krauss, & Higgins, 1975). The area of expertise we chose was knowledge of New York City. We asked New Yorkers to describe picture postcards of 16 New York City landmarks to non-New Yorkers, and vice versa, and we compared their references to those of pairs of New Yorkers and pairs of non-New Yorkers talking about the same postcards.

The primary piece of expertise we examined was knowledge of proper names. Initially, most New Yorkers know, for example, that the Citicorp Building is called the Citicorp Building, and most non-New Yorkers do not. The name *Citicorp* is information that experts can supply the novices, that novices can acquire from experts, and that both can exploit in assessing their partner's expertise. Note that to learn that a particular building is called *Citicorp* is not simply to learn the proper name *Citicorp.* One has to learn what features distinguish the Citicorp Building from other buildings, and that it is the building with these features that bears the name *Citicorp.* Non-New Yorkers, in referring to a postcard of the building, may focus on pictured features that are in reality incidental to the building's identity, whereas New Yorkers should bring out those features of the building that are truly characteristic. So part of learning a proper name is learning the most apt way of characterizing its referent.

Another part of this expertise is what we will call perspective. When people become experts on a topic, not only do they know more than novices, but their understanding of it changes (for a review, see Chi, Glaser, & Rees, 1982). They can adopt more abstract perspectives on the topic and organize their knowledge more on structural properties and less on surface features. Most New Yorkers know the Citicorp's distinctive slanted roof, what happens there, its neighboring buildings, and what it looks like from other directions, whereas most non-New Yorkers don't. So when a New Yorker views a postcard of it, he or she is likely to "see through" the picture and think directly of the building, its characteristic features, and its surroundings. A non-New Yorker viewing the same postcard is more likely to focus on the picture itself—the angle of regard, the clouds, its other features. The expert attends more to the pictured building, and the novice to the building's picture. A New Yorker might say, "It [meaning the building] is the Citicorp Building," and a non-New Yorker, "It [meaning the postcard] is the shot of the building with the slanted roof." New Yorkers should also be more likely to point out features that are obscure or absent in the postcards themselves.

Method

Each of 32 pairs of Stanford University students was given two identical sets of 16 postcards of common New York scenes and was asked to arrange the two sets in the same order by describing them. The two students could not see each other. Each pair went through this procedure six times, each time with a new ordering of the postcards.

The two students sat at a desk on either side of a screen, each with the same 16 pictures and a four-by-four grid with 16 spaces. For the student we will call the *director,* the postcards were already arranged on the grid, and for the student we will call the *matcher,* they were scattered randomly beside the grid. The directors were told to describe their postcards from number 1 to number 16 so that the matchers could arrange theirs in the same order. They were encouraged to talk back and forth freely, saying whatever they needed to complete the task efficiently without error. At the end of each trial, the director's pictures were rearranged, and the matcher's pushed off to the side. This procedure was completed six times. The pictures for each trial were arranged in a predetermined random order with the constraint that no picture was ever first or last on more than one trial nor followed the same picture in all six trials. The six random orders were the same for all pairs, but half the pairs received the trials in one order, and half in a different order. All conversations were tape recorded and later transcribed verbatim.

The postcards were of 16 scenes: the Empire State Building, the World Trade Center, Rockefeller Center, Times Square, the United Nations, Washington Square Park, the boat pond in Central Park, Central Park South, Chinatown, Shea Stadium, Yankee Stadium, the Brooklyn Bridge, the George Washington Bridge, the outside of Citicorp, the atrium lobby of Citicorp, and South Street Seaport.

The director was either a New Yorker or a non-New Yorker—an expert or a novice—and so was the matcher. The two partners didn't know each other before the experiment and were told nothing about whether or not their partners were from New York. The 32 pairs of students were divided into four groups of 8: experts directing experts, experts directing novices, novices directing experts, and novices directing novices. To qualify as an expert, a student had to have lived in New York City for at least 10 years and within at least 3 years of the experiment. A few exceptions were made for people who had moved away more than 3 years before but who visited the city frequently and extensively. None of the novices had ever been to New York City, except during airport stopovers or infancy. All students were native English speakers. After the experiment all students filled out a questionnaire that tested their expertise of New York City. One person claiming to be from New York City scored less than 50% on this test, so the pair to which she belonged was replaced. The students completed the experiment as a course requirement or for pay. Most students were selected from a questionnaire they had completed about their degree of knowledge of New York, but many of

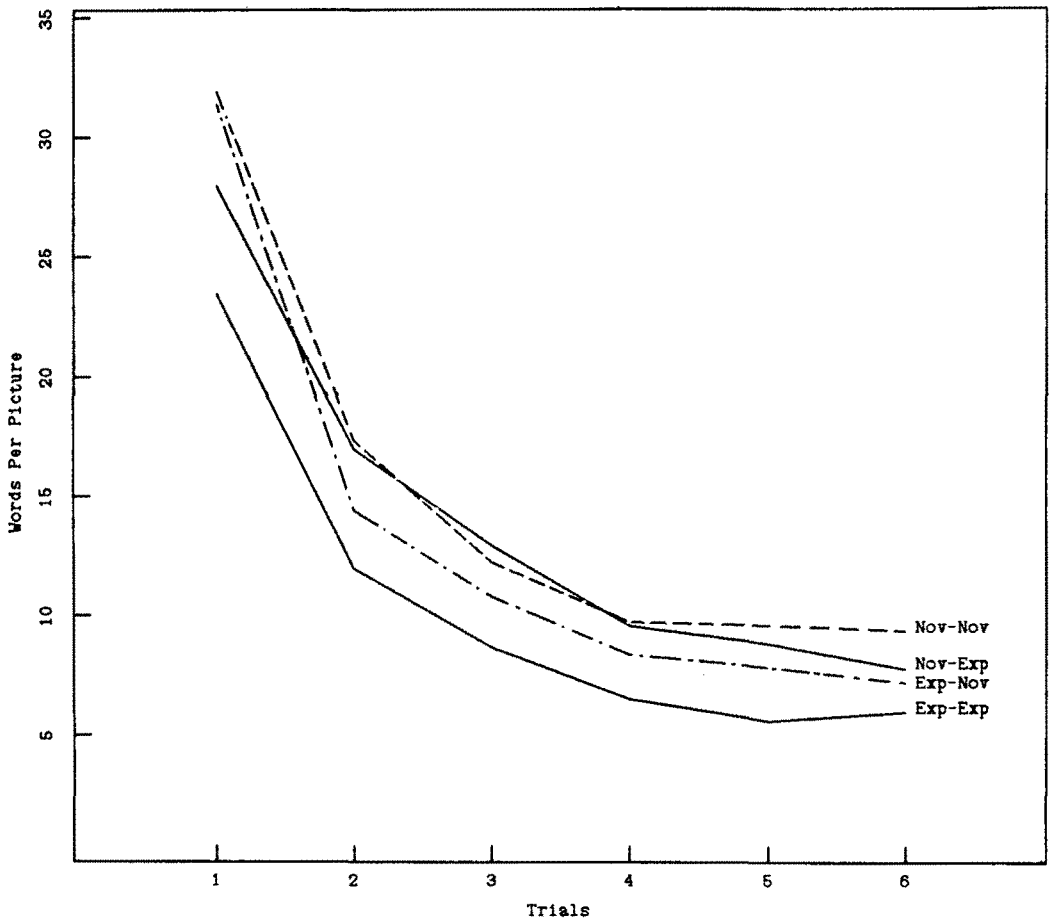

Figure 1: Mean number of words per postcard used by directors and matchers.

the New Yorkers were brought in through an advertisement in the university newspaper that asked for New Yorkers.

Results and Discussion

The analysis is divided into three parts—overall efficiency, the turn-by-turn process of referring, and perspective.

Efficiency

The task generally went as follows. The director would refer to the postcard in a position (e.g., *The ninth*) and then to the landmark pictured in it (e.g., *is the George Washington Bridge*). (All italicized and cited examples, such as this one, are from our transcripts.) Once the matcher accepted the reference and found the postcard, he or she would acknowledge this, and the director would go to the next position. Our interest is in the second reference, the one to the content of the postcard. In the simplest pattern, the two partners took just two turns (occasionally without the second turn), as in this example:

> Director. Six is the Empire State Building.
> Matcher. Yeah.

Yet it often took several exchanges to arrive at a mutually acceptable reference, as in this example:

> Director. Tenth is the Cidicorp [sic], Citicorp Building?
> Matcher. Is that with the slanted top?
> Director. Yes.
> Matcher. Mkay.

Here the process of referring took four turns to complete, which we will call Turns 1, 2, 3, and 4. The director presented the initial noun phrase *the Cidicorp, Citicorp Building?*; the matcher expanded on it; the director accepted the expansion with *yes;* and the matcher then accepted the initial description plus its expansion with *mkay* (see Clark & Wilkes-Gibbs, 1986).

If directors and matchers are sensitive to each other, the more of the relevant common ground they have, the more efficient they should be. With the relevant common ground, directors can use brief noun phrases and their partners can understand them immediately. This prediction was supported both by the use of fewer words and turns over trials and by the change in word use with expertise.

Two partners became more efficient trial by trial as they took advantage of the common ground built up with the previous

references to each postcard. Consider first the total number of words used by the two partners for each card on each trial (14 in the Citicorp example). The average number of words is plotted in Figure 1 over trials for each type of pair. All pairs, regardless of expertise, used fewer words as they progressed from the first trial to the last. With eight pairs of people in each of four groups, the mean number of words differed significantly over trials, $F(5, 140) = 181.10, p < .001$; more important, the linear trend (the decrease) over trials was highly reliable, $F(1, 140) = 661.00, p < .001$. Consider next the mean number of words the director used in Turn 1 for each card on each trial (6 in the Citicorp example). This index also decreased over trials, averaging 15.6, 10.3, 7.9, 6.6, 6.3, and 5.7 words per card on Trials 1 through 6, respectively, linear trend: $F(1, 140) = 628.30, p < .001$. A third index of efficiency is the number of turns the two partners needed per postcard (4 in the Citicorp example). This also decreased over trials, averaging 3.7, 2.5, 2.2, 2.0, 1.9, and 2.0 turns on Trials 1 through 6, respectively, linear trend: $F(1, 140) = 236.37, p < .001$.

The two partners, then, needed fewer words and turns to find mutually acceptable references with repeated references to the same postcards. This result confirms a long tradition of related findings on repeated references in the referential communication task (e.g., Glucksberg, Krauss, & Higgins, 1975; Krauss & Glucksberg, 1969, 1977; Krauss & Weinheimer, 1964, 1966, 1967).

As predicted, two partners were also more efficient the more expert each partner was. For combined number of words, expert–expert pairs averaged 10.5 words per postcard. Expert–novice and novice–expert pairs needed more words, with 13.2 and 14.0 words per postcard. Novice–novice pairs needed the most, with 15.0 per postcard. (In the naming convention used throughout the paper we list the expertise of the director first and that of the matcher second.) Pairs with expert directors averaged 2.6 fewer words per postcard than pairs with novice directors, $F(1, 28) = 6.56, p < .02$, and pairs with expert matchers averaged 1.9 fewer words than pairs with novice matchers, $F(1, 28) = 3.34, p < .08$. The average number of words in Turn 1 for each card yielded a similar pattern, with 6.4, 8.5, 9.5, and 10.5, respectively, for the four types. Experts used 2.6 fewer words on average than novices, $F(1, 28) = 11.83, p < .002$, and directors used 1.6 fewer words talking to experts than to novices, $F(1, 28) = 4.14, p < .051$. However, the four types of partners took roughly the same number of turns per postcard, with averages of 2.4, 2.5, 2.2, and 2.4.

These overall analyses, however, give us little insight into the source of the efficiency. For that we turn to the referential process itself.

The Referential Process

In the collaborative model of reference, the two partners work together to achieve a mutually accepted reference. As we noted earlier, the speaker ordinarily presents a referring expression, and if either partner does not find it acceptable, they repair, expand, or replace it in further presentations until they find an acceptable one. If experts and novices have techniques for assessing, supplying, and acquiring expertise within this process, we should see these in the way proper names are introduced into it.

Introduction of proper names. We looked first at the director's Turn 1 in placing each postcard. (We will exclude the 24 cases in which the matcher initiated the placements, which happened almost exclusively on the last postcard.) The critical part of each utterance is the part of the predicate after *Number 6 is . . .* or *Number 6 has. . . .* This part was categorized as one of three forms: name alone (N), description alone (D), or name plus description (N + D).

Unfortunately, it is inherently difficult to separate many descriptive elements from proper names because most proper names contain at least some descriptive elements. The proper names *the Brooklyn Bridge, Yankee Stadium,* and *Central Park,* for example, entail that the referents are a bridge, a stadium, and a park. Whenever the directors used *the Brooklyn Bridge,* their partners could immediately rule out all but the two postcards with bridges in them. All the proper names in our study ruled out at least some postcards. Still, the descriptive element *lake* is not part of a proper name in *the Central Park lake,* even though *bridge* is part of the proper name *the Brooklyn Bridge.*

We categorized each form as N, D, or N + D, therefore, according to the following rules of thumb. First, a form was considered N if it consisted of a proper name alone (as in *The tenth is of Yankee Stadium*), or a proper name followed by a prepositional phrase with another proper noun (as in *the shot of New York with the World Trade Centers* or *a view coming I think on on Broadway e- of of Times Square*). A form was considered N even if it contained *a shot of* or a similar term (an issue we will return to). Second, a form was considered N + D if it contained any descriptive words not part of the proper name itself (as in *Rockefeller Center, with all the flags; the Central Park lake;* or *the vertical U.N.*). We made an exception for *interior/inside (of) Citicorp* and *exterior/outside (of) Citicorp* because, as we realized later, no proper names alone could distinguish the two Citicorp pictures, and no one could pick out the right picture with interior or exterior unless they also knew the name. Third, a form was considered D if it didn't have a proper name in it (e.g., *the park with the flags*). These classifications were made by the first author; a few questionable cases were decided by both authors in consultation.

A proper name is the conventional expression used within a community to refer to a particular person, place, or thing. Proper names like *the Citicorp Building* tend to be shorter than equally informative definite descriptions like *the tall building with the triangular top.* Indeed, the use of proper names appears to be governed by a convention: All else being equal, if two people mutually know a proper name, they should use that name in preference to a definite description. When two people know a woman's name is Nancy, they will ordinarily use *Nancy* in preference to *the woman with the short hair.* Directors, then, should have tried to use proper names whenever feasible.

Directors did just that. Figure 2 plots over trials the percentage of times that directors used a proper name (with or without a description) in Turn 1 on each postcard. The percentages are plotted separately for the four types of partners. Experts, as expected, introduced proper names much more often than novices, 66% to 32% of the time, $F(1, 28) = 24.17, p < .001$. They

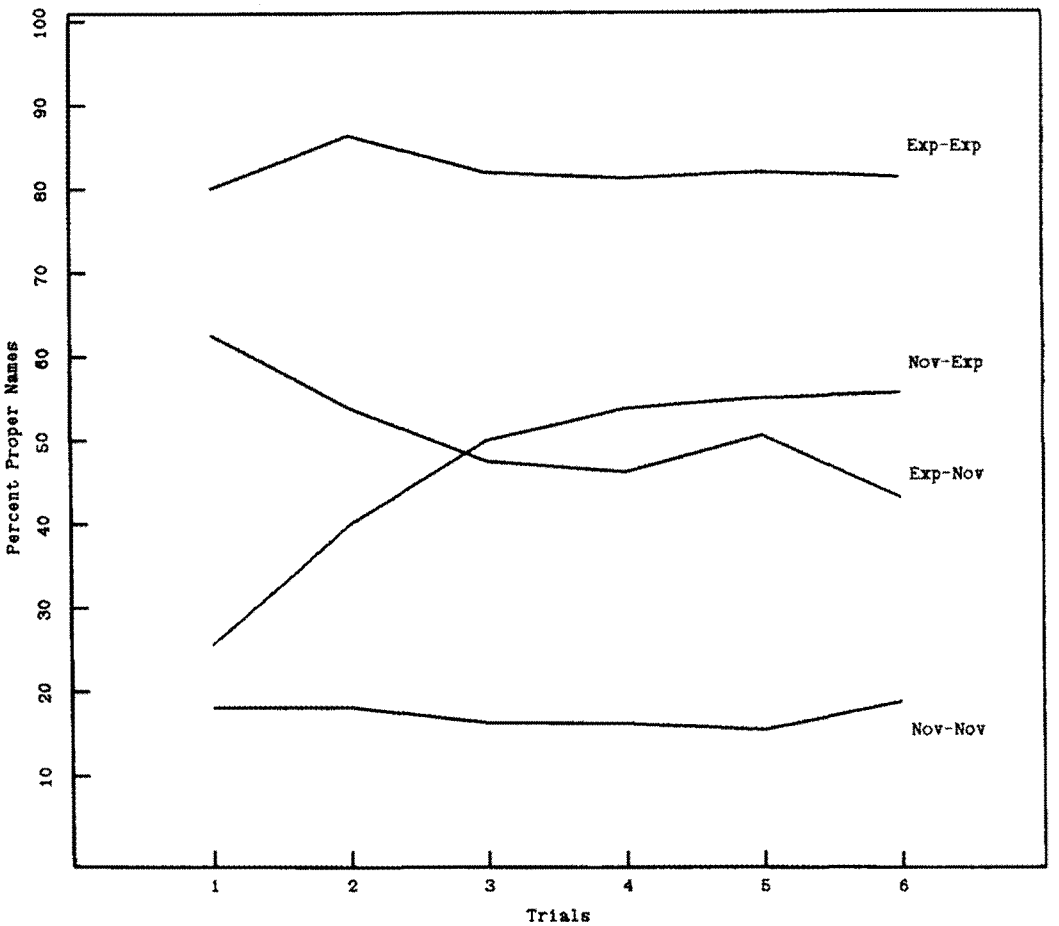

Figure 2: Percentage of postcards on which director mentioned a proper name on Turn 1.

knew more names to begin with. Still, experts used names more often with other experts than with novices, 83% to 50% of the time, and novices did too, 47% to 17% of the time. The percentage of proper names was significantly lower when the matcher was a novice, $F(1, 28) = 18.83$, $p < .001$. These results show that the directors, regardless of expertise, tailored their initial utterances to fit the expertise of their matchers.

How should directors have adapted to their partners over trials? Little change should have occurred when the expertise of the two partners was about the same. Experts talking to other experts should have used whatever proper names they knew on the first trial and continued to use them throughout the task. As Figure 1 confirms, their use of proper names hovered around 83% for the six trials, varying only six percentage points. Likewise, novices talking to other novices should have mentioned the few names they knew in the first trial and used them in all six trials. And as Figure 1 shows, their use of proper names remained at a low 17% rate over the six trials, varying only three percentage points.

When the two partners differed in expertise, the directors should have adapted to their matchers, and they did. Experts talking to novices declined 20 percentage points in their use of proper names, from 63% on Trial 1 to 43% on Trial 6, linear trend: $F(1, 35) = 7.42$, $p < .02$. As for novice directors, their name use rose steadily from 26% on Trial 1 to 56% on Trial 6, an increase of 30%, linear trend: $F(1, 35) = 26.50$, $p < .001$. The linear trends of the expert–novice and novice–expert pairs are significantly different, $F(1, 70) = 30.85$, $p < .001$. How novice directors learned the names is a question we will return to.

Directors adjusted to their partners' expertise in still another way. When the directors used a name, they could have used it either without or with a description—N or N + D. If experts were attentive to their matcher's needs, they should have added descriptions more often with novices than with other experts. Table 1 lists the percentages of postcards placed with N, D, or N + D for each trial. As these numbers show, experts added descriptions 42% of the time when talking to novices but only 13% of the time when talking to other experts, $F(1, 14) = 13.01$, $p < .001$. Experts talking to novices stopped adding descriptions from a level of 73% on Trial 1 to 41%, 29%, and 18% on Trials 4, 5, and 6, linear trend: $F(1, 35) = 52.24$, $p < .001$. Experts talking to other experts added descriptions 25% of the times they used names on Trial 1, but by Trial 3, the rate had dropped to about 9%, where it remained through Trial 6, linear trend: $F(1, 35) = 27.69$, $p < .001$. So, by Trial 6, experts were still adding descriptions twice as often for novices as for experts.

Table 1
Percentage of References by Name (N), Name + Description (N + D), and Description (D) by Directors on Turn 1

	Trial						
Reference	1	2	3	4	5	6	Total
			Expert–expert				
N	59	70	77	75	76	78	72
N + D	20	16	7	7	7	7	11
D	20	14	16	18	17	15	17
			Expert–novice				
N	17	23	29	34	34	36	20
N + D	46	24	20	14	18	8	21
D	37	53	52	53	48	56	50
			Novice–expert				
N	15	28	36	40	46	47	35
N + D	11	12	14	13	10	10	12
D	74	60	50	47	44	44	53
			Novice–novice				
N	8	9	13	13	15	18	13
N + D	10	9	3	3	1	1	4
D	82	82	84	84	84	81	83

Note. $N = 128$ for each cell.

Novice directors adjusted to their partners' expertise in a similar way. On Trial 1, they added descriptions to their names slightly more often with novices than with experts, 57% to 42% of the time (this difference was not significant). The novices who learned names from their expert partners declined in their use of descriptions to confirm their names, stabilizing at a 17% rate through Trial 6 (for 12 of 71 names used), linear trend: $F(1, 35) = 4.47$, $p < .05$. Those speaking to other novices dropped to a 4% rate (for 1 of 24 names used), linear trend: $F(1, 35) = 28.58$, $p < .001$. The novices apparently thought that the names they came up with spontaneously, such as *Chinatown* and *the Empire State Building,* were obvious enough not to need continued confirmation.

The first trial. All the evidence so far points to changes already taking place within the first trial. We examined this by dividing the first trial into quarters and tabulating the uses of N, D, and N + D within each quarter. Table 2 shows the percentages of use. To our surprise, the first quarter was indistinguishable from the other three quarters, as confirmed by the lack of statistical interactions with quarters. Directors adjusted to their partners before they had arranged even four postcards. In the first quarter, expert directors were already using a name alone 44% of the time talking to other experts, but less than a third as often, 13% of the time, in talking to novices, $F(1, 14) = 9.21$, $p < .009$. Novice directors, who couldn't have been helped yet by their partners' expertise, used names only 9% and 0% of the time to experts and novices.

To adjust so quickly, the directors must have picked up on cues from their matchers in the very first pictures. One possible cue was a New York accent, but the students' accents weren't particularly identifiable to our ears and no one commented on them. It seemed more likely that directors took most of their cues from the content of what was said. To test this, we prepared a transcript of everything each pair said in arranging the first two postcards and printed a sheet of these 32 transcripts in random order. We asked two New Yorkers and two non-New Yorkers who hadn't been in the experiment to read each transcript while viewing the appropriate postcards and to judge whether each partner was a New Yorker.

The expertise of the two partners was correctly identified a remarkable 84% of the time. The non-New Yorkers judged expertise just as accurately as the New Yorkers, 84% to 83%; experts were correctly recognized almost as often as novices, 80% to 87% of the time; and directors, who did more of the talking, were somewhat better recognized than matchers, 91% to 77% of the time. Thus, after just two postcards, the two partners displayed enough information to allow good estimates of each other's expertise. On what basis could they do this?

Assessing expertise. In only six pairs (one expert–expert, three expert–novice, and two novice–expert pairs) did one partner explicitly ask or tell the other before or during the first trial whether either was from New York. Only three of these did so within the first two pictures. In the other 26 pairs, the partners could assess expertise only from the way each other responded. We propose that they relied on at least these two guidelines:

1. Participants in conversation can use only as specific information as their knowledge and beliefs permit.

Table 2
Percentage of References by Name (N), Name + Description (N + D), and Description (D) by Directors on Turn 1 in Each Quarter of Trial 1

	Quarter				
Reference	1	2	3	4	Total
		Expert–expert			
N	44	47	75	72	59
N + D	34	41	3	3	20
D	22	13	22	25	20
		Expert–novice			
N	12	9	25	23	17
N + D	50	59	47	27	46
D	38	31	28	50	37
		Novice–expert			
N	9	9	28	12	15
N + D	9	9	12	12	11
D	81	81	59	75	74
		Novice–novice			
N	0	6	22	3	8
N + D	6	12	12	10	10
D	94	81	66	87	82

Note. $N = 32$ for each cell.

Table 3
Number of Matchers' Responses to Directors' Use in Turn 1 of Name (N), Name + Description (N + D), or Description (D) in Trial 1

	Director's initial reference							
	Expert				Novice			
Matcher's response	N	N + D	D	Total	N	N + D	D	Total
Expert								
Accept	61	19	6	86	18	10	46	74
N	5	2	12	19	0	1	24	25
N + D	0	1	1	2	0	2	3	5
D	9	4	7	20	1	1	21	23
Question	1	0	0	1	0	0	1	1
Total	76	26	26	128	19	14	95	128
Novice								
Accept	14	31	26	71	6	6	60	72
N	0	0	0	0	0	0	2	2
N + D	0	2	0	2	0	0	5	5
D	4	21	20	45	3	6	36	45
Question	4	4	0	8	1	1	1	3
Total	22	58	46	126	10	13	104	127

2. All else being equal, participants in conversation will offer information if they believe it will make their talk more efficient.

These guidelines should enable the two partners to accumulate evidence about expertise both from the director's presentation in Turn 1 and from the matcher's response to it.

The director's first presentation—N, D, or N + D—was followed in the next few turns in one of five ways. The matchers could: (a) accept the presentation, (b) add a name of their own, (c) add a name and a description of their own, (d) add a description, or (e) explicitly ask for more information. Each pattern, each presentation plus response, provides the two partners evidence about each other's expertise. No one pattern constitutes conclusive evidence, of course, but each adds to a body of accumulating evidence. Table 3 shows how often each pattern occurred in Trial 1. It supports the proposal that these patterns are used as evidence for expertise.

First consider evidence for possession of expertise. By guideline 1, expert directors should have been able to name the landmarks more often than novice directors, and we have already seen that they did. Similarly, expert matchers should have been more likely than novice matchers to accept a name alone without asking any questions. Experts accepted 79 of the 95 names alone they were given (83%) and novices accepted 20 of 32 (63%), but this difference was not reliable. By guideline 2, expert matchers should also have responded with names, or with names plus descriptions, more often than novice matchers, and they did, 20% to 3% of the time, $F(1, 28) = 16.25$, $p < .001$. So when a director or matcher supplied a name, or when a matcher accepted one without comment in the first trial, their partners already had some grounds for believing they were talking to an expert.

Next consider evidence for lack of expertise. By guideline 1, novice directors could have been only as specific as their knowledge permitted, so they should have used descriptions alone for their references more often than expert directors; they did, 68% to 33% of the time, $F(1, 28) = 20.90$, $p < .001$. The names volunteered by novice directors should have been limited to such well-known landmarks as the Empire State Building, the World Trade Center, and Chinatown. These three made up 68% of the proper names introduced by novice directors.

Novice matchers revealed their ignorance in other ways. For one, they should have been more likely than expert matchers to confirm a director's presentation with descriptions alone. By guideline 2, if they had known proper names, they would have supplied them. Indeed, on Trial 1, novice matchers offered descriptions alone for 36% of the postcards, but expert matchers did so only 17% of the time, $F(1, 28) = 22.54$, $p < .001$. When the director began with a description alone, the matcher had an excellent opportunity to introduce a name. Novice matchers did so only 5% of the time, whereas expert matchers did so 40% of the time—50% and 29% of the time in expert–expert and novice–expert pairs, respectively, $F(1, 28) = 13.00$, $p < .001$.

A matcher's ignorance should have been especially clear when the director both named and described a landmark, and the matcher followed up with only another description or clarification, as here:

> Director. Number ten is just one huge building pointed at the top, Citicorp Center.
> Matcher. And you're looking, are you looking at it from the base?
> Director. Yes, there's there's just two buildings that are visible.
> Matcher. Okay.

Novice matchers offered descriptions alone in response to directors' N + D 42% of the time, and expert matchers did so only 11% of the time, $F(1, 28) = 11.54$, $p < .002$. Other matchers requested additional information, claimed lack of understanding, or implied the need for more information with an *Uhhhhh*. One novice, when told to pick "Times Square, which, with big

Sony sign," cut in before the director mentioned the Sony sign and said, "Which means nothing to me. I don't know what Times Square is." Another said, "Okay. I need a little more help on that. I've never been to New York." With these cases added in, novice matchers responded to N + D with further descriptions or questions 48% of the time and experts only 11% of the time, $F(1, 28) = 13.70, p < .001$.

With all these sources of evidence, the two partners could each accumulate a substantial body of evidence about the other's expertise, and we assume they did. That is what allowed them to adjust so quickly to their partner's level of expertise.

Supplying and acquiring expertise. Part of our proposal was that novices should have acquired pieces of expertise from expert partners, and we have already seen evidence that they did. By Trial 6, novice directors were using proper names 56% of the time when talking to experts but only 19% of the time when talking to other novices, $F(1, 14) = 7.00, p < .019$. How did they learn them?

Novice directors learned most of the names when, limited by their own knowledge, they supplied descriptions for the pictures and their expert matchers supplied the names. Here is an example:

> Director. Fourteen is the fountain with the arch in the background.
> Matcher. Right, Washington Square, good.

On Trial 1, when offered descriptions alone, as here, expert matchers offered proper names 33% of the time, and novice matchers did so only 5% of the time, $F(1, 28) = 15.63, p < .001$. Expert matchers also corrected names volunteered by novices 9% of the time; with other experts, they either corrected the name or corroborated it with an alternate name 8% of the time. In Trial 2, expert matchers continued to offer names to 26% of novices' descriptions, but not to any of the experts' descriptions. Novice matchers did so only 1% of the time to either novice or expert directors. This difference did not reach significance, $F(1, 28) = 3.05$. Here, then, is the source of the novices' proper names and even of some of the experts'. Over the first two trials, experts offered names in response to novices' initial descriptions 27% of the time, and they corrected another 8% of the novices' names.

Novices couldn't acquire all the proper names at once—at least they didn't try to—and the experts recognized this. As we have already seen, expert directors talking to novices added descriptions to the names 72% of the time on Trial 1, and from Trial 2 on, they continued to do so 51%, 41%, 29%, 35%, and 17% of the time. Apparently, they couldn't be sure their partners would always remember the link between name and landmark. Novice directors talking to experts, however, could drop the descriptions as soon as they, the novices, believed they knew the names, because they could be sure their expert partners also knew them. They added descriptions to names consistently less often than experts from Trial 1 to Trial 6—42%, 30%, 28%, 25%, 18%, and 17% of the time. They eventually reached the same rate as expert directors. The difference in trends is significant, $F(1, 70) = 5.14, p < .05$.

Thus, partners seemed to assess each other's expertise mainly through the information in the director's initial presentation and in the matcher's responses to it. They were able to do this by assuming that people can use information only as specific as their knowledge permits and that they will offer helpful information when they can. Also, novices acquired knowledge from experts by picking up the information offered in the very process of completing each reference successfully.

Perspective

Part of being an expert on New York City landmarks is being able to think about them from many perspectives. When New Yorkers see a postcard of Rockefeller Center, they can think about Rockefeller Center itself—its location and surroundings, its unpictured features, what happens there. When non-New Yorkers look at the postcard, all they know of the building is what is depicted and what one can generally assume about buildings like it. General assumptions like this, however, do not distinguish Rockefeller Center from other buildings, so for the purpose of referring, non-New Yorkers are forced to focus on what is actually depicted, or on the depiction itself. As a result, experts referring to Rockefeller Center should have been tempted to describe features of the place itself, whereas novices should have tended to focus more on the features of the postcard. Yet directors who are sensitive to their partners' expertise should have adjusted their perspectives to match.

Picture and place references. The director's initial references for each postcard took two main forms, as illustrated for a postcard of a fountain. He or she could make a place reference by referring only to the fountain, as in *the fountain,* or a picture reference by referring to the picture as well, as in *the picture of the fountain.* Picture references in our data were headed by one of six nouns: *picture, shot, view, scene, photograph, postcard.*

By using place or picture references, directors are taking manifestly different perspectives on what they are doing. Compare (a) *Number eleven is Chinatown* with (b) *The seventh one is a picture of Rockefeller Center.* With *number eleven* in (a), the director is referring to the object depicted in the eleventh postcard, as if it means "the object depicted in the picture on postcard number eleven." But with *the seventh one* in (b), she is referring to the picture on the seventh postcard, as if it means "the picture on the seventh postcard." Pragmatically, both are indirect references (Clark, 1978; Nunberg, 1979), as in *I am parked two blocks away,* where *I* means "my car," or as in *Queen Elizabeth is on all British stamps,* where *Queen Elizabeth* means "a picture of Queen Elizabeth." (Note that indirect reference like this is not ellipsis. *I* cannot be derived by deletion from *my car* and *am parked* agrees in person with *I* and not with *my car.*) At other times, the directors were more explicit about what they were referring to, as in *All right, the first picture is a picture in the evening, of the Brooklyn Bridge.* The same director might alternate between place references for some postcards and picture references for others. By their choice of place versus picture reference, the directors were indicating what they were focusing on—the landmark itself or the picture of it.

Which type of reference should directors have chosen when? Generally, they should have preferred place to picture references, because place references are shorter. Indeed, of their first references to each postcard on each trial, they used picture references only 6% of the time. They also should have preferred

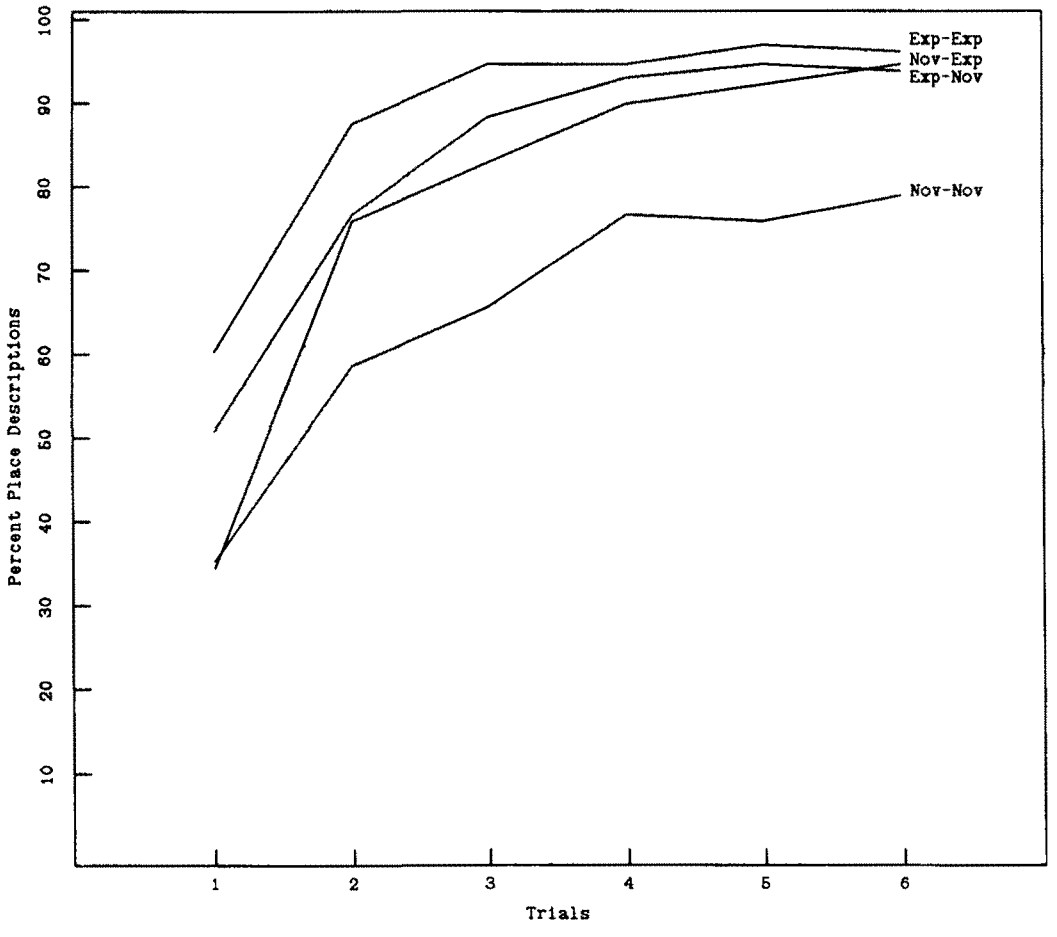

Figure 3: Percentage of postcards directors identified with place-oriented descriptions.

picture references less often from one trial to the next, and indeed, the percentages for Trials 1 through 6 were 15, 9, 6, 3, 2, and 2, linear trend: $F(1, 140) = 51.06$, $p < .001$. However, the more expert a director was, the more often he or she should have focused on the landmarks themselves and used place references. Indeed, experts used fewer picture references than novices, 4% to 9%. This difference, however, was not significant, $F(1, 28) = 2.33$, nor were any other differences; there were too few picture references for statistical reliability.

Picture and place perspectives. The two partners, however, could take picture and place perspectives other than by using picture and place references. One novice, for example, took a picture perspective when he said, "In the upper right-hand corner there's a little marina," as did another when she said she was "looking at a tall building from near the base." Because of this, we had a rater blind to condition classify each director's utterances for each postcard as either picture oriented or place oriented. An utterance was classified as picture oriented if the director mentioned a picture, view, scene, shot, photograph, or postcard; any gross features of the card itself (e.g., its horizontal or vertical orientation, or a portion of the card); or the vantage point from which the photograph was taken. In place-oriented descriptions, people mentioned only features of the landmark depicted (e.g., "Twelve is the skyscraper with the slanty roof"). In borderline cases, the rater was instructed to judge whether he thought the wording revealed an awareness of the particular image on the postcard.

Figure 3 shows the average number of place-oriented descriptions used by each pair in each condition on each trial. As expected, experts used more place descriptions than novices, 86% to 72% of the time, $F(1, 28) = 10.80$, $p < .01$. Yet directors adjusted to their matchers' expertise. Experts used slightly more place descriptions with experts than with novices, 88% to 83% of the time, and novices used slightly more with experts than with novices, 78% to 65% of the time. The combined difference was reliable, $F(1, 28) = 4.87$, $p < .05$. The directors made this adjustment only gradually over the course of the conversation. On Trial 1, experts used more place-oriented descriptions than novices, regardless of the expertise of their matcher. But from Trial 2 on, the directors in the mixed pairs took perspectives more like their matchers, as revealed by a contrast analysis, $F(1, 140) = 5.56$, $p < .01$.

A more informal examination of people's references yields supporting evidence. On Trial 1, experts were more likely than novices to mention features that were characteristic of the landmarks but were either inconspicuous or not in the pictures at

all. On Trial 1, two New Yorkers talking to other experts referred to the skating rink in Rockefeller Center, even though the postcard depicted a summer scene with cafe tables in place of the skating rink. So did two experts talking to novices, though from Trial 2 on, they adjusted and referred to more conspicuous features in the picture, such as the flags surrounding the plaza.

Novices sometimes referred to items that just happened to be depicted but were not characteristic of the actual landmark, such as clouds or cars. For example, "And then, uh, another tall building with, uh, clouds behind?" and the following:

> Director. And the eleventh one is the skyscraper with a lot of clouds behind it. It's like one building out by itself, kind of.
> Matcher. Okay, that's the one with the cars in front.
> Director. Right.
> Matcher. Mkay.

The experts rarely did this. For instance, the postcard of South Street Seaport conspicuously showed many vendors with small carts not ordinarily found there. Whereas the 16 novice directors referred to the carts or vendors a total of 16 times, expert directors mentioned them only 5 times. The experts referred instead to its more permanent features, some even to its location in the lower east side or near the pier, neither of which was depicted in the postcard.

Both the formal and the anecdotal evidence, then, suggest that experts tended to see through the postcards to the landmarks depicted, whereas novices tended to focus more on the postcards themselves. Yet when necessary, experts could draw back and look at the postcards as their novice partners did, and novices could acquire the place perspectives of their expert partners. People seem to be able to adjust to each other even on such a subtle matter as picture versus place perspective.

Definite versus indefinite reference. Directors also had a choice between definite and indefinite references. According to some theories (e.g., Clark & Marshall, 1981; Hawkins, 1978), people can use a definite reference only when they believe the referent satisfies two criteria: (a) it is mutually identifiable from common ground, and (b) it is readily identifiable. As for the first criterion, the two partners mutually knew from their instructions that they had the same 16 postcards. If that was all they needed, they should have used definite references 100% of the time from Trial 1 on. But on Trial 1, their initial place references (e.g., *the fountain*) were definite 54% of the time, and their initial picture references (e.g., *the picture*) were definite only 24% of the time.

The second criterion, ready identifiability, turned out to be critical. Experts who discovered they were talking to another expert could assume adequate familiarity with, or ready accessibility of, most of the landmarks, and primarily use definite references. Experts who discovered they were talking to novices had to assume less familiarity or accessibility and use fewer such references. Experts speaking to experts used definite references 83% of the time; those talking to novices used them only 61% of the time. In contrast, novices entirely unfamiliar with a landmark being described didn't have ready accessibility of its features, regardless of what they thought their partners knew. They used definite references only 36% and 37% of the time in talking to experts and novices, respectively. The ordering of these three levels is reliable, $F(1, 28) = 50.24$, $p < .001$. Many of these definite references occurred because directors contrasted the first of two stadiums or bridges with the second, which enabled them to refer to the second with respect to the first (e.g., *the other stadium* or *the bridge without the lights*). Even when these cases are removed, the three-level pattern is the same. Also, the directors should have made picture references (e.g., *a dining scene, like a cafe*) only for those landmarks they couldn't mutually recognize easily. As a result, most of the 75 initial picture references by both experts and novices should have been indefinite. They were, 76% of the time.

The two partners spent the first trial establishing mutually acceptable descriptions for each postcard. So, from the second trial on, they should have been able to draw on this readily available source of mutual knowledge and to make definite instead of indefinite references. They did. For place references, definite references jumped from 54% of the time on Trial 1 to 98% from Trial 2 on, $F(1, 28) = 28.62$, $p < .001$. For the picture references, the jump was from 24% to 91%, $F(1, 28) = 14.31$, $p < .001$. Mutually accepted descriptions, then, were apparently a highly salient source of common ground for definite reference.

Concluding Remarks

In conversation, we have assumed, making a successful reference requires the coordinated participation of both speaker and addressee, and the two do not take that process as complete until they reach the mutual belief that the addressee has understood it to a criterion sufficient for current purposes (Clark & Wilkes-Gibbs, 1986). What we have shown is that the two of them assess, supply, and acquire expertise in the very process of reaching this mutual belief. Assessing, supplying, and acquiring expertise contribute to the success of the current reference and, as a result, to future references as well.

Two partners accommodate to each other's expertise, our findings suggest, by following a basic strategy: (a) Begin assuming only as much expertise as you think might be shared by your partner; and (b) use your partner's responses to adjust to his or her actual expertise. The strategy works, we have argued, because of two guidelines: conversationalists can use only as specific information as their knowledge and beliefs permit; and all else being equal, conversationalists will offer information they believe makes their talk more efficient.

An expert speaker who wants to refer to the South Street Seaport can use the bare proper name if he or she thinks the addressee might also be an expert. What is implied in using it, according to the basic strategy, is that the speaker knows the place by sight and expects the addressee to know it too. By responding "Yup," the addressee not only accepts the reference but also implies that he or she too is an expert. The addressee may even display further knowledge, as when another matcher offered the alternative name *Fulton Fish Market* apparently as reassurance that he really knew it:

> Director. What's this. This is probably South Street Seaport.
> Matcher. Yeup.
> Director. You got it?

Matcher. Fulton Fish Market. Yeah.
Director. Right. Okay.

Using a proper name assumes a certain expertise, and accepting the name confirms it.

An addressee who isn't an expert won't understand the speaker's proper name, and the response should show it. Typically, our data suggest, the addressee will ask for a description, wait until more information is given, or offer a description of his or her own:

Director. Okay, next is a Central Park scene. It's a lake. Uh, it's fairly dark with a couple of trees in the foreground. And some benches.
Matcher. And it's real clear? The lake is real/clear?
Director. Yeah.
Matcher. Okay.

(The director began his next utterance at the slash.) The matcher, by failing to respond to the name, encouraged the director to keep elaborating until she could confirm his understanding by offering a further description. In doing so, she gave the director evidence that she was not an expert. In contrast, expert matchers who were not entirely sure of a landmark often showed evidence of recognizing the name and using it to help them find the picture, as in this example from an expert–expert pair:

Director. Okay, then we have, I think we have Rockefeller um S-Square there. Center.
Matcher. With the flags going all around.
Director. The flags. All the flags.
Matcher. And the golden whatever that thing is.
Director. Um hmm. Um hmm.

Apparently, the matcher wasn't sure enough to accept the name without confirming it, yet he demonstrated that he knew what to look for by selecting a picture from the name alone. In both examples, the directors had ample means to assess their partners' expertise in the process of arriving at an acceptable reference.

When the director is, instead, a novice, he or she is limited by his or her own lack of knowledge and must begin assuming a lower level of shared expertise. The director has no choice but to use a description, as here:

Director. Seventh is looking out across the square, it looks like the middle of town, with a bunch of flags, international flags.
Matcher. Fine, Rockefeller Center.

If the matcher had accepted the description and done nothing more, as with *fine* alone, he would have implied that he had no helpful information to add, and that he too, therefore, was a novice. But when he added *Rockefeller Center,* as here, he not only accepted the reference, but displayed his expertise. The director, indeed, could learn the name offered this way and use it in later references to the same picture.

Experts often seem compelled to indicate that they are experts, even when they are wrong, as here:

Director. Six is the uh the uh I think it's the new Chase building. The chisel top?
Matcher. Oh, Citicorp building.
Director. The Citicorp, that's it. I knew it was a bank.

The reference would have been complete with *The Citicorp, that's it.* Yet the director, apparently to save face, goes on to reassert his expertise with *I knew it was a bank.*

What is remarkable is the variety of cues available in references for displaying and inferring expertise. We have identified four main cues. The first is the use of proper names, *the Citicorp Building,* as against mere descriptions, *the building with the diagonal top.* Experts are able to use proper names, but novices, until they learn the names, can use only descriptions. The second is definite reference, *the flea market,* as against indefinite reference, *a marketplace.* With definite references, speakers presuppose not just that the referents are mutually identifiable, but that they are readily identifiable. Experts, being familiar with a topic, are more likely to presuppose this than novices are. The third cue, more particular to our task, is the use of place references, *Rockefeller Center,* as against picture references, *a picture of Rockefeller Center.* Related to this is the fourth cue, the use of a place perspective, *the Citicorp Building,* as against a picture perspective, *Times Square looking out to a billboard with Sony?* Experts were more likely than novices to describe landmarks as if they were familiar with them from any vantage point. Novices were more likely to limit themselves to the view depicted in the postcard.

Conversationalists probably exploit these cues without being aware of it. It seems unlikely that people in our task consciously reasoned that their partners couldn't be from New York because they used too many indefinite references or too many references to pictures instead of landmarks. The process instead, we suggest, is that when two people seek a mutually acceptable name or description for a landmark, they are forced to take the same perspective on it—or at least perspectives that are not distinguishably different. The two people adjust their perspectives simply to be able to complete the process of reference.

In conversation, we have assumed, speakers and their addressees work to reach the mutual belief that the speakers have been understood, but only to a criterion sufficient for current purposes. In our task the directors and matchers set a high criterion in order to place the postcards without error, so they devoted much effort to the referential process. In situations in which less is at stake or the referents are more familiar, conversationalists presumably set lower criteria and expend less effort. Without the stringent criteria, they probably also accommodate less and exchange less expertise. What actually occurs in less exacting tasks is an open question.

In everyday conversation, however, people deal with discrepancies in expertise that are often even greater than the discrepancies studied here. Sometimes they are aware of these discrepancies beforehand, but often they pick up on them as they go along. In either case, they must continually assess and adjust their utterances to make sure their addressees understand them. What we have demonstrated is that people accommodate to each other quickly and automatically in the very process of making themselves understood.

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Received January 29, 1986
Revision received June 5, 1986 ■