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THE ORGANIZATION OF SOCIAL INFORMATION
A CONVERGING OPERATIONS APPROACH

John B. Pryor

University of Notre Dame

Thomas M. Ostrom

Ohio State University

Department of Psychology
Ohio State University
Columbus, Ohio 43210

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A neglected topic in social perception deals with how people organize the flow of information about their social environment. This flow of social information typically involves several information items about each of several persons often occurring in haphazard temporal order. This paper questions the assumption that social information is automatically organized on a person-by-person basis, that the information items about each person are cognitively grouped into one person category that is separate from the other person

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categories. The notion that familiarity mediates the cognitive organization of person information was examined using a converging operations approach. Three distinct methodologies were used to study this relationship: 1) a speeded sorting task, 2) a recognition reaction time task and 3) a free recall task. Each of the three experiments demonstrated that this tendency to organize social information on a person-by-person basis was directly determined by familiarity. Two of the three tasks produced evidence that persons do not serve to organize social information for completely unfamiliar persons.

Abstract

A neglected topic in social perception deals with how people organize the flow of information about the many individuals in their social environment. This flow of social information typically involves several items of information about each of several persons. The items about different persons are often arbitrarily intermixed in their temporal order of appearance. This paper questions the assumption that social information is automatically organized on a person-by-person basis, that the information items about each person are cognitively grouped into one person category that is separate from the other person categories. The notion that familiarity mediates this cognitive organization of person information was examined using a converging operations approach. Three distinct methodologies were used to study the relationship between familiarity and person organization: 1) a speeded sorting task, 2) a recognition reaction time task; and 3) a free recall task. Each of the three experiments demonstrated that this tendency to organize social information on a person-by-person basis was greater for familiar than for unfamiliar persons. Two of the three tasks provided evidence that social information is not organized by person when the stimulus persons are completely unfamiliar.

The Cognitive Organization of Social Information: A Multiple Operationism Approach

An implicit assumption that has been made over the years in social psychology is that persons constitute the fundamental unit of social perception. It has been thought that people cognitively organize most of their experiences in terms of persons. They encode and integrate into impressions information concerning the persons who inhabit their social environments.

This assumption was a theoretical cornerstone in Asch's (1946) investigations of impression formation. Perhaps Asch's most explicit and concise statement of this assumption is found in his 1952 text on Social Psychology:

> "...ordinarily our view of a person is highly unified. Experience confronts us with a host of actions in others, following each other in relatively unordered succession. In contrast to this unceasing movement and change in our observations we emerge with a product of considerable order and stability. Although he possesses many tendencies, capacities, and interests, we form a view of one person..." (p. 206)

A similar line of reasoning can be found in Heider's (1958) discussion of the unit relationship between a person and his or her behaviors, attributes, possessions, etc. Both Asch and Heider subscribed to a gestalt view of perception in which stimuli are experienced in terms of organized wholes. In translating gestalt theory into social perception, persons became these organized wholes.

For Asch's (1976) research in person perception the notion of a person gestalt was a de jure assumption. Following Asch's pioneering investigations, a body of person perception research developed that utilized Asch's methodology. This methodology embodied Asch's assumption in that it presented information about one person, and required subjects to make impression ratings before presenting information about any other person. While much of this subsequent research did not share Asch's gestaltist theoretical orientation (Anderson, 1962), the importance of individuals to social perception was retained as a de facto characteristic of that methodology.

Social information

As implied in the quote above, Asch assumed that the "person gestalt" is created automatically upon encountering information items about a person. This assumption was made in full recognition of the complexity of the social environment in which items of information about others are acquired. However, few components of that social complexity have found their way into researchers laboratories. Research practices in the study of impressions have almost completely adopted Asch's methodology of having subjects think about persons one at a time. Researchers present all the information about one stimulus person, and elicit a response toward that person from the subject before moving on to a second stimulus person.

This is very different from the usual manner in which people learn about others. In a typical day we learn a variety of things about a number of different people. The items we learn about one person are often interspersed among items we learn about others. Social information, as it is normally acquired, has at least four characteristics. The information items (a) pertain to more than one person, (b) include a variety of items about each person, (c) are encountered in a temporal sequence, and (d) are interspersed between other persons in an arbitrary fashion. Whereas research practices lead the subject to focus on the stimulus person to the exclusion of all others, this is not necessarily true in our normal social environment. Under these circumstances organizing information in terms of persons constitutes only one of many possible modes of cognitive organization. Thus, the problem of discovering the determinants of the strength of the "person gestalt" becomes fundamental to all work in person perception. If there is no cognitive unit representing another person, there can be no within-person organization of information nor would that person exist as a source of social influence.

In the analysis of problems concerning cognitive organization, a convenient language is provided by associative network theories of memory (e.g., Anderson & Bower, 1973; Collins & Loftus, 1975; Kintsch, 1974). Without adhering strictly to any one of the various models that have been proposed to date, it is possible to utilize the general terminology and spatial metaphor common to all of these models in describing the organization of person information. Using associative network terminology, a person-focused organization of social information would exist when a "person node" in memory is connected by associative pathways to a series of "feature nodes." Feature nodes may include such person information items as traits, physical features, behaviors, possessions, etc. The person node itself may be conceptualized as an abstract nexus of associations. Operationally, the person node may be accessed most readily through the information item most strongly associated to the other items concerning a particular person. A person's name might often provide the most convenient access to the person node.

Using this terminology, the strength of the "person gestalt" may be conceptualized in terms of the associative strength of the pathways connecting feature nodes to the person node. The strength of an association is known to be an increasing function of its frequency and recency of activation (Hayes-Roth, 1977). Therefore, one factor that might be expected to affect the strength of a "person gestalt" is the familiarity of the person. This is because familiar persons are ones who we have encountered frequently, and often recently, in the past. Therefore, the strength of the "person gestalt" concerning a familiar person should be greater than that of an unfamiliar person. Put in other terms, social information about familiar persons are more likely to be organized by person than is social information about unfamiliar persons.

Assessing Cognitive Organization

Mandler states that (cognitive) "Organization is defined by stable relationships among elements. These elements may be sensations, perceptions, phonemes, words, action sequences, behaviors, syntactic units or elements themselves organized into groupings, categories or concepts" (1975, p. 17). A wide variety of experimental methodologies have been employed by cognitive researchers to assess the organizational characteristics of memory (Tulving & Bower, 1974). There are at least two basic reasons for this proliferation of methodologies. First, different performance measures tap different aspects of information processing. A stable cognitive structure may potentially influence many different phases of information processing. Second, by definition, all measures of cognitive structure are indirect and therefore contain process-irrelevant variance. The use of converging operations (Garner, Hake, and Erickson, 1956) help eliminate those alternative explanations.

This argument for multiple operations has also been made in regard to the study of social psychological variables such as attitudes (Cook and Selltiz, 1964) and general dispositional differences (Campbell & Fiske, 1959). It is interesting to note that despite the wide acceptance of the converging operations research strategy, there are almost no published examples of its use in social psychological experimental research.

In the present set of investigations we explored the cognitive organization of social information using three different experimental methodologies, thereby allowing us to triangulate in on the underlying cognitive structure. We selected tasks that reflected different phases in the cognitive processing of information. One was an input task that was relevant to how people classify or categorize social information into person categories. The second was a processing task that measured the ease with which one thought leads to another when both thoughts are about the same person. The third task was an output task that looked at how person organization affected the overt communication of person information.

For the first operationalization, we assessed the speed with which subjects could classify or sort information items according to person categories. Taylor and Crocker (in press), in their summary of research on the schema concept, note that one function of a schema is to allow the person to identify and categorize stimuli quickly. Yet they did not report any direct evidence bearing on this assumption. In one condition of the first study, the person categories represented organized structures or strong "person-gestalts" (i.e., pertained to familiar persons); under the other they represented only weakly organized structures (i.e., pertained to unfamiliar persons). Classification time should be related to the speed or ease with which subjects can mentally identify information items as instances of cognitive categories. We predicted that the cognitive structures for familiar persons would be more readily available during encoding and hence, more facilitative for classification than the less well formed structures representing unfamiliar persons.

In the second operationalization, we assessed the speed with which subjects could mentally scan a memorized information list and report whether a pair of test items had been a part of the list. Under one condition the list contained information items about familiar persons and under another condition it contained items about unfamiliar persons. We predicted that subjects would cognitively organize the information according to persons when they were familiar, but would be less likely to when they were unfamiliar. This person-by-person organization of the information under familiar conditions was expected to facilitate the recognition speed of two information items concerning the same person relative to the recognition speed of two items concerning two different people. Smaller recognition speed differences were expected under unfamiliar conditions. These predictions are based on the assumption that thought travels most easily along the strongest associative pathway.

The third operationalization involved categorical clustering in free recall. This measure of person organization is derived from the order of listing the items in recall. We predicted that information regarding familiar persons would tend to be recalled on a person-by-person basis (the items for each person would tend to cluster together in recall) more so than would items regarding unfamiliar persons. Thus, associative cohesiveness was expected to be reflected in the organization of recall.

Development of Stimulus Materials

In order to fulfill the multiple operationism goal of this research, the first step was to assemble a set of stimulus materials that could be used in each of the three studies. Since we were interested in how familiarity affected the way people organized social information, the information set had to satisfy three objectives. First, the stimuli would have to include several items of information about each of several persons. Second, several distinct replications of the stimulus materials would be needed to increase generalizability and satisfy counterbalancing needs. Third, they should allow us to vary person familiarity while holding constant the specific information items in the stimulus set.

Familiarity is a compound construct. That is, high familiar persons and low familiar persons differ from one another on more than just one dimension. At least three sources of difference can be identified. For example, your favorite memory of your Uncle Charlie may be of him sitting in his rocking chair sipping beer and telling jokes. One reason he is familiar is because you have encountered his name (Uncle Charlie) frequently in the past. A second reason is that the information items you know about him (tells jokes, likes rocking chairs, and drinks beer) have been associated with him frequently in the past. A third possible reason he is familiar is that the separate information items have been associated with one another frequently in the past (e.g., drinking beer and telling jokes may become associated with one another).

We decided in the present research to study the effects of familiarity as a compound construct. It did not seem fruitful to investigate the components of familiarity without first establishing that person organization is affected by familiarity in its more global, compound form. Consequently, we developed stimulus materials that allowed us to manipulate familiarity as a compound construct.

Thirty-eight undergraduates at Ohio State University were asked to write down the names of the first three famous persons that came to mind. Subsequently, they were asked to write down the first three items of information concerning each of these persons that came to mind. These lists were collated and 20 of the most frequently mentioned famous persons were selected. Five of the most frequently mentioned facts concerning each person were selected and converted to generalities that did not uniquely distinguish the persons. For example, "George

Washington was first president of the United States" was converted to "George Washington was a leader." These converted facts will be referred to as "descriptors." In associative network terminology, they are the feature nodes of our stimulus persons.

Descriptions of the 20 persons were divided into 4 stimulus replications of 5 persons each. An attempt was made to keep the persons and descriptions within each replication relatively heterogeneous. No two descriptors used within a set were the same. The descriptors within each set were arranged into matrices as shown in Figure 1. The rows of these matrices represented the familiar person descriptions. The columns of these matrices were used to generate descriptions of unfamiliar persons. Thus, from Figure 1 the descriptors <u>republican</u>, <u>politician</u>, <u>honest</u>, <u>golfer</u> and <u>awkward</u> pertain to a familiar person (Jerry Ford) and the descriptors <u>republican</u>, <u>Irish</u>, <u>slender</u>, <u>proud</u>, and <u>explorer</u> pertain to an unfamiliar person (Bruce King).

Insert Figure 1 about here

The order of the descriptors within rows was initially randomized and then juggled to eliminate unfamiliar person descriptions that seemed improbable or inconsistent. Using this method it is possible to construe the same basic information sets as either familiar or unfamiliar person descriptors.

These four stimulus replications were used in all three of the experiments described below. Having four stimulus replications satisfied two aims of this research. By using more than one stimulus replication in each experiment, we increase our confidence that the findings can be more widely generalized. Second, it allows us through the use of appropriate counterbalancing procedures to increase the sensitivity of our research design by making familiarity a within-subjects variable.

Input Task

Method

Overview. This experiment assessed the speed or ease with which subjects could classify information items according to person categories. Information items were taken from the four stimulus sets described above. Most previous experimental investigations that have looked at the speed with which stimulus instances can be identified as category members have presented stimuli one at a time and measured each decision time (e.g., Collins & Quillian, 1969). The present experiment involved presenting subjects with multiple stimulus instances in the form of a deck of index cards and asking subjects to sort them as quickly as possible into piles according to person. Similar tasks have been employed in perceptual discrimination studies (Garner, 1969; Morton, 1969).

Each information item was typed on a 3 x 5 index card in sentence form containing the name, the verb "to be" in an appropriate tense, and a descriptor ("Jerry Ford is honest" was one example). Each subject sorted four decks of index cards into piles according to persons as quickly as possible. Two of these decks were familiar versions of the stimulus sets (the rows) and two were unfamiliar (the columns). The order in which the four stimulus sets were presented was initially randomized and this same random order was used across subjects. The order of the experimental conditions (familiar vs. unfamiliar) was counterbalanced.

In addition to the variables previously mentioned, this experiment also incorporated two variables related to the size of the stimulus sets. The original 5 persons x 5 descriptors matrices (as shown in Figure 1) were used to generate three additional matrices. Some subjects received information sets containing 3 descriptors about each of 5 persons, others received information sets containing 5 descriptors about each of 3 persons, and still others received 3 descriptors about each of 3 persons. Thus, the number of persons (3 vs 5) and the number of descriptors (3 vs 5) were two-level between subject variables.

The number of cognitive categories used to represent a stimulus array and the number of items per category are known to affect the recall of the array (Wood, 1972), however, little is known about how the number and size of apparent categories affect the ease of encoding. With regard to the manipulation of the number of persons, one hypothesis is that encoding according to a categorical structure is more difficult the more categories involved. Whether this would interact with the manipulation of familiarity remains to be seen. By manipulating the number of persons, we seek to ascertain whether the organizational phenomena studied here generalize to different group sizes.

The manipulation of the number of items per category in the present study may help in ascertaining a firmer understanding of the processes by which familiarity influences sorting speed. Conceivably familiarity may influence sorting speed through at least two processes: (1) the formation of categories and (2) the use of categories. The enhanced availability of familiar person categories over unfamiliar person categories in the initial formation of a categorical structure could be a primary determinant of differential sorting speeds. If this is the case, then one would expect that the effects of familiarity upon sorting speed would be more pronounced for stimulus sets involving fewer information items. If on the other hand, familiar person categories are used more easily than unfamiliar categories throughout the sorting task, then one would expect no interaction between familiarity and a number of items.

Subjects. Twenty-four undergraduates from Ohio State University introductory psychology classes participated as subjects in partial fulfillment of a course requirement. These subjects were randomly assigned to the six presentation orders of the familiar and unfamiliar conditions used to counterbalance the design.

Procedure. Subjects were instructed that the principle concern of the experimental task was to assess how quickly they could do two things simultaneously: (1) sort index cards into pre-designated categories and (2) scan these index cards for spelling errors. The purpose of the spelling-error task was to insure that subjects actually read all of the information contained on each index card. Subjects were given a shuffled deck of cards face down and a Hunter Klockounter timer (Model 120A) was initiated as the experimenter said: "Go!" The subjects stopped the timer after having sorted the cards into categories by pressing a "Yes" or a "No" button. "Yes" signified that the subject had detected at least one spelling error in the stimulus deck and "No," that there had been no errors. When subjects pushed the "Yes" button, they were asked to go back through the deck and point out the error.

Subjects received four practice decks prior to the presentation of the experimental decks. These decks involved the same basic sorting task used in the experimental decks except the categories were birds, dogs, fruits and automobiles instead of people's names. Spelling errors were present in two of the practice decks. They always occurred in the descriptor term. No errors were present in the actual experimental decks. However, midway through the experimental decks a bogus deck (consisting of half familiar and half unfamiliar persons) was included that did have an error.

Following each sorting trial the experimenter recorded the sorting time (registered in centiseconds). At the end, subjects were debriefed about the nature of the experiment and asked not to discuss it with their classmates.

Results and Discussion

The sorting time scores for each experimental trial for each subject were divided by the number of cards that were sorted (9, 15, or 25). This resulted in an index that represented the average sorting time per card on each trial. These indices were analyzed in a 2 x 2 x 2 x 2 mixed design analysis of variance (Poor, 1973). Number of persons (3 vs. 5) and number of descriptors per person (3 vs. 5) were between subjects factors. Familiarity (familiar vs. unfamiliar) and set order (1st familiar and unfamiliar vs. 2nd familiar and unfamiliar) were within subject factors. The only significant result was a main effect for familiarity, F (1, 20) = 13.19, $p < .003$. The average per card sorting time for familiar decks was 1.98 seconds; for unfamiliar decks it was 2.17 seconds.

These results support the hypothesis that the encoding of information according to person categories is facilitated when the persons are familiar. Subjects found it easier to classify social information by persons when the persons represented previously developed cognitive structures.

The number of persons variable did not produce a main effect or interaction with familiarity (F (1, 20) = 1.18, $p > .25$ and F (1, 20) = 1.96, $p > .15$, respectively. This demonstrates that the familiarity variable influences encoding across different group sizes. Similarly, the number of items per person also failed to produce a main effect or interaction with familiarity (both F's < 1). This favors the hypothesis that familiarity facilitates encoding throughout the sorting task, instead of just in the initial phases.

Subjects appeared to be reasonably alert in detecting spelling errors in the bogus deck. They were identified 83% of the time. This is especially good in view of their apparent weak spelling ability. Eleven percent of the time they reported misspellings in the experimental decks (%F = 10.4 and %U = 12.5) where none actually existed. These results indicate that subjects were reading the entire sentence before sorting each card.

A limitation inherent in this methodology is that it provides for only a relative comparison of organizational strength. We can infer that the familiar sets were more easily organized according to persons than the unfamiliar. Although this can be interpreted to mean that stronger "person gestalts" were formed for familiar persons, there is no way of determining whether such automatic organization by person occurred in the unfamiliar sets. This is an important issue and constitutes one of the major foci of the next two studies.

Processing Task

Method

Overview. The rationale for this experiment was based upon the premise that memory search times are influenced by the organization of memory. A subject should be able to find two stored information items more quickly if they are in the same memory location (i.e., pertain to the same person) than if they are in two different locations (pertain to two different persons).

The experimental task involved here was a variant of the Sternberg (1966) probe reaction time task developed by Johnson (1979). This task involves a list of information items that subjects are asked to commit to memory. Subsequently, subjects are presented a series of probes and asked to verify as quickly as they can whether probes had been a part of the original list. Johnson's variant of this procedure involved presenting probes that contained more than one item of information. Johnson found that when the initial information list was organized into units or "chunks," subjects were able to recognize two items from the same chunk as members of the list more quickly than two items from different chunks. (Sentis and Burnstein (1979) have used a similar procedure in studying the organizational properties of balance.)

In an analogous fashion, the present experiment tested the hypothesis that when information is organized by person (i.e., when the stimulus set contains familiar persons rather than unfamiliar persons) subjects would be able to recognize probes containing two pieces of information about the same person more quickly than probes containing information about two different persons. Probes contained the descriptors only; no person names were included.

All subjects received one familiar and one unfamiliar stimulus set, each followed by a set of probes. Stimulus sets consisted of the same four 3 persons x 3 descriptors sets that were used in the first experiment. It was decided to not use the longer stimulus sets (e.g., 5 x 5) from the previous study. Using a smaller memory set should minimize recognition errors during the response task.

The pairing of stimulus sets across subjects was counterbalanced using all six combinations of the four sets taken two at a time. Also, the order of the sets vis-a-vis the familiarity variable was counterbalanced. Each subject received an equal number of within-persons and between-persons probes following each stimulus set. Thus, the basic design was a 6 x 2 x 2 x 2 (Counterbalancing Condition x Order x Familiarity x Probe Composition) factorial with Counterbalancing and Order as between-subject variables and Familiarity and Probe Composition as within-subject variables.

Subjects. Twenty-four undergraduates from Ohio State University introductory psychology classes participated as subjects. Participation was partial fulfillment of a course requirement. Subjects were randomly assigned to the twelve counterbalancing conditions.

Procedure. Subjects were presented each 3 x 3 stimulus set with the information items (e.g. "George Washington was a leader") printed on index cards. The cards were thoroughly shuffled before the first trial began. The descriptor on each card was underlined. Subjects read through the deck three times, saying the sentences aloud. The cards were shuffled anew before each consecutive run through the deck. Subjects were told that their memories for the underlined words would subsequently be tested.

Following this initial exposure to an information set subjects were presented a series of probes projected onto a translucent sheet of plexiglass. Probes consisted of either two words (one oriented above the other) which had both been descriptors used in the stimulus set (these are termed test probes) or two words, only one of which had been used in the stimulus set (these are termed foils). The onset of the slide triggered a Hunter Klockounter timer (Model 120A). This timer stopped automatically when the subject pressed either one of two buttons (a "Yes" or a "No" button) on a control box. "Yes" signified that both words had been in the initial set while "No" signified that one of the words was not in the set. An experimenter recorded both the subject's reaction time (in milliseconds) and the yes or no response.

Subjects saw an equal number of within-person (where both descriptors concerned the same person) and between-persons probes. From an information set containing three descriptors about each of three persons, there are nine possible unique within-person pairs of descriptors and twenty-seven possible unique between-persons pairs of descriptors. In order to equalize the number of times each descriptor appeared in the context of within- and between-persons probes, each unique within-person probe was presented three times. The orientation of descriptors (top or bottom) was randomly determined for each probe. Thus, subjects were given a total of fifty-four test probes for which the appropriate response was "Yes." In addition to these probes, they were also given fifty-four foils or "No" response probes. In constructing foils for each stimulus set, fifty-four person descriptors which subjects had not seen in the experiment were selected. Each of the nine stimulus set descriptors appeared in foils with these non-set words six times. The order of the presentation of experimental and foil probes was randomized.

Following the presentation of the probes from the second stimulus set, subjects were debriefed concerning the nature of the experiment and asked not to discuss it with their classmates.

Dependent measures. The primary dependent measures were derived from subjects' "Yes" responses to the test probes (responses to the foils were ignored). Each subject made 27 reaction time responses for the within-person probes and 27 for the between-person probes within the familiar and within the unfamiliar conditions. Reaction times concerning "No" responses to the test probes (errors) were ignored in the data analysis. Reaction times for the "Yes" responses were transformed to speed scores by taking the reciprocal of the reaction time in seconds. Reaction time scores typically form a positively skewed distribution because while the lower bounds of a score are typically set by physiological limitations, the upper bounds are mediated by such things as momentary di.tractions or lapses in concentration. Conversion to speed scores provides a convenient way to normalize the distributions. The mean speed scores were obtained within each experimental conditions for each subject.

Results

The speed score averages were analyzed in a 6 x 2 x 2 x 2 (Counter-balancing Condition x Order x Familiarity x Probe Composition) mixed design analysis of variance. The means of the Familiarity x Probe Composition interaction are shown in Table 1, $F\ (1, 12) = 5.12$, $p < .05$.

Insert Table 1 about here

As we can see from Table 1, the speed with which subjects were able to recognize probes in the familiar/within-person condition exceeded the recognition speed for probes in the other conditions. This result implies that finding an information item concerning a familiar person in memory facilitated finding other items concerning the same person. Thus, the information seemed to be cognitively organized by persons under familiar conditions, but not under unfamiliar conditions.

One alternative explanation for the findings might be that the difference revealed in the above analysis was due to the fact that particular within-person probes were presented three times each while particular between-persons probes were presented only once each. However, this explanation may be ruled out by the failure of the within vs. between manipulation to produce any differences under unfamiliar conditions.

Since the actual number of data points which went into the four within subject cells of the design was based upon the number of correct or "Yes" responses in these cells, it is appropriate to examine the number of errors (or "No" responses) in these conditions. The average error rate across these cells was less than 7%. An analysis of variance revealed no significant differences between conditions.

The issue of whether subjects automatically organized the information by persons is addressed by examining the responses to the within and between probes in the unfamiliar condition. Not only were these mean speed scores <u>not</u> significantly different, but they were in the wrong direction. This implies that no person-focused organization existed in the unfamiliar cells. This finding seems particularly interesting in light of the fact that recognition errors did not vary as a function of familiarity. Thus, while the three exposures to the stimulus sets allowed subjects to retain the descriptors equally well across the different conditions, only in the familiar condition did they cognitively organize the information by persons. Certainly, differential accuracy may be influenced by organization and may have been evidenced in the present study had there been larger stimulus sets or fewer exposure trials.

In the next study, the effects of familiarity on person organization will be taken up again using a third measurement technique. In addition to this, the influence of organizational variables upon the accuracy of cognitive representations of persons will be examined.

Output Task

Method

Overview. The principal aim of the present study was to examine the influence of person familiarity upon the organization of free recall. The design and stimulus materials of this study were comparable to those of the first (input) study. Subjects received either 3 or 5 descriptors about each of either 3 or 5 persons in a stimulus set. The order of the stimulus sets was randomized and the same random order was used across subjects. The order of the experimental conditions (familiar vs. unfamiliar) was counterbalanced across subjects. Each subject received 2 familiar and 2 unfamiliar stimulus sets.

The present study utilized a free recall paradigm. Subjects were asked to recall orally presented, randomly ordered stimulus items. The extent to which the information was organized by persons was assessed by examining the ordinal clustering of recall according to persons.

Subjects. Forty-eight undergraduates from Ohio State University introductory psychology classes participated as subjects in this experiment in partial fulfillment of a course requirement. Subjects were randomly assigned to the four counterbalancing conditions.

Procedure. Subjects were instructed that the experiment concerned memory for information about persons. The stimulus sets were read aloud to the subject by the experimenter. As in previous studies, each information item within a set consisted of a sentence (e.g., "George Washington was a leader"). The order of presentation was randomized with the constraint that if subjects recalled all items in the order read, organization by persons would occur at exactly chance level according to the index used to measure clustering. Following a presentation subjects were instructed to recall as many of the sentences as they could remember, writing them down in the order they came to mind. Subjects were provided a booklet of paper slips on which to write down their responses. The subjects wrote one sentence per page and did not turn back once they completed a page. Each stimulus set was presented twice in succession with a recall trial following each presentation. The second presentation was given in a different random order than the first. Following the final presentation/recall trial subjects were debriefed as to the purpose of the experiment and asked not to talk about it to their classmates.

Measurement of clustering. The general scoring strategy for the recall protocols was to consider persons as categories and examine the extent to which information items within a category were ordinally clustered in recall. A variety of mathematical indices are available for assessing categorical clustering. The measure used in the present study was the "Adjusted Ratio of Clustering" (or ARC) proposed by Roencker, Thompson and Brown (1971). The formula for ARC is:

$$ARC = \frac{O - E}{Max - E}$$

where O equals the number of observed categorical repetitions (a categorical repetition is where any two instances from a particular category are adjacent in recall), E equals the number of repetitions expected by chance ($E = (\Sigma M^2/N) - 1$, where M is the number of instances recalled in category K and N is the total number of instances recalled), and Max equals the maximum number of categorial repetitions possible ($Max = N - K$, where K is the number of categories recalled).

The ARC measure has the following advantages over most alternative clustering indices: (1) it is generally easy to interpret (perfect clustering = 1, chance clustering = 0) and (2) the expected value of ARC is relatively unaffected by (a) the number of categories recalled (b) the distribution of items across categories or (c) the total number of items recalled.

Because subjects were asked to recall the entire sentence (containing a name and descriptor), clustering could be computed three ways. In the whole sentence method, recalled items were considered as units for analysis only if a correct name and descriptor (paired in the manner received in the stimulus set) were recalled. All errors were ignored in counting the repetitions and in totaling the number recalled. For the name only method, descriptors were ignored. Repetitions were counted by examining adjacencies in names. Errors in names (i.e., the inclusion of names foreign to the stimulus set) were ignored in counting repetitions or number recalled. The descriptor only method ignored names. Repetitions were counted only on the basis of descriptors. Descriptors were considered to be instances of the same category (or person) when they had been paired with the same name in the stimulus set. Again, errors among the recalled descriptors were ignored when repetitions or number recalled were counted.

Results and Discussion

Clustering. The three ARC measures were analyzed in separate analyzes of variance. The design was a 2 x 2 x 4 x 2 x 2 factorial (Number of Persons x Number of Descriptors x Counterbalancing Order x Familiarity x Trials) with the first three factors as between-subject variables and the last two as within-subject variables. The results of all three analyzes were substantially the same in terms of the significance of the effects detected and the directions of the differences. Therefore, only the results of the whole sentence analysis will be reported. Figure 2 shows the means across the Familiarity and Trials variables.

Insert Figure 2 about here

There was a significant main effect for Familiarity (F (1, 32) = 22.70, $p < .001$).[1] Familiarity did not interact with any other factors in the experiment (all p's $> .20$), indicating its generality across number of persons, and number of descriptors per person, and trials. The size of the memory load determined by number of persons and number of descriptors (a total of 9, 15, or 25 items) did not affect clustering (all p's $> .20$).

Thus subjects tended to organize their recall in terms of persons more for familiar persons than for unfamiliar persons. In addition, there was an increase in person organization from trial one to trial two (F (1, 32) = 15.58, $p < .001$).[1] The main effect for trials may also be interpreted as resulting from the familiarity process. Person-by-person organization increased as subjects, in the course of the experiment, became more familiar with persons in the information sets.

It is important to note that no significant degree of person-by-person organization existed in the first trial with the unfamiliar persons. In Figure 2 the mean ARC scores were significantly different ($p < .001$) from chance (or zero) in all cells except on the first trial of the unfamiliar condition.[2] That one cell has a mean of .175 and an $F(1, 32) = 1.78$, $p > .10$. This finding parallels the failure of within- vs. between-persons probes to produce any differences under unfamiliar conditions in the choice reaction time experiment above. Taken collectively these results cast serious doubt upon Asch's contention that person gestalts are formed automatically when social information is encountered.

Recall. In addition to organization, other dimensions of subjects' recall are also interesting to note. Mandler (1975) and others have often found that recall is improved by organization. The ability to recall information about others is an important problem for social psychologists because it directly effects the availability of person information in conversational and decision making contexts. We expected that our subjects would be able to remember more about familiar than unfamiliar persons even though the information presented in either case was essentially the same.

An analysis of variance was performed using the number of whole sentences recalled correctly as a dependent variable. There were significant main effects for the Familiarity and Trials variables (F (1, 32) = 290.24, $p < .001$ and F (1, 32) = 168.19, $p < .001$, respectively). These trends, given in Table 2, parallel the findings for the ARC measures.

There were also significant main effects for the Number of Persons and Number of Descriptors variables ($\underline{F}$ (1, 32) = 84.82, $\underline{p} < .001$ and $\underline{F}$ (1, 32) = 114.71, $\underline{p} < .001$, respectively). More items were recalled when the Nubmer of Persons or Number of Descriptors was 5 than when either was 3. Significant two-way interactions (all $\underline{p}$'s $< .01$) were detected between Trials and Number of Persons, Trials and Number of Descriptors, Familiarity and Number of Persons, and Familiarity and Number of Descriptors. Larger numbers of either persons or descriptors in the stimulus set resulted in enhanced recall under Familiar conditions as compared to Unfamiliar and on Trial 2 as compared to Trial 1.

A main effect and several interactions were detected with regard to the counterbalancing order. The main effect simply shows that some orders resulted in more recall than others. The interactions of this variable with the other variables were primarily ordinal rather than disordinal in nature.

As mentioned above, a distinct advantage in using ARC as a measure of clustering is that it is not mathematically biased by the number of recalled items. An analysis of the average within condition correlation[3] between ARC (computed with the whole sentence method) and the number of items recalled correctly bore this out in the present data ($\underline{r}$ (46) = .127, $\underline{p} > .10$). Therefore, although the recall patterns seem to parallel the ARC patterns across the manipulation of familiarity, it is not likely that differential recall directly influenced the reported ARC differences. Additional evidence with regard to this point comes from the analyses of the set size variables (number of names and number of descriptors). While each of these variables influenced the number of items recalled, neither influenced clustering measures.

This lack of an association between recall and clustering gives us greater confidence in our interpretation of the effects of trials on clustering. Increased frequency of exposure should strengthen the associative pathways between the descriptors and person mode, and this makes the person more familiar. The increase in clustering across trials cannot be dismissed as an artifact resulting from there being a larger number of items recalled.

Errors. By the same process through which organization influences total recall, we may also expect it to influence the accuracy of recall. A high error rate for the recall of information concerning unfamiliar persons would seem to compound the problems associated with the study of person perception using only a first impression methodology.

The issue of accuracy is multifaceted problem. There are many different kinds of errors that can be made when people recall items of social information. In order to capture the variety of error types in the present study, a taxonomy of errors was developed. Five distinct categories of errors were identified: (1) a name foreign to the stimulus set paired with a descriptor from the set (Wrong Name/ Correct Descriptor), (2) a name from the stimulus set paired with a descriptor foreign to the set (CNWD), (3) a name and descriptor pair both foreign to the stimulus set (WNWD), (4) a name from the stimulus set paired inappropriately with a descriptor from the set (Mismatch), and (5) a repetition of exactly the same sentence in the recall protocol (Repeat). 4.3% of the total responses were WNCD errors, 5.7% were CNWD errors 0.4% were WNWD errors, 10.6% were Mismatch errors and 0.4% were Repeat errors.

Separate analyses of variance were conducted on each of these error types. The analyses of WNCD, CNWD and Mismatch errors all produced significant main effects for Familiarity (F (1, 32) = 11.31, $p < .01$; F (1, 32) = 6.20, $p < .02$; and F (1, 32) = 125.85, $p < .001$, respectively); WNWD errors produced a marginally significant main effect (F (1, 32) = 3.19, $p < .10$). More of these errors were made under Unfamiliar than Familiar conditions.

The Trials variable also produced some significant effects across some of these error types. For the WNWD analysis, there was a significant main effect for Trials, F (1, 32) = 7.16, $p < .02$. This was also true in the analysis of CNWD, Mismatch and Repeat error types F (1, 32) = 12.38, $p < .01$; F (1, 32) = 4.31, $p < .05$; and F (1, 32) = 8.86, $p < .01$, respectively). For all of these error types except the Repeat errors, errors decreased as a function of Trials. For the Repeat errors, errors increased over trials.

A composite error index was formed by simply adding together the various error types. An analysis of this composite index is useful in summarizing the major error trends. This analysis revealed a main effect for Familiarity (F (1, 32) = 51.16, $p < .001$); more errors were made for unfamiliar persons (M_u = 2.19) than familiar (M_f = 0.85). Also observed was a significant main effect for Number of Persons (F (1, 32) = 6.81, $p < .02$); however this was not true for the Number of Descriptors (F (1, 32) < 1, NS). More errors were made in the 5 persons condition (M_5 = 1.89) than in the 3 persons condition (M_3 = 1.16). Evidently, increases in the number of categories (or persons) resulted in more errors, but not increases in the number of instances per category. Some of the individual analyses had tended in this direction but had failed to produce statistically significant effects.

In order to substantiate that the ARC coding strategy vis-a-vis errors (i.e. ignoring errors) was not mathematically related to the ARC scores reported, the average within condition correlation[3] between ARC and the total number of errors was computed. This correlation failed to approach statistical significance (r (46) = -.149, $p > .10$). That our ARC scoring strategy was not biased by error rates is also substantiated by the fact the number of persons variable produced a main effect for total errors but not for ARC.

General Discussion

Taken collectively, these three experiments strongly suggest that the tendency to organize social information by persons is mediated by the familiarity of the persons involved. These findings lead us to question the generality of person perception studies that are concerned only with "first impression" or information about strangers.

These studies also suggest that the organizational phenomena under consideration are present during different phases of information processing. This implies that the familiar persons used in these experiments represent fairly stable cognitive structures. The first study demonstrated that preexistent person categories are more easily imposed upon social information during encoding than newly formed person categories. While the sorting experiment allowed us to observe a relative difference between the cognitive organizations of information under familiar and unfamiliar conditions, it did not allow for any absolute assessment of whether or not the information was organized by persons at all under unfamiliar conditions. However, such an assessment was possible in both the reaction time and free recall studies.

The reaction time study was concerned with the ease (or speed) with which one thought follows another. Ideas or information items associated with a person node tended to bring to mind other items associated with the same node. Under familiar conditions, information items were most easily accessed on a person-by-person basis. There was no evidence that the retrieval of information about a particular person facilitated the retrieval of other information about the same person under unfamiliar conditions. Thus, this experiment failed to produce any indication that the unfamiliar sets were cognitively organized by persons.

The inferred cognitive processes underlying the free recall experiment are analogous to those of the reaction time experiment, except the task involved recall instead of recognition memory. A person node organization resulted in information items about the same person being recalled together. As noted above, person clustering on the first trial of the unfamiliar condition was not significantly different from chance. Clustering was, however, significantly better than chance on trial two. The trials factor itself may be considered a manipulation of familiarity; subjects were more familiar with the information items and nodal associations on the second trial than on the first. Thus, the increase in clustering on the second trial further substantiates the importance of familiarity. The lack of person clustering on the first trial under unfamiliar conditions further substantiates our hypothesis that person-by-person organizations are not necessarily evoked when we encounter information about strangers.

By using three different operational definitions of cognitive organization, the confidence with which we may assert that we have actually accessed the cognitive structures in question is increased. Each separate methodology has its specific limitations with regard to the control of theoretically irrelevant components. And, while we recognize possible avenues of refinement with regard to these methodologies, their confluence serves to triangulate the theoretical construct, cognitive organization.

While multiple operations were used across these experiments in assessing cognitive organization, the operationalization of familiarity was the same. Ideally, this independent variable should be multiply operationalized as well (see Campbell, 1969). As one step in this direction, Simpson and Jacobson (Note 1) have found results similar to those reported in the free recall experiment using information sets consisting of facts about subjects' intimate friends.

Alternatives to person-focused organizations

If one accepts the evidence of this article suggesting that social experience is not necessarily cognitively organized by persons, the obvious next question is: how is it organized? A number of alternative organizational modes are possible depending on the particular experimental circumstances. In addition, subjects might utilize several modes simultaneously. For example, our research group has found that the spatial-temporal flow of information and the presence of competing semantic or descriptor categories may significantly influence the organization of person information (Ostrom, Pryor & Simpson, in press; Simpson, 1979). Both of these factors seem to interfere or compete with person-by-person organizations under certain circumstances.

Cognitive organization and social behavior

Another avenue for future research involves examining the influence of differential cognitive organizations upon social behaviors. Research by Wilder (1977) in the area of social influence has already examined several issues that are relevant to this concern. Wilder found that the social influence of persons in a conformity situation was greater when subjects were encouraged to perceive them as individual "social entities" rather than when subjects were encouraged to perceive them as members of a group.

Although Wilder did not directly assess the cognitive representation of the stimulus persons in his experiments, it is reasonable to suggest that a single node was used to represent the persons when they were perceived as members of the same group and that individual nodes represented the persons when they were perceived as separate social entities. Wilder (1978) has also found that the cognitive individuation of outgroup members serves to decrease ingroup/outgroup discrimination in the allocation of rewards. Wilder's studies suggest that examinations of the cognitive representation of persons, such as in the present study, may be useful in understanding the social influence of groups upon targeted individuals and the evaluations of observers concerning group members.

Components of familiarity

As noted in the introduction, three basic components underly the compound construct of familiarity as it was operationalized in the present experiments. (1) Discriminability. Familiar persons are likely to be highly discriminable as organizing categories. To the extent that you are familiar with someone, you probably know of distinguishing facts associated with that person (e.g., their names and idiosyncratic mannerisms). (2) Nodal association. As mentioned above familiar persons are, by definition, those with whom we have had repeated encounters. Through a process akin to classical conditioning, the associative bonds connecting feature and person nodes are strengthened with repeated encounters. (3) Inter-feature association. It is reasonable to suggest that the ensemble of information concerning a familiar person is likely to "make sense," that is, the items may be associatively inter-related.

The present studies were not designed to determine which of these three components contributed to the overall effects of familiarity on person organization. Their primary purpose was to establish that familiarity, as a compound construct, had detectable effects on person organization in three distinct phases of information processing. This was convincingly accomplished. The stage is now set to find out which one (or several) of the components is responsible.

Footnotes

[1]These main effects were also obtained in the Name only ARC analysis (Familiarity F (1, 32) $=$ 35.13, $p < .001$; Trials F (1, 32) $=$ 28.00, $p < .001$) and the Descriptor only ARC analysis (Familiarity F (1, 32) $=$ 24.77, $p < .001$; Trials F (1, 32) 7.55, $p < .01$.

[2]This pattern was also found for the other two ARC measures. The name only method and the descriptor only method yielded mean values of .11 and .18, respectively, for the unfamiliar, first trial condition. The corresponding F (1, 32)'s were 1.31 and 2.22.

[3]This is the mean (based on an r to z transformation) of eight correlations. One correlation was computed for each trial of the two familiar and the two unfamiliar decks.

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1. Simpson, D., & Jacobson, L. Unpublished manuscript, Carroll College, 1979.

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Table 1

Speed scores (1/RT) as a

function of person

familiarity and probe composition

		Person Familiarity	
		Familiar	Unfamiliar
Probe Composition	Within Persons	0.997	0.925[a]
	Between Persons	0.932[a]	0.948[a]

Note: Cells sharing a common superscript are not significantly different ($p > .25$). The unscripted cell differs from the largest of the other three at $p < .10$. It differs from the remaining two at $p < .05$.

Table 2

Mean correct recall as a function

of familiarity and trials

		Person Familiarity	
		Familiar	Unfamiliar
Trials	1	9.78	5.20
	2	12.04	7.63

Figure Captions

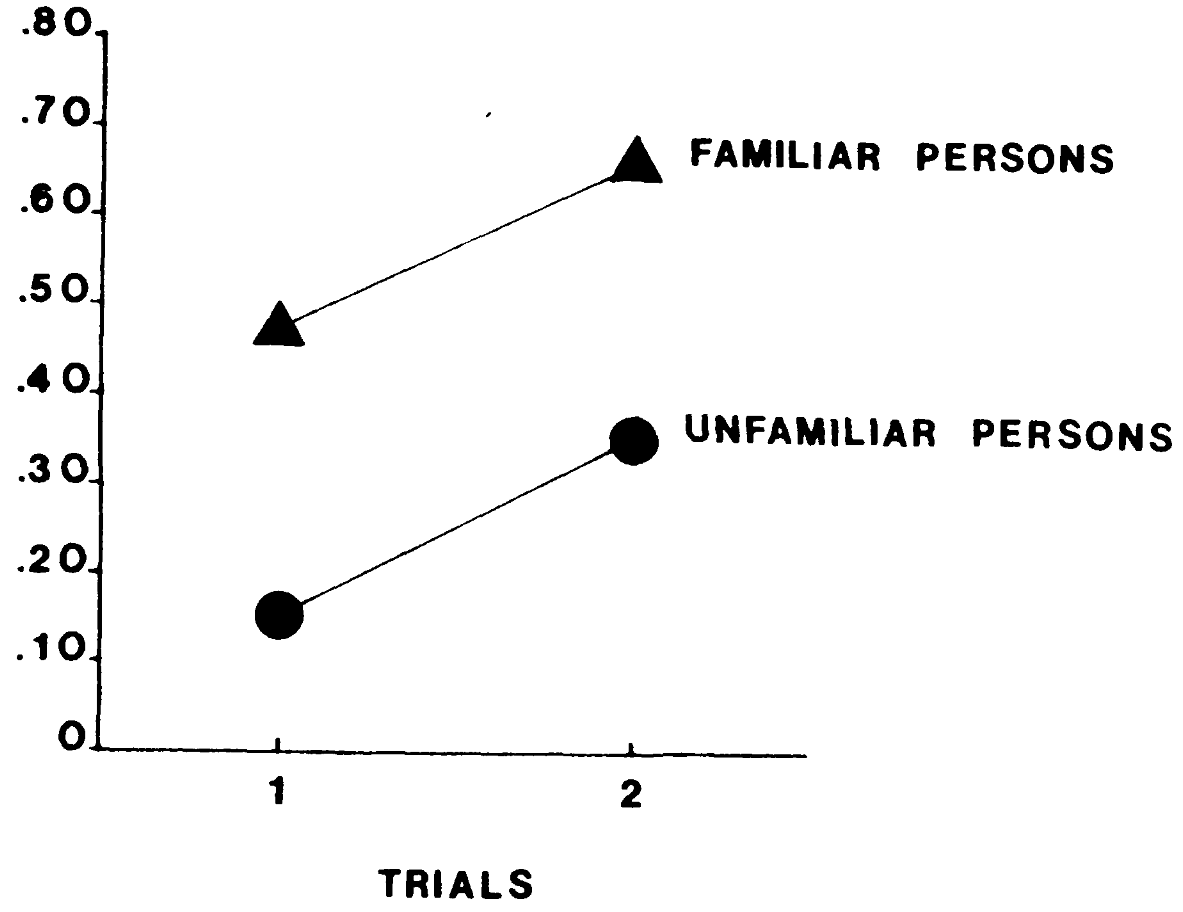
Figure 1. An example of one stimulus replication. The rows describe familiar persons and the columns describe unfamiliar stimulus persons.

Figure 2. Clustering (ARC) in free recall as a function of familiarity and trials.

UNFAMILIAR PERSONS

FAMILIAR PERSONS

FAMILIAR PERSONS	BRUCE KING	DOUG CONNERS	RICHARD LENNON	LAWRENCE STOUFFER	WILLIAM WINTHROP
JERRY FORD	REPUBLICAN	POLITICIAN	HONEST	GOLFER	AWKWARD
JOHN KENNEDY	IRISH	KILLED	CATHOLIC	LEADER	DEMOCRAT
JOHNNY CARSON	SLENDER	WELL-DRESSED	ENTERTAINER	MIDDLE-AGED	HUMOROUS
NAPOLEON BONAPARTE	PROUD	GENERAL	SHORT	AMBITIOUS	STRATEGIST
CHRISTOPHER COLUMBUS	EXPLORER	ADVENTURER	CAPTAIN	BRAVE	SAILOR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and Business
University of Oregon
Eugene, OR 97403

Dr. Joseph Olmstead
Human Resources Research
Organization
300 North Washington Street
Alexandria, VA 22314

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LIST 15 (Continued)

452:KD:716:tam
78u452-883
6 November 1979

Dr. Thomas M. Ostrom
The Ohio State University
Department of Psychology
116E Stadium
404C West 17th Avenue
Columbus, OH 43210

Dr. George E. Rowland
Temple University, The Merit Center
Ritter Annex, 9th Floor
College of Education
Philadephia, PA 19122

Dr. Irwin G. Sarason
University of Washington
Department of Psychology
Seattle, WA 98195

Dr. Benjamin Schneider
Michigan State University
East Lansing, MI 48824

Dr. Saul B. Sells
Texas Christian University
Institute of Behavioral Research
Drawer C
Fort Worth, TX 76129

Dr. H. Wallace Sinaiko
Program Director, Manpower Research
and Advisory Services
Smithsonian Institution
801 N. Pitt Street, Suite 120
Alexandria, VA 22314

Dr. Richard Steers
Graduate School of Management
and Business
University of Oregon
Eugene, OR 97403

DATE
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