Memory for details about people: familiarity, relatedness, and gender congruency

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Abstract This study examines factors that influence memory for details about people. In two experiments, subjects learned fictitious details about familiar (friends, relatives) and/or unfamiliar individuals, and were tested both immediately and after a 1-week delay. To control for a confounding between familiarity and genetic relatedness in [Experiment 1](#), in [Experiment 2](#) specific relationships (identical twin, first cousin, acquaintance) were assigned to unfamiliar individuals. Across experiments, retention was enhanced for familiar compared to unfamiliar individuals, for friends/acquaintances compared to relatives, for more closely than distantly related individuals, and for individuals of the opposite gender as the subject.

Keywords Memory · Social cognition

Introduction

Several different lines of research converge on the conclusion that, as objects of processing, people are different. The perceptual details of human faces are processed differently than are either animate non-human entities or inanimate objects (McKone, Kanwisher, &

Duchaine, 2007; but see Gauthier, Skudlarski, Gore, & Anderson, 2000). Memory for facts about people is better than that for inanimate objects (Mesoudi, Whiten, & Dunbar, 2006), and memory for information in general is better when the source of that information is a person as opposed to an inanimate object (e.g., a computer; Reysen & Adair, 2008). People themselves are also processed differently, depending on factors such as race and gender (Ito & Urland, 2003). In the present study, we examine three factors that may influence memory for details about people, including familiarity, relatedness, and gender congruency.

In a previous study we demonstrated that subjects learn (fictitious) details more quickly about familiar individuals than about strangers (Kole & Healy, 2007). To explain the advantage for familiar individuals, we posited that knowledge of individuals is stored in long-term memory as mental models (e.g., Park, 1986; van Dijk & Kintsch, 1983), or as integrated representations consisting of a set of highly interconnected details. New details about familiar individuals might activate those already stored, which allows for elaborative processing (Schulman, 1974). In the present study, we examine familiarity again with the expectation that the advantage found for familiar individuals by Kole and Healy will be replicated. Because long-term retention is of primary concern in the present study, unlike the earlier study, we examine memory following a 1-week delay as well as immediately after learning. It has been shown in previous studies (e.g., Schmidt & Bjork, 1992; Schneider, Healy, & Bourne, 2002) that factors that promote acquisition of information sometimes have a different effect on long-term retention of that information. Thus, it is important to determine whether familiarity has a memory advantage at both short and long retention intervals.

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In the previous study, the familiar individuals consisted of both friends and family members indiscriminately. It is not clear whether both types of familiar individuals would show a memory advantage or whether the memory advantage would be limited to one of the two types of familiar individuals. We also explore two other questions, the first concerning friends and the second family. With respect to friends, we examine whether memory is better for friends of the opposite gender than for those of the same gender as the subject. An advantage for friends of the opposite gender would be consistent with some studies on face processing showing incongruity effects in terms of memory for male subjects (Becker, Kenrick, Guerin, & Maner, 2005; Maner et al., 2005; but see Wright & Sladden, 2003, for the opposite effect). Such incongruity effects were not found in those memory studies for female subjects, but other studies, involving visual attention, have reported incongruity effects for both genders (Maner et al., 2003). For family members, we examine whether memory increases with increasing genetic relatedness. Thus, instead of just comparing related and unrelated individuals, for related individuals, we also examine whether the degree of relatedness influences retention.

For both of the experiments in this study, the same procedure and details were used as in the study by Kole and Healy (2007) except for the addition of a 1-week retention test and the separation of familiar individuals into friends and relatives. In [Experiment 1](#), subjects learned details either about friends and relatives or about strangers, and performance on each type of relation was compared. Thus, in [Experiment 1](#) we tested whether familiarity and relatedness improve memory for details about people. In [Experiment 2](#), we tested the same factors, and in addition we tested whether degree of genetic relatedness and gender congruency also impact memory for details about people.

Experiment 1

In [Experiment 1](#), we tested two factors that may impact memory for people: familiarity and relatedness. Subjects learned fictitious details about either familiar individuals (including friends and relatives) or unfamiliar individuals, and they were tested both immediately and after a 1-week delay. Previous research demonstrates a large mnemonic benefit for familiarity (e.g., Kole & Healy, 2007); thus, we predict better memory for details about familiar than for unfamiliar individuals. The previous advantage for

familiarity could be based on enhanced retention for details about both family and friends or just one of those categories because no differentiation was made between those categories previously. In the present study, the familiar individuals are constrained to equal numbers from each category, which enables us to determine whether the familiarity advantage is specific to one category or holds for both of them.

Method

Subjects

Forty-eight introductory psychology students at the University of Colorado participated for course credit. Subjects were assigned to conditions according to a fixed rotation based on their time of arrival for testing.

Materials

A set of 144 fabricated details, which served as the learning set, was adopted with minor modifications from that used by Van Overschelde and Healy (2001) and Kole and Healy (2007). Each detail was presented as a statement including person, verb phrase, and category exemplar in that order (e.g., Linda Hanley drives a BMW); 12 unique details were associated with each of 12 individuals. The set of 12 names varied with the between-subjects factor of *familiarity*. In the unfamiliar condition, the 12 names were of individuals drawn from the domains of professional beach volleyball and off-Broadway plays, and in the familiar condition, the 12 names were of individuals well known to the subject. Further, for the familiar condition, unlike the study by Kole and Healy, half of the names were those of friends and the other half were those of relatives, and for each type of relation, half of the names were those of women and the other half were those of men. Each of the 12 verb phrases uniquely identified one of the categories, and was between one to four words in length (median = 3.00). The category exemplars were generally one word in length, and were common instances of the category. See the [Appendix](#) for a list of all the details.

Procedure

Listing procedure For subjects in the familiar condition, the experiment began with a listing procedure, during which they were required to type the names (first and last) of 12 individuals (6 women, 6 men) with whom they were well acquainted, including 3 friends and 3 family members of

each gender. Subjects in the unfamiliar condition bypassed the listing procedure and proceeded directly to the learning phase.

Learning phase During the learning phase, subjects were presented with 12 fictitious statements about each of 12 individuals for a total of 144 statements. In the unfamiliar condition, the statements described the 12 unfamiliar individuals; in the familiar condition the statements described the 12 individuals named during the listing procedure. Each statement was presented individually for a 3-s interval, in blocks of 12. The set of 12 statements presented within a block was constrained such that one statement was presented about each of the 12 individuals, and each of the 12 categories was used once. After each block there was a cued recall test over the 12 statements presented in the block. During each test, cues were also presented individually, in a different order from that used to present the details, and each cue consisted of a name and a verb phrase followed by a blank (e.g., Linda Hanley drives a _____?). Thus, subjects had to respond by typing the category exemplar. Subjects were instructed that if they could not remember the category exemplar then they could press the “Return” key to advance to the next question, and that the test would automatically advance after 8 s if they did not initiate a typing response. The presentation and testing of the 144 details constituted one learning round, and subjects completed three learning rounds such that each detail was presented and tested three times. Both the order of blocks as well as the 12 details presented within a block were held constant, but the order in which details within a block were presented was different for the three learning rounds, thereby discouraging a serial-order mnemonic strategy.

Immediate and retention tests Following the learning phase was the immediate test, during which subjects were tested over all 144 details, again with cued recall, but in this case with no prior study. Both the set of 12 cues presented within a block and the order of blocks were the same as in the learning phase, but cues were presented in a new pseudorandom order. Thus, within each set of 12 cues, each individual and category was tested once. The retention test took place 1 week later and was the same as the immediate test except for the order of the test cues, which followed the same constraints as for the immediate test.

Questionnaire Following the retention test was a questionnaire in which subjects in the familiar condition only were asked for each of the 144 statements whether

it was true, with the statements presented in a pseudorandom order following the same constraints as on the tests. Subjects selected from among three alternative responses for each statement: *true*, *false*, or *don't know*.

Analyses

There were two sets of analyses conducted for the learning phase, both of which involved 2×3 factorial analyses of variance including the within-subject variable of *learning round* (1–3). For the first set of analyses, which investigated the role of familiarity, the second variable, which was manipulated between subjects, was *familiarity* (familiar, unfamiliar). For the second set of analyses, which investigated the role of genetic relatedness and was restricted to the familiar condition, the second variable, which was manipulated within subjects, was *relatedness* (related, unrelated). There were two corresponding sets of 2×2 factorial analyses of variance for the test phase, which included the same variables of familiarity and relatedness as well as the within-subject variable of *test* (immediate, retention). The dependent variables examined were accuracy (proportion of correct responses) and response time for correct responses (in seconds). For each subject, median response time for each learning block (or each test) was used as a summary measure to remove the problem of outliers.

Results and discussion

All significant results ($p < .05$) are reported here.

Learning phase

Familiarity In the analysis of accuracy, there was a main effect of familiarity, with memory better for details about familiar than unfamiliar individuals, $F(1, 46) = 33.437$, $MSE = .051$, $p < .001$, $\eta^2 = .421$. There was also a main effect of learning round as performance tended to decrease across rounds, reflecting interference, $F(2, 92) = 5.736$, $MSE = .005$, $p = .005$, $\eta^2 = .111$. However, as in previous studies (Kole & Healy, 2007; Van Overschelde & Healy, 2001), this pattern of interference held only for the unfamiliar condition. Performance increased across rounds for the familiar condition; the interaction between familiarity and learning round was significant, $F(2, 92) = 13.334$, $MSE = .005$, $p < .001$, $\eta^2 = .225$ (see top panel of Fig. 1).

Fig. 1 Proportion correct (*top panel*) and correct response time (in seconds; *bottom panel*) during the learning phase of Experiment 1 as a function of learning round, familiarity, and relatedness (for the familiar condition). Bars indicate standard errors of the mean

The analysis of response time revealed a similar pattern, with response times faster for details about familiar than unfamiliar individuals, and improving across learning rounds (see bottom panel of Fig. 1). The main effects of familiarity, $F(1, 46) = 5.339$, $MSE = .244$, $p = .025$, $\eta^2 = .104$, and learning round, $F(2, 92) = 7.842$, $MSE = .026$, $p < .001$, $\eta^2 = .146$, were both significant.

Relatedness In the analysis of accuracy restricted to the familiar condition, there was a main effect of relatedness, with accuracy higher for friends (i.e., unrelated) than for family (i.e., related), $F(1, 23) = 15.730$, $MSE = .005$, $p < .001$, $\eta^2 = .406$.

The same pattern was evident for response time; response times were faster for friends (i.e., unrelated) than for family (i.e., related), $F(1, 23) = 31.514$, $MSE = .024$, $p < .001$, $\eta^2 = .578$.

Immediate test vs. retention test

Familiarity As for accuracy during the learning phase, there was an advantage for the familiar over the unfamiliar condition, $F(1, 46) = 100.115$, $MSE = .029$, $p < .001$, $\eta^2 = .685$. Performance decreased over the 1-week delay, reflecting forgetting, $F(1, 46) = 136.219$, $MSE = .005$, $p < .001$, $\eta^2 = .748$. However, forgetting was greater for the familiar condition than for the unfamiliar condition. This result might reflect a lower degree of original learning for the unfamiliar condition than for the familiar condition. Alternatively, this pattern might simply reflect a floor effect for the unfamiliar condition, $F(1, 46) = 90.135$, $MSE = .005$, $p < .001$, $\eta^2 = .662$ (see top panel of Fig. 2). However, the advantage for the familiar condition was significant for both the immediate test, $F(1, 46) = 119.501$, $MSE = .024$, $p < .001$, $\eta^2 = .722$, and the retention test, $F(1, 46) = 50.309$, $MSE = .010$, $p < .001$, $\eta^2 = .522$. In fact, accuracy was over three times greater for the familiar group than for the unfamiliar group for both tests.

The analysis of response time also revealed an advantage for the familiar relative to the unfamiliar condition, $F(1, 46) = 9.492$, $MSE = .617$, $p = .004$, $\eta^2 = .171$. Furthermore, subjects were faster during the immediate test than during the retention test, $F(1, 46) = 28.749$, $MSE = .136$, $p < .001$, $\eta^2 = .384$ (see bottom panel of Fig. 2).

Relatedness The second analysis of test accuracy, restricted to the familiar condition, again revealed an advantage for friends compared to relatives, $F(1, 23) = 5.621$, $MSE = .014$, $p = .027$, $\eta^2 = .196$.

Similarly, the analysis of test response time revealed an advantage for friends compared to relatives, $F(1, 23) = 11.156$, $MSE = .085$, $p = .003$, $\eta^2 = .327$.

Questionnaire

For the familiar condition, more details were known (i.e., either *true* or *false* was the selected response as opposed to *don't know*) about friends (58.875 out of 72 or 81.8%) than about relatives (56.833 or 78.9%), $t(23) = 2.139$, $p = .043$, $\eta^2 = .166$. Averaged across all stimuli in the familiar condition, there was a significant correlation between performance on the immediate test and the number of details known, $r(46) = .358$, $p = .013$. Likewise, there was a significant correlation between performance on the retention test and the number of details known, $r(46) = .338$, $p = .019$. This analysis of details known collapsed across *true* and *false* details. The number of *true* details concerning friends (12.96 or 18.0%) was actually significantly less than the number of *true* details concerning relatives (15.71 or

Fig. 2 Proportion correct (*top panel*) and correct response time (in seconds; *bottom panel*) at test of Experiment 1 as a function of test, familiarity, and relatedness (for the familiar condition). Bars indicate standard errors of the mean

21.8%), $t(23) = 2.877$, $p = .009$, $\eta^2 = .265$. Thus, subjects performed better on friends than on relatives even though they had to learn more details about the friends.

First individuals listed

As revealed by the analysis of the questionnaire results, the significant advantages found for friends over relatives reflect at least in part the number of details known about the individuals. On the basis of the assumption that the first male and female family member or friend listed should be the most familiar, a set of analyses was conducted restricted to the initial friends and family of each gender listed by the subjects. In this case, the number of details known was higher on average than

without the restriction but equivalent for friends (20.083 out of 24 or 83.7%) and for family (20.042 or 83.5%). Nevertheless, test accuracy for these first individuals listed remained better for friends than for family, $F(1, 23) = 5.621$, $MSE = .014$, $p = .027$, $\eta^2 = .196$ (see top panel of Fig. 3). In contrast, response time at test revealed an interaction between relatedness and test, $F(1, 23) = 5.419$, $MSE = .186$, $p = .029$, $\eta^2 = .191$, reflecting the fact that response time improved for family but worsened for friends across the 1-week retention interval. Response times were significantly faster for friends than for relatives on the immediate test, $F(1, 23) = 14.577$, $MSE = .113$, $p < .001$, $\eta^2 = .388$, but not on the retention test, $F < 1$ (see bottom panel of Fig. 3).

Fig. 3 Proportion correct (*top panel*) and correct response time (in seconds; *bottom panel*) at test of Experiment 1 as a function of test and relatedness for first names listed in the familiar condition only. Bars indicate standard errors of the mean

Summary

The results of [Experiment 1](#) suggest that at least two factors influence memory for people, namely, familiarity and relatedness. Based on previous research and theory, we predicted enhanced retention for details about familiar compared to unfamiliar individuals. This prediction was based on the idea that people are represented as higher-order structures (e.g., mental models) in memory, and that new details, whether true or false, may be rapidly integrated into those structures. We found large, facilitative effects of familiarity; both accuracy and speed of responding were greater for familiar than for unfamiliar individuals.

In addition, we explored the benefit for familiar individuals further by distinguishing between two categories of individuals, family members and friends, to see whether the advantage held for only one of those categories or for both. In fact, we found an advantage for friends (i.e., unrelated individuals) compared to relatives on both measures of performance. However, subjects were more familiar with their friends than with their relatives, which might underlie this advantage. When examining only the most familiar friends and relatives, the advantage for friends (in terms of accuracy) persisted, although retention (in terms of response time) across the 1-week delay was better for relatives. In [Experiment 2](#), we take a different approach to separating the effects of familiarity and relatedness, specifically by controlling for familiarity and assigning relationships to unfamiliar individuals. Furthermore, we test two additional factors that may also influence memory for details about people, those of gender congruency and degree of genetic relatedness.

Experiment 2

The purpose of [Experiment 2](#) was again to examine whether retention is enhanced for details about unrelated individuals, but in this case controlling for familiarity. In [Experiment 2](#), subjects learned fictitious details about both familiar and unfamiliar individuals. The familiar individuals included the subject's mother, father, best female friend, and best male friend, whereas the unfamiliar individuals included a newly discovered identical twin and a newly discovered first cousin, as well as newly made male and female acquaintances.

The relationship types allow for the examination of three orthogonal factors that may influence memory for people.

The first factor is *familiarity*, and based on the results of [Experiment 1](#) and previous studies (e.g., Kole & Healy, 2007), we expect that details regarding familiar individuals will be better retained than those regarding unfamiliar individuals. The second factor is *relatedness*, or whether memory is better for details about unrelated individuals than those about related individuals, as in [Experiment 1](#). It was found in [Experiment 1](#) that subjects knew more about their friends than their family members, so familiarity and relatedness were confounded to some extent. In [Experiment 2](#), however, we assess the contribution of relatedness to memory unconfounded by familiarity by examining only the unfamiliar individuals. By examining relatedness for unfamiliar individuals only, this assessment removes the possible influence on memory for details of whether the details were known by the subjects to be true or false about the individuals in question. Furthermore, [Experiment 2](#) allows us to go beyond an examination of relatedness (related versus unrelated) by comparing two different levels of relatedness, or the *degree of genetic relatedness*, so that we can assess whether memory improves as the proportion of common genes increases. The last factor is *gender congruency*, which allows us to determine whether memory is worse when there is a gender match between the subject and the individual in the learning set. As mentioned in the Introduction, gender incongruity effects have been shown for perceptual memory tasks such as face recognition (Becker et al., 2005; Maner et al., 2003, 2005; but see Wright & Sladden, 2003).

The way in which the subjects process the details given to them about each individual is not controlled in the present experiments. However, in [Experiment 2](#) any differences in memory for details found among the unfamiliar individuals can only be attributed to the description of them as an identical twin, a first cousin, or an acquaintance because everything else is held constant across subjects (e.g., the details). Thus, for example, any difference found between memory for details concerning the newly discovered identical twin and first cousin can be attributed directly to processes that relate to the specific difference in the type of kin relation. The precise nature of those processes cannot be known, but it can be assumed that whatever processing is invoked is due to the described relation.

As in [Experiment 1](#), there were two sessions spaced exactly 1 week apart; the first session consisted of three learning rounds and an immediate test, whereas the second session consisted of a retention test over all details presented during the first session and two questionnaires.

Method

Subjects

Thirty-two introductory psychology students (16 female, 16 male) at the University of Colorado participated for course credit. Subjects were assigned to conditions according to a fixed rotation based on their time of arrival for testing.

Materials

Subjects in Experiment 2 learned 12 statements about each of eight individuals for a total of 96 statements, as opposed to 12 statements about each of 12 individuals as in [Experiment 1](#). The eight individuals included four familiar (mother, father, best unrelated female friend, best unrelated male friend) and four unfamiliar (newly discovered identical twin, newly discovered first cousin, new female acquaintance, new male acquaintance) individuals. The names of the identical twin and first cousin were both selected to match the gender of the subject, so that degree of genetic relatedness was not confounded with gender (see [Appendix](#) for the details studied and tested in [Experiment 2](#)). Eight stimulus sets were constructed such that across subjects each set of 12 details associated with a given individual was paired equally frequently with each of the eight types of relations.

Procedure

The procedure was the same as that in [Experiment 1](#), with the following four modifications and additions. (1) All subjects completed the listing procedure, and were required to provide the first and last names of their mother, father, best unrelated female friend, and best unrelated male friend. (2) All subjects were instructed to imagine that they had just discovered two new family members (identical twin and first cousin, the names of both of which were matched to the gender of the subject, although the surnames of both were different from that of the subject) and had made two new acquaintances (male and female acquaintance). Subjects were provided a name for each type of relation, then completed a short training phase during which they had to identify correctly the relation (i.e., identical twin, first cousin, male acquaintance, female acquaintance) for each of the four names. For training, a name and each of the four relations was presented, and subjects had to select from among the four alternatives; training continued until subjects had

correctly paired all names with each relation three times in a row. (3) Learning and test consisted of 96 details, as opposed to 144 as in [Experiment 1](#). During learning, subjects were presented and tested over blocks of eight statements at a time, with the constraints that each type of relation occurred once and no category occurred more than once during each block. (4) For the questionnaire, subjects again verified whether each statement was true or false (or the subject did not know) for familiar individuals only. In addition, a second questionnaire was generated from the statements associated with unfamiliar individuals by phrasing each of those statements in the first person perspective. For example, if the statement “Linda Hanley drives a BMW” was included in the set for unfamiliar individuals, then the corresponding statement during the second questionnaire was “I drive a BMW.” Subjects responded to these statements about themselves, which were presented after those regarding familiar individuals, again by responding *true*, *false*, or *don't know*. This questionnaire was included to verify that on average subjects were not more similar to any one of the four unfamiliar relations, thereby eliminating self-similarity as an explanation for any observed differences between unfamiliar individuals.

Analyses

There were four sets of analyses for the learning phase. The first set of analyses elucidates the contribution of familiarity to memory for details about people. In this set of analyses, performance for familiar and unfamiliar individuals was compared; thus, averages combining the four familiar individuals and the four unfamiliar individuals were computed for each learning round. These were 2×3 repeated measures analyses of variance, including the within-subject variables of *familiarity* (familiar, unfamiliar) and *learning round* (1–3).

The purpose of the second set of analyses was to examine whether relatedness impacts memory for details about people and focused on unfamiliar individuals (identical twin, first cousin, female acquaintance, male acquaintance), thereby eliminating any effects of familiarity. For this set of analyses, averages combining the two relatives (identical twin and first cousin) and the two acquaintances (male and female) were computed for each learning round. Thus, these were also 2×3 repeated measures analyses of variance, including the within-subject variables of *relatedness* (related, unrelated) and *learning round* (1–3). Note that for these analyses, only effects or interactions involving relatedness are reported.

The third set of analyses examined whether memory depends on degree of genetic relatedness, or more specifically if retention is improved as the proportion of shared genes increase. In this case, the data were limited to the identical twin and first cousin. These were 2×3 repeated measures analyses of variance, including the within-subject variables of *degree of genetic relatedness* (high, corresponding to the identical twin, and low, corresponding to the first cousin) and *learning round* (1–3). Only effects or interactions involving degree of genetic relatedness are reported.

The last set of analyses tested whether memory is influenced by gender congruency, that is, whether there is a match between subject gender and gender of the individual in the learning set. The data for these analyses were restricted to only (unfamiliar) male and female acquaintances; identical twins and first cousins were excluded as the gender for these two types of relations was matched to that of the subject, and familiar individuals were excluded in order to eliminate familiarity as a potential confounding variable. Thus, these were $3 \times 2 \times 2$ mixed factorial analyses of variance, including the within-subject variables of *learning round* (1–3) and *gender of acquaintance* (male, female), as well as the between-subjects variable of *subject gender* (male, female). Only interactions involving gender congruency (gender of acquaintance $\times$ subject gender) are reported here.

The corresponding analyses for the test data were the same as for the learning data with the exception that the learning round variable was replaced by the *test* (immediate, retention) variable. The dependent variables examined were accuracy (proportion of correct responses) and response time for correct responses (in seconds). For simplicity, the results of the response time analyses are not reported here because there were few significant results, and those that were significant were consistent with those of the accuracy analyses.

Results and discussion

All significant results ($p < .05$) are reported here, unless otherwise noted.

Learning phase

Familiarity Accuracy improved monotonically across rounds (Round 1, $M = .730$; Round 2, $M = .807$; Round 3, $M = .820$); the main effect of learning round was significant, $F(2, 62) = 24.472$, $MSE = .006$, $p < .001$, $\eta^2 = .441$. More interestingly, as in [Experiment 1](#), accuracy

Fig. 4 Proportion correct during the learning phase of [Experiment 2](#) as a function of learning round and relatedness. Bars indicate standard errors of the mean

was greater for familiar ($M = .852$) than for unfamiliar ($M = .719$) individuals; the main effect of familiarity was significant, $F(1, 31) = 64.112$, $MSE = .013$, $p < .001$, $\eta^2 = .674$.

Relatedness The second analysis, restricted to unfamiliar individuals only, revealed a more consistent improvement for unrelated individuals (i.e., newly made male and female acquaintances) than for related individuals (i.e., newly discovered identical twin and first cousin; see [Fig. 4](#)). The interaction of learning round and relatedness was significant, $F(2, 62) = 3.550$, $MSE = .004$, $p = .035$, $\eta^2 = .103$.

Degree of genetic relatedness Degree of genetic relatedness did not influence learning; performance during learning was statistically equivalent for identical twins ($M = .723$) and first cousins ($M = .719$), $F < 1$.

Gender congruency Subjects tended to learn more details about opposite-sex individuals than about same-sex individuals (male subjects: male acquaintance, $M = .609$, female acquaintance, $M = .660$; female subjects: male acquaintance, $M = .813$, female acquaintance, $M = .788$). The gender incongruity effect approached statistical significance, $F(1, 30) = 3.625$, $MSE = .018$, $p = .067$, $\eta^2 = .108$.

Immediate vs. retention test

Familiarity The first analysis compared mean accuracy for details involving familiar individuals to that for unfamiliar

individuals. On average, accuracy was greater for details involving familiar ($M = .633$) than unfamiliar ($M = .347$) individuals, and decreased from the immediate test ($M = .615$) to the retention test ($M = .365$); the main effects of familiarity, $F(1, 31) = 112.403$, $MSE = .023$, $p < .001$, $\eta^2 = .784$, and test, $F(1, 31) = 208.527$, $MSE = .010$, $p < .001$, $\eta^2 = .871$, were both significant. In addition, there was greater forgetting (i.e., a greater decrease in accuracy from the immediate to the retention test) for details involving familiar individuals (immediate test, $M = .778$; retention test, $M = .488$) than for those involving unfamiliar individuals (immediate test, $M = .451$; retention test, $M = .243$); the interaction of familiarity and test was significant, $F(1, 31) = 8.574$, $MSE = .006$, $p = .006$, $\eta^2 = .217$. However, the advantage for details involving familiar individuals was significant for both the immediate test, $F(1, 31) = 96.081$, $MSE = .018$, $p < .001$, $\eta^2 = .756$, and the retention test, $F(1, 31) = 81.620$, $MSE = .012$, $p < .001$, $\eta^2 = .725$.

Relatedness In the second analysis, restricted to unfamiliar individuals only, there was a main effect of relatedness. On average across tests, subjects correctly recalled more details for unrelated individuals (male and female acquaintances, $M = .385$) than for related individuals (identical twin and first cousin, $M = .309$), $F(1, 31) = 13.068$, $MSE = .014$, $p = .001$, $\eta^2 = .296$. This pattern parallels that found in [Experiment 1](#), but in this case the advantage cannot be due to differences in prior knowledge. The difference might be due in part to an advantage for gender incongruity because both related individuals were of the same gender as the subject. However, accuracy was higher for the unrelated individuals than for the related individuals even when the unrelated individuals were of the same gender as the subject ($M = .353$), $t(31) = 2.188$, $p = .036$, $\eta^2 = .134$. Thus, gender incongruity cannot explain the observed effect of relatedness.

Degree of genetic relatedness Degree of genetic relatedness was also found to impact memory. In an analysis restricted to genetically related but unfamiliar individuals (i.e., first cousin, identical twin), there was a significant advantage for details about the identical twin ($M = .340$) relative to the first cousin ($M = .279$), $F(1, 31) = 7.040$, $MSE = .017$, $p = .013$, $\eta^2 = .185$.

Gender congruency The fourth analysis, also restricted to unfamiliar individuals, revealed the predicted gender incongruity effect. Both female and male subjects learned more details about opposite-sex individuals than about same-sex individuals (male subjects: male acquaintance, $M = .260$, female acquaintance, $M = .339$; female subjects: male

acquaintance, $M = .495$, female acquaintance, $M = .445$), $F(1, 30) = 5.160$, $MSE = .025$, $p = .030$, $\eta^2 = .147$.

Questionnaire

As in [Experiment 1](#), for the first questionnaire the number of details to which subjects responded either *true* or *false* was summed for each of the four familiar individuals (mother, father, female friend, male friend), yielding a gross measure of knowledge about each of the four individuals. Knowledge of related individuals was compared to that of unrelated individuals; however, there were no significant differences between the two groups, perhaps because in [Experiment 2](#) subjects listed their parents, with whom they are presumably very familiar, as well as their best female and male friends.

For the second questionnaire, the number of details to which subjects responded *true* with respect to themselves was summed for each of the four unfamiliar individuals (identical twin, first cousin, male and female acquaintance), yielding a gross measure of how similar subjects were to each type of relation. No significant differences were found between related and unrelated individuals or between identical twins and first cousins. Thus, similarity-to-self explains neither the advantage in terms of number of details learned for the male and female acquaintances compared to the identical twin and first cousin, nor the advantage in terms of number of details learned for identical twins compared to first cousins.

Summary

The pattern of results suggests multiple factors that influence memory for details about people: familiarity, relatedness, degree of genetic relatedness, and gender congruency. Memory is enhanced when individuals are familiar compared to unfamiliar. However, eliminating the effects of familiarity, memory is also enhanced when individuals are friends or acquaintances as compared to genetically related, when they are more closely genetically related than further, and when they are of the opposite gender.

General discussion

The present study examined three factors that might contribute to the learning of details about people. The first factor was familiarity. We predicted that details regarding familiar individuals would be learned and retained better

than those about unfamiliar individuals. This prediction was based on previous empirical and theoretical observations (e.g., Kole & Healy, 2007; Van Overschelde & Healy, 2001). The second factor, which was examined in two parts, was relatedness. Specifically, in the first part we compared learning details about related individuals (family members) and unrelated individuals (friends). In the second part of our assessment of relatedness, we considered degree of genetic relatedness by examining whether details about more closely related individuals (i.e., an identical twin) would be better learned and retained than those about less closely related individuals (i.e., a first cousin). The last factor was gender. We predicted that memory for details would be better for opposite-sex individuals than for same-sex individuals, that is, we predicted a gender incongruity effect. In addition to examining the factors promoting learning of details, we assessed the extent to which the same factors promoted long-term (1-week) retention of those details.

With respect to the first factor of familiarity, the present study underscores the role of familiarity in learning. In both experiments, subjects learned more details about familiar individuals than about unfamiliar individuals, irrespective of genetic relation. This finding had been established in previous studies for immediate testing and was extended in the present study to testing after a 1-week delay. Indeed, the effects of familiarity are among the largest in the literature, with subjects able to recall between three and four times as many fictitious details when those details concern familiar individuals. In part, familiarity serves to improve memory by reducing the amount of proactive interference experienced as subjects learn more details. Evidence for this possibility was provided by examining the learning phase of [Experiment 1](#), in which the number of details correctly recalled improved over learning rounds for both friends and relatives, but decreased for unfamiliar individuals. These findings replicate earlier work by Kole and Healy (2007), which demonstrated that memory facilitation can occur even when subjects are simply cued to think about familiar individuals while learning details about unfamiliar individuals or unfamiliar countries. The present study also demonstrates that the advantage for familiar individuals observed during learning is maintained over both short and long (1-week) intervals. It should be noted, however, that all subjects took both immediate and retention tests, so the two tests are not independent. In any event, we may speculate as to the proximate mechanisms underlying the advantage for familiar individuals. Specifically, if details about people are highly interconnected in memory, then presentation of new details might activate those already stored, allowing for elaborative processing (Schulman, 1974).

With respect to the second factor of relatedness, perhaps counterintuitively, subjects correctly recalled more details about unrelated individuals than related

individuals during both the immediate and the retention test, and this advantage occurred regardless of whether those individuals were familiar ([Experiment 1](#)) or not ([Experiment 2](#)). This advantage is consistent with evolutionary theories pointing to an advantage for information relevant to mate selection (Bleske-Rechek & Buss, 2001; Buss, 1988) as well as to prior work showing the importance of the formation of coalitions and alliances (Tooby & Cosmides, 1996) and to theories that stress the importance of peer group influence on personality development (Harris, 1995). By these theories, friends rather than family members are responsible largely for the transmission of socio-cultural norms. It is likely that for college students, friends are more important than family members in this sense. Support for these explanations also comes from the finding in [Experiment 2](#) that when both gender and familiarity were controlled in an analysis comparing memory for details of unfamiliar same sex acquaintances with those of unfamiliar same sex relatives, there was still an advantage for acquaintances over relatives.

In addition, documenting the importance of the degree of genetic relatedness, in [Experiment 2](#), memory was better for details about identical twins than for those about first cousins. Although we cannot exclude entirely the idea that identical twins might be processed differently than first cousins (e.g., self-referential encoding for identical twins), we can at least rule out similarity-to-self as a possible source of this advantage. On average, subjects shared no more in common with their fictitious identical twin than with their fictitious first cousin.

It should be noted that finding better memory for details about friends than for relatives indicates a memory disadvantage for relatedness, whereas finding better memory for details about identical twins than those about first cousins indicates a memory advantage for relatedness. In both cases, relatedness plays an important role in memory, but the directions of the effects are different, suggesting that the function relating relatedness to memory is U-shaped rather than monotonically increasing or decreasing.

With respect to the third factor of gender, a gender incongruity effect was found in [Experiment 2](#) like that found in earlier studies of face recognition (Becker et al., 2005; Maner et al., 2003, 2005), in this case for both male and female subjects. This finding, like that concerning the factor of relatedness, is also consistent with mate selection as influencing memory for details about individuals (Bleske-Rechek & Buss, 2001; Buss, 1988).

Thus, the present findings demonstrate the importance of three factors in the processing of and memory for details about people: familiarity, relatedness, and gender congruency. These findings might be explained through an evolutionary perspective that involves both mate selection and genetic relatedness (e.g., Nairne & Pandeirada, 2008). However, it would be difficult to specify how these

evolutionary pressures could lead to better memory for details about people, although they probably did help shape memory's ultimate functional design.

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Appendix

Table 1 Details organized by name and category. Italicized entries used in [Experiment 2](#)

<i>Names</i>	<i>Verb phrases</i>	<i>Astrological signs</i>	<i>Authors</i>	<i>Cars</i>
B.J. Crosby	astrological sign is	<i>Scorpio</i>	<i>Faulkner</i>	<i>Honda</i>
<i>Barbara Fontana</i>	likes books by	Libra	<i>King</i>	Nissan
<i>Brian Burke</i>	drives a	Aries	Steinbeck	Saab
<i>Gina Ferrall</i>	collects	<i>Sagittarius</i>	<i>Poe</i>	<i>Cadillac</i>
<i>Kent Steffes</i>	has a pet	<i>Aquarius</i>	Voltaire	<i>Porsche</i>
<i>Linda Hanley</i>	drinks	<i>Cancer</i>	<i>Hemingway</i>	<i>BMW</i>
<i>Michael Siberry</i>	likes to eat	<i>Taurus</i>	<i>Shakespeare</i>	<i>Toyota</i>
<i>Mike Whitmarsh</i>	likes the month of	<i>Pisces</i>	<i>Dante</i>	<i>Chevy</i>
<i>Nancy Reno</i>	watched the movie	Virgo	Austen	VW
Roberto Lopez	listens to	<i>Leo</i>	<i>Salinger</i>	<i>Ford</i>
Stephanie Bennet	likes to play	Gemini	Koontz	Mercedes
Yvette Freeman	watches the TV show	<i>Capricorn</i>	<i>Grisham</i>	<i>Jeep</i>
<i>Collectibles</i>	<i>Dogs</i>	<i>Drinks</i>	<i>Foods</i>	<i>Months</i>
<i>antiques</i>	<i>spaniel</i>	<i>milk</i>	fish	<i>August</i>
dolls	<i>retriever</i>	tea	<i>burgers</i>	February
<i>pictures</i>	dachshund	juice	bread	September
spoons	<i>bulldog</i>	<i>margaritas</i>	fondue	<i>April</i>
<i>shoes</i>	<i>labrador</i>	<i>Pepsi</i>	<i>American</i>	<i>March</i>
<i>books</i>	<i>collie</i>	<i>Sprite</i>	<i>chicken</i>	<i>June</i>
<i>cars</i>	rottweiler	<i>Coke</i>	<i>Chinese</i>	<i>May</i>
stamps	<i>poodle</i>	beer	<i>pizza</i>	<i>November</i>
<i>cards</i>	mutt	lemonade	<i>vegetables</i>	October
<i>money</i>	<i>dalmation</i>	<i>wine</i>	<i>Mexican</i>	<i>January</i>
coins	huskie	<i>coffee</i>	fruit	July
<i>rocks</i>	<i>shepherd</i>	<i>water</i>	<i>Italian</i>	<i>December</i>
<i>Movies</i>	<i>Music</i>	<i>Sports</i>	<i>TV Shows</i>	
<i>300</i>	<i>country</i>	<i>softball</i>	CSI	
<i>27 Dresses</i>	reggae	<i>soccer</i>	<i>American Idol</i>	
Contact	rap	hockey	Alias	
<i>Poltergeist</i>	<i>hip hop</i>	<i>basketball</i>	<i>ER</i>	
<i>The Dark Knight</i>	<i>alternative</i>	rugby	<i>South Park</i>	
Scream	<i>oldies</i>	<i>baseball</i>	<i>Grey's Anatomy</i>	
<i>Juno</i>	<i>classical</i>	<i>volleyball</i>	Oprah	
<i>Superbad</i>	<i>blues</i>	<i>pool</i>	<i>Heroes</i>	
Spiderman	<i>indie music</i>	football	<i>Family Guy</i>	
Speed	jazz	<i>golf</i>	Frasier	
<i>The DaVinci Code</i>	pop	lacrosse	<i>Lost</i>	
<i>Titanic</i>	<i>rock</i>	<i>tennis</i>	The Simpsons	

References

- Becker, D. V., Kenrick, D. T., Guerin, S., & Maner, J. K. (2005). Concentrating on beauty: Sexual selection and sociospatial memory. *Personality and Social Psychology Bulletin*, 31, 1643–1652. doi:10.1177/0146167205279583
- Bleske-Rechek, A. L., & Buss, D. M. (2001). Opposite-sex friendship: Sex differences and similarities in initiation, selection, and dissolution. *Personality and Social Psychology Bulletin*, 27, 1310–1323. doi:10.1177/01461672012710007
- Buss, D. M. (1988). The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology*, 54, 616–628. doi:10.1037/0022-3514.54.4.616
- Gauthier, I., Skudlarski, P., Gore, J. C., & Anderson, A. W. (2000). Expertise for cars and birds recruits brain areas involved in face recognition. *Nature Neuroscience*, 3, 191–197. doi:10.1038/72140
- Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review*, 102, 458–489. doi:10.1037/0033-295X.102.3.458
- Ito, T. A., & Urland, G. R. (2003). Race and gender on the brain: Electrocortical measures of attention to race and gender of multiply categorizable individuals. *Journal of Personality and Social Psychology*, 85, 616–626. doi:10.1037/0022-3514.85.4.616
- Kole, J. A., & Healy, A. F. (2007). Using prior knowledge to minimize interference when learning large amounts of information. *Memory & Cognition*, 35, 124–137.
- Maner, J. K., Kenrick, D. T., Becker, D. V., Delton, A. W., Hofer, B., Wilbur, C. J., & Neuberg, S. L. (2003). Sexually selective cognition: Beauty captures the mind of the beholder. *Journal of Personality and Social Psychology*, 85, 1107–1120. doi:10.1037/0022-3514.85.6.1107
- Maner, J. K., Kenrick, D. T., Becker, D. V., Robertson, T. E., Hofer, B., Neuberg, S. L., Delton, A. W., Butner, J., & Schaller, M. (2005). Functional projection: How fundamental social motives can bias interpersonal perception. *Journal of Personality and Social Psychology*, 88, 63–78. doi:10.1037/0022-3514.88.1.63
- McKone, E., Kanwisher, N., & Duchaine, B. (2007). Can generic expertise explain special processing for faces? *Trends in Cognitive Sciences*, 11, 8–15. doi:10.1016/j.tics.2006.11.002
- Mesoudi, A., Whiten, A., & Dunbar, R. (2006). A bias for social information in human cultural transmission. *British Journal of Psychology*, 97, 405–423. doi:10.1348/000712605X85871
- Nairne, J. S., & Pandeirada, J. N. S. (2008). Adaptive memory: Remembering with a stone-age brain. *Current Directions in Psychological Science*, 17, 239–243. doi:10.1111/j.1467-8721.2008.00582.x
- Park, B. (1986). A method for studying the development of impressions of real people. *Journal of Personality and Social Psychology*, 51, 907–917. doi:10.1037/0022-3514.51.5.907
- Reysen, M. B., & Adair, S. A. (2008). Social processing improves recall performance. *Psychonomic Bulletin & Review*, 15, 197–201. doi:10.3758/PBR.15.1.197
- Schmidt, R. A., & Bjork, R. A. (1992). New conceptualizations of practice: Common principles in three paradigms suggest new concepts for training. *Psychological Science*, 3, 207–217. doi:10.1111/j.1467-9280.1992.tb00029.x
- Schneider, V. I., Healy, A. F., & Bourne, L. E., Jr. (2002). What is learned under difficult conditions is hard to forget: Contextual interference effects in foreign vocabulary acquisition, retention, and transfer. *Journal of Memory and Language*, 46, 419–440. doi:10.1006/jmla.2001.2813
- Schulman, A. I. (1974). Memory for words recently classified. *Memory & Cognition*, 2, 47–52.
- Tooby, J., & Cosmides, L. (1996). Friendship and the Banker's Paradox: Other pathways to the evolution of adaptations for altruism. *Proceedings of the British Academy*, 88, 119–143.
- van Dijk, T. A., & Kintsch, W. (1983). *Strategies of discourse comprehension*. New York: Academic Press.
- Van Overschelde, J. P., & Healy, A. F. (2001). Learning of nondomain details in high- and low-knowledge domains. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 27, 1160–1171. doi:10.1037/0278-7393.27.5.1160
- Wright, D. B., & Sladden, B. (2003). An own gender bias and the importance of hair in face recognition. *Acta Psychologica*, 114, 101–114. doi:10.1016/S0001-6918(03)00052-0