

Confusing One Person With Another: What Errors Reveal About the Elementary Forms of Social Relations

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Seven studies investigated the cognitive structure of social relationships exhibited in the patterns of substitutions that occur when people confuse a person with another. The studies investigated natural errors in which people called a familiar person by the wrong name, misremembered with whom they had interacted, or mistakenly directed an action at an inappropriate person. These studies tested the relational-models theory of A. P. Fiske (1990b, 1991) that people use 4 basic models for social relationships. All 7 studies provide support for the theory; Ss tend to confuse people with whom they interact in the same basic relationship mode. In addition, Ss confuse people of the same gender. Other factors (age, race, role term, similarity of names) generally have smaller, less reliable effects, indicating that the 4 elementary modes of relationships are among the most salient schemata in everyday social cognition.

Imagine that the two of you are in bed, and your spouse calls you by the wrong name. What sort of relationship do you suppose your spouse has (or imagines having) with the person whose name was substituted for yours? Would you believe it if your spouse told you that the person so named was just a client, merely a supervisor, or only an office mate? Mistakes of misnaming like this are one kind of social error in which a person inadvertently substitutes one person for another. Mismaking is a speech error, but people also make memory and action mistakes that involve such substitutions. People often remember telling someone something (e.g., a joke, personal information, or instructions) but later forget just whom it was they told. Or a person goes to a movie with someone but later is confused about which person it was. People also dial the wrong person's phone number, hand something to the wrong person, or reach out to hold the hand of the wrong person. These social substitu-

tions involve diverse cognitive modes: speech errors in addressing or referring to people, person-memory errors in recalling the identity of partners in social interaction, and errors in which people misdirect social actions to an unintended or inappropriate person.

Although it was Freud (1901/1960) who most forcefully affirmed the motivational significance of slips, people have recognized for centuries that such errors often expose a person's concealed wishes and intentions. Freud (1916-1917/1963) presented two telling examples from plays by Schiller and Shakespeare. Freud's work on parapraxes (1901/1960, 1916-1917/1963) not only proposes a particular theory of slips but also introduces the idea that the study of errors offers a direct passage to hidden structures of belief and desire and offers a revealing way of discovering the processes underlying normal, error-free performance. (See Mohavedi, 1985, for a recent review of the evidence on Freudian slips.)

In particular, social mistakes may reveal the basic typology of cognitive structures that people use in relating to other people. We hypothesize that when people make such social errors they tend to confuse different people with whom they have the same kind of relationship. Of course, there are other possible sources of confusion as well: There may be effects of race, gender, role, and other stimulus similarities of the people confused; the two people may have similar-sounding names; and there may be a recency effect when a person has just been speaking with (or thinking about) one person and then addresses or refers to someone else. But our hypothesis is that although stimulus similarity will have an effect on errors, the pattern of errors should also reflect the nature of the social relationships themselves. That is, we predict that social substitution errors convey information about what sets of people are socially equivalent, in terms of how the person making the error is relating to them at the moment of the error. People mistakenly substitute Person A for Person B when they interact with A and B in the same way. The substitutions reflect the fact that A and B are alternative partners for the same fundamental

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mode of interaction. We hypothesize that people sometimes forget exactly with whom they are interacting, while still keeping track of what kind of interaction it is that they are engaged in. That is, even when they lose track of the characteristics of the person, they remember how they were interacting.

If this is true, then such mistakes reflect people's naive, implicit conceptions of the basic kinds of social relationships in which they are engaged. In this event, we can use naturally occurring social substitution errors as a tool for determining people's fundamental social orientations, their basic modes of relating to others. If the relationship mode is cognitively salient to people making these mistakes, substitutions within the same basic relationship mode should be more frequent than substitutions across modes. We can then test a theoretical taxonomy of the basic types of social relationships by predicting the categories within which substitutions will tend to occur. If the theoretically generated taxonomy does not correspond to the cognitive framework that people are actually using, then it will not predict the pattern of substitution errors.

In brief, the goal of our seven studies was to reveal the cognitive structures governing social relationships through an examination of naturally occurring social slips. More specifically, the studies test A. P. Fiske's (1990a, 1990b, 1991, in press) relational-models taxonomy of social modes as a predictor of patterns of errors in misnaming, person memory, and interpersonal action. Four of the studies compare this prediction about the effects of representations of relational characteristics against predictions based on stimulus characteristics inhering in the people confused.

The next section summarizes Fiske's theory of the elementary models for social relationships. Then we briefly review previous research and thought about the significance of errors. After reporting the methods and results of studies of three different kinds of social substitution errors, we briefly discuss the use of naturally occurring errors as a methodology for social cognition research.

The Relational-Models Theory: Four Fundamental Forms of Social Relationships

A. P. Fiske (1991) proposed a relational-models framework that might provide a unified theory of social relations, which was based on a synthesis of research and theory in anthropology, social psychology, sociology, and allied disciplines. The theory posits that four elementary relational structures are the cognitive sources for generating social action, for understanding and evaluating others' social behavior, and for coordinating social interaction. The four fundamental models are communal sharing, authority ranking, equality matching, and market pricing. *Communal sharing* (CS) is a relationship of equivalence, in which all the people in some bounded group are considered the same for the social purposes in question. Membership in the collectivity is all that matters: People ignore individual identity. Close kinship relations, particularly between mothers and young children, are a prototype of CS, as is intense love. A communal sharing dyad or group makes decisions by consensus, seeking unanimity and speaking with one voice. In transactions, the group pools resources and operates on the principle, What's mine is yours. *Authority ranking* (AR) is an asymmetric,

linearly ordered relationship in which superiors take precedence, and subordinates respectfully defer to them. In making decisions, there is a chain of command in which authorities issue orders that lower ranking people obey. In transactions, senior people may expropriate things from their juniors, who have to "pay tribute," but conversely, high rank implies pastoral responsibility for followers, according to the principle of noblesse oblige. *Equality matching* (EM) is an egalitarian relationship in which people aim to maintain an even balance. Typical manifestations are turn taking, in-kind reciprocity in which people get back the "same thing" they give, distributive justice as equality among shares, an-eye-for-an-eye revenge in which people match harm for harm on a one-to-one basis, and compensation in which people replace a loss with the same thing that was taken away. One-person, one-vote elections are the most common form of decision making in this mode, although people sometimes use fair lotteries. *Market pricing* (MP) is a relationship that is based on proportionality, in which people organize their interactions with reference to some system of ratio values. The most salient examples are prices, wages, rents, and interest rates, all of which represent ratios of exchange. People using this model make decisions according to rational calculations of cost and benefit or supply and demand, as when the market determines what commodities are produced, where, how, and by whom. (The etymology reveals an important structural fact: Rationality requires a ratio-scalable metric by which any two benefits and costs can be compared. Thus, ratios are at the root of the rational.) In transactions, people make exchanges according to the price (or utility) ratios of the items. (In a collaborative chapter with Scott Weinstein, A. P. Fiske, 1991, provides a formal, content-free, mathematical axiomatization of the relational structures and operations entailed in each of these models.)

According to A. P. Fiske's theory, people usually use these four fundamental relational schemata whenever they interact with other people or deal with putative beings like gods, spirits, and ancestors. Occasionally, especially under extreme stress, social relations collapse and people treat others merely as means to extrinsic ends, using pure coercive force or stealth. In these cases, the interaction is *asocial*. More often, people simply ignore each other, not taking each other into account at all; this is the *null* relationship case. For the most part, however, the four models inform social interaction as congruent social motivations and normative obligations. A. P. Fiske (1991, in press) reviews evidence suggesting that these four elementary relational structures govern the circulation of things in all kinds of transactions (exchange, distributions and contributions, justice); underlie the organization of work; and provide the social meaning of objects, land, and time. The same four structures are evident in marriage systems in traditional societies and major forms of marriage and sexual relations in the industrial world, in decision processes, and in the mechanisms of social influence. People also appear to use these four elementary relational models as the basis for the formation of groups, group structure, and norms, and for constituting social identity and aspects of the self. The models also have a directive aspect that manifests itself in distinctive social needs and motivations, forms of moral judgment, political ideology and social legitimization, responses to transgression and misfortune, and possibly

the psychology of religion and social development. Furthermore, the relational structures generated by these four models are readily discernible in all kinds of aggression and social conflict. There is ample ethnographic and cross-cultural material showing that these four relational structures are manifest in many diverse and historically unrelated cultures, at all levels of social organization from dyads to the interaction of nations.

The theory hypothesizes that social relations in all of these disparate domains exhibit the same fundamental relational structures because people generate social action (and evaluative judgment) using the same set of four cognitive models, regardless of the content or context. By combining the elementary forms in various concatenations and nested hierarchies, people produce complex social forms. Because various implementation rules must be specified and certain parameters must be set before people can realize any of these relational structures in any actual interaction, there is a great deal of cultural variation in the social manifestations of the universal structures: People can use the models only in some culture-specific way. Social ontogeny involves learning the cultural implementation rules for each model.

This view of social relationships focuses on the structure of relationships rather than on the attributes of people. People are not just oriented toward people in their particularity; they are thinking primarily in terms of relationships. This implies that at times people may lose track of the identity of the particular person who is their partner in an interaction while the relational model, the structure of the relationship, remains salient. Our studies explore this hypothesis by using naturally occurring errors to unobtrusively determine and compare the factors that organize representations of social relationships.

Previous Research on Errors

Reason (1990) effectively surveyed the study of errors, reviewing previous work on the basic forms of errors and the underlying cognitive mechanisms. Most of this previous work is only marginally related to our focus here, so a very brief review of work on interpersonal action slips, misnamings, and person memory errors will suffice.

Norman (1981) has elaborated a cognitive model of action slips, postulating that they arise because of errors in the formation of intentions and in the faulty activation and triggering of hierarchically organized schemata. Reason and Mycielska (1982) also developed a classificatory analysis of motor slips in relation to a general theory of action—focusing on speech errors, memory blocks, and recognition failures. Speech errors receive more detailed attention in Dell (1986), who offered a theory of sentence production that is based on spreading activation within linguistic representations at a number of levels. (On speech errors, see also Cutler, 1982.) Errors of memory are principally considered in studies of the “tip-of-the-tongue” phenomenon (e.g., Brown & McNeill, 1966; Reason & Lucas, 1984) and in numerous discussions of retrieval mechanisms.

Although a considerable volume of research has been devoted to speech, action, and memory errors, much less attention has been paid to errors of a distinctly social character, that is to say, those that involve a confusion between people. The finding that more similar tokens of a type are more apt to be

substituted (e.g., Dell & Reich, 1980; Fromkin, 1980) suggests that confusions between people might establish the underlying structures of the implicit representation of social relationships. This logic is pursued by Taylor, Fiske, Etcoff, and Ruderman (1978) in experimental recall tasks of memory for who said what; on the basis of subjects’ confusions after observing a simulated discussion, the study concluded that race and gender are categories that organize the encoding of person information. Taylor et al. inferred that stereotyping can be explained by general cognitive categorization processes that are not specific to memory in the social domain *per se*. Arcuri (1982) replicated Taylor et al.’s results and showed that confusions within categories are more frequent when the categories are redundant (e.g., all the women are teachers, and all the men are students). Miller (1988) found that observers of a simulated discussion apparently categorized women according to their attractiveness, tending to make errors in which they confused the most attractive women with each other and the least attractive with each other. Other work in social cognition and person memory also suggests that inherent characteristics of persons, such as gender, age, race, or personality traits (e.g., S. T. Fiske & Neuberg, 1990; Sherman, Judd, & Park, 1989) are the operative factors in people’s representations of social interaction. But by focusing on the features of people as individuals, this research neglects the nature of the social relationships that people engage in.

However, Bond, Jones, and Weintraub (1985) found that when subjects are asked to name as many acquaintances as possible, they give names in bursts that correspond to social groups; in this free-recall task, subjects did not retrieve names according to the physical or personality characteristics of the persons. Bond and Brockett (1987) replicated these results, showing that within the free-recall social group clusters, there were subclusters of people with similar personalities. Bond and Brockett also found that subjects retrieved the name of an acquaintance to a social group cue faster than to a personality cue and, if both types of cue were presented, responded faster if the social cue came first. They interpreted these results as showing that memory for acquaintances is hierarchical, with social groups and roles being the superordinate categories because memory structures are based on the contexts in which people encounter others. Andersen and Klatzky (1987) also found that social stereotypes (clown, politician, bully, neurotic, brain, guru) were richer, better articulated, and more vivid and had more distinctive associations than did personality traits. Anderson and Klatzky also interpreted this as indicating that social stereotypes are the more basic, as well as superordinate, cognitive categories. This research indicates that people think about others in terms of the ways in which they relate to them socially.

A. P. Fiske’s relational-models theory predicts that the four elementary models are the most salient cognitive factors in the representations of social relations. If so, people should make errors in which they confuse people with whom they interact in the same fundamental relationship mode. A subsidiary prediction is that the role term (e.g., *friend*, *boss*) that the person uses to refer to another person will affect the patterning of social slips. Role terms are the manifest categories people commonly use to describe, refer to, and address others. However, accord-

ing to the relational-models theory, roles are combinations of the four elementary modes of relationship, and conversely, many different roles use the same four elementary modes. If the four relational modes are the more fundamental relational schemata, then people will often make errors in which they substitute one role term for a different term that is based on the same underlying mode. Other errors will involve substitutions of people who are identified by the same role term, either because the surface role concepts themselves are salient at the time or because the underlying modes are also the same.

In addition to mode of relationship, role terms, and personal characteristics like gender, age, and race that may organize errors, we examined three further factors. Recency and relative frequency of encounter are well known to influence the character of confusions among items (Reason & Lucas, 1984; Reason & Mycielska, 1982), with more frequently and recently encountered elements tending to intrude and substitute. Further, and especially in the case of misnamings, phonetic similarity is apt to exert a biasing effect on speech errors, with more similar utterances being more substitutable (Nooteboom, 1980).

Hence, the studies reported below seek to compare the degree to which alternative possible organizing properties of representations of people and of social relations predict the patterning of social slips and to validate the hypothesis with convergent results across three error domains. To collect elusive data not readily accessible in the laboratory, we used naturalistic diary methodology, in spite of its known limitations (cf. Norman, 1981). By encouraging prompt recording and providing financial incentives, we hoped to minimize memory distortions and selective reporting of slips. We hypothesized that because cognitive representations of social relationships are organized by mode of relationship, relationship modes would pattern social slips independently of alternative organizing properties. More specifically, we hypothesized that the two persons confused in social slips would tend to have the same mode of relationship with the person making the error; this effect of relationship mode on confusability should be independent of the effects of personal characteristics and nominal roles.

Study 1: Preliminary Investigation of Misnaming Errors

Method

Subjects. An interviewer randomly selected 55 faculty, staff, and graduate students from the Carnegie Mellon University telephone directory. Of these, 39 were successfully located and were asked to participate in a short psychology study; 28 (72%) agreed. Their average age was 37.5 years; half were men and half were women.

Procedure. The interviewer introduced himself as working with the psychology department and asked subjects to fill out a questionnaire about memory lapses. If people agreed, they were handed a questionnaire that asked them to "list all the times you can recall that you have been called by someone else's name." It also asked subjects for their naive theories of why they had been confused with someone else in each case. Last, it asked subjects to choose one incident and describe the other two people, giving their age, race, gender, height, build, hair, grooming (noticeable clothing, makeup, glasses, etc.), striking facial features, occupation or role ("relative to you" and "how they are related to each other"), characteristic gestures and speaking style (etc.), distinctive habits or behavior, and personality traits. Then the interviewer

thanked the subjects and described the hypotheses. No subject expressed suspicion regarding the specific hypotheses of the study.

Results

We obtained a total of 48 incidents from 21 people; 7 people indicated that they could not recall any incidents of name confusion, and 1 had no information on the people involved. (Most of the subjects who could not recall having been confused with someone else were older, high-status men; subjects reported that most of the people making errors tended also to be older and of higher status.) The incidents ranged in time from 25 years previously to currently continuing; most had occurred in the past 2–3 years. People's naive explanations of the misnaming errors focused primarily on similar relationships and similar appearance, although many insisted on "simple name confusion" and "similar names." No one suggested similar personality or behavior as a possible reason.

Using all the information provided by subjects, a coder who was blind to the hypotheses of the study coded each incident for the relationships between confuser and subject, between confuser and the other confusee, and between subject and the other confusee. (The instruction to code the relationship between the two people who were confused with each other was intended as a distraction to counteract the possibility of demand effects on the coder. When the coder was carefully debriefed, she indicated that she had no hypothesis about what predictions had been made.) The person making the error most commonly had an authority ranking relationship with the person addressed, while there was only one market pricing relationship. We used the *del* statistic (Hildebrand, Laing, & Rosenthal, 1977) to test the prediction that slips would occur within mode of relationship. The *del* statistic represents the proportional reduction in error that a prediction rule achieves against a baseline of expected cell frequencies calculated from the marginal totals. The *del* statistic is somewhat like a correlation coefficient for categorical variables. It is a more stringent test than chi-square, because it tests a specific prediction of association of the categorical variables: In this case, the prediction is that errors will occur along the diagonal of the table (in the CS/CS, AR/AR, EM/EM, and MP/MP cells). In the analyses that follow, the reader should keep in mind that *dels* from different tables are not directly comparable, because the precision of the predictions varies as a function of the number of categories and the distribution of the marginal totals. (When the number of expected errors, as calculated from the marginal totals, is less than about 5, the estimates of probability are not absolutely precise, although no better estimate is known; D. K. Hildebrand, personal communication, December 1990.) The effect of mode of relationship was highly significant ($del = .72, p < .00005$); in 81% of the cases, confusers had the same mode of relationship with the person whose name they used and the person whom they were actually addressing. Subjects reported no cases in which they were confused with someone of the opposite gender ($del = 1.0, p < .00005$). The age data were analyzed in three ways, all of which yielded highly significant results: dividing people into ages by decade ($del = .52, p < .00005$); splitting the sample according to whether they were over age 30 ($del = .59, p = .0001$); and dividing people according

to whether they were of an age apparently roughly equivalent to the age of the confuser, greater than the confuser's age, or less than the confuser's age ($del = .77, p < .00005$). We also looked at the role terms (*secretary, daughter*) that subjects used to describe the relationships between the confuser and each of the two people confused; subjects used 29 distinct role terms. The results by role were highly significant ($del = .59, p < .00005$); subjects described the two people's roles vis-à-vis the confuser as the same in 62% of the cases. Subjects did not provide any cases in which they reported that either of the two people confused were non-White, so we could not estimate the effects of race.

Discussion

This study provides preliminary support for the idea that people think about others in terms of their relationships with them, as well as in terms of their individual features. The majority of name confusions were errors in which people substituted within the same relationship mode and within demographic categories. This supports the relational-models theory, as well as confirming the findings of Taylor et al. (1978) and other work on demographic categorization and stereotyping. (When the data were collected for this study, the author [S. T. Fiske] who directed the study was interested in exploring the effect of person characteristics on confusions and had not considered the possibility of mode effects, and the experimenter was unaware of the relational-models theory. So the relational-models theory could not have been the source of any demand effects in the collection of data or in subjects' reporting.)

However, we had some doubts about whether the minimal information available to the coder in this study allowed the coder to accurately code the relationships. For example, the interaction between parent and child is structured by different relational models in different families, and even in the same family the mode of relationship varies from domain to domain and from moment to moment. Furthermore, a great many of the errors that subjects reported had occurred many years before, increasing the possibility of reporting bias and memory distortion. So we conducted a study in which the subjects recorded errors immediately, and themselves coded the mode of relationship that was operative at the specific moment that someone made a misnaming error.

Study 2: Self-Coding of Mismaking Errors

Method

Subjects. Subjects were 24 volunteers (15 female, 9 male) mostly undergraduates at the University of Pennsylvania, who signed up for a paid study of mistakes and errors.

Procedure. Each subject was first interviewed for a period of approximately 15–30 min so that the task and the coding scheme for the modes of social relationship could be explained and discussed. The experimenter first familiarized subjects with the nature of misnaming errors (the incorrect substitution in speech of one person's name for another's, including errors in which a person misused a kin term, e.g., *Dad*). Because we wanted subjects to assess and code their own relationships—a task we felt they could do with greater validity than we ever could—the subjects read one-paragraph descriptive summaries of the four modes of relationship (communal sharing, authority ranking,

equality matching, and market pricing, although the modes were only identified by two-letter codes). The experimenter then discussed these descriptions with the subject and checked subjects' understanding by having them classify several prototypical social relationships (e.g., self and mother, recruit and drill sergeant) and give personal examples of each relationship mode. (Various checks we employed—see below—suggest that revealing our categories did not result in biased codings by the subjects.)

Subjects were then given 10 questionnaires, each of which was to be used to report one observed or performed misnaming error. The questionnaires elicited the time and date of the incident and the time and date at which the subject recorded it; the name, gender, age, and race of the three people implicated in the slip (person misnamed, person whose name was misapplied, and person who made the slip); a description of the incident and the subject's part in it; one- or two-word free descriptions of the role of each of the two people confused relative to the misnamer (hereafter referred to as *role*); a classification of the relationship mode (CS, AR, EM, MP) that governed the interaction between the person making the error and both the person whose name was used and the person who was incorrectly addressed; and any ideas of the subject on why the mistake was made. Subjects were allowed to indicate a secondary code if either relationship was based on a combination of models, but they rarely chose to use this option. They were also permitted the option of indicating that the relationship did not correspond to any of the four alternatives. Whenever possible, the experimenter elicited retrospectively remembered cases of such slips and had the subject describe them on questionnaires that the experimenter then went over with the subject. To discourage fabrication, the questionnaire requested, and the experimenter mentioned, that subjects should record the first and last names of each person involved "so that we can do some follow-up, if necessary." Subjects were paid \$4 and were informed that they would be paid \$2 when they returned at a scheduled date, plus 50¢ per completed questionnaire. This provided a small incentive to report all errors, without giving subjects much motivation to take the risk of fabrication. A few days later the experimenter telephoned the subject to answer any questions and to encourage completion of the study, and then called at the completion of the interval to confirm the scheduled final interview.

All subjects did return at an arranged time 7 to 10 days later for a debriefing session, at which they turned in completed forms. At the second interview, experimenters went over with the subjects each incident they reported, to check the report for apparent validity and the questionnaire for completion. The experimenter elicited any information necessary to fill in incomplete or ambiguous responses, solicited the subjects' ideas on experimental hypotheses, explained the experiment's purpose, and paid the subjects. One subject—who reported the maximum 10 incidents allowed—appeared to have fabricated them, and his data were excluded and are left out of these tabulations and analyses. When asked for their guesses about the experimental hypotheses, only 1 of the 24 subjects, who was trained in anthropology, suggested that slips might tend to occur within mode. (He reported his cases in great detail, and discussions with him about each case convincingly demonstrated their validity, so they were not eliminated from the analyses.)

Results

Mode of relationship. One hundred fifteen misnaming slips were collected from the 24 subjects, with a mean of 4.8 and a range of 1 to the maximum allowable 10. The misnaming slips are cross-tabulated by mode of social relationship in Table 1.

In 14 cases (12%) one or both of the relationships was not considered classifiable (labeled *other*). Most of these cases involved acquaintances or strangers with whom the subject per-

Table 1
Misnaming Errors, Study 2

Relationship with person incorrectly named	Relationship with person whose name was used					Total
	CS	AR	EM	MP	Other	
Communal sharing (CS)	21	2	4	0	3	30
Authority ranking (AR)	6	12	2	0	3	23
Equality matching (EM)	6	4	37	0	0	47
Market pricing (MP)	1	0	2	4	0	7
Other	2	3	0	0	3	8
Total	36	21	45	4	9	115

Note. $del = .60$, $p < .00005$.

ceived no significant relationship at all: the null relationship case. (Significance levels of the main results in all of the following studies are unaffected by whether the *other* category is included or excluded.) Excluding these cases, in 73% of cases the person making the error was relating in the same mode with the person addressed and with the person whose name was mistakenly substituted. (That is, the person making the error was relating in the same mode at the time of the error; but typically subjects used only a single mode to characterize the whole relationship with any given person.)

The *del* test revealed a highly significant overall effect of mode ($del = .60$, $p < .00005$) and significant effects for each mode considered individually against the other three modes combined (del for communal sharing = $.56$, $p < .00005$; del for equality matching = $.64$, $p < .00005$; del for authority ranking = $.55$, $p < .00005$; del for market pricing = $.71$, $p < .00005$). (The prediction rule—derived from our hypothesis—was that all error substitutions would involve constancy of relationship mode; we gave these four cells error weights of 0, and all other cells error weights of 1.) Because in one sense cases reported by the same subject are not “independent,” we also tested the main hypothesis using only one randomly chosen error from each subject; using this sample, del for mode = $.68$, $p < .00005$.

Other predictors. Same-gender confusions occurred in 88% of cases. This compares with an expected frequency (adjusted for the different proportions of males and females referred to by male and female subjects) of 51% and corresponds to a high *del* value of $.74$ ($p < .00005$). Same-race confusions represented 79% of cases against an expectation of 70%, and del (race) equals $.36$, $p < .00005$.

“Same age” was defined by a latitude of 2 years, a criterion met by 72% of pairs confused. Even using the stringent criterion that small discrepancies in age category were given error weights equal to large discrepancies, del (age) is $.30$, $p < .00005$. In 56% of slips, subjects used the same one- or two-word role terms (e.g., *friend*) in free descriptions of the two relationships, and the role had a significant effect on substitutions, del (role) = $.50$, $p < .00005$. Calculation of *del* requires weighting “errors,” that is, cases that are inconsistent with the hypothesis. In all the

analyses, the *del* values for age and role were calculated using a stringent criterion for correspondence: Every discrepancy was given equal weight. The *del* for role would have been higher if role terms that were similar to the role term applied to the correct person had been counted as partially consistent with the role prediction (that is, had been given error weights less than 1). And *del* for age would have been higher if age substitutions in different but adjacent age classes had been counted as partially consistent with the age prediction.

Although strength of prediction must be inferred circumspectly from these data, it appears that mode of relationship and gender were better predictors of the patterning of misnaming slips than was race, and perhaps better predictors than the subjects’ own role terms for the relationships. Note, however, that the magnitude of *del*s from different tables cannot be compared unless the precision is roughly the same, which is not usually the case in tables based on different numbers of categories.

Independence of predictors. Do these factors have independent effects on errors? That is, if people make a substitution in which the two people confused are the same on one attribute, is it more likely that they will also be the same on the other attributes? Cross-tabulations of slips by alternative predictors, dichotomized same or different, were examined to test for independence. For mode of relationship, for example, we looked at whether the correspondence or discrepancy of mode affected the probability of correspondence of the role terms used for the two people. Mode of relationship concordance in the misnamings was strongly associated with free role description concordance, $\chi^2(1, N = 101) = 31.69$, $p < .00005$. Note that this is not a correlation of mode of relationship with role terms applied to individuals. The association shows that among these errors, when the same relationship mode governs the speaker’s relationship with the two people confused, the speaker is also more likely to use the same role term to describe the two. Associations among predictor variables mean that when the two persons confused in an error share one attribute, they are more likely to share the other attribute. These associations do not imply that the relevant features are more likely to co-occur in particular persons: For example, the association of same-gender substitutions with same-age substitutions does not imply that gender is correlated with age in the sample of individuals who were subject to confusion. Mode of relationship correspondence was more weakly associated with whether or not the two people had the same age, $\chi^2(1, N = 100) = 7.00$, $p < .01$. Same-role errors were associated with same-gender errors, $\chi^2(1, N = 101) = 14.94$, $p < .001$, and with age, $\chi^2(1, N = 101) = 13.26$, $p < .001$, as well as with mode correspondence. When gender was the same, age was also more likely to correspond, $\chi^2(1, N = 101) = 6.69$, $p < .01$, and role terms were also more likely to be the same. All associations were positive. Race was independent of all four alternative predictors.

These associations among predictors suggest that the predictive power of some predictors may be mediated by, or derived from, others. The associations of same-role substitutions with same-gender and same-mode substitutions especially need clarification, because both mode and gender are apparently strong predictors and mutually independent ($\chi^2 = 0.13$, *ns*). Inspection of the respective cross-tabulations (role by mode, role by

gender) indicated that slips with incongruent predictors (one attribute the same for the two people confused and the other attribute differing in the two people) were considerably more apt to be same mode or same gender with different role than the reverse, taking into account the greater frequency of slips in which roles differ. That is, only 1 of 14 different-gender slips was same role, whereas 38 of 51 different-role slips were same gender. Similarly, only 6 of 36 different-mode slips were same role, but 21 of 51 different-role slips were same mode: If the mode differs, roles are unlikely to be the same, but the reverse effect is not nearly as strong. We did post hoc analyses treating one or the other of these two types of incongruent slips as prediction errors. These analyses confirm that these differences are significant: Mode congruity reduces role incongruities proportionally more than role congruity reduces mode incongruities ($del = .70$, $p < .00005$, vs. $del = .40$, $p < .00005$). The same analyses show that gender congruity reduces role discrepancies substantially more than role congruity reduces gender discrepancies ($del = .87$, $p < .00005$, vs. $del = .20$, $p < .001$). In other words, people's tendency to make substitutions in which both relationship mode and gender remain unchanged tends to result in substitutions in which role terms correspond. In particular, this suggests that mode of relationship confusions causes role descriptor confusions, not the reverse.

Further predictors. Twenty-two additional student subjects rated the "similarity of sound" on a scale of 0 (*no similarity*) to 4 (*very similar*) of 50 randomly chosen pairs of names that subjects in the first study actually confused, and 50 interleaved pairs randomly constructed (without replacement) from the same 100 names. Mean similarity of the true pairs was 0.976, and of the randomized pairs, 0.756, $t(21) = 5.57$, $p < .001$. This effect is highly significant, but its magnitude must not be overestimated: Only 14% of true pairs' mean ratings reached the midpoint of the scale; thus, very few of the substitutions involve names that are rated as sounding similar. When we use the midpoint of the scale as the criterion for considering the names to be similar, sound similarity was found to be independent of gender, age, race, role, and mode of relationship. Eighteen percent of actually confused name pairs shared a first letter, compared with 9% expected by random assortment.

On the forms they completed, subjects suggested that recency or frequency of interaction was a contributor to the slip in eight cases (7%), similar sound in six (5%), similar looks in seven (6%), and similar age in one (0.9%). Thus, these more general cognitive factors do not seem to account for very many of the errors, although there may be effects of these kinds that subjects are unaware of: Subjects clearly underestimated the effects of age similarity, for example.

It is possible that the high *del* for mode is the result of our pooling the errors from individual subjects who have very different proportions of the four modes of relationships. Suppose some subjects interact with others mostly in a CS mode; chance alone will lead most of their substitution errors to be with other CS relationships. Suppose some other subjects have mostly EM relationships, while others have mostly AR relationships and others mostly MP relationships. Pooling the data from subjects with differently biased base rates for the four modes will result in a spurious association that would not be apparent in a large sample of errors from any individual subject. This is because

the marginals for the individual subjects are misrepresented by the marginals for the pooled sample. We cannot readily obtain a large sample of errors from any one subject. But we can determine whether the association of relationship mode within the error pairs from each subject differs from the *del* for people involved in different errors by each subject. Suppose the differential individual base-rate hypothesis is correct, and the results are not due to confusability as such. Then, for each subject, we can randomly choose one person from one error and a second person from a different error reported by that subject. When we pool these random pairs from different errors, the same association of mode should appear. Eighteen subjects produced two or more errors, and the *del* for one randomly chosen pair of people from different errors by each subject is .15; this does not approach significance and is substantially lower than the .60 *del* for relationship mode of pairs of people who were actually confused with each other. We excluded cases in which either person was coded *other*, and used Cochran's Q (Cochran, 1950) to compare the proportion of cases in which mode was concordant in the actual errors (14/18) with the proportion in the random cross-error pairs (7/18). The difference is significant: $Q = 5.44$, $p < .025$. This indicates that the differential individual base-rate hypothesis does not explain the concordance in the error substitutions. Thus, it is characteristic of errors per se that people tend to substitute someone with whom the person making the error relates in the same mode.

Discussion

Study 2 again strongly supports the hypothesis that people tend to make name mistakes in which they hold constant the mode of relationship with the two people confused. It also confirms once again the results of Taylor et al. (1978) that people mix up people of the same gender and race, while showing that confusions also tend to involve substitutions of people who are the same age and whom the speaker describes by the same role term. We were motivated to conduct these studies because one of us found that his children very frequently addressed him by the wrong parental term, calling Dad "Mom," and vice versa. There were months when one or the other child probably used the wrong term more than 20% of the time (usually correcting himself or herself). Yet the two of us differ considerably in personality and appearance (one wears glasses and has long hair; the other had a beard). And we found that we frequently called our daughter by our son's name and our son by our daughter's name. As we explored mistakes of this kind, we found several families in which parents sometimes called their children by the dog's name (good families to live in if you're a dog), and many parents who routinely went through the list of their children's names in search of the correct one, calling off each in turn until they reached the name they wanted. This suggests that the speakers are treating the people whose names they list or whom they confuse as socially equivalent, despite extreme familiarity with the people and heedless of salient age, gender, and personality differences among them. Many middle-class parents have relationships with their children (and sometimes their pets) based on communal sharing, combined with elements of authority ranking. Both parents typically have this relationship with all of the children, so that if the social orienta-

tion is one of caretaking, nurturance, and identification (CS), or of instruction, command, or correction (AR), then all the children may be partially interchangeable in terms of how the parent acts toward them and thinks of them. Similarly, from the child's point of view either parent may be substitutable for the other in many interactions. In these cases and in those that the subjects reported, the form of the relationship often appears to be the most salient cognitive factor organizing the social interaction. However, it is possible that this effect is specific to some feature of language or speech production, rather than something more basic about social cognition. So we conducted an analogous study of naturally occurring errors in recall of interaction partners.

Study 3: Person-Memory Errors

We tested the prediction that when people incorrectly remember with whom they have done something, they should substitute someone with whom they have the same mode of relationship that they have with the actual person.

Method

Subjects. Subjects were 19 volunteers who signed up to participate in a paid experiment on social errors; none had participated in Study 2. They were predominantly University of Pennsylvania undergraduates.

Procedure. The procedure was almost identical to that of Study 2, but the incidents to be recorded were instances in which people had trouble remembering or were confused about which person they had interacted with on a previous occasion. Again, the experimenter trained subjects to code mode of relationship and gave them questionnaires eliciting identical information, with minor changes in question order. Subjects again provided free-response role relationship terms and coded modes of relationship. Subjects coded the mode of relationship that existed between the person who had trouble remembering and the person wrongly recalled as having been involved in the interaction, and they coded relationship mode between the person misremembering and the person who was actually involved in the incident. The procedure otherwise followed Study 2, except that the period over which incidents were collected was extended, varying from 12 to 17 days. At the debriefing, no subjects guessed the hypotheses guiding the research.

Results

Mode of relationship. The 19 subjects reported 60 person-memory slips (a mean of 3.2 per subject), ranging from 1 to 8 each. Table 2 cross-tabulates the errors by mode of relationship.

Two cases (3%) included one or more relationships classified *other* and were excluded from further analysis. Mode of relationship with the actual interactant and the person incorrectly remembered corresponded in 79% of the substitution errors. The overall prediction of within-mode slips was overwhelmingly supported ($del = .71, p < .00005$), as it was for each mode taken individually against the other three modes combined; del (CS) = .70, $p < .00005$; del (EM) = .61, $p < .00005$; del (AR) = .69, $p < .00005$; del (MP) = .94, $p < .00005$. (Using only one randomly chosen error per subject, in order to assure independence of cases, del for mode = .68, $p < .00005$.)

Gender and race were again both significant predictors of error substitutions: del (gender) = .66, $p < .00005$; del (race) =

Table 2
Person-Memory Errors, Study 3

Relationship with actual person	Relationship with person remembered					Total
	CS	AR	EM	MP	Other	
Communal sharing (CS)	12	0	6	0	0	18
Authority ranking (AR)	0	7	3	1	0	11
Equality matching (EM)	1	1	17	0	0	19
Market pricing (MP)	0	0	0	10	0	10
Other	0	1	0	0	1	2
Total	13	9	26	11	1	60

Note. $del = .71, p < .00005$.

.65, $p < .00005$. Again using the stringent criterion that any discrepancy between age categories (8–11, 12–15, 16–17, 18–19, 20–21, 22–23, etc) was given equal error weight, the results confirmed that people tended to make substitutions that held age constant, del (age) = .18, $p = .001$. Role was also highly significant, del (role) = .60, $p < .00005$. Once again, an even higher del would have resulted if substitutions of role terms similar to the role of the actual interactant had been given error weights less than 1, and if highly improbable substitution possibilities had been eliminated from the table. For example, most people have only one person whom they call *mother*, so that errors are not likely to involve substituting a second “mother” for that person. However, in this study we did not undertake to generate a matrix of similarities among role terms, which in any case may vary considerably from one subject to the next.

Only one of the predictors was associated with any of the others: As in the first study, errors in which the substitutions left relationship mode unchanged tended to co-occur with errors in which people substituted a person of the same age as the intended person, $\chi^2(1, N = 58) = 4.82, p < .05$. This means that when the subject reported the same mode of relationship with the actual interactant and with the person incorrectly remembered, the two people confused were more likely to be the same age. Sound similarity was not examined in this study, because it had relatively little effect on speech errors and seemed less pertinent to memory about interactions. Again, subjects very rarely suggested that frequency and recency might have contributed to their slips.

Further predictors. We considered the possibility that the proximity of the two mode-of-relationship questions on the misnaming and person-memory questionnaires might have caused the relationship coded second to be primed by the first.¹ A second possibility was that the coding of earlier slips biased the coding of later ones. These two biases might have led to specious agreement of codes within slips. These biases would be expected to produce differential agreement in the subsequent rating of earlier and later relationships within and across slips.

¹ Nicholas Maxwell suggested the possibility of this artifact.

Relationships originally rated second, for example, would have their coding spuriously influenced by the rating just made.

Consequently, 2 to 4 months after their original participation, experimenters telephoned a total of 10 subjects from Studies 2 and 3. Experimenters asked subjects to recode the relationships of the participants in all of the 60 slips that these subjects had previously reported. Five subjects coded their slips from first to last, and 5 did the reverse. For all subjects, the order of coding the two relationships within each slip was alternated.

The overall reliability in the coding of each relationship was 78% (93 of 120); Cohen's kappa = .63; *del* = .63, *p* < .00005. On the original questionnaire, subjects were asked to indicate the mode of relationship that was operative at the time the error occurred. Because any two people may interact using any or all of the four modes in different contexts and at different times, some of the disagreement between concurrent and subsequent codings may reflect the fact that the structure of the immediate interaction may not correspond to the mode that usually predominates in the relationship (or the mode that predominated 2 to 4 months later, when subjects were coding the relationship the second time).

There was no difference in agreement between slips presented in the original and those presented in reverse order ($\chi^2 = 0.03$, *ns*). There was also no difference in coding agreement between the errors that subjects reported earlier and slips they reported later ($\chi^2 = 0.46$, *ns*), nor between the relationships originally coded first and the ones originally coded second in each slip ($\chi^2 = 1.28$, *ns*). Hence, there is no evidence for priming either over the term of each subject's data collection or within each brief coding episode. Similarly, had subjects been aware of our hypothesis and been affected by demand, they would have spuriously coded the second relationship to correspond with the first. This bias would have produced a lower reliability coefficient for their subsequent recoding of the second relationship in the pair than for their first, more veridical coding. Furthermore, had subjects been catching on to our hypothesis in the course of reporting their slips, later slips should have shown greater concordance of mode than earlier ones, which was not the case. (Nevertheless, we took additional steps to obviate this concern in Studies 4, 6, and 7.)

We again tested the hypothesis that the mode results were an artifact of individual differences in base rates of reporting different modes. To do this, we compared the *del* for mode of actual error pairs with randomly chosen pairs of people taken from different errors by each of the 14 subjects who produced at least two errors. The *del* in this case is .32, which is barely significant (*p* = .05) and substantially lower than the *del* for relationship mode in pairs of people who were actually confused with each other. It appears that subjects do differ somewhat in their base rates for the four modes of relationship, or in their coding tendencies, or at least in the relationship modes for which they make and report errors. But are these relatively small differences in individual base rates sufficient to explain the high degree of concordance in error pairs? We again excluded all cases involving anyone coded *other* and used Cochran's *Q* on the small sample of people who made more than one error. Comparing the proportion that were same mode in the random cross-error pairs (7/14) with the proportion that were same mode in the actual errors (11/14) from the

same subjects, although the absolute magnitude of the difference, 50% versus 79%, is large, the difference is not significant (*Q* = 2.67, *p* = .11). Because the sample size is so small, we combined the misnaming and person-memory studies to obtain a sample of 32 subjects who produced two or more errors, and Table 3 shows the pooled results; for each such subject, we chose one pair of people at random from different errors. If we take the proportion of cases that are concordant in pairs of people who were confused with each other and compare them with the proportion that are concordant in pairs of people who were reported in different errors, the difference in proportions in this combined sample is highly significant (*Q* = 8.07, *p* < .005). Thus, the observed concordance of modes in error substitutions is a function of the error process as such.

Discussion

Once again, the error data support all the predictions. Furthermore, relationship mode concordance is independent of concordance of gender, race, and role term, although it is correlated with age concordance. Note that one explanation of the results that appears to be an alternative to the relational-models account is actually equivalent to it. It might be that people remember interactions by thinking about the kind of activity (e.g., going to the movies, giving advice) and inferring from it the people with whom they might have been interacting. That is, type of activity might be the factor mediating memory and hence errors. But if so, people must classify activities into categories that correspond closely to the taxonomy of the four basic relational models, or else the strong tendency to make mistakes within mode of relationship would not have been observed. If errors are affected by people's use of activity type to remember interaction partners, then basic activity types must correspond to the four elementary relationship modes. There is no particular evidence to suggest that people are using activity type in recall. But if they are, they could be classifying activities into categories that are narrower, more precise, and more numerous than the four relationship modes. However, people's activity categories cannot cut across relationship types very much, although perhaps they are hierarchically embedded as subtypes.

Table 3
Random Pairs of Persons From Different Errors by Same Subject, Studies 2 and 3 Combined

Second random person	First random person				Total
	CS	AR	EM	MP	
Communal sharing (CS)	4	3	4	0	11
Authority ranking (AR)	2	2	2	0	6
Equality matching (EM)	2	2	5	2	11
Market pricing (MP)	0	0	1	3	4
Total	8	7	12	5	32

Note. *del* = .22, *p* = .038.

That is, the hypothesis of activity-mediated recall implies that the four relational modes are indeed the effective determinants of the results.

Study 4: Misactions

It might be that these effects of relationship mode and personal attributes are limited to verbally mediated cognition. So to explore further the generality of the effect of relationship mode on social substitution errors, we conducted a fourth study of misdirected actions. In our own experience, for example, we had made mistakes in which we placed a half-drunk cup of milk at the wrong child's place or drove to the wrong person's house. Like misnaming and misremembering, these action errors are substitutions of one person for another. This kind of error is much rarer, so it was necessary to canvas a much larger number of subjects and modify the reporting procedure somewhat. The 45 subjects (28 women and 17 men) were preponderantly University of Pennsylvania undergraduates, and again all were paid for participating in the study.

Method

Experimenters alerted potential subjects to our interest in misactions and initiated subject recruitment in a few large lecture classes (total enrollment = 470) and in two sororities (membership = 180) by brief presentations of the definition of misaction slips and details of payment. In all, experimenters handed out questionnaires to 675 people, including 25 distributed to passersby and friends. Experimenters returned a few days later and interviewed subjects who came forward with cases, explaining the four relationship modes to them with the same materials and procedures used in Studies 2 and 3. Subjects completed a questionnaire describing the incident, like the form previously employed. However, in this misaction questionnaire, the two mode-of-relationship questions (about the misactor's relationships with the two people confused) were separated by a number of other items. Interposed between them was a question requiring the subject to code the misactor's relationship with another person with whom the subject had a different mode of relationship. This question was inserted to discourage priming between the first and second primary questions. Additionally, two questions were added to assess the recency and frequency of subjects' contact with the two people confused in the misaction.

Misaction errors seem to be much rarer than the other kinds of substitutions, inasmuch as none of the potential subjects could come up with retrospective reports of errors, and even in the sorority to which one experimenter belonged—which was participating as part of their fund-raising effort—only a small proportion of the subjects alerted to our interest came forward with instances.

Results

The 45 subjects each produced one misdirected action. These are presented by mode of relationship in Table 4. The most common errors included hand holding and other touching, and dialing the phone number of the wrong acquaintance.

Misactors were in the same relationship mode with the intended and actual persons in 67% of the errors. The overall prediction of within-mode confusions was again supported ($del = .48, p < .00005$), as was the prediction for each individual mode against the others combined, except for MP, for which there were only three cases; del (CS) = .49, $p < .00005$; del (EM) = .60, $p < .00005$; del (AR) = .39, $p < .05$; del (MP) = 0, *ns*.

Table 4
Misdirected Actions, Study 4

Relationship with actual person	Relationship with appropriate recipient				Total
	CS	AR	EM	MP	
Communal sharing (CS)	16	4	4	3	27
Authority ranking (AR)	0	3	1	0	4
Equality matching (EM)	1	2	11	0	14
Market pricing (MP)	0	0	0	0	0
Total	17	9	16	3	45

Note. $del = .48, p < .00005$.

This reflects the relative infrequency of market pricing in college students' interactions and the small sample we obtained of uncommon action slips.

Gender, age, and role were also significantly predictive of the patterning of misaction slips. For gender, $del = .80, p < .00005$. Once again using the stringent criterion that any discrepancy in age category was given equal error weight, del (age) = .38, $p < .00005$ (using the age categories 4–7, 8–13, 14–15, 16–17, . . . 28–31, 32–35, 36–37, 38–39, 40–43, 44–49, 50–53, 54–57, >58). For role, $del = .14, p = .016$. Presumably the reason that the del value for role is relatively low in this study is that many actions would not have been defined as socially inappropriate unless there was a discrepancy between the social roles of the intended recipient and the actual recipient: Misdirected actions in which the actor describes both persons by the same role term would be much less likely to be noticed or reported, because indeed the action would often be role appropriate, even if it was not actually directed to its intended recipient. Note also that once again, a higher del would have resulted if substitutions of role terms similar to the role of the actual interactant had been given error weights less than 1, and if highly improbable substitution possibilities had been eliminated from the table. (Improbable substitutions include, for example, *husband* for *husband*, or *mother* for *mother*, because most people only have one person whom they address or refer to in this way.) In this sample of misactions, there were only two instances in which people intended to direct actions to non-White recipients: Both of the acts were actually directed to Whites. (We could not calculate random error pairs for misactions, because no subject reported more than one error.)

None of the predictor variables were significantly associated with any others in this study. In particular, the effect of relationship mode on the misdirection of action was independent of the effects of the stimulus features inhering in the individuals confused.

In five slips (11%) the subject had spoken to the appropriate recipient of the misaction immediately beforehand. Forty-nine percent reported having thought of the intended person immediately prior to acting, although this figure may be inflated by retrospective rationalization or reconstructive memory bias. In

any case, this effect of recency of associative thoughts of the intended recipient of the misactions does not conflict with the predictions of the relational-models theory or the other predictions.

In 17 cases (38%) subjects reported spending more time with the appropriate recipient of the misaction than with the inadvertent recipient, and an equal number of subjects reported the reverse. There is therefore no evidence of a frequency effect in these slips.

Study 5: Nonstudent Replication

Most of the subjects in Studies 2, 3, and 4 were students, and (as we anticipated) students at the University of Pennsylvania seem to have few active market pricing relationships during the school year—at least few MP relationships that involve naming, remembering, or interacting with people with distinct personal identities. They reported comparatively few substitution errors involving MP relations. So we attempted to replicate the studies in two branches of an East Coast advertising firm, seeking to obtain a nonacademic population and more MP cases. In this fifth study we elicited errors of all three kinds (misnaming, person-memory, and misaction) from the same subjects. The questionnaire was similar to the one used in Study 4; again, in between the two items coding the mode of relationship with each of the two people confused for each other, we inserted three other items, including a dummy question asking about similar errors made regarding a person with whom the misactor had a different relationship mode. Unfortunately, despite strenuous follow-up, only 12 of these 27 unpaid subjects returned prospective “diary” questionnaires (one error report each). Furthermore, these advertising firm subjects reported very few MP errors in either retrospective or diary reports, so that this study did not allow us to retest the prediction about MP relations. However, the few prospective diary reports we did obtain again strongly supported the overall prediction that substitutions would occur predominantly within mode ($del = .72, p = .0001$).

Discussion of Studies 1–5

In two of the three prospective studies in which the data set was large enough to permit the relevant analyses, errors in which mode of relationship was the same were somewhat more likely when the people confused were the same age. In the misnaming study (but not the other two prospective studies), errors in which the subject used the same role term to describe relationships with each of the two people confused were much more likely when the subject's mode of relationship with the two people was the same. These associations need to be replicated in other populations and investigated further, because none of the predictors were correlated with any of the others in the misaction study. But it is already clear that the consistent effect of relationship mode on error substitutions across all of the studies cannot be purely an artifact of any correlation of within-mode substitutions with any other type of error.

In order to further examine the links among the predictors of error substitutions, we combined the prospective diary data from Studies 2, 3, 4, and 5. This gave us a total of 207 cases for which all five predictors were unambiguously reported, allow-

ing us to control for the effects of relationship mode. The overall del for mode in this pooled data was .59 ($p < .00005$). Because all of the predictors have effects on substitutions, there are only three cases in which gender, age, race, and role all differ, so we cannot examine the effect of mode in cases in which all four other attributes of the person substituted are different from the attributes of the intended person. However, chi-square tests on this pooled data show that concordance of mode is unrelated to concordance of gender or race ($\chi^2 = .57$ and .09, respectively; neither is significant). Because role and age congruence are the only predictors correlated with mode congruence, $\chi^2(1, N = 207) = 25.88, p < .001$, and $\chi^2(1, N = 207) = 5.20, p < .05$, respectively, it is reasonable to test the effect of mode controlling only for these two predictors. There are 50 cases in the pooled data in which the person substituted was of a different age class from the intended person and was described as having a different role with the person making the error. The del for relationship mode in these 50 different-role, different-age cases is .29, which is substantially less than the overall del but still highly significant ($p = .0018$). Comparing the overall del with this number shows that about half of the predictive power of relationship mode in the pooled data is due to its covariation with the other predictors, and about half of its predictive power is independent. This indicates that in everyday social interactions, people must be attending not only to the demographic characteristics and culturally defined roles of other people but also to which of the four modes of relationship governs the interaction.

Diary studies are potentially vulnerable to biased reporting of cases. A partial control on such potential report biases is to compare these results with a data set that has somewhat different, if greater, potential biases. As in Study 1, in the initial sessions of Studies 2 and 3, the experimenter asked each subject to recall any slips or memory errors that the subject remembered. The errors retrospectively reported at this point are presumably very salient ones, because subjects had not been primed to report them ahead of time. In fact, subjects reported that many of these errors were recurrent mistakes that someone had made hundreds or even thousands of times (e.g., a mother persistently misaddressing her children). These retrieved errors show the same pattern that is exhibited by the ones collected using the prospective diary method of all four studies, as shown in Table 5 ($del = .55, p < .00005$). Subjects reported that the speaker was in the same relationship mode with the person addressed and the person whose name was used in 69% of the cases.

We obtained similar data from the 27 advertising firm subjects of Study 5, who each reported a single retrospective error (15 misnaming substitutions, 9 misactions, and 3 person-memory errors), and these data once again strongly support the mode-congruence hypothesis ($del = .48, p = .0002$). It is unlikely that the initial reporting of these retrospective cases would be subject to precisely the same biases as the prospectively reported ones.

Studies 6 and 7: Additional Controls and Comparisons With Other Relationship Taxonomies

Having demonstrated in the first five studies that people tend to confuse people with whom they relate in the same man-

Table 5
Retrospectively Reported Cases of Misnaming, Studies 2 and 3

Relationship with person incorrectly named	Relationship with person whose name was used				Total
	CS	AR	EM	MP	
Communal sharing (CS)	5	1	1	0	7
Authority ranking (AR)	1	5	1	0	7
Equality matching (EM)	3	1	7	0	11
Market pricing (MP)	0	0	0	1	1
Total	9	7	9	1	26

Note. $del = .55$, $p < .00005$. Other cases have been ignored in this table.

ner, we can use the analysis of natural errors to compare theories about the natural kinds of social relationships. Is the relational-models taxonomy the best description of the implicit social orientations of American subjects? We designed replications to test the discriminant power of alternative taxonomies of social relationships. We had subjects apply Clark and Mills's (Clark, 1984; Clark & Mills, 1979; Mills & Clark, 1984, 1986) binary distinction between communal and exchange relationships, as well as Foa and Foa's (1974, 1980) six-category taxonomy of the kind of resource typically exchanged in the relationship.

Also, it is possible that people confuse people when they typically interact with them in the same situation. People may make errors that are based on similarity of interactional setting, independent of the similarity of relationship mode. So in our replications we asked subjects where they usually interacted with each person. To confirm that the results generalize to a wider population of English-speaking American adults who are not students, we conducted identical follow-up studies on one student sample and one nonstudent sample.

In addition, it is possible that despite the apparent results of the debriefings, demand effects were operating in some way in Studies 2–5. So we designed replications in which subjects did not know the relational-models taxonomy when they recorded or reported their errors and in which they could not easily connect their coding of their relationships with the errors they reported.

We had obtained similar results in Studies 2–4, where we paid subjects 50 cents per error, and in Studies 1 and 5, where we did not pay subjects at all. But to reduce the possibility of fabrication in the replications, we elected to pay subjects a flat amount, regardless of how many errors they reported (\$5/hour for each session; nonstudents also were paid \$3 per session to cover transportation).

Furthermore, we thought that it would be desirable to control for the differential individual base-rate hypothesis in another way. With this in mind, we decided to compare the *del* for pairs of people whom subjects actually confused with each other with the *del* for pairs of people randomly chosen from among a list of all the people with whom each subject interacts. So we designed

replications in which subjects provided lists of all their acquaintances and later provided the usual information about each one. This gives us a second kind of base-rate information for each subject. It also provided the opportunity for an additional control for priming effects: Subjects each coded a long list of all of their acquaintances, in which the people they had confused were randomly included, typically separated by many other acquaintances.

Method

Subjects. We recruited nonstudent subjects with small display advertisements in a community newspaper for “participants in social psychology experiments” and recruited student subjects through similar advertisements in the student newspaper. Many of the student subjects were fulfilling a social psychology course requirement to participate in an experiment. Different experimenters ran the two studies. (Indeed, a different experimenter ran each one of the seven studies.)

Procedure. When subjects arrived, the experimenter identified the experiment as “Dr. Alan Fiske's” (as the advertisements had also indicated). She then gave the subject sheets of lined paper and asked the subject to list the first names of “everyone you interact with in any way.” The experimenter told the subject to record any appropriate identifying information if the subject did not know the person's name. After once prompting for additional names, the experimenter thanked and paid the subject.

As the subject left, the experimenter said—as if it were an afterthought—that we were doing additional experiments and asked if the subject would like to participate in another one. All subjects agreed. The experimenter said she was doing some experiments for Nick Haslam, and gave the subject a sheet describing all three kinds of social errors (mislabeled, misaction, person memory). The experimenter went over these instructions with the subject; the instructions stated that the subject should record only social errors that the subject committed (not those of other people). The experimenter asked if the subject could remember ever making any such mistakes, and asked the subject to fill out a simple form. The form asked for a description of the substitution error, the names of the people involved, when the error had occurred, and whether the subject had made the same error before. The experimenter then gave the subject 10 additional forms to take home and stressed that they should be filled out immediately after any error occurred. The experimenter paid the subject and arranged for a follow-up visit 7 to 10 days later. Subjects were instructed that they would be paid a flat amount when they returned, regardless of how many or how few errors occurred.

After a few days, the experimenter attempted to telephone to find out if the subject had made any errors. Subjects who were contacted were asked to describe any errors that they had made. In the course of the conversation, the experimenter indirectly tried to elicit the names of the people who had been confused. If the subject had recorded any errors, the experimenter confirmed the scheduled appointment. Otherwise, the experimenter postponed the appointment and telephoned again a few days later to see if the subject had recorded any errors by then.

The experimenter then prepared five different copies of the names in the original list, each randomized in a different order and with a different heading. One list asked the subject to code the relationship mode (CS, AR, EM, MP); another asked about the kind of resource typically exchanged (money, goods, services, information, status, love); another asked about the contingency of giving and getting in the relationship (communal or exchange); another asked, “In what situation do you most commonly interact with this person?” (free response). The mode descriptions were derived from the relational-models theory. The resource descriptions were adapted almost verbatim from Foa and

Foa's (1980) Appendixes B and C. The paragraphs describing communal and exchange relationships were derived directly from Clark and Mills's descriptions of the defining features of these two relationships (Clark, 1984; Clark & Mills, 1979; Mills & Clark, 1984, 1986). The key distinction is whether what people give, want, and expect from each other is contingent on what the other person gives them (or is predicted to give them subsequently) or is contingent only on the other person's needs. For this reason, we refer to Clark and Mills's communal versus exchange distinction hereafter as *contingency*. The order of presentation of these four lists was balanced using a Latin square design, and subjects were randomly assigned to the four presentation orders. Last, each subject received another randomly ordered list of acquaintances that asked about the person's age, race, and gender, and the term that the subject would use to describe the person to someone else who did not know the person.

When the subject arrived for the second session, the experimenter went over the descriptions of the errors the subject reported and then paid and thanked the subject. As they had been promised, subjects were paid a flat amount, regardless of how many errors they reported. Then the experimenter asked if the subject would like to participate in a follow-up of the acquaintance study. All subjects agreed. The experimenter checked to determine whether all of the people involved in the subject's substitution errors were on their acquaintance list. If not, the experimenter added the missing name(s) to the list before printing it out. The experimenter presented the subject with a randomly ordered list of the acquaintances the subject had listed in the first session and explained to the subject the instructions for rating one of the variables. When the subject completed that list, the experimenter took it and provided the next one, until the subject had completed all five lists. The experimenter then thanked, paid, and debriefed the subject.

We added one or more error names to the lists of 8 student subjects, none of whom realized that a name or names had been added, and none of whom were able to correctly identify any added names when they were explicitly told of the additions during debriefing. We added one or more error names to the lists of 10 nonstudent subjects, 4 of whom recognized that there were additional names on the list; they were all able to correctly identify at least one name. However, when asked this same question during debriefing, 6 of the 15 nonstudent subjects whose lists did not actually include any added names said they had "recognized" names they had not originally listed. This indicates that in both samples the addition of error names went largely undetected.

Results

In the student sample, 23 subjects came in for the original session. Two reported no social substitution errors before the close of the study, and 1 consistently failed to return for the second session. This left 20 subjects, who reported 38 prospective errors (27 misnamings, 8 misactions, 3 person memory). There were 14 women and 6 men and 13 Whites, 5 African Americans, and 2 Asian Indians; their mean age was 20.7 years.

In the nonstudent sample, 57 people came in for the initial visit; 25 of these never caught themselves making any error during the following days; 3 declined to return; 3 more reported errors over the telephone but failed to show up for the second visit; 3 were lost from the sample for other reasons; and 1 subject was eliminated because the debriefing suggested that the subject suspected that the acquaintance recall and error studies were connected. This left 22 subjects who reported making errors during the prospective, diary part of the study. (All but 3 of these nonstudent subjects had some college education, but none had any postgraduate training. Their mean age was 32.9;

17 were White and 5 were African American.) They reported 34 social substitution errors (25 misnamings, 8 misactions, 1 person memory). In the two samples, misdialing was the most common misaction; there were also a couple of cases of "mis-huggings," and 1 subject gave a birthday present to the wrong person.

Mode of relationship. Both samples again support the hypothesis; for the nonstudents, $del = .42$, $p = .0005$; for the students, $del = .30$, $p = .004$ (see Tables 6 and 7). Combining the two samples (to produce large enough marginals for the analysis), del was highly significant for CS versus the other three modes together ($del = .44$, $p < .00005$); for AR versus the other three modes ($del = .52$, $p = .003$); and for EM versus the other three modes ($del = .42$, $p = .0001$). There was no significant effect for MP alone.

To assure statistical independence of cases, we repeated the analysis using one randomly chosen error from each subject, which actually increased the magnitude of the association slightly: For nonstudents, $del = .50$, $p = .0001$, and for students, $del = .42$, $p = .002$. We repeated all of the univariate analyses discussed below, using one randomly chosen error from each subject; the interpretation and statistical significance of the results were unchanged.

To control for the differential individual base-rate hypothesis, we chose one random pair of people who were involved in different errors made by the same subject. For the 12 students who reported more than one error, $del = .07$, *ns*. (Because there were only 7 nonstudent subjects who reported more than one error during the diary phase of the study, the results are not reliable, but for these random different-error pairs, $del = -.17$, *ns*.) Combining these samples, we can use Cochran's Q to compare the proportion of cases in which mode is concordant for real errors (11/19) and in random pairs of people involved in different errors by the same subjects (6/19). The difference in proportions is significant ($Q = 5.0$, $p = .025$). These results indicate that the patterns of error substitutions cannot be explained by any differences between subjects in their base rates for the relationships in which they make social errors: The

Table 6
Nonstudent Replication With Acquaintance Coding, Study 6

Relationship with actual person	Relationship with appropriate recipient				Total
	CS	AR	EM	MP	
Communal sharing (CS)	15	1	1	4 ^a	21
Authority ranking (AR)	0	0	0	0	0
Equality matching (EM)	3	0	8	0	11
Market pricing (MP)	1	1	0	0	2
Total	19	2	9	4	34

Note. $del = .43$, $p = .0005$.

^a Two of these cases were substitutions of an ex-spouse for a spouse, and one was the substitution of an annoying ex-friend for a friend.

Table 7
Student Replication With Acquaintance Coding, Study 7

Relationship with actual person	Relationship with appropriate recipient				Total
	CS	AR	EM	MP	
Communal sharing (CS)	10	1	3	0	14
Authority ranking (AR)	0	3	0	0	3
Equality matching (EM)	4	2	7	4	17
Market pricing (MP)	2	0	2	0	4
Total	16	6	12	4	38

Note. $del = .30$, $p = .004$.

mode concordance is specific to error substitutions. Thus Studies 6 and 7 again provide strong support for the relational-mode theory.

To control for individual differences in base rate in another way, we chose three random pairs of acquaintances from each subject's list; for the nonstudents, $del = .15$, $p = .03$; for the students, $del = .31$, $p = .0001$. This suggests that there are individual differences in the relative frequencies of different people's mode codings of their relationships as a whole, although these differences do not show up in the relationships involved in error substitutions. Furthermore, the magnitude of these differences does not appear to be sufficient to account for the concordance of mode in error substitutions, even if the acquaintance lists were representative of relationships involved in errors.

Clark and Mills's Communal Versus Exchange Contrast. The contrast between communal and exchange relationships (contingency) did not predict error substitutions in the nonstudents' diary reports ($del = .18$, $p = .13$). In the student population, there is an apparent effect of the communal versus exchange distinction ($del = .53$, $p = .0001$). However, the student results appear to be an artifact of individual differences in base rates of relationships represented in the reported errors; taking one random pair of people from different errors for each of the 12 students who reported more than one error, $del = .47$, $p = .04$. (Even the low positive del in the nonstudent sample may be an artifact of individual differences: for the 7 nonstudent subjects who reported multiple errors, the analysis of the seven random pairs from different errors yields a del of .59, $p = .06$. Although there are individual differences in the base rates of communal and exchange relationships across all acquaintances for our nonstudent sample, there do not appear to be such individual differences in the student sample. Taking three random pairs of acquaintances for each nonstudent subject, $del = -.02$, *ns*; taking three random pairs of acquaintances for each student subject, $del = .07$, *ns*. These results suggest that perhaps base rates for all acquaintances are not a valuable guide to base rates for relationships that are involved in social substitution errors.) Combining these samples to compare the difference between the proportion of cases in which contingency is concordant for real errors (16/19) and in random pairs of people involved in

different errors by the same subjects (15/19), we find no significant difference (Cochran's $Q = .042$). Thus, these data provide no meaningful support for the hypothesis that people tend to make error substitutions that are related to the distinction between communal and exchange relationships.

Resources. At first sight, the results for resources (love, status, information, money, goods, services) appear to be positive. For nonstudents, $del = .37$, $p = .002$, and for students, $del = .43$, $p = .0002$. However, if we control for the hypothesis of individual differences in base rates, the results look different. The result for random pairs of people who were not confused with each other (involved in different errors reported by the same subject) is $del = .56$, $p = .002$; this del is actually higher than the del for the error pairs, suggesting that the entire effect may be due to differences among subjects in the resources involved in the errors they report. (Because there are only 7 subjects in the nonstudent sample who reported more than one error, the results may not be reliable, but there is also a marginally significant positive association of resources in the seven random pairs of people from different errors by nonstudents, $del = .26$, $p = .074$. Once again, the proportions of different kinds of relationships reported in an individual's errors do not necessarily correspond with the proportions across all acquaintances. In the resource case, while the del s for random pairs of people involved in errors are significant, there is no such association evident in the much larger samples of random pairs of acquaintances: For nonstudents, $del = .11$, $p = .07$; for students, $del = .07$, *ns*.) Combining these samples, there is no difference between the proportion of cases in which resource is concordant for real errors (12/19) and in random pairs of people involved in different errors by the same subjects (12/19). Taken together, these analyses do not provide any convincing support for the hypothesis that people make error substitutions in which they hold constant the resource exchanged in the relationship.

Situation. Subjects reported the situation in which they most commonly interacted with each person. The ones they mentioned most frequently were their own home, specific other people's homes, work, school, dorm, and various social and recreational settings. These situations appear to predict error substitutions: For nonstudents, $del = .30$, $p = .002$; for students, $del = .33$, $p < .00005$. However, analysis of random pairs of people from different errors made by each of the subjects suggests that these results may be due to differences among subjects in the situation in which they report making errors. With these random pairings, for the students, $del = .36$, $p = .006$. (For the seven nonstudent subjects who produced two or more errors, $del = -.07$, *ns*. There is no appreciable concordance of situation in the random pairs of acquaintances in either sample.) Combining these samples, the difference between the proportion of cases in which situation is concordant for real errors (8/19) and in random pairs of people involved in different errors by the same subjects (5/19) is small and nonsignificant ($Q = 3.0$, *ns*). Hence, there may be an effect, but these data do not provide any very solid support for the hypothesis that people make errors in which they tend to confuse people with whom they interact in the same situation.

Role term. The role term that subjects use to describe other people is related to their error substitutions. For the nonstudents, $del = .28$, $p = .002$; for the students, $del = .60$, $p < .00005$.

However, some of this association may be an artifact of individual differences in subjects' base rates for the role terms they used to describe people involved in their errors. Taking randomly chosen pairs of people from different errors by each student subject, $del = .61$, $p = .0004$. (There is no tendency for role term concordance among the seven random pairs of nonstudent acquaintances, $del = .05$, $p = .19$. However, there is no significant effect among the seven nonstudents who reported multiple errors, and the 66 random pairs of nonstudent acquaintances also did not show any role term concordance.) Combining these samples, the difference between the proportion of cases in which role term is concordant for real errors (12/19) and in random pairs of people involved in different errors by the same subjects (10/19) is not significantly different ($Q = 1$, ns). Hence, Studies 6 and 7 do not give support for the hypothesis that people tend to confuse people whom they describe by the same role term.

Race. In these samples, race appeared to be a powerful predictor of error substitutions. In the nonstudent sample, 30 of the actual recipients of the speech or action were White, and 4 were African American. Subjects made only one cross-race error, substituting an African American for a White ($del = .87$, $p < .00005$). In the student sample, 18 of the actual recipients of the speech or action were White, 13 were African American, 3 were Asian or Asian American, and 4 were from other groups, $del = .83$, $p < .00005$. However, this result may be entirely due to differential base rates in the races represented in the errors of different individual subjects. The 12 random cross-error pairs from the student sample exhibit a del of .83, $p < .00005$. (The seven such pairs from the nonstudent sample are perfectly concordant: $del = 1.0$, $p < .00005$.) It seems that some of this effect is probably due to individual differences in race of acquaintances, because the samples of random pairs of acquaintances exhibit significant tendencies for confusions to occur within race; nonstudent $del = .27$, $p = .01$; student $del = .70$, $p < .00005$. Combining these samples, the difference between the proportion of cases in which race is concordant for real errors (17/19) and in random pairs of people involved in different errors by the same subjects (18/19) is not significantly different ($Q = 1.0$, ns)—and in the wrong direction. So these two studies do not support the hypothesis that people tend to make substitutions that take race into account.

Age. For these studies, we analyzed the results using five age classes and used the same ones for both samples: 0–17, 18–35, 36–50, 51–65, and over 65. There was an apparent tendency to make substitutions that maintained the age classes unchanged: For nonstudents, $del = .19$, $p = .04$; for students, $del = .87$, $p < .00005$. (The seven nonstudent subjects who reported multiple errors showed no discernible tendency for individual differences in age-class base rates for relationships involved in their errors.) Naturally, individual subjects do differ somewhat in the ages of their associates, as reflected in the modest age-class associations in the random pairs of acquaintances (nonstudent $del = .20$, $p = .009$; student $del = .31$, $p = .007$). The interpretation of these results is difficult, however, because there was only one person outside the 18–35 age range in the sample of random pairs from different student errors. Combining these samples, age is concordant in the same proportion of cases of real errors (15/19) and of random pairs of people involved in differ-

ent errors by the same subjects (15/19). Thus, these data do not support the hypothesis that age is a factor in social substitution errors.

Gender. As in all the previous studies, both samples exhibited very strong effects of gender. For the nonstudents, $del = .82$, $p < .00005$; for the students, $del = 1.0$, $p < .00005$. Some of this effect may be a function of individual differences in the representation of males and females in the relationships in which they make errors. For the 12 students with multiple errors, random pairings from different errors gives a del of .38 ($p = .032$). (However, for the 7 nonstudents, $del = -.17$, $p = .66$. A small part of this effect may possibly be due to the expectable differences in gender of the acquaintances of different subjects. If we take three random pairs of acquaintances from each subject's list, for the nonstudents, $del = .16$, $p = .08$, and for the students, $del = .23$, $p = .04$.) Combining these samples, gender is concordant in a significantly higher proportion of cases of real errors (19/19) than of random pairs of people involved in different errors by the same subjects (11/19; $Q = 8.0$, $p < .005$). Thus, once again there is a distinct tendency to hold gender constant in social substitution errors.

Independence of predictors. The results from Studies 6 and 7 support the hypothesis that when people make social errors, they tend to substitute someone else whom they relate to in the same mode and who is of the same gender as the intended person. These two studies do not provide unequivocal evidence that other factors independently affect error substitutions. Nevertheless, we thought that it would be worthwhile to examine the degree to which the effect of relationship mode on error substitutions is independent of the apparent effects of the other factors. We examined the data to assess the associations between relationship mode and other predictors, to determine whether the predictive power of mode is independent of resource, contingency, situation, and term. Chi-square tests indicate that mode concordance is independent of age concordance, sex concordance, race concordance, and resource concordance in both samples. Among nonstudents, mode concordance is independent of situation concordance and role term concordance (χ^2 for situation = 0; χ^2 for role term = .28). But among students, mode substitutions are positively associated with situation substitutions to a high degree, $\chi^2(1, N = 38) = 18.03$, $p < .0001$, and also marginally associated with role term substitutions, $\chi^2(1, N = 37) = 3.31$, $p < .07$. Among students, mode substitutions are independent of contingency substitutions ($\chi^2 = 0$), but among nonstudents, they are positively associated, $\chi^2(1, N = 34) = 4.11$, $p < .04$. Thus, in general, mode concordance tends to be independent of the effects of other factors in these two studies, confirming the results of the earlier studies.

Retrospectively reported errors. In the initial session, 14 nonstudents and 10 students provided retrospective reports of errors. In both of these samples, the analyses of these retrospective errors failed to provide support for hypotheses about relationship mode, resource, or the communal versus exchange contrast. (Combining the two samples yields a marginally significant mode association, $del = .20$, $p = .055$.) In both samples the most frequent errors inconsistent with the mode hypothesis were cases in which a subject interacting in an EM mode with a friend or co-worker substituted a friend in a CS relationship;

these may simply represent subject errors in coding relationship mode. Factors that produced significant results in both of the retrospective samples were situation, role term, gender, and race; age was significant in the retrospective errors of students, but not of nonstudents.

Discussion

The relational-models theory predicts the errors of nonstudents drawn from West Philadelphia, as well as students. This confirms the results of Study 5 and suggests that the effect may be general among people in the kind of American populations we sampled. In Studies 6 and 7, the possibility of either demand effects or priming artifacts was virtually eliminated, and both studies provide strong support for the hypothesis that people tend to make social errors in which they substitute another person with whom they relate in the same mode. Both studies also provide two kinds of controls for individual base rates. The apparent results for resource, contingency, role term, situation, age, and race may be largely artifacts of individual differences in the base rates for relationships in which subjects report errors. But individual differences in base rates do not account for any of the observed effect of relationship mode or for all of the effect of gender.

The tendency of people to make errors in which they substitute another person to whom they relate in the same mode is independent of any possible tendencies to make error substitutions according to sex, age, race, or resource. Mode substitutions are independent of situation, contingency, and role term substitutions in one of the two samples. Although there may be an association in the other sample, these possible associations need to be interpreted with great circumspection, because the nonconcordant samples used in these analyses are small, and moreover, these studies provide no convincing evidence that any factors other than relationship mode and gender actually had true effects on error substitutions *per se*.

In these studies, subjects coded their relationships with others overall, not the quality or structure of the interaction at the moment they made the error. This probably accounts for the moderate reduction in the magnitude of the *del* coefficients obtained in these studies compared with the previous five studies.

General Discussion

Mode of relationship had a very strong effect on confusability in all seven studies. Mode has effects independent of the effects of most of the other predictors in almost all of the studies, including the strongest other predictor of substitution errors, gender. This supports our hypothesis that the mode of relationship is salient in social cognition, quite apart from the personal characteristics of the particular individuals with whom one is interacting. Furthermore, whenever the marginals are large enough to produce reliable results, each of the four elementary modes of relationship taken separately predicts error substitutions consistently. Thus, the data support the specific four-part taxonomy of A. P. Fiske's (1990a, 1990b, 1991, in press) relational-models theory. All seven studies show that when people make social errors, they tend to make substitutions that hold

relationship mode constant (substituting one CS relationship for another CS, an AR for an AR, an EM for an EM, or an MP for an MP).

Six studies also confirmed the findings of Taylor et al. (1978) that people tend to confuse people of the same gender, and two studies showed that people also are more likely to confuse two people of the same race. In five studies, people tended to confuse people of the same age. Especially given the differences in methodology, the current studies' replication of the Taylor et al. results on race and gender is compelling.

It would be interesting to explore whether other visible characteristics like height, hair color, facial and bodily resemblance, or dress also affect confusability even when visual recognition is not problematic. Native language, dialect, and accent are perceptible features that might also affect confusability. It also seems likely that other invisible but socially salient characteristics would affect confusability: religion, kinship, organizational membership, place of origin, sexual orientation, highly salient ideological stances, and other important attitudes. In all probability, the relative cultural importance of these features determines the degree to which they affect confusability: Compare religion in Northern Ireland (where some people use it as a reason for killing others) and in the urban United States, or language in Québec city (where it is a contentious issue) and in Geneva (where it is not).

However, the effect of mode is especially interesting because it indicates that the nature of the relationship with another person may be uniquely salient in cognition about that person. Earlier research has assumed that people attend mostly to the traits and other attributes of the individual being perceived. But these error studies suggest that in everyday interaction people focus primarily on how they are interacting with each other.

It is interesting that equality matching and communal sharing relationships are consistently common in subjects' errors but that market pricing relationships are much less frequent. This could be a result of subjects' making relatively more errors involving EM and CS relationships than ones involving MP relationships, or it could be a consequence of subjects' having more EM and CS relationships in the first place. We are exploring this question in other studies. Another possibility is that subjects have numerous MP relationships, but in these MP relationships they more rarely use personal names or any other individuating terms in addressing or referring to people. Market pricing relationships are very often quite literally anonymous, and one cannot "confuse" people whom one does not discriminate in the first place. Salespeople interact with many customers, and everyone interacts with many salespeople, clerks in bureaucracies, and other service personnel without ever learning or using their names.

We are dependent in these last six studies on the subjects' ability to apply a taxonomy that does not correspond to any particular culturally defined typology. Yet what is striking is how readily subjects did learn these categories and how facile they were at applying them to their own relationships: Subjects found it easy and natural to learn and use them after only a few minutes of instruction. The learnability of these categories is consistent with the hypothesis that they correspond to a preexisting implicit typology. Nevertheless, subjects seemed to ignore an important factor that the theory specifies: Actual rela-

tionships are composites of the elementary relational forms. Despite our theoretical suppositions and our instructions to subjects in Studies 2–5, subjects seemed to be coding relationships as if a single mode governed all of their interaction with a given person. For this reason and because of the constraints imposed by teaching a coding scheme in a few minutes, there is bound to be some error in subjects' coding of which model was operative at the exact point the error occurred. Indeed, we found that subjects' reliability in recoding their relationship mode a couple of months after the errors was 78%. This is especially a problem in Studies 6 and 7, in which subjects coded their overall relationship with the two people, quite apart from the specific structure of the error situation. To the extent that people do make such errors in applying this classification scheme and thus introduce random noise into the data, the results of these studies would tend to underestimate the true cognitive impact of the relational models on social errors.

Our primary goal is to understand and explain what people do in their everyday life, so if we can directly predict the data of ordinary social interaction, we are closer to that goal than if we stop at predicting only responses to experimentally induced conditions. Social psychology has become a laboratory science. But hypothesis testing does not always require experimental manipulation or other artifice. Field studies of naturally occurring phenomena often have the advantage that external validity is not problematic. However, studies based on subjects' reports are always vulnerable to incomplete reporting. Diary studies inevitably face this problem; it is the price that is paid for obtaining reports on this kind of naturally occurring behavior. Subjects may not have noticed, remembered, or been willing to report all slips. It is difficult to assess the biases that such omissions may have introduced; our impression was that subjects were intrigued by the phenomenon and were motivated to report all the errors they noticed. If the results of the diary reports of Studies 2–5 were due to demand effects, however, we would not expect to have obtained the same results in Study 1, where neither the subjects nor the coder was aware of the hypothesis, nor in Studies 6 and 7, where subjects knew nothing of the taxonomy when they recorded and reported their errors. Although subjects coded their own relationships in Studies 6 and 7, they did not connect this coding with the errors they had reported.

Furthermore, if the results of all these studies were due to biases in recall or recording of errors, then these biases would have to take the form of a specific proclivity to report cases in which the subject's relationship mode with the intended target corresponded to the subject's relationship mode with the person whose identity was mistakenly substituted. For such a bias to operate, subjects would have to be thinking in terms of categories corresponding with those of the relational-models typology (or some closely associated set of hierarchically subordinate ones) and attending specifically to cases where the two relationships match. Because subjects were not aware of the hypothesis, the most likely explanation of any such selective attention is that the four types of relationships are cognitively prominent, despite the brevity of subjects' exposure to the taxonomy. In fact, it would appear that cases where the two relationships differ would be more striking, humorous, or anomalous, and therefore easier to remember. Thus, cases of errors in which the

two relationships correspond might tend to be underreported, leading to an underestimate of the true effects.

We obtained the same results regardless of remuneration. In Studies 1 and 5 subjects were not paid, and in Studies 6 and 7 subjects were paid a flat amount regardless of how many errors they reported. In Studies 2–4 we attempted to reduce underreporting by paying subjects a modest sum for each error they reported. (This amount did not appear to be such as to motivate fabrication for most subjects in our student samples.) We also did everything feasible to control for fabrication: We had subjects record the names of the people they had confused, "so we can follow up if necessary"; and at the second session, the experimenter asked each subject to redescribe each error, allowing us to check for consistency, verisimilitude, and any manifest anxiety about any reported error.

In sum, for the following reasons it seems highly unlikely that reporting biases could explain the results of these studies: We obtained the same results in the three studies in which subjects were paid on the basis of the number of slips they reported, and in the four studies in which they were not; subjects did not suspect the hypothesis; there was no difference in mode concordance between errors that subjects reported early and ones they reported later; in three of the five prospective studies for which the relevant data were collected, concordance between subjects' own role descriptors is independent of concordance in relationship mode; three sets of retrospective data show the same mode of relationship concordance results as the six prospective diary studies; neither coder nor subjects in the first study could have known the hypothesis; and subjects in Studies 6 and 7 did not perceive a connection between their error reporting and their coding of their acquaintances.

The cognitive structure of social relationships can also be studied with other techniques. In the most widely used method, subjects sort role terms by similarity, which produces data that can be analyzed with cluster analysis, factor analysis, or multidimensional scaling (see, e.g., Foa, 1961; Triandis, Bontempo, Villareal, Asai, & Lucca, 1988; White, 1980; Wiggins & Broughton, 1985; Wish, Deutsch, & Kaplan, 1976).² Studies using these techniques generally yield major clusters or dimensions equivalent to communal sharing and authority ranking and sometimes suggestive of equality matching or market pricing. However, the results from this elicitation approach are inevitably constrained by the necessity to begin with some list of standard role terms, and usually there is no good means for assessing the extent to which these terms adequately cover the universe of significant everyday social relations. Different subjects may also conceive of any given role term (e.g., *teacher*) in different ways, because researchers using this method do not specify which one of the many possible complementary dyadic role relationships is intended (e.g., *vis-à-vis* kindergarten student, janitor, parent, fellow teacher, or principal). Furthermore, this technique does not readily permit the assessment of the structure of personal relationships, because it relies on generic role terms.

² For a more detailed review of dimensional and cluster studies of the structure of interpersonal relations, see the section on "Theoretical Roots and Conceptual Convergence" in chapter 2 of A. P. Fiske (1991) and also A. P. Fiske (in press).

Another problem with this approach is the artificiality of the task of sorting role terms: What cognitive criteria are subjects using to make these explicit similarity judgments, and how are these criteria related to everyday implicit social cognition? In a sorting task of this kind, subjects have to make a conscious, reflective assessment of the "distance" between role terms, which is a task that they do not overtly perform in the course of everyday social interactions. Given the ambiguity and unnaturalness of this unintuitive task, we do not know what criteria subjects use to make these judgments, and there is a risk of demand effects. Probably as a consequence of these problems, similarity-rating studies often produce results that are somewhat difficult to interpret; we can draw reliable conclusions about the structure of social relations only after reviewing a number of such studies that use different elicitation techniques and diverse methods of data reduction. In contrast, the study of naturally occurring substitution errors produces clearer, less ambiguous results. However, error studies necessarily rely on diary methods that entail inherent risks of incomplete and biased reporting. Also, the relevant controls and the most powerful manipulations are not always feasible when collecting data about naturally occurring behavior. So the two methods are complementary. The greater the variety of methods we use to explore the cognitive foundations of social relationships—methods with different biases and distinct sources of error—the more we will learn.

Conclusion

Because all three kinds of substitution errors exhibit the same pattern, this pattern cannot be a function of the unique properties of speech production, memory, or motor processes per se; instead, the pattern must be produced by some cognitive resource that all three of these processes use. Our results support the hypothesis that this common cognitive resource is a set of four basic models for relating to people: communal sharing, authority ranking, equality matching, and market pricing. Cutting across these modes of relationship is a salient attribute of the person: gender. The best predictors of the substitutions people make in social errors are relationship type and gender: People tend to confuse people with whom they have the same kind of relationship, and people who are the same gender. Mode and gender predict the pattern of errors as well as or better than the age or race of the people confused, and indeed often better than the subjects' own role terms for describing their relationships. Furthermore, mode and gender were the only factors demonstrated to have an effect in every one of the seven studies. It is particularly significant that the relational-models theory predicts error substitutions better than role terms—the cultural labels that subjects use to characterize their own interactions—because it suggests that the theoretically generated implicit categories are more salient in social cognition than people's explicit, linguistically labeled folk categories. The two taxonomies overlap considerably, of course, but as far as can be determined from these data, the effect of mode on errors tends to be independent of the effect of role; one is apparently a "deep," implicit structure used to generate and structure relationships, whereas the other is an explicit surface taxonomy used in linguistic communication. In the one study where the two are associated, the

effect of role terms appears to be mediated by relationship mode, so that mode correspondence predicts role correspondence much better than role correspondence predicts mode correspondence. The effect of relationship mode also appears to be more important in determining these errors than more general cognitive factors like recency or frequency of interaction and similarity of the sound of people's names.

It is important to recognize that the results of these studies support the specific four-part typology of the relational-models theory, and not just any similarity metric for social relations. If people were using very different categories with appreciably different boundaries, these results would not have been obtained. Imagine, for example, categorizing people according to the number of siblings they had or the month of the year in which they were born; the tendency to make social substitution errors within such socially irrelevant categories would be at chance.

Moreover, the tendencies to make substitutions within mode and within gender each have large effect sizes. Because these two factors are uncorrelated, their combined effect size is so large that there is not much error left to explain. And surely subjects are imperfect in their application of the mode taxonomy, and particularly in coding the relationship that was operative at the moment of the substitution error. This irreducible noise in the measurement results in underestimation of the true effect of mode. If we also allow for the probability of small independent additional effects of concordance for age, race, situation, sound, and recency of interaction, then no other major factors can be operative unless they are closely associated with the tendencies to make substitutions within mode or within gender. The same logic suggests that it would be hard to devise a taxonomy of relationships that could predict these error substitutions much better than the categories of the relational-models theory. The only logical possibility is a set of finer distinctions that are subsets of the four relational models.

These social substitution errors suggest that people represent their social world in terms of the kinds of relationships they have with others. For example, people are more likely to confuse two people with whom they have market pricing relationships than two people with whom they relate in different modes. If a person in an equality matching relationship uses the wrong name in addressing someone, the error is likely to be a substitution of the name of another person with whom the speaker also has an equality matching relationship. If a supervisor interacts with a subordinate in an authority ranking mode and later forgets the subordinate's identity, the confusion is likely to be with another subordinate with whom the supervisor also has an authority ranking relationship. When a person misdirects an action that is intended for a partner in a communal sharing relationship, the action is likely to be directed toward someone in another communal sharing relationship. This pattern of substitutions indicates that these four relational structures are the principal cognitive models that people use in social interaction.

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