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The Recapitulation Hypothesis in Person Retrieval

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In retrieving a person from memory, subjects retrace the course of acquaintanceship: they invoke a social stereotype, then apply a personality correction. The present article tests this *recapitulation hypothesis.* In a pair of experiments, subjects saw two serially presented cues and retrieved an acquaintance whom both of the cues described. As hypothesized, retrievals were faster if the first cue was a social category and the second cue a personality category, rather than vice versa. The experiments assess several explanations for this order effect: a social context-personality index explanation, a size difference explanation, and a criterion shift explanation. Results show that the order effect cannot be fully accounted for by differences in the size of social and personality categories, nor by the relaxation of personality criteria. The findings implicate a hierarchical social context-personality index memory structure.

Psychologists have studied the problem of acquaintanceship. How do people come to know one another? Over the course of an acquaintanceship, how do their conceptions of one another change? For years, scholars have posed such questions. Inquiries into the development of relationships are a long-standing social psychological tradition (Newcomb, 1961).

Other psychologists, students of person memory, have considered the problem of retrieval. How do people retrieve their acquaintances from memory? What process do they use? The scholars who pose these questions

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are cognitively oriented. Theirs is a contemporary movement (Wyer & Srull, 1984).

The current article offers a theoretical solution to the problem of acquaintanceship and the problem of person retrieval. The article builds on a theory that was introduced by Bond and Brockett (1987), a social context-personality index theory.

Social Context-Personality Index Theory

Drawing on recent cognitive developments (Kolodner, 1984; Reiser, Black, & Abelson, 1985), Bond and Brockett (1987) proposed a context-index theory. According to this theory, acquaintances are stored in memory by personality deviations from a social stereotype.

The theory begins by characterizing the process of acquaintanceship. People are met in social contexts. Associated with each context is a stereotype of the kind of person who would be met there. One stereotype would depict the college professor—as intelligent, for example, and absentminded. Such stereotypes are used in first encounters, when all that can be known is a stranger's group or social role. Over extended interactions, an individual's personality is revealed. In getting to know a professor, the cognizer would note ways in which the stereotype was wrong, and come to think of this person by a deviation from the original conceptualization. Having thought of a professor as intelligent and absentminded, the cognizer might learn that this professor is not intelligent, but dull; and that this professor is also extraverted. This is the course of acquaintanceship: a stereotypic conceptualization, followed by individuating corrections.

The course of acquaintanceship has implications for cognitive structure. Person memories are stored in a social-personality hierarchy. Atop the hierarchy is a social knowledge structure; below it are personality substructures. The social knowledge structure contains the stereotype used in understanding strangers. The personality substructures serve to index acquaintances. They record deviations from the social stereotype, idiosyncrasies that were noted as an acquaintance became known. The personality substructures are accessible over labeled links, but only from the parent social structure. Below the personality substructures are the cognizer's acquaintances.

Having addressed the problem of acquaintanceship, context-index theory proceeds to the problem of retrieval. Here it offers *a recapitulation hypothesis:* in retrieving a person from memory, cognizers retrace the course of acquaintanceship. A social context supplied the original conceptualization of an acquaintance; personality indices were added later. Like acquaintanceship, retrieval entails two steps: (1) accessing a social context and (2) traversing a personality index.

A Presentation Order Effect

Bond and Brockett (1987) adapted a cued retrieval procedure (Freedman & Loftus, 1971) to assess their context-index theory. At a computer terminal, subjects saw two serially presented cues. One of the cues was a social category (e.g., professor); the other was a personality trait (e.g., extraverted). Subjects saw one of the cues, then (after a pause) the other cue, and retrieved an acquaintance whom both of the cues described (e.g., an extraverted professor). The order of cue presentation was manipulated: at some trials, subjects saw a social category cue, then a personality trait cue; at other trials, they saw a personality cue, then a social cue. Of interest were retrieval times, as measured from the second cue

Context-index theory predicts that the order of cue presentation should affect times to person retrieval. Theoretically, retrieval entails two steps: (1) accessing a social context and (2) traversing a personality index. In the memory laboratory, Step 1 will be effected upon presentation of a social category cue and Step 2 must await the completion of Step 1. If social and personality cues are presented in succession, their order will determine the initiation of the retrieval process. Retrieval will begin on either the first or second cue, whichever is a social context. Because personality structures are accessed via social structures, early receipt of the social category cue should confer a retrieval advantage: retrievals should be faster if a social cue precedes, rather than follows, a personality cue. This preferred presentation order enables a recapitulation of acquaintanceship.

In two experiments, Bond and Brockett (1987) found the predicted order effect: acquaintances were retrieved more quickly if a social cue preceded a personality cue than if it followed a personality cue. The effect was sizable, averaging nearly one-third of the subject's faster RTs. Moreover, the effect generalized across stimulus materials. It was evident whether the social cue identified a role (e.g., professor) or a group (your family); and whether personality was cued by a trait adjective (e.g., extraverted) or a type noun (an extravert). In all cases, person retrievals were faster if the order of cue presentation mimicked the course of acquaintanceship. Bond and Brockett invoked their context-index theory to explain this order effect.

The current paper develops alternative explanations for the order effect. It reports two experiments that were inspired by these explanations and offers path analytic models of person retrieval.

Alternative Explanations

Why are acquaintances retrieved more quickly if a social cue precedes a personality cue. rather than vice versa? There may be *a size difference*

explanation. Personality categories are equivalent to social categories: each can be accessed independently of the other, and each is searched in the same way. In Bond and Brockett's experimental procedure, the subject sees two serially presented cues and must retrieve an acquaintance who fits the overlap of the cues. Upon seeing the first cue, the subject accesses the corresponding category. Later, he/she searches this category for an acquaintance who fits the second cue. This search, initiated by the second cue, consists of a series of random sampling trials. At each trial, the subject locates an acquaintance who belongs to the first category and checks to see whether that acquaintance fits the second cue. If so, the retrieval is complete; if not, the subject randomly samples another member of the first category. In this interpretation, retrieval times depend on the number of sampling trials needed to find an appropriate memory. The number of trials depends, in turn, on the proportion of acquaintances in the first category who belong to the second category. This is a conditional probabilty—P(2nd 1st).

Bond and Brockett (1987) report that retrievals are faster if a social cue precedes a personality cue, rather than vice versa. This may reflect differences in category size. Perhaps personality categories are larger than social categories, and the probability of personality category membership given social category membership [P (Personality Social)] exceeds the probability of social category membership given personality category membership [P (Social ~ Personality)]. If so, it would take more sampling trials to search a personality category than a social category. This is the size difference explanation.

The *criterion shift explanation* offers another account. Subjects see two serially presented cues and must recall an acquaintance who fits the overlap of the two. According to the criterion shift explanation, the first cue triggers a search, and an acquaintance who fits the cue is found during the interstimulus interval. Upon seeing the second cue, the subject must make a decision. The subject may decide that the second cue describes the acquaintance and terminate the retrieval trial. Or the subject may conclude that the second cue does not describe the acquaintance and resume the memory search.

In this explanation, presentation order influences decisions about person memories. The criteria for membership in personality categories are fuzzy. By relaxing those criteria, subjects can decide that an acquaintance who was retrieved to a social cue also fits a personality category cue and quickly end a retrieval trial. Because social categories are less fuzzy, the criteria for social category membership cannot be readily shifted (Hastie, Park, & Weber, 1984). Having retrieved an acquaintance to a personality cue, subjects must often acknowledge that this person does not belong to a social category and will be forced to renew their memory search. In this view, retrieval times reflect decision criteria that differ in fuzziness, independently of category size.

EXPERIMENT 1

An experiment was conducted to assess social context-personality index theory against these alternative explanations. As in earlier research (Bond & Brockett, 1987), subjects see two serially presented cues and must retrieve an acquaintance whom both of the cues describe. As before, one of the cues identifies a social category and the other, a personality category. The order of cue presentation is varied, and retrievals are timed.

Subjects then receive some additional assignments. They judge the size of each category that had served as a retrieval cue, and the size of each category intersection that had served as a retrieval specification. From these judgments, we estimate the probability that a member of the first-cued category would belong to the category cued second—that is, P(2nd 1st).

Finally, these subjects perform a decision task. They see two serially presented cues: a social and a personality category cue. They retrieve an acquaintance to the first cue. Later, they must decide whether this acquaintance can be described by a second cue. The order of cue presentation is varied. On some trials, the retrieval cue is a social category and the ensuing decision cue, a personality category; on other trials, a personality category serves as the retrieval cue, and a social category as the decision cue. Because these are the same categories that had been seen earlier at double-cue retrieval trials, the procedure permits us to relate decisions about a particular cue to double-cue retrievals involving that cue.

Earlier results revealed faster person retrievals if a social cue preceded (rather than followed) a personality cue. The experiment assesses the context-index explanation for this effect against two alternative explanations.

Size differences may account for the effect of presentation order. If so, subjects' size estimates should indicate that the probability of personality category membership given social category membership exceeds the reverse conditional probability [i.e., *P* (Personality (Social) > *P* (Social ~ Personality)]. Moreover, these probabilities should be inversely related to retrieval times.

According to another explanation, the order effect results from the relaxation of personality decision criteria. If so, the relaxation should be evident in a laboratory analog of the subject's decision process. On a decision task, acquaintances should be said to belong to personality categories more often than to social categories, and these differential decisions should transcend category size differences. Moreover, *categories*

that evoke positive inclusion decisions should have occasioned fast retrievals, when (at an earlier task) they served as the second of two retrieval cues.

According to our context-index explanation, the effect of presentation order reflects an accessing of personality structures via social structures. If this explanation is valid, presentation order should have an effect on double-cue retrievals that cannot be explained by category sizes or person decisions.

Person retrievals to single cues should distinguish between two of the explanations. The size difference explanation assumes that personality categories are larger than social categories, and that retrieval times depend on the proportion of memories in the search space that fit the search criterion: the higher this proportion, the faster the retrieval. As part of a decision task, the current subjects will be asked to search among all their acquaintances for one who fits a single cue. If the size difference explanation is valid, it should take longer to find one of the few acquaintances who fits a social cue than one of the many who fits a personality cue. Context-index theory makes an opposite prediction: retrievals should be faster to social categories than personality categories, because the former can be accessed directly, and the latter cannot.

Having compared these explanations, we construct a path analytic model of person retrieval. As Kenny (1979) notes, path analysis is useful in assessing mediating-variable explanations—like the size difference and criterion shift accounts.

Method

Subjects

Twenty-one undergraduate psychology students at Ohio State University participated in the study to fulfill a course requirement.

Experimental Category Cues

The 16 nonitalicized Traits, 8 nonitalicized Groups, and 8 Roles that appear in Table I were selected as cues.

The Traits were chosen on the basis of earlier research. Bond and Brockett (1987, Experiment I) had undergraduates list personality traits of people they knew. Anderson (1968) had undergraduates rate personality traits for meaningfulness. The traits in Table I were volunteered by Bond and Brockett's subjects more often than any others. Moreover, Anderson's subjects rated these traits as highly meaningful. Each rating exceeded 3.35 on a scale that ranged from 0 (have no idea what the trait means) to 4 (have a very clear idea of the trait's meaning).

The Social cues were selected on the basis of pretesting with an independent sample of 20 Ohio State undergraduates. Each undergraduate was handed a list of 24 Groups and 24 Roles, and asked "How many people do you know who belong to each of these categories?" We used the resulting category size estimates to choose Groups and Roles

TABLE 1
EXPERIMENTAL CATEGORY CUES

Traits	Groups	Roles
Cheerful	Your family	Doctor
Studious	Co-workers at a job	Housewife
Oversensitive	A dormitory	Businessman
Understanding	Your psychology class	Waitress
Unpopular	Your high school class	Coach
Disagreeable	A basketball team	Teacher
Intelligent	A football team	Grandparent
Sociable	A sorority"	Boyfriend"
Imaginative	*A fraternity`*	
Self-critical		
Sincere	*A country club*	
Unselfish	*A TCU student*	
Humorous	*A musical group*	
Considerate	*Your elementary school class*	
Self-centered	*A summer camp*	
Insecure	*A church*	
	Neighbors at home	
Unreasonable	*A baseball team*	
Impatient	*A history class*	
Spiteful	*A friend's family*	
Shy	*A political organization*	

" In Experiment 1, female subjects saw the cue A *sorority;* male subjects, the cue *A fraternity.* In Experiment 2, all subjects saw both of these cues.

" Female subjects saw the cue *Boyfriend;* male subjects, the cue, *Girlfriend.* `

The italicized cues were used in Experiment 2 but not Experiment I.

Procedure

Subjects arrived at the laboratory alone and were given two tasks: a retrieval task and a decision task.

Retrieval task. While sitting at a computer terminal, the subject saw two cues on the terminal screen. The subject saw a cue at the top of the screen, then (2.5 s later) a second cue just below the first. The subject was instructed to recall an acquaintance whom both of the cues described. The subject would effect this retrieval, hit a button on the terminal keyboard, then jot the acquaintance's name on a sheet of paper. Subjects were told to respond to each pair of cues as quickly as possible, but not to respond unless they could recall an acquaintance who fit the description. Subjects were supervised through four practice trials, then paced themselves through 16 experimental trials. A time limit was imposed on retrievals: if the subject had not responded within 20 s, the trial was aborted.

Afterward, subjects answered questions about each person they had recalled. They indicated how well they knew each person on a scale that ranged from I *(not at all)* to 7 *(very well),* and noted how long it had been since they had seen the person by providing a direct estimate of time since last contact.

Subjects were then handed a list of 32 category names and 16 category pairs. The category names were the ones that had served as retrieval cues. Subjects responded to each category name by answering the question, "How many people do you know who belong to this category?" The category pairs were the cue pairs to which the subject had retrieved

people do you know who belong to both of the categories in this pair?" Thus, the subject might indicate how many doctors, how many cheerful people, and how many cheerful doctors he or she knew.

Decision task. Next, subjects made decisions about acquaintances. They began by positioning two fingers over the terminal keyboard—the left index finger over the key marked *Y,* the right index finger over the key marked *N.* A trial commenced with the appearance of a category name at the top of the computer screen. The subject responded to this cue by retrieving an acquaintance who belonged to the category as quickly as possible. After hitting the button marked Y to signal the retrieval, the subject encountered a 2.5-s pause, then saw a second category name on the screen just below the first. Having retrieved a person in response to the first category, the subject's task was to decide whether this acquaintance belonged to the second category. If the acquaintance belonged to the second category, the subject signaled "Yes" by hitting the Y button; if the acquaintance did not belong to the category, the subject signaled "No" by hitting the *N* button. The subject was instructed to make this decision as quickly as possible, then identify the acquaintance in writing. Again, a 20-s time limit was imposed.

Subjects were supervised through four practice decision trials, then paced themselves through 16 experimental trials. A debriefing concluded the experiment.

Overall Design and Counterbalancing

Each retrieval trial displayed two of the categories in Table 1—one category, then (2.5 s later) a second category. One was a Trait; the other was either a Group or a Role. Category positions were manipulated to form four distinct types of category pairs: Group-Trait, Trait-Group, Role-Trait, and Trait-Role. Each pair type appeared once at each of four retrieval blocks, in a random order. Category pairings and assignment of categories to pair types were randomized anew for each subject.

The decision trials resembled the retrieval trials. At each decision trial, the subject retrieved an acquaintance to one category, then decided whether the acquaintance belonged to a second category. The two categories at a decision trial were two that the subject had encountered together at a retrieval trial, and the two categories appeared in the same order as they had earlier. Thus, a subject who had seen "Cheerful . . . Doctor" at a retrieval trial would later see "Cheerful . . . Doctor" at a decision trial. There were four pair types at decision trials: Group-Trait, Trait-Group, Role-Trait, and Trait-Role. Each type appeared once at each of four decision blocks. The category pairs were presented in one random order at retrieval trials and a different random order at decision trials.

Results

The experiment manipulated two independent variables: Presentation Order (Personality Trait-first vs Personality Trait-second) and Social Category (Group vs Role). These were treated as factors in 2 x 2 within-subject analyses of variance.

Double-Cue Retrievals

Subjects were asked to retrieve a person who fit two cues—a Social Category and a Personality Trait. They failed to retrieve acquaintances on 9.24% of these double-cue trials; nonretrievals were distributed equally across experimental conditions.

From each of the remaining trials, the time between presentation of the second cue and the subject's response was recorded by the computer.

TABLE 2
MEANS IN EXPERIMENT I. BY TYPE OF CATEGORY PAIR

	Type of category pair			
First cue: Second cue:	Group-Trait	Trait-Group	Role-Trait	Trait-Role
Double-cue RT (seconds)	3.17	4.75	3.56	4.11
Prob (2nd 1 1st) (category membership)	0.328	0.311	0.522	0.211
Positive decisions (proportion to Second cue)	0.631	0.321	0.726	0.239

Means within category pair type appear in the first row of Table 2. Bond and Brockett (1987) found that an acquaintance was retrieved more quickly if a Social Category cue preceded, rather than followed a Personality Trait cue. The current results replicate this effect. Here subjects took 3.36 s to retrieve an acquaintance if a Social cue preceded a Personality cue, 4.43 s if it followed a Personality cue, $F(1, 20) = 14.52$, $p < .005$. Retrieval times do not depend on whether the Social Category is a Group or a Role, main effect, $F(1, 20) = 0.10$; nor does the disadvantage from positioning the Personality cue first depend on the Social Category, interaction, $F(1, 20) = 2.56$, $p > .12$. This disadvantage is large: it averages 1.07 s, which is 32% of the faster mean RT.

Category Size

Perhaps size differences can explain this order effect. Perhaps the duration of first-category search is determined by the proportion of people in the first category who belong to the second category: P(2nd 1st). The explanation contends that Social categories are smaller than Personality categories; that P (Personality | Social) > P (Social | Personality); and that this inequality accounts for differences in RTs.

Subjects estimated the size of each category that had served as a retrieval cue by noting the number of people they knew who belonged to the category. If these estimates could be validated, they would have relevance for the size difference explanation.

We wondered about the reliability of category size estimates, fearing that our subjects' estimates might be tainted by their prior retrieval to category cues. We addressed these concerns by comparing the current subjects' size estimates to estimates that had been made by an independent sample of 20 Ohio State undergraduates (see Method section above). The independent sample estimated the size of all 16 Social categories used in Experiment 1, but no Personality categories. The independent sample made these

with no prior experimental task. Statistical analyses revealed that the current sample and the independent sample made similar size estimates. The current sample estimated that the average Social category included 40.26 acquaintances; the independent sample estimated that it included 34.52 acquaintances; for the difference, t(40) = 0.48, n.s. Correlational analyses should reveal whether the two samples agree on relative category size. For each of the 16 Social categories used in Experiment 1, we noted the mean size estimate by the current sample and the mean estimate by the independent sample. Across the 16 categories, these means are strongly correlated, r = .977.

According to the current sample's estimates, the Role categories are smaller than the Group and Personality categories of Table 1 (M number of acquaintances per Role, Group, and Personality category = 17.27, 59.67, and 50.89, respectively; in a one-way ANOVA, F(2, 40) = 12.38, p < .001). The Groups and Traits do not differ in size.

Subjects had retrieved acquaintances to category pairs. After estimating the size of each category in a retrieval pair, subjects estimated the number of people they knew who belonged to *both* categories in the pair. The size of this category intersection was divided by the size of the category that had served as the first retrieval cue. The resulting quotient is an estimate of the probability of second category membership given first category membership: P(2^{nd} | 1st).

Mean values of P(2nd 1st) were computed within category pair type. As shown in Table 2, the probability that an acquaintance who was retrieved in response to a Role category would also fit a Personality category is .522, while the probability that an acquaintance who was retrieved in response to a Personality category would also fit a Role category is .211. This difference is highly significant, F(l, 20) = 47.47, p < .0001. On the other hand, P(Group ~ Personality) does not differ from P(Personality Group); these are .311 and .328, respectively; F(1, 20) = 0.13. In a 2 x 2 ANOVA, the conditional probabilities display a strong main effect of Presentation Order (F(1, 20) = 29.59, p < .0001) and a Presentation Order x Social Category interaction (F(1, 20) _ 17.72, p < .0005).

These results reflect differences in the denominators of conditional probabilities. As reported above, Role categories are smaller than Personality categories; Group categories are not. P(Personality Role) is large because its denominator is small. The numerators of conditional probabilities are category intersections. An ANOVA on the size of these intersections reveals no Presentation Order effect, *F(1,* 20) = 0.48, and only a marginal Social Category effect, such that category intersections are slightly smaller if they involve Roles rather than Groups, Ms = 7.29 vs 12.60 persons, respectively; F(1, 20) = 3.03, p < .10.

The size difference explanation is not fully supported. Retrievals *are*

faster if a Group cue precedes (rather than follows) a Personality cue, yet the relevant conditional probabilities do not differ. In any case, the explanation predicts an inverse correlation between retrieval time and the conditional probability of second-category inclusion. No such correlation was found. The mean within-subject/within-pair type r-to-Z-tor between RT and P(2nd 1st) was 0.08, t(20) = 0.47.

Person Decisions

Criterion shifts may influence the double-cue retrieval results. An acquaintance may be retrieved to the first category, then checked for inclusion in the second category. If the latter is a fuzzy Personality Trait, the criterion for category inclusion can be relaxed and the trial is terminated. But if the second category is a well-defined Group or Role, a negative inclusion decision must be acknowledged, and the search for an appropriate acquaintance resumed.

This explanation was assessed with a laboratory analog of the hypothesized process. Subjects retrieved an acquaintance to one cue, then made a decision about whether the acquaintance fit a second cue. Of interest is the proportion of trials on which the acquaintance was said to fit the second cue. Means for proportion positive category inclusion decisions appear in Table 2, for four types of category pairs. The criterion shift interpretation predicts more positive decisions to a Personality cue than to a Social cue. Results support this prediction. Far more acquaintances are said to fit a Personality cue than a Social cue, M proportion positive decisions = 0.678 vs 0.280, respectively; F(1, 20) = 77.08, p < .0001. The effect is particularly strong when the Social cue is a Role, Presentation Order x Social Category, F(1, 20) = 4.37, *p* < .05.

These decision results can be compared to the probabilities that appear one row above them in Table 2. In the absence of a criterion shift, the proportion of positive second-category inclusion decisions should equal the probability of second-category membership given first-category membership. When the second category is a Group or Role, this equality holds: the proportion of positive decisions is .280; P(2nd 1st) is .261. If the criterion is relaxed, the proportion of positive second-category decisions should exceed the relevant conditional probability. When the second category is a personality Trait, this inequality is evident: the proportion of positive decisions is .678, and P(2nd 1st) is only .425. This pattern of means should increase confidence in our size estimation and decision procedures, as it confirms the criterion shift account.

According to the criterion shift explanation, retrievals are terminated by positive decisions. The decision cues in Experiment I were categories that had appeared at retrieval trials, as the second of two cues. The design permits a cue-by-cue analysis of the relationship between retrievals and decisions. The analysis reveals lon^{g}er retrieval times to cues that

(later) evoked negative inclusion decisions than to those that evoked positive decisions. Weighting each category pair type equally, M RTs are 4.51 s to negative decision cues, 3.35 s to positive decision cues. Although missing data complicate significance testing, these results support the criterion shift account.

Earlier, the size difference explanation was assessed with a measure of P(2nd 1st). The validity of this measure can now be established. If the measure is valid, it should predict subjects' decisions about second-category inclusion: the higher P (2nd 1st), the greater the likelihood that a person retrieved in response to the first cue should fit the second cue. The relevant validity coefficient is highly significant. For the within-subject within-pair type relationship between P(2nd 1st) and category inclusion Decisions (0 = No, 1 = Yes), the mean Fishers r-to-Z-to-ris 0.30, $t(20) = 5.99$, $p < .001$.

Single-cue Retrievals

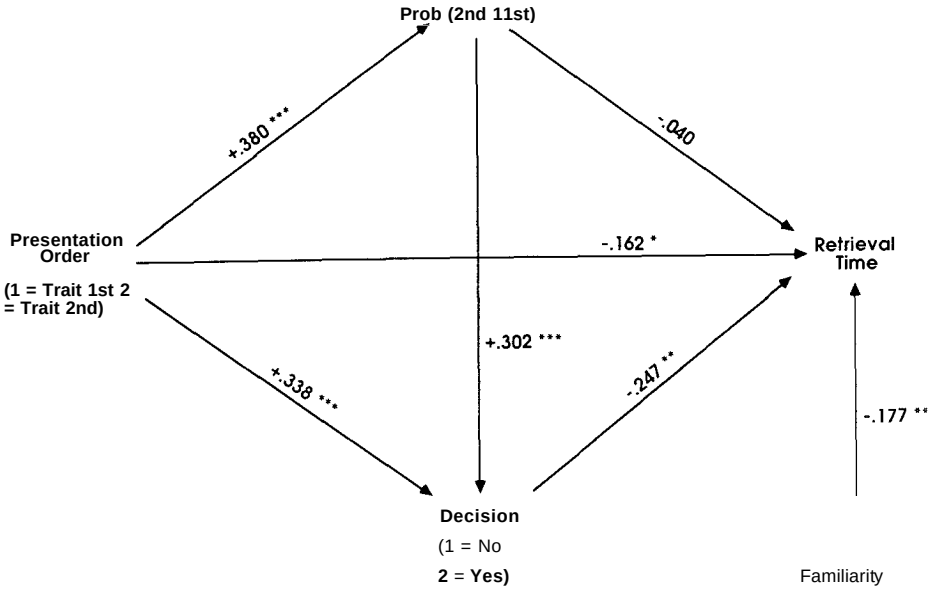
Subjects were asked to retrieve acquaintances to a single cue. On 1.19% of these trials, they retrieved no acquaintance. A few nonretrievals occurred in every experimental condition.

From each of the remaining trials, the interval between presentation of the cue and the subject's response was timed, and means were computed for Role, Group, and Personality cues. According to the size difference explanation, it should take longer to find one of the few members of a Social category than it takes to find one of the many members of a Personality category. According to the context-index explanation, retrievals should be faster to Social cues than to Personality cues.

Results contradict the size difference prediction. Mean retrieval times are 1.86 s to Role cues, 2.52 s to Group cues, and 2.90 s to Personality cues, in a one-way ANOVA; $F(2, 40) = 7.67$, $p < .01$. Size estimates indicate that Roles are smaller than Personality Traits. Yet Roles are more effective as retrieval cues: for the difference between single-cue RTs to Role and Personality cues, $t(20) = 3.08$, $p < .005$. Retrievals are not significantly faster to Group cues than to Personality cues, $t(20) = 1.14$, n.s. The results provide only partial confirmation of the context-index prediction.

Acquaintance Characteristics

Subjects answered questions about the acquaintances retrieved at double-cue trials. They noted how well they knew each acquaintance, then indicated how recently they had seen the acquaintance. One-way ANOVAs revealed no differences in the characteristics of acquaintances retrieved in response to the four category pair types. The four pair types elicited acquaintances who were comparable in familiarity, $F(3, 63) = 1.36$, n.s.; and in recency of contact. $F(3, 63) = 2.30$, n.s. Bond and Brockett (1987)



Fio. 1. Path analysis of Experiment I.

* p < .025 **p <.O *** p < .001

found that well-known acquaintances were retrieved more quickly than lesser known acquaintances. Their finding is replicated here: for the relationship between acquaintance Familiarity and RT, the mean within subject/within-pair type Fishers r-to-Z-to-r = -0.19, $t(20) = -2.71$, $p < .025$). Here RTs were unrelated to Time-since-Contact (mean r-to-Z-to-r = -0.01, $t(20) = -0.12$).

A Model of Person Retrievals

We developed a path analytic model of person retrievals. The model was intended to explicate why acquaintances are retrieved more quickly if a Social cue precedes, rather than follows, a Personality cue. The model—shown in Fig. 1—includes five variables: the Presentation Order at a double-cue trial, the RT at that trial, the Familiarity of the person who was retrieved, the Probability that a person who was retrieved to the first category cue would belong to the second category, and the Decision about a person's inclusion in the second category.

The model was designed to accommodate the context-index explanation, the size difference explanation, and the criterion shift explanation. The model decomposes the Presentation Order effect on RT into a direct

effect and two indirect effects. Presentation Order may influence RTs via its effects on person Decisions and on conditional Probabilities of second-category inclusion. But according to the context-index explanation, Presentation Order also has a direct effect—one that is separable from any others.

Having specified this path analytic model, we proceeded to estimate the model's parameters. We devised an estimation procedure that would suit this within-subject design, by fitting the model separately for each subject, with double-cue trial as the unit of analysis. Conditional Probabilities were inferred from the subject's category size estimates; Decisions, from the subject's response at a decision trial that displayed the same cues as the relevant retrieval trial. After computing standardized path coefficients for each of our 21 subjects, we averaged the within-subject coefficients and used one-sample t tests to compare each mean coefficient to 0.

Mean standardized path coefficients appear in Fig. 1. As shown there, Presentation Order affects the Conditional Probability of category membership (t(20) = 6.19, p < .0001), as well as the subject's category inclusion Decisions (420) = 7.00, p < .0001), with higher Conditional Probabilities and more positive Decisions on Trait-second than Trait-first trials. Consistent with the criterion shift explanation, positive Decisions speed Retrievals (420) = -3.21, p < .01). Predictably, high Conditional Probabilities of second-category membership promote positive second-category inclusion decisions (420) = 5.99, p < .001). But contrary to the size difference explanation, Probabilities have no direct effect on RTs, t(20) = -0.73. As in Bond and Brockett, Familiarity affects Retrieval Times, with fast retrievals of Familiar acquaintances, t(20) = -2.90, p < .025. More importantly, RTs are directly affected by Presentation Order (t(20) = 2.43, p < .025), with faster retrievals on Trait-second trials. This direct effect supports context-index theory.

We tried to expand the path analytic model by including Social Category and Time-Since-Contact as determinants of Retrieval Time. Neither had an effect. We used an alternative estimation procedure for the model in Fig. 1, by applying Fisher's Z transformations to each subject's standardized path coefficients. Significance tests on the mean Z transforms yield conclusions identical to the ones reported above. We estimated the parameters in two separate models —one for trials that involved Roles, the other for trials that involved Groups. The estimates were similar to those in Fig. 1. Thus, in the model for Roles, P(2nd 1st) has no effect on RTs, *M* path coefficient = —.079, 020) = -0.58.

Single-cue retrievals were path analyzed to see if differences in category size could account for differences in RT, They could not. This path analysis modeled single-cue RTs as a function of category size, as well as dummy variables that distinguished among Trait, Group, and Role

cues. Results indicated faster RTs to Social Category than Trait cues (*M* within-subject path coefficient = — .25, t(20) = -3.35, *p* < .001) and faster RTs to Role than Group cues (*M* coefficient = —.17, t(20) = 3.18, *p* < .001). Category size was unrelated to Retrieval Time (*M* coefficient = -0.03, t(20) = –.56).

Discussion

Acquaintances are retrieved more quickly if a social cue precedes, rather than follows, a personality cue. Experiment 1 assessed three explanations for this effect.

Experiment 1 discredits the size differences explanation. Given the reliability and validity data, subjects' category size estimate would seem to have a bearing on the explanation. According to these estimates, size differences are unrelated to retrieval time. Moreover, the size differences explanation is forced to a logical contradiction. To account for the double-cue retrieval times, the explanation must assume that social categories are smaller than personality categories. To account for the single-cue results, it must assume that social categories are larger than personality categories. Both cannot be true.

Experiment 1 places constraints on a criterion shift account. The account cannot explain why single-cue retrievals are slower to personality traits than to roles. Indeed, if subjects always relax personality criteria, they should have responded more quickly to traits. Upon seeing a trait-cue, subjects should have retrieved one acquaintance, then aborted the trial with a criterion relaxation. Theoretically, they should have needed to sample many acquaintances before satisfying a rigid role cue. If there are criterion shifts, they must be task-specific. Subjects may relax personality criteria, but only after retrieving an acquaintance to some other cue.

In this narrower domain, the criterion shift explanation remains viable. Consistent with the explanation, subjects decide that many acquaintances belong to personality categories, and subjects' decisions predict double-cue retrieval times. Unfortunately, support for this explanation is limited by the methodology of Experiment 1. In the experiment, subjects performed a double-cue retrieval task, then a decision task that displayed the same cues. Decisions from the second task were treated as surrogates for decisions at the first task. This research strategy has risks. At best, the later decision would allow an indirect inference about the earlier decision. At worst, the later decision might be biased by subjects' prior exposure to the decision cue. A stronger test of the criterion shift explanation would examine the subject's original decision—the decision made at a double-cue retrieval trial.

The context-index explanation remains viable. Consistent with the explanation, the presentation order effect cannot be fully accounted for

by subjects' decisions, nor by conditional probabilities; moreover, the single-cue retrievals are faster to role than to personality cues. The explanation would be more strongly supported if the single-cue results were stronger—in particular, if retrievals were shown to be faster to group than to personality cues. The explanation could also be buttressed in another way. Context-index theory maintains that personality categories play an organizational function in memory: they are used to index acquaintances met in the same context. Experiment l did not seek evidence of this personality indexing; a stronger test of the theory would.

EXPERIMENT 2

Experiment 1 discredited the size differences explanation for the presentation order effect in person retrieval. A second experiment was designed to discriminate between the two remaining accounts. Experiment 2 tests for personality indexing and for personality criterion relaxation.

Perhaps personality traits serve no organizational function in memory for people; perhaps they are useless as retrieval cues. Some cues are certainly useless. Some would prompt an undirected memory search. If retrievals were no faster to personality traits than to these "garbage" cues, the hypothesis of personality indexing could be rejected.

In Experiment 2, subjects must retrieve acquaintances who have a specified letter in their name. Initial letters do not count. In designing the Experiment, we assumed that people would not be accessible by the noninitial letters of their names, hence that noninitial letter cues would be "garbage."

More specifically, the Experiment requires subjects to retrieve an acquaintance who fits two cues. Sometimes the two cues are a social category and a personality category; sometimes they are a social category and a noninitial letter; sometimes they are a personality category and a noninitial letter. As before, cues are presented in succession and separated by a pause. Presentation order is varied, and retrievals are timed.

According to social context-personality index theory, person retrieval entails two steps: (1) accessing a social context and (2) traversing a personality index. In the laboratory, Step 1 is initiated upon presentation of a social category cue. Retrievals are rapid if a social category appears as the first of two cues because Step 1 can be completed during an interstimulus pause. If a social category comes second, Step 1 is delayed. RTs should reveal a presentation order effect. They should differ by the time it takes to complete Step 1.

This theory implies a presentation order effect for a social cue and *any* nonsocial cue; indeed, it implies order effects of equal magnitude whatever the accompanying cue. In Experiment 2, there should be a presentation order effect for social and *letter* cues. with faster *retrievals*

when the social cue precedes, rather than follows, the letter. It should equal the presentation order effect for social and *personality* cues.

Context-index theory asserts that the members of a social context are accessed by their personality characteristics; thus, traits should be useful as retrieval cues. Double-cue retrievals should be faster to a social and personality category than to a social category and a useless letter. Whether the social cue comes first or second, a personality index should save time.

Letters are rigid criteria. A name either does or does not include a letter. Given this assumption, the criterion shift explanation is applicable to Experiment 2. When subjects retrieve an acquaintance who fits a social cue and a letter, there can be no criterion shift in either presentation order. When they retrieve an acquaintance to a personality cue and a letter, there should be a criterion relaxation (hence a faster retrieval) if the personality cue comes second. An order effect for personality and letter cues would have no context-index explanation.

Experiment 2 seeks evidence of criterion relaxation. After retrieving acquaintances to traits, subjects are asked how well the traits describe these acquaintances. If they report that the traits do not fit, retrieval criteria must have been relaxed.

Acquaintances are retrieved more quickly if a social cue precedes, rather than follows, a personality cue. Experiment 1 discredited a size difference explanation for this effect. Social and personality cues seem to prompt a directed retrieval process that obscures size difference effects. Other cues (like noninitial letters) may initiate an undirected memory search. If so, size differences should predict search duration. In an undirected search, there should be faster double-use retrievals if a small category precedes, rather than follows, a large category, and a faster single-cue retrieval to a large than a small category alone. Experiment 2 assesses this logic.

Method

Subjects

Thirty undergraduate psychology students at Texas Christian University participated in the study to fulfill a course requirement.

Experimental Category Cues

Twenty traits, 20 Groups, and 20 Letters were selected as cues for Experiment 2.

The 20 Traits, which appear at the left of Table 1, included the 16 that had been used in Experiment 1, plus the 4 that are italicized in the Table. These new Traits met the same meaningfulness criteria as the original 16 (Anderson, 1968).

The 20 Groups, which appear in the center of Table 1, included the 8 that had been used in Experiment 1, plus 12 additional Groups—those that are italicized. Most of these

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to know acquaintances in each Group. The two Groups that were not pretested ("A TCU student" and "A country club") seemed appropriate for Texas Christian subjects.

As Letter cues, we used all of the letters of the alphabet except J, Q, U, V, X, and Z. In the experiment proper, Letter cues were capitalized and prefaced by the phrase The letter." Thus, subjects would respond to "The letter A."

Procedure

Subjects arrived at the laboratory alone to participate in a study that was similar to Experiment 1.

Subjects began the experiment with a retrieval task. While sitting at a computer terminal, the subject saw two cues on the terminal screen—one cue, then (4 s later) a second cue. The subject was to recall an acquaintance whom both of the cues described, hit a button as quickly as possible, then jot the acquaintance's name on a sheet of paper.

The subject saw Trait, Group, and Letter cues. In response to a Letter cue, the subject was to think of an acquaintance whose name included that letter, disregarding the first letter of the acquaintance's name. Thus, in response to "The letter A," the subject could retrieve either Charlie or Alma, but not Albert. As the experimenter noted, the letter could appear in either a first or last name, so long as it was a noninitial letter.

Subjects were given 4 practice trials, then 30 experimental trials. A 35-s time limit was imposed on retrievals.

At each of the 30 trials, the subject saw two retrieval cues in succession. Cues were manipulated to form six distinct types of cue-pairs: Group-Trait, Trait-Group, Group-Letter, Letter-Group, Letter-Trait, and Trait-Letter. Each pair type appeared once at each of five retrieval blocks, in a random order. Cue pairing and assignment of cues to pair types were randomized anew for each subject.

After the last retrieval trial, subjects made judgments about the acquaintances they had retrieved. As in Experiment 1, they judged familiarity and time since contact. Subjects then made judgments of Person-Trait Fit, by noting the extent to which their acquaintances possessed certain Traits. For each acquaintance retrieved to a Trait, the subject judged the acquaintance's Fit to that Trait. Thus, a subject who had retrieved Acquaintance I to the trait "Cheerful" was asked "How cheerful is Acquaintance I?" Each subject judged 20 Person-Trait Fits, making these judgments on 7-point scales that ranged from / = "*Not at all* [Trait-cue]" to *7* = "*Very* [Trait-cue]."

Finally, subjects returned to the computer terminal for a decision task. As in Experiment I, the subject retrieved an acquaintance to one cue, then (4 s later) decided whether this person could be described by a second cue. Subjects were given 4 practice trials, then 30 experimental decision trials. As in Experiment 1, the two cues at a decision trial were two that the subject had encountered in the same order at a retrieval trial. On some trials, the subject had to decide whether a person's name included a particular noninitial Letter.

Results

Double-Cue Retrievals

Subjects were instructed to retrieve an acquaintance to a pair of serially presented cues. There were six types of cue pairs: Group-Trait, Trait-Group, Group-Letter, Letter-Group, Letter-Trait, and Trait-Letter. On 11.43% of the trials, the subject retrieved no acquaintance. There were more of these nonretrievals to cue-pairs that included Letters than to those that did not, Ms = 16.43% vs 1.43% nonretrievals to Letter pairs and other pairs, respectively, F(l, 27) = 57.61, p < .0001.

Times to successful retrievals were averaged within Hair tvne Meunc

TABLE 3

MEANS IN EXPERIMENT 2 BY TYPE OF CATEGORY PAIR

	Type of category pair					
First cue: Second cue:	Group-Trait	Trait-Group	Group-Letter	Letter-Group	Letter-Trait	Trait-Letter
Double-cue RT (seconds)	5.13	7.02	9.21	10.27	9.44	11.96
Person-trait fit (1 to 7)	5.55	5.61	—	—	5.68	5.67
Positive decisions (proportion to Second cue)	0.693	0.657	0.532	0.512	0.702	0.436

appear in the first row of Table 3. Context-index theory makes predictions about retrievals that involve a Group cue. RTs for the four relevant pair types were submitted to a two-way within-subject ANOVA, with Group-cue Position (Group First vs Second) and Nongroup cue (Trait vs Letter) as factors. Context-index theory predicts a main effect for Group cue Position, a main effect for Nongroup cue, and no interaction. The ANOVA confirms all three predictions. Retrievals were faster if a Group cue came First rather than Second, RTs = 7.17 vs 8.64 s, F(l, 27) = 7.07, p < .02; they were faster if the Group cue was paired with a Trait rather than a Letter, Ms = 6.07 vs 9.74 s, F(1, 27) = 44.76, p < .0001, and these effects combined additively; that is, there was no Group cue Position x Nongroup cue interaction, F(1, 27) = 0.67. Experiment 1 is clearly replicated: retrievals were faster at Group-Trait than Trait-Group trials, t(27) = 3.48, p < .005.

Some trials did not involve Group cues. Here context-index theory predicts inefficient retrievals. As predicted, the mean RT at trials that included a Group cue was 7.91 s, the mean RT at other trials was 10.70 *s*, F(l, 27) = 19.98, p < .0001.

The criterion shift explanation predicts faster retrievals to Letter-Trait than Trait-Letter trials. Consistent with the explanation, acquaintances were retrieved more quickly if a Trait followed, rather than preceded, a Letter, t(27) = 2.53, p < .02. This effect, which cannot be explained by context-index theory, inspires a closer look at the criterion shift account.

Person-Trait Fit

Subjects noted the fit between a person and a trait to which the person had been retrieved. The criterion shift explanation predicts worse Person-Trait Fits if the Trait had served as the second, rather than the first, of two retrieval cues. This prediction was not confirmed. A 2 (Trait-cue Position: First vs Second) x 2 (Nontrait cue: Letter vs Group) ANOVA

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The main effect of Trait-cue Position yielded an F(1, 27) = 0.06, n.s. Mean judgments (on a scale from 1 to 7, with higher numbers reflecting a closer Person-Trait Fit) were 5.55, 5.61, 5.68, and 5.67 for Group-Trait, Trait-Group, Letter-Trait, and Trait-Letter trials, respectively. These data do not support the criterion shift explanation; for an a priori comparison of Group-Trait vs Trait-Group, t(27) = 0.42, n.s.

According to the criterion shift explanation, subjects speed their person retrievals by settling for poor Person-Trait Fits. Theoretically, there should be no presentation order effect if personality criteria are not relaxed.

Subjects seemed to apply some criteria strictly. On 30% of the Group-Trait trials, they retrieved an acquaintance who fit the Trait perfectly—that is, a person whose fit to the trait was 7 on a 1–7 scale. The criterion shift explanation predicts slow retrievals when criteria are not shifted. Indeed, Group-Trait retrievals that yield a perfect Person-Trait Fit should be as slow as Trait-Group retrievals.

Results contradict this criterion shift prediction. Twenty-five subjects reported a perfect Person-Trait Fit on at least one Group-Trait trial. Their data show a strong presentation order effect. At Group-Trait trials that resulted in a perfect Fit, the mean RT was 3.67 s; at Trait-Group trials, it was 7.12 s, t(24) = 5.51, p < .001.

Perhaps subjects use personality judgments to justify their retrievals: having relaxed a personality criterion in retrieving an acquaintance, subjects relax it again in judging criterion fit. The data do not support this claim. In the subjects' judgment, there were many poor Person-Trait Fits. Across the five acquaintances retrieved at Group-Trait trials, subjects reported a mean worst fit of 2.14 on a 7-point scale where 1 implied that the person did not fit the trait at all. These judgments acknowledge a criterion relaxation at retrieval.

According to the criterion shift explanation, subjects can settle for a poor Person-Trait fit after one sampling trial or achieve a better fit by sampling additional acquaintances. Thus, good fits should take longer than poor fits. Results show the opposite: in fact, poor fits take longer. For the relationship between double-cue RT and Person-Trait Fit, the mean within-pair type r-to-Z-to-r was -0.23 *(427)* = -4.59, $p < .0001$). At Group-Trait trials, it was -0.36 *(427)* = -3.64, $p < .001$). When personality criteria are relaxed, person retrievals are slow.

Person Decisions

Again, subjects were given a decision task: they retrieved an acquaintance to one cue, then decided whether the acquaintance ✍fit a second cue. Consistent with the criterion shift explanation, subjects made more positive decisions to Trait than to Group cues, *Ms* = 69.73 vs 58.48% positive decisions, t(27) = 2.89, p < .01. In addition, they tended to make mnre positive decisions to Group than to Letter cues, *Ms* = 58.48 vs 48.39% positive decisions, respectively, t(27) = -1.93, p = .06.

The criterion shift explanation holds that double-cue retrievals are terminated by positive inclusion decisions. To assess this hypothesis, we again compared double-cue RTs, by a decision made (later) to the second cue. Missing data complicate significance testing, but cues that evoked a positive, rather than a negative, inclus ion decision had (earlier) occasioned faster RTs, *Ms* = 8.54 vs 9.13 s, respectively.

Single-Cue Retrievals

As part of a decision task, subjects retrieved an acquaintance to a single cue—a Group, a Trait, or a noninitial Letter. On 4.29% of the Letter trials and 0.59% of the other trials, no acquaintance could be retrieved.

Times to successful retrievals were averaged within cue type and subjected to statistical analyses. Consistent with context-index theory, retrievals were significantly faster to Group than to Trait cues, *M* RTs = 2.69 vs 3.10 s, respectively; *t(27)* = 2.10, $p < .05$. Retrievals to Trait cues were, in turn, faster than retrievals to Letters, *M* RTs = 3.10 vs 5.44 s, respectively; t(27) = 5.70, p < .0001.

These results may appear to contradict Experiment 1. There, single-cue retrievals were not significantly faster to Groups than to Traits. However, meta-analytic procedures (Rosenthal, 1984, p. 66) indicate that the current Group-Trait difference is consistent with the earlier result (for comparing significance levels, Z = 0.62, n.s.). Combining the two Experiments, retrievals are faster to Group than to Trait cues (Z = 2.19, p < .05).

Letter Category Size

During the retrieval task, subjects jotted down the names of 30 acquaintances, one at each double-cue trial. From these names, we derived an estimate of Letter category size. For each subject, we noted the proportion of persons on the subject's recall sheet whose names (as listed) fit a given Letter cue, omitting the person who was recalled in response to the cue itself. In this fashion, we derived 20 category size estimates for each subject—one for each of the 20 letter cues. These indicate that 0.165 of an average subject's acquaintances fit the average Letter cue.

We used these estimates to assess the size difference analysis of retrievals that involve Letter cues. The analysis is supported by a strong relationship: the larger the Letter category in a double-cue specification, the faster is the double-cue retrieval, mean within-subject within-pair-type r-to-Z-tor = -0.52, t(27) = -3.93, p < .001. Category size also affects single

mean r-to-Z-to-r = -0.16, t(27) = -2.63, p < .05. Noninitial Letters initiate a search whose duration can be predicted from the proportion of memories that fit the search criterion. This suggests that the search was undirected.

Acquaintance Characteristics

Subjects answered questions about the acquaintances retrieved at double-cue trials, noting how well they knew each acquaintance, and how long it had been since they had seen the acquaintance. One-way ANOVAs reveal that there are differences in familiarity and time since contact for acquaintances retrieved in response to the six pair types, F(5, 135) _ 3.86, and 3.60, respectively; each p < .005. These differences are of interest if they can explain presentation order effects on retrieval times.

Analyses reveal that, compared to acquaintances retrieved in response to Trait-Group cue pairs, those retrieved to Group-Trait pairs were *less* familiar *(t(27)* = 2.10, p < .05) and had been seen somewhat *less* recently—although the latter tendency was not significant (t(27) = 1.65, n.s.). Within-subject within-pair type correlations show that the more familiar an acquaintance, the faster the acquaintance was retrieved, r corresponding to the mean Fisher's Z = – .19, 027) = – 3.63, p < .005. Thus, differences in familiarity cannot explain why retrievals are faster if a Group cue precedes, rather than follows, a Trait cue.

Path Analysis

Again, we sought a model that could explain why acquaintances are retrieved more quickly to a Social Group and Personality Trait if the Group cue precedes, rather than follows, the Trait cue. The model—which appears in Fig. 2—was intended to accommodate both the context-index and the criterion shift explanations for the presentation order effect. According to the model, RTs are influenced by four variables: Presentation Order, Person Decisions, Person-Trait Fit, and acquaintance Familiarity. The criterion shift explanation holds that Presentation Order should affect RTs via two indirect paths: one involving Person Decisions and a second involving Person-Trait Fit. According to the context-index explanation, Presentation Order has a direct effect on RTs—over and above any criterion shift.

From Experiment 2 Group-Trait and Trait-Group trials, we estimated coefficients for the model, using the within-subject methods described in the earlier path analysis. Mean standardized path coefficients appear in Fig. 2. These do not support the criterion shift explanation. Contrary to the explanation, Group-Trait Presentation Order has no significant effect on Decisions, *M* path coefficient = 0.03, *t(27)* = 0.80, n.s.; nor on Person-Trait Fit, *M* coefficient = -0.01, *t(27)* = – 0.42, n.s. Contrary to the explanation, Person Decisions do not significantly affect RTs, M

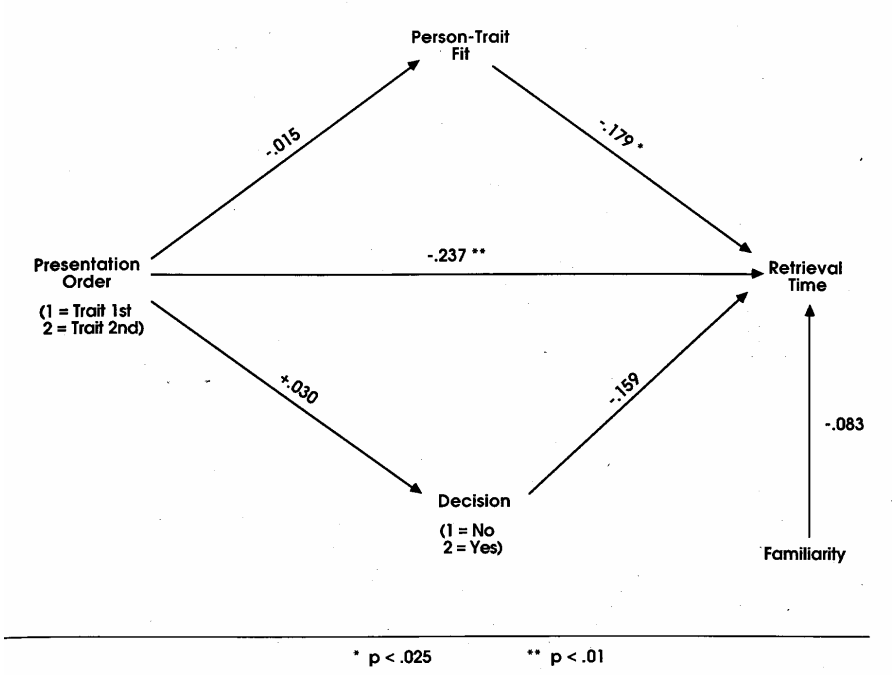

Fig. 2. Path analysis of Experiment 2.

coefficient = -0.16, t(27) = – 1.58, p > .10. Although Person-Trait Fits affect RTs *(M* coefficient = -0.18, *t(27)* = -2.38, p < .05), the effect is directionally opposite the criterion shift prediction: poor Person-Trait Fit slows retrievals.

This path analysis supports the context-index explanation. Group-Trait Presentation Order has an effect on RTs that cannot be accounted for by Person-Trait Fit, Person Decisions, or Familarity *(M* coefficient = -0.24, *t(27)* = -2.99, p < .01).

These results do not differ from the Group-Trait path analysis of Experiment 1. There is no significant difference between Experiments in the Presentation Order effect on Decisions (meta-analytic Z = 1.66, n.s.), the direct effect of Decisions on RTs (Z = 0.19), or the direct effect of Presentation Order on RTs (Z = 0.34). Combining the two analyses, Presentation Order has a highly significant direct effect on RTs (Z = 4.24, p < .0001). Of course, it is possible that these path analyses omitted relevant variables; hence they do not prove context-index theory.

Discussion

Experiment 2 found three presentation order effects: one involving Groups and tajts, a second involving groups and letters, and a third

involving letters and traits. Context-index theory had predicted the first and second effect; the criterion shift account had predicted the first and third.

Acquaintances are retrieved more quickly if a letter cue precedes, rather than follows, a personality trait. This may suggest that the order effect for groups and traits results from a personality criterion relaxation. This account is not supported. Single-cue results place constraints on the account, by implying that criterion shifts must be specific to the second of two cues. Group-letter results reveal that double-cue presentation order can affect retrievals when criteria cannot be shifted. In the narrower domain of double-cue retrievals that involve a personality trait, judgments of person-trait fit contradict the criterion shift account. They indicate that there is no special relaxation of a personality criterion that comes second; that there is a presentation order effect when the criterion is most strictly applied; and that criterion relaxation *slows* response time. The criterion shift account would have difficulty explaining these results.

Context-index theory may provide an explanation. Because of limited memory capacity, acquaintances cannot be indexed by every conceivable feature. Instead, they are indexed by a few traits that most strongly differentiate them from others. Although many of the Experiment 2 personality cues referred to memory indices, others probably did not. Retrievals were faster to the indices—acquaintances' most distinguishing characteristics.

Subjects' decisions about acquaintances have been interpreted as evidence for a criterion shift, but there may be an alternative explanation. Context-index theory proposes a memory hierarchy: acquaintances are linked to personality categories which are linked, in turn, to social categories. If subjects find it easier to say that an individual belongs to a personality than to a social category, perhaps the results reflect relative proximity in the hierarchy. This *distance effect* would be familiar to students of semantic verification (Smith, 1978).

Results discredit a size difference explanation for social and personality retrievals. To account for double-cue retrievals, the explanation must assume that groups are smaller than personality categories; to account for single-cue retrievals, it must assume the reverse. Nor can the explanation be salvaged if it is restricted to the double-cue task. To explain why retrievals are faster if a group cue precedes, rather than follows, a letter, the account must assume that letter categories are larger than groups. Given this size difference, the explanation predicts faster retrievals if a trait is followed by a letter rather than a group. In fact, retrievals are much faster on Trait-Group than Trait-Letter trials. Group cues accommodate a directed retrieval that bypasses any size difference disadvantage.

These cues invite subjects to retrieve acquaintances as they naturally would—by retracing the course of acquaintanceship.

Size differences do seem to affect retrievals to letter and trait cues. Apparently, letter categories are smaller than trait categories. Thus, double-cue retrievals are faster if a letter cue precedes, rather than follows, a trait; and single-cue retrievals are faster to a trait than to a letter.

As the results suggest, there are multiple ways of retrieving acquaintances. Subjects use a context-index process if possible. Otherwise, they must resort to a undirected search. Unlike the context-index process, this inefficient alternative shows size difference effects.

GENERAL DISCUSSION

Having addressed the specifics of the current data, we now discuss the theory that inspired this work. We consider the theory's characterization of acquaintanceship, its hypothesis about person retrieval, and a social psychological application.

To stereotypic first impressions, individuating corrections are made. Brewer (in press) has detailed the stages in this process. In a first encounter, the perceiver assigns a stranger to a social category. The categorization takes minimal effort because the perceiver exploits an array of visually prominent cues (Hamilton, 1979). From the categorization comes a stereotypic conceptualization of the stranger that governs early encounters. Brief relationships may run their course with this stereotypic impression intact. But extended interactions with an acquaintance will invariably suggest inadequacies in the initial impression. Then corrections will be made. Whether these contradict the original impression, amplify it, or add unrelated information, the individuation of an acquaintance is cognitively taxing. Individuating inferences require an abstraction from the behavioral data of multiple episodes (Kelley, 1967). New corrections must be added, and old ones updated, as the relationship continues to unfold.

Context-index theory maintains that the corrections to first impressions are personality inferences. Subjects' open-ended descriptions of acquaintances support this contention. Park's (1986) subjects were participating in a seven-week seminar. Each week, the seminar participants wrote open-ended descriptions of one another. These descriptions changed over time. As the subjects became acquainted, their descriptions of one another came to be dominated by personality traits.

In retrieving an acquaintance from memory, subjects retrace the course of acquaintanceship: they invoke a social context, then apply a personality index. Here the recapitulation hypothesis was supported by studies of cued retrieval. The hypothesis has been validated in other studies, too. Bond and Brockett (1987) had subjects name as many acquaintances as

possible in 10 min., then identify their acquaintances' social and personality attributes. Consistent with context-index theory, acquaintances were retrieved hierarchically—in social clusters that were divided into personality subclusters.

Context-index theory has applications beyond the cognitive laboratory. It can explain the persistence of stereotypes by noting that acquaintances are construed as exceptions. A recent field study by Bond, DiCandia, and MacKinnon (in press) illustrated this phenomenon. Blacks are stereotyped as aggressive (Sagar & Schofield, 1980). Bond et al. examined the operation of this stereotype in responses to violence at a psychiatric facility. Archives revealed no difference in the number of violent acts by the black and white patients confined to this facility; however, the white hospital staff physically restrained black patients nearly four times as often as whites. Black patients were differentially restrained only during their first month at the psychiatric facility. After interacting with the staff for a month, they were treated no differently than whites. Although staff members learned that black individuals were not aggressive, they continued to restrain incoming black patients. Their stereotype retention demanded more than the discounting of a few "oddballs"; indeed, staff members came to view *every* black acquaintance as an exception. In the context-index analysis of stereotyping, this is a modal representation. Future research should apply the theory to a wider range of real-world phenomena.

REFERENCES

Anderson, N. H. (1968). Likableness ratings of 555 personality-trait words. *Journal of Personality and Social Psychology, 9,* 272-279.

Bond, C. F., Jr., & Brockett, D. R. (1987). A social context-personality index theory of memory for acquaintances. *Journal of Personality and Social Psychology. 52,* 1110--1121.

Bond, C. F., Jr., DiCandia, C. G., & MacKinnon, J. R. (In press). Responses to violence in a psychiatric setting: The role of patient's race. *Personality and Social Psychology Bulletin.*

Brewer, M. B. (In press). A dual process model of impression formation. In R. S. Wyer, Jr. & T. K. Srull (Eds.), *Advances in social cognition.* Hillsdale, NJ: Erlbaum.

Freedman, J. L., & Loftus, E. F. (1971). Retrieval of words from long-term memory. *Journal of Verbal Learning and Verbal Behavior,* 10, 107-115.

Hamilton, D. L. (1979). A cognitive-attributional analysis of stereotyping. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 12, pp. 53-84). New York: Academic Press.

Hastie, R., Park, B., & Weber, R. (1984). Social memory. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 2, pp. 151-212). Hillsdale, NJ: Erlbaum.

Kelley, H. H. (1967). Attribution memory in social psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation,* **15,** 192-238.

Kenny, D. A. (1979). *Correlation and causality.* New York: Wiley.

conceptual memory: A computer model. Hillsdale, NJ: Erlbaum.

Newcomb, T. M. (1961). *The acquaintance process.* New York: Holt, Rinehart & Winston.

Park, B. (1986). A method for studying the development of impressions of real people. *Journal of Personality and Social Psychology,* 51, 907-917.

Reiser, B. J., Black, J. B., & Abelson, R. P. (1985). Knowledge structures in the organization and retrieval of autobiographical memories. *Cognitive Psychology,* **17,** 89-137. Rosenthal, R. (1984). *Meta-analytic procedures for social research.* Beverly Hills, CA:Sage.

Sagar, H. A., & Schofield, J. W. (1980). Racial and behavioral cues in black and white children's perceptions of ambiguously aggressive acts. *Journal of Personality and Social Psychology, **39,*** 590-598.

Smith, E. E. (1978). Theories of semantic memory. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (Vol. 6, pp. 1-56). Hillsdale, NJ: Erlbaum.

Wyer, R. S., Jr., & Srull, T. K. (1984). *Handbook of social cognition (3* Vols.). Hillsdale, NJ: Erlbaum.