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ASSOCIATIVE NETWORKS, CATEGORIES, AND SCHEMAS

Martin Andrew Therkelsen

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Department of Psychology,
Australian National University,
Canberra.

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Originality of thesis

Except where otherwise acknowledged,

this thesis is my own original work.

Martin A. Therkelsen

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CONTENTS

Abstract

A model of impression memory was utilized which partitioned impression information into category-consistent (schema) and category-inconsistent information (peripheral). The memory for consistent and inconsistent information was investigated in a series of experiments. Two information-processing models, the Schema-Pointer-Plus-Tag (SP+T) and the Associative-Network-Plus-Elaborative-Processing (AN+EP) models were tested for their ability to account for impression memory data.

Experiment 1 tested subjects' recognition memory for an impression. Subjects' hit rates for schema and peripheral impression traits were equal both at immediate and delayed test intervals. False alarm rates were greater for schema nonimpression distractors than for peripheral distractors at each retention interval. Reaction times paralleled recognition performance. Times to make schema and peripheral hits were equal, while correct rejections of schema nonimpression distractors took longer than peripheral distractors.

Experiment 2 tested subjects' recall memory for an impression. Subjects recalled equal proportions of schema and peripheral impression traits at immediate test, but recalled a greater proportion of schema traits after a delay. Recall intrusions at immediate test were equal for schema and peripheral nonimpression traits, but there were more schema than peripheral intrusions at the delayed test.

Experiment 3 also tested subjects' recall memory for an impression, though in this experiment subjects were required to furnish impression traits themselves, rather than selecting them from a checklist as in Experiments 1 and 2. The pattern of results was similar to that of Experiment 2, except that there was a greater proportion of schema impression traits recalled at both retention intervals, rather than only at the delayed test.

Experiment 4 found that recalled impression traits were no more or less associated or linked with other impression traits than nonrecalled impression traits. Additionally, recalled traits were no more likely to be linked with other recalled traits than nonrecalled traits, and no more likely to be the source of links to other impression traits.

Experiment 5 found a similar pattern of results to Experiment 4 with respect to not only

those links within the impression, but also between impression traits and other traits in the subjects' vocabularies. Recalled impression traits did not differ from nonrecalled traits on any of the measures of association or interlinking.

Experiment 6 found a significant relationship between traits categorized together as measured in Experiments 1-3, and traits seen as associated when judged on a pairwise basis as measured in Experiments 4-5. The better recall of schema traits as found in Experiments 2 and 3, which contrasts with the failure of Experiments 4 and 5 to show that recalled traits were simply more interassociated than nonrecalled traits, cannot be attributed to measurement factors.

Both the SP+T and the AN+EP models were found to be inappropriate for modelling impression memory data, as was a simple associative model. Memory for impression information was shown to be schematically driven, though not to the extent suggested by the SP+T model.

CHAPTER ONE

THEORETICAL AND EMPIRICAL REVIEW

1.1 *Introduction*

A fundamental dimension of social interaction is the exchange of opinions about other people. These opinions or impressions are often discussed, analysed, and amended in the course of everyday conversation. The cognitive processes involved in the formation of impressions have long been the subject of attention (Asch, 1946; Bruner & Taguiri, 1954; Heider, 1944), and recent interest has focused particularly on memory for impressions. This thesis examines the structure of memory for first impressions, and evaluates two cognitive processing models which attempt to account for impression memory data.

Chapter 1 proposes a theoretical memory structure that may underlie the memory of any stimulus, including an impression, and reviews data on the recognition and recall of structurally different components of the memory trace. Chapter 2 details two information-processing models, adapting each to the processing of first impressions. Chapters 3 through 7 provide experimental data on the memory for impressions, providing a basis for model evaluation. Chapter 8 reviews overall trends and draws final conclusions.

1.2 *Natural categories for persons*

In a series of studies, Rosch and her colleagues have developed the concept of "natural" categories (Mervis & Rosch, 1981; Rosch, 1973, 1975, 1978; Rosch & Mervis, 1975; Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). Natural categories pertain to a diverse array of everyday stimuli, from physical objects such as fruit or furniture, to less tangible stimuli such as colours. The categories are "natural" in that they represent the outcome of our classifications of everyday objects, and may be contrasted with the artificial categories utilized in research into concept formation and hypothesis testing (Bourne, 1970; Levine, 1975; Trabasso & Bower, 1968). Laboratory-based categories have been characterized by a constrained universe of exemplars that vary on a few salient dimensions e.g. round or square, and red or blue. Commonly, all possible combinations of features are displayed by various exemplars. Yet within the context of the experimental task, strict criteria differentiate acceptable exemplars (e.g. round and red) from unacceptable exemplars.

Natural categories have none of these orderly qualities. Firstly, a natural category may be associated with a number of features exemplified by various category members, but any one exemplar may not exhibit all the category features. That is, natural categories rarely have strict and precise criteria, all of which which must be met before an object will be judged to be a member of that category. In addition, a stimulus object may exhibit features associated with other categories. Again, this does not prevent the stimulus from being categorized, providing it does not exhibit a plethora of such features. Finally, an object will usually exhibit features peculiar to itself, allowing for the discrimination of one category member from another. Because of these properties, natural categories have been described as having indeterminate or "fuzzy" boundaries (McCloskey & Glucksburg, 1978; Zadeh, 1965), and members are said to bear "family resemblances" to each other, rather than being identical with each other (Wittgenstein, 1953).

Secondly, Rosch asserts that natural objects do not represent all possible combinations of features (e.g there are no natural objects with feathers and fur). Rather, objects exhibit non-random groupings of attributes, and as a result, our natural categories reflect these orderly feature groupings. However, the correlational structure is not so strong as to allow objects to fall clearly into one category or the other. This gives rise to the overlapping nature of category boundaries discussed above.

Thirdly, within each natural category there are some members which are generally considered more representative of that category, and others which are considered less representative. For example, a robin is considered to be a good exemplar of the category of birds, a chicken to be a moderate exemplar, and a penguin to be a poor exemplar. Thus, within each category there are said to be gradients of representativeness, ranging from those members most representative to those least representative. Rosch found that representativeness affects a number of cognitive processes, such that increased representativeness allows for faster judgements about exemplars, enables faster learning and easier retention, reflects greater strength of association with the category label, and results in less representative exemplars being seen as more like more representative members than vice versa (Mervis & Rosch, 1981).

The most representative member of the category is, in Rosch's terms, the prototype of that category. Rosch's prototype is not an abstract image of an "ideal" member, which in some manner represents the central or average features of the category. Rather, it is a specific category member, and as such, it enjoys all the cognitive advantages noted above. To the extent that other exemplars share prototypical features, they will also affect cognitive processing in the ways described.

Fourthly, natural categories are also hierarchical, such that the category of Animals subsumes the category of Birds, which in turn subsumes the category of Robins. This postulate is lent import by Rosch's assertion that within any hierarchy there is a level which is "basic", in that more of our everyday cognitions involve members at this level than at subordinate or superordinate levels. For example, "Chair" denotes a basic level category of objects, which at a superordinate level would be included in the category of "Furniture", or at a subordinate level would be further classified into types of chairs e.g. "Kitchen-chair".

Rosch characterizes the differences between these levels of categorization in terms of cue validity, where a cue refers to some attribute or feature of the category members. Basic-level categorization maximizes total cue validity, in that basic-level members maximize the number of shared attributes within the category, minimize the number of features shared with other categories, and minimize the number of features peculiar to only one member. Thus all chairs share a number of characteristics such as seat, legs, and back, while being distinguishable on the basis of minor features such as colour, style, and materials. Nevertheless, they are quite distinguishable from tables, dressers, and sofas.

Throughout, Rosch has concentrated primarily on non-human domains, be they animate as with birds or animals, or inanimate as with furniture. She did not explicitly consider the possibility that we may have natural categories for people. Others have explored the categorization of people according to criteria such as sex (Ashmore, 1981; Bem, 1981), age (Brewer, Dull, & Lui, 1981), and race and religion (Hamilton, 1979), though these attributes are more criterial in character than those normally associated with natural categories. In addition, these categories of people are somewhat general in their scope, akin to a superordinate level in any hierarchy of classification of people. Within any of these general classifications of people, the question remained of whether people were distinguishable on the basis of their personalities. Natural categories for people based on personality differences offered promise as a fundamental basis of everyday cognitions about, and interactions with, other people.

Cantor and Mischel (1977, 1979a, 1979b) first explored this question, attempting to determine whether there are categories or types of people denoted by the two trait terms of "extravert" and "introvert". Each of these types was hypothesized to be associated with a number of features in the form of other traits such as "outgoing", and with specific behavioural evidence such as "reads a lot". In the broader view, Cantor and Mischel examined the question of whether we naturally categorize people on the basis of their personalities, that is, on the basis of their perceived traits and behaviours.

Cantor and Mischel found that the degree to which a stimulus person was representative of an "extravert" or "introvert" category affected, firstly, the amount that could be recalled about that person (1979b); secondly, the accuracy and confidence of recognition of information about that person (1977); and thirdly, the amount that could be inferred about that person (1979a, 1979b). Thus gradients of representativeness within person categories affected cognitive processing in a similar manner to that found by Rosch in other domains.

Cantor and Mischel (1979a) also found that subjects perceived hierarchies of "types", from superordinate types such as "committed person", through basic types such as "social activist", to subordinate types such as "Save-the-whaler". Moreover, the middle level categories displayed an optimum combination of common and individual attributes: many common attributes shared between members of that category, few attributes shared with other categories, and few attributes peculiar to individual members of the category. Thus the cognitive economy characteristic of

Rosch's basic level categories was also found with middle level categories of person types.

In summary, gradients of representativeness and hierarchical organization were found in the domain of categories for people. It also seemed reasonable to assume that person categories display the indeterminate boundaries and correlational structure found in other domains. Consequently, Cantor and Mischel (1977, 1979a, 1979b) concluded that natural categories existed for people, based on trait and behavioural information.

1.3 *Features of a person: The impression*

Assignation of a person to a personality related category must involve perception of, and inferences about the behaviours, emotions, attitudes, and traits of the person. That is, the person's personality features form the basis of the impression.

The impression may be characterized not only in terms of its content, but also in terms of its evaluative tone. This is not so much an attribute of the person as such, but is rather an affective judgement of the stimulus person by the perceiver. The evaluative tone or valence of an impression is a fundamental dimension of impressions, and has been repeatedly reported in analyses of personality descriptions elicited from subjects (Anderson, 1962; Hartwick, 1979; Rosenberg & Sedlak, 1972). While some conceptualize the impression as basically a judgement of likeability, and report evidence suggesting an independence of impression valence and impression content (Anderson, 1962; Anderson & Hubert, 1963; Dreben, Fiske, & Hastie, 1979; Hartwick, 1979; Hastie & Park, 1986; Riskey, 1979; Rywick & Schaye, 1974; Wyer & Gordon, 1982), the current focus in this report is on memory for impression content. Impression tone is not ignored, but rather is treated as a factor which may interact with memory for impression content, whereby positive and negative impressions invoke different memory processes, and is therefore assessed throughout for interactive effects on memory. To conclude, memory for an impression is conceptualized as memory for the perceived personality attributes making up the impression, while impression valence is treated as a potential source of interaction with memory processes.

The impression is thus conceptualized as consisting of various pieces of observed or inferred information within the context of an overall judgement. If the majority of these pieces of information are features or attributes of one particular category, then assignment of the person to a category may be a straightforward process. Figure 1.1 illustrates this possibility. Traits 1, 2, and 3 are features of category A, while trait 4 is a feature of category B. If an impression consisted of these four traits, then three of the traits would point to the person being a type "A" person, while one trait would point to them being a type "B" person. The weight of evidence, with all things being equal, would suggest that the person is more like a type "A" than "B".

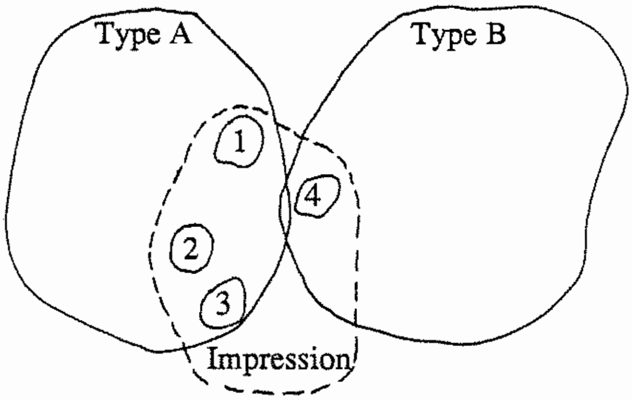

Fig 1.1 Schematic representation of an impression and its relationship to person categories.

There will, in all likelihood, be occasions when all the perceived features of the stimulus person are attributes of just one category, and other occasions when each perceived feature is an attribute of a different category. In the former case, the stimulus person would be judged to be a good exemplar of one category, while in the latter, the stimulus person would resist categorization. Both of these situations are of lesser interest in this research, since the former involves an absence of impression features associated with more than one category; while the latter lacks a single category to which the stimulus person could be assigned.

Thus, an impression of another's personality can be conceptualized as a number of features which are attributes of person categories, and which allow judgements about the type or category of person the exemplar most resembles. While a number of the exemplar's features will be consistent with the matched category, other features will not. The result is a basic differentiation in the impression between those features that are consistent with the matched category, and those features that are not. The memorial consequences for category-consistent and category-inconsistent information as represented in an exemplar becomes a fundamental question.

1.4 *Memory for Exemplars: The General Domain*

The memory for different parts of a stimulus has been investigated in various stimulus domains. Woodworth and Schlosberg (1954) concluded after a review of data on memory for visual forms that people employed a strategy of "schema with correction" (p. 715) whereby a new stimulus was decomposed into those parts that were like previously seen stimuli, and those that deviated from the usual pattern. That is, subjects partitioned new forms into features that were consistent with or related to the prevailing category, and those that were not. The term "schema" as used by Woodworth and Schlosberg bears resemblance to Rosch's notion of prototype, in that it refers to the collection or pattern of features that best characterizes the category. It is different in that it does not refer to one specific category exemplar that is judged to be the prototype of the category. Woodworth and Schlosberg found that this familiar pattern or prototype played an active role in the processing of components of the stimulus, resulting in a memory trace containing two types of information: schema-(prototype)- typical and schema-(prototype)-atypical information. These observations support the memory trace model outlined above, though no data were presented on whether one of other of the two types of information was more memorable.

Linguistic studies by Bartlett (1932) demonstrated that prior knowledge, or "schemas", significantly constrained the understanding and memory for new stories, such that with increasing retention intervals, progressively less detail could be recalled, and progressively greater distortions of the gist of the story occurred to accord with prior knowledge. The inference to be drawn from Bartlett's work is that information consistent with a familiar schema is recalled more accurately than inconsistent or unfamiliar information. Thus, not only does prior knowledge guide encoding of new material, as Woodworth and Schlosberg (1954) found, but it also has a role in guiding retrieval of this material.

More recent evidence comes from a number of categorization and classification studies which have investigated memory for different aspects of category-related information, such as the prototype of the category, specific exemplars, and so on. Stimuli have included linguistic forms (Bransford & Franks, 1971; Franks & Bransford, 1971), dot configurations (Homa, Sterling & Trepel, 1981; Homa, Cross, Cornell, Goldman & Schwartz, 1973; Posner & Keele, 1968, 1970; Strange, Kenney, Kessel & Jenkins, 1970), and letters/numbers (Reitman & Bower, 1973). A central issue has been whether memory for the attributes of specific exemplars decays more quickly than memory for the attributes of the prototype of the category. It is commonly argued that if exemplar information is lost from memory more quickly, then this may imply that some separate prototype-extracting and storage mechanism exists independently of the storage of the exemplars themselves (although some argue that differential forgetting of exemplar and prototype information need not imply separate mechanisms e.g. Brooks 1978; Medin & Schaffer, 1978; Hintzman & Ludlum, 1980).

In these studies, subjects were commonly trained to sort a number of experimental stimuli into a few categories. Each stimulus was a particular distortion of one prototype or pattern. Often, the prototypes had some features in common, resulting in exemplars of each category being similar to each other. Consequently, it often took the subject many trials to correctly sort exemplars into their correct categories. Upon completion of the learning stage, the subject was required to sort a set of test stimuli. The test stimuli usually comprised some old exemplars, some new exemplars (being new distortions of the prototypes), and the prototype pattern of the category itself.

It was generally found that a previously unseen prototypical exemplar was classified more accurately, more confidently, and more quickly than other unseen exemplars which were distortions of that prototype. Further, the greater the distortion represented in the test exemplar, the less accurate, the less confident, and the more time consuming was its classification. This evidence suggests that the prototype of the category is cognitively salient in comparison to exemplars which are distortions of it.

However, the data also show that old exemplars were classified or recognised as accurately and confidently as the unseen prototype. This indicates that exemplar-specific information was stored and retrieved as required. While exemplars contained non-prototypical features, their recognition was unimpaired. This suggests that prototype-consistent and prototype-inconsistent information represented in an old exemplar may be equally memorable. At a sufficiently delayed test, however, classification performance of old exemplars was comparable to that of novel exemplars, and less than that of the prototype, suggesting a more rapid loss exemplar-specific information. This reinforces the view that prototype-consistent information remains the most salient and recognizable.

Reitman and Bower (1973) offer further data on the recognition or classification of exemplars representing differing levels of prototype distortion. Their experiment used simple letter or number strings for "obvious" prototypes e.g. "1234" and "ABCD"; and a mixture of letters and numbers for "difficult" prototypes e.g. "41AB" and "3yzD". Distortions of these prototypes involved deleting up to three of the four elements while still preserving order eg "124", or "zD". A recognition test showed that subjects were most confident recognising old exemplars of the obvious, full prototypes, and less confident recognising exemplars of the obvious but distorted, prototypes. As the distortion increased, the confidence of subjects decreased. For the "difficult" prototypes however, subjects were equally confident at recognising either the full prototype exemplar, or any of the distorted exemplars.

The data of Reitman and Bower (1973) suggest that subjects, when learning about a category represented by an obvious prototype, place less emphasis on encoding and storing particulars of actual exemplars. If, however, the prototype is difficult to abstract and formulate, subjects spend more cognitive resources on encoding and storing the features of the particular exemplars themselves. These data have implications for processing of exemplars of person categories. If natural categories for persons are more like "difficult" concepts in that they are made up of attributes which are neither necessary nor sufficient in themselves, then impressions of exemplars of those person categories may well be stored with attention given to their particulars, since no obvious and simple prototype exists around which memory of the exemplar can be stored. This inference is not necessarily contrary to the one above, where prototype-consistent information would be expected to be better recognized than inconsistent information. Which type of impression information is better recognized is dependent upon which type of encoding strategy is used: prototype with corrections, or equal emphasis for all attributes.

While the classification above studies focused on the recognition or classification of stimuli, none was concerned with the ability to *recall* attributes of old exemplars. To study recall of particular exemplars would yield information concerning the ability to retrieve features which are consistent with the prototypical attributes the category, and those which are deviations from prototypical attributes. From these data it could be ascertained whether there is some assimilation to prototype over time such that, over time, the memory trace contains proportionately more prototype-consistent features. As yet, there is a paucity of data in the classification literature on recall of stored exemplar information.

In conclusion, categorization and classification studies suggest that where a prototype can be utilized, memory for an exemplar will consist of parts tagged as being consistent with the prototype, and parts tagged as being inconsistent. The evidence suggests that prototype-consistent information will be better recognized. Under conditions where the prototype is difficult to formulate, all parts of the stimulus will be encoded with equal attention, and there will be no advantage to prototype-consistent features. None of the studies suggests that prototype-inconsistent information will be better recognized. Finally, there is a need for studies on the recall of different kinds of exemplar information.

1.5 *Memory for Exemplars: The Human Domain*

Research into the cognitive processing of information about others is characterized by a number of approaches. Apart from the category/prototype approach which shall be elaborated below, the principal traditions stem from the Gestalt school, and from the associationistic Verbal Learning school. These approaches are examined for their compatability with the category approach, since *prima facie*, they suggest that the impression is not reducible to constituent features or attributes.

1.5.1 *The Gestalt View*

Soloman Asch (1946) began research into the perception of traits in others and their cognitive organization. Asch was interested in how an impression of another's personality was organized and structured, and whether, for example, this impression could be described as the simple sum of perceived trait characteristics, or whether there occurred some integrative process such that the final impression was not simply reducible to its constituent parts. His experimental procedure for investigating these questions is one still frequently followed today: The subject is presented with a list of trait terms and instructed to form an impression, and following this, is required to perform some task such as inferring the presence or absence of other attributes. As a result of his studies, Asch concluded that the impression was organized and integrated; that the individual trait terms interacted with each other to produce a particular and constrained interpretation of each term; that some traits were perceived as being more "central" or carrying more influence while others were less so; and that subjects were sensitive to harmony and contradiction within the trait ensemble. Thus the impression was neither a simple summation of the participating traits, nor a holistic view devoid of particulars regarding which traits were presented.

Two topics of particular relevance in Asch's study are first, the issue of central and peripheral traits; and second the issue of ordering effects in trait ensembles. Firstly, Asch found that in a seven trait ensemble describing a person, some traits had wide ranging implications regarding the presence or absence of other traits, while others had apparently minor implications regarding other attributes. The classic study demonstrating this found that the trait "warm", when added to six other traits, allowed many more confident inferences to be made than when the trait "polite" was added to the same six traits. Similarly, when "cold" was added, many more inferences were made than when "blunt" was added. Asch concluded that some traits in an ensemble were "central" or carried more influence, while others were "peripheral" or carried little influence. Asch's data suggest that some traits are processed differently from others, regardless of whether the trait is consistent or inconsistent with the remaining personality impression features.

A quite different explanation suggests that had Asch used a different checklist to gauge subjects' inferences, then he may have found that just as many inferences could have been made with the ensemble that contained "polite" as with the ensemble containing "warm" (Wishner, 1960; Podell, 1961). Alternately, it can be seen that some trait ensembles, considered as a whole, allowed more inferences to be made with a particular adjective checklist than other trait ensembles. Thus when "warm" was added to the six other traits the resulting ensemble may have concorded more with subjects' person categories than when "polite" was added, thus allowing more confident judgements about what other attributes would be present. Both these explanations suggest that individual traits such as "warm" do not necessarily have some independent and influential status regardless of the context in which they appear.

Further to this point, Asch presented his subjects with the six traits referred to above without the added seventh term to see what inferences would be drawn. He found that a more neutral impression emerged when the results were averaged over all subjects, but that there were pronounced individual differences. Quite positive or quite negative impressions were formed by subjects despite the omission of the traits "warm" and "cold". Asch concluded that "a full impression cannot remain indifferent to a category as fundamental as the one in question" i.e. to the like/dislike categories (p. 266). Asch's reference to "category" here is not unlike the concept of category used in the present research. Also noteworthy is that when presented with a common set of traits which may have seemed evaluatively neutral to the experimenter, subjects were prone to adopt either a positive or negative view of the stimulus person. Thus some categorizing behaviour seems to have been initiated by subjects in an apparently neutral context.

The second finding of interest in Asch's studies concerns the effect of the order of traits in the ensemble. Initial traits were found to carry more weight in the final impression than later traits, an effect known as the primacy-in-impression effect. Asch suggested that early traits set up a "frame of reference" which guides the interpretation of later traits. In the context of categorization, this "frame of reference" might be seen as pointing to a particular type of person. Later traits would be regarded as atypical or distortions of that prototype. Hence, reading a particular ensemble forwards may suggest a basically "nice type" with a few failings, while reading it in the reverse direction may suggest a basically "unpleasant type" with a few redeeming qualities. Thus the data on order effects may reflect the occurrence of categorizing behaviour, which may have been manipulated by the manner of presentation of the traits.

Finally, when selecting groups of traits, Asch was "guided by an informal sense of what traits were consistent with each other" for initiating impressions of "the kind of person described" (p. 261). As detailed above, Asch noted that the accounts of the subjects diverged from each other in important respects, producing a notable degree of inter-subject variability. The experimental work reported in this thesis is guided by this finding, and as far as possible, allows subjects to decide for themselves which traits are associated with each other.

In conclusion, the work of Asch (1946) which has been seminal in the domain of person perception, does not exclude the possible role of natural categories in the processing of impressions about others. Rather, there are frequent references by Asch himself to categories of people, and to subjects' propensity to cast seemingly neutral personality information into a positive or negative light.

1.5.2 *The Verbal Learning View*

Early research on the memory for traits was reported by Anderson and Hubert (1963) who were seeking an explanation for Asch's primacy-in-impression effect. They were seeking an explanation that did not involve intuitive notions such as "frame-of-reference". Their hypothesis suggested that subjects simply pay less attention to traits later in the series and hence these later traits carry less weight in the final impression.

The attention-decrement hypothesis carries with it the assumption that traits presented later in the ensemble maintain constant likeability-dislikeability values. It is only the amount of attention given to these traits that varies. That is, in terms of the model of trait information integration developed by Anderson (1965):

Impression Valence = w1.t1 + w2.t2 + w3.t3 + ...+ wn.tn

where n is the number of traits in the ensemble; weight coefficients, w, sum to unity; and t represents the scaled likeability-dislikeability value of the particular trait, it is only the weighting coefficients which vary in value, and not the trait values themselves. By contrast, Asch (1946) suggested that the traits presented later in the sequence are given particular nuances as a consequence of the context, and consequently the likeability-dislikeability value for a given trait would vary as a function of the particular meaning ascribed. This would prove difficult for Anderson to incorporate in his model in any simple way.

It should also be noted that Anderson and Hubert operationalized the impression as an affective judgement of the stimulus person. Impressions varied essentially in terms of affective strength. As noted above, affect is a fundamental dimension of impressions, but should not be presumed to be the only important dimension.

Anderson and Hubert hypothesized that, if subjects were informed that they would be required to recall the traits as well as report their impressions, then this would ensure equal attention to all traits, and should thus abolish the primacy effect. They found that asking subjects to recall traits abolished the primacy-in-impression effect, and also resulted in a quite large recency effect in recall (immediate recall being used). They concluded that since there was no primacy (or recency) effect in the impression, but there was a strong recency effect in recall, then the "principal implication of the present studies is that the formation of the impression involves a memory process which is distinct from, and not dependent on, the immediate verbal memory of the adjectives just heard" (p. 386). This conclusion remains popular (Dreben, Fiske, & Hastie, 1979; Hartwick, 1979; Hastie & Park, 1986; Riskey, 1979; Rywick & Schaye, 1974; Wyer & Gordon, 1982).

Anderson and Hubert concluded that recall of impression traits is subject to processes similar to those that govern the recall of words from any list, while the impression formation process is a distinctly different process. For Anderson and Hubert, asking subjects to recall traits would not yield evidence pertinent to an examination of the effects of impression formation.

It is perhaps not surprising that the impression formation process and memory process should appear independent, since recall was required immediately after hearing the trait ensembles. This would have allowed subjects to make use of temporal contiguity of traits in their working memories during recall, rather than having to retrieve them from any organized trace in long-term memory (Atkinson & Shiffrin, 1968). Thus the experimental design of Anderson and Hubert possibly obscures the true relationship between impression formation and memory processes.

Close examination of the data of Anderson and Hubert further qualifies the independence position. In the first of their two experiments, subjects had to form impressions of 80 characters, and some had, in addition, to recall the traits ascribed to 40 of these. Each character was described by a six-trait ensemble containing three favourable traits and three, in effect, unfavourable traits. Of the 80 characters, 48 were described by randomly ordered "filler" ensembles irrelevant to the impression primacy effect, while 16 were described by three favourable traits followed by the three unfavourable traits, and the remaining 16 characters were described in the reverse manner. Based on these latter 32 characters, Anderson and Hubert reported an impression primacy effect where no recall was required, and no primacy where recall was required. However, the recall function showing the recall recency effect was based on recall of 40 characters, namely 24 "fillers" and only 16 constructed in the favourable/unfavourable or unfavourable/favourable pattern. Thus the impression and recall functions are based on different character sets, and cannot be strictly compared.

In addition, Anderson and Hubert do not report separate likeability ratings of the impression-only and impression-plus-recall groups. Hence it is not known if the instruction to recall traits significantly altered subjects' impression-formation strategies. Subjects who had to recall traits may have opted to allocate greater cognitive resources to recall, thereby significantly altering the impression formation process. Thus the independence of impression formation and memory for traits is not convincingly shown in Experiment 1.

The second experiment of Anderson and Hubert paralleled their first in several major respects. Again the recall function is based on data approximate to, but not identical with, the data on which the impression primacy results were based. Again, no strong conclusions can be drawn.

Others have elaborated on the independence proposition (Dreben, Fiske, & Hastie, 1979; Riskey, 1979; Rywick & Schaye, 1974), though only Rywich and Schaye

(1974) have attempted to establish whether the independence effect persists beyond the temporal limits of immediate, or short-term memory. In a design that interpolated a 60-second mathematics task between impression reporting and recall of traits, Rywick and Schaye (Experiment 2) reported an abolition of the recall recency effect while leaving the impression function unaffected. They suggested that clearing the short-term memory buffer had abolished the recall recency effect, but had not affected the impression formation process. The independence of the two processes was reaffirmed.

Two points can be made with respect to Rywick and Schaye's results. First, their instructions directed subjects to "pay close attention to the following 8 words", after which subjects were administered the likeability rating task. Such instructions are not impression-formation instructions, and may not have encouraged subjects to form any impression during their presentation. Second, not only was there no recency effect in the recall functions of the delayed recall group, but there was no recency effect in the recall functions of the immediate recall group either, where the short-term buffer should be operational. Thus it appears that the subjects may have adopted a processing strategy that was neither an impression-formation nor a list-recall strategy. Consequently, the results of this study must seen in the light of these qualifications.

Nevertheless, the general conclusion has been drawn in each of the studies that recall of traits is essentially a list-learning phenomenon, subject to the same factors affecting recall of lists of words, and divorced from the impression-formation process. However, the confounding factors common to all studies which constrain the validity of this conclusion should be iterated. Firstly, traits were presented as lists. Subjects did not have to either nominate traits that they felt may have described a stimulus person, nor did they have to select traits from checklists, either of which procedure may have encouraged impression-formation strategies. Secondly, recall was nearly always immediate. None of the studies have a delay between rating and recall greater than one minute of interpolated activity. Hence there are no data on the long-term recall function, where the memorial effects of impression formation may be most potent. Thirdly, few attempts were made to avoid subjects using recall strategies. Anderson and Hubert incorporated one unanticipated recall test, but the recall and impression data are, as above, based on different characters. Riskey had four such "unwarned" recall trials, but the instructions to subjects indicated that on some infrequent trials, recall would also be required. Consequently, these "unwarned" recall trials were not totally unwarned. Fourthly, stimulus characters were described by self-contradictory trait ensembles (at least in evaluative terms). Although instructions to subjects indicated that each trait had been supplied by an acquaintance, and that some inconsistency might be found, the subject may have had difficulty in forming a coherent impression. This may have encouraged a list-learning strategy. Fifthly, subjects simply indicated the likeability of the character. No further processing was required e.g. indicating what other traits the character may have. Thus the subjects may have responded to the rating task by doing a rough count of the good and bad points, and indicating the overall outcome. There would have been no need to form a unified impression of the character.

Each of these factors has made the recall of traits appear similar to recall of a list of common words. Careful experimentation is therefore needed to minimize the likelihood of subjects using list-learning strategies in studying memory for impression traits. A set of experimental procedures which attempts this are developed in the experimental work reported in this thesis.

1.5.3 *The Influence of Prototypes: The Schema View*

Recent work specifically addressing the issue of memory for impressions stems largely from Cantor and Mischel (1977). Their study represents a confluence of research on prototypes, impression formation, natural categories, and schematic processing. They posed the question of whether trait labels such as "extravert" or "introvert" denoted a prototypical sort of person which was associated psychologically with a set of behavioural features, in much the same way as features were associated with the label "bird" or "furniture".

Further, they raised the question of whether such a labelled set of associated features influenced the encoding, storage, and retrieval of information regarding another person. That is, they sought to determine whether subjects engaged in "schematizing" behaviour as originally described by Bartlett (1932) and Woodworth (1938).

Cantor and Mischel (1977) collected lists of features or attributes in the form of traits that subjects felt were associated with the labels of "extravert" and "introvert", assuming that these two labels referenced person prototypes. From these lists of attributes they constructed four fictional characters, two of which were each represented by six traits moderately associated with the label, and four unrelated traits. Two control characters were also constructed, each represented by ten traits, all of which were either slightly related or unrelated to the two labels. A second group of subjects read descriptions of the characters, with the instruction to remember the information. In an immediate recognition test, some of the previously presented items were re-presented, as were novel items which ranged from those traits highly related to the relevant prototype, to those unrelated to the prototype. The data show that prototype-related distractors were less confidently rejected than prototype-unrelated distractors. The subjects could, however, clearly distinguish target items from distractors. On the basis of this evidence, Cantor and Mischel concluded that while the prototype had been activated and did play some role in processing information about the character, the retrieval of specific, stored information also allowed for a clear and accurate decision about which trait items had been presented and which had not.

In their discussion of the data, Cantor and Mischel (1977) concluded that subjects "exhibited a clear memory bias consistent with the trait prototype, expressing greater confidence that they had seen nonpresented but conceptually related material as opposed to nonpresented, unrelated material" (p. 45). As a consequence, these results have often been accepted as evidence of superior memory for prototype-consistent information (e.g. Hastie & Kumar, 1979; Landman & Manis, 1983; Srull, 1981; Taylor & Crocker, 1981).

A closer examination of the data of Cantor and Mischel (1977) shows two things. Firstly, subjects' recognition ratings of prototype-consistent and prototype-unrelated traits were nearly equal (the sample data actually show a higher confidence rating for the unrelated items but no inferential statistics were reported). Hence, memory for impression traits (or hit rates) showed no bias toward either type of information. Secondly, prototype-consistent distractors induced more uncertainty than unrelated distractors, since their confidence ratings fell closer to the midpoint of the certain-uncertain scale. In other words, more false alarms were made for prototype-consistent distractors. Since the hit rates for the two types of information were nearly equal, but the false alarm rate for consistent distractors was higher than that of the unrelated distractors, the *d'* value (Green & Swets, 1966) for congruent information would be less than the value for unrelated information. This suggests that contrary to the accepted interpretation of the results, prototype-consistent information is *less* discriminable and *less* accurately remembered than prototype-unrelated information.

This appears to be contrary to the evidence reviewed above in the non-human domain, which suggests that consistent information is more memorable than inconsistent information. However, the difference may be more apparent than real. In the studies using inanimate stimuli, recognition was measured only with respect to, in effect, hit rates. It was found that hit rates for consistent and inconsistent information were either equal, or with the passage of time, higher for consistent information. Cantor and Mischel (1977) tested immediately, and reported equal hit rates. Thus, there may be no real disparity between the two domains.

A study by Woll and Graesser (1982) was similar in design to that of Cantor and Mischel (1977), though shows different results. Subjects recognized material with respect to eight fictional characters (two additional "filler" characters were not tested) 30 minutes after first hearing tape-recorded descriptions of the characters' traits and behaviours, and then rating each on a likeability scale. The hit rate for consistent information was higher than for inconsistent information, as has been found in other domains. The false alarm rate for consistent distractors was higher than for inconsistent items, and approached the hit rate for consistent targets. The difference in hit rates, and the high false alarm rate, contrast with the equal hit rates and low false alarm rates of Cantor and Mischel (1977). Reconciliation of the results of these two studies may rest on methodological grounds. Cantor and Mischel (1977) employed four characters, memory set instructions, and tested immediately, while Woll and Graesser (1982) employed 10 characters, impression formation instructions, and tested after a short delay. It is apparent that subjects in the former study were primed to remember the information, had less information to remember, and were spared a retention interval, while subjects in the latter study formed general impressions rather than preparing for a memory test, had more information to remember, and had to remember it after an interval of thirty minutes. Thus in the latter study, more misses of atypical information, and more alarms to nonpresented typical information is not an unexpected outcome.

Regardless of the differences in outcome of these two studies, the false alarm data in both point to a measure of memory that has been neglected in the recognition studies in the general domain reviewed above. It is clear that not only are hit rates for consistent and inconsistent information an important measure, but the false alarm rates for the two types of information are also important. What may initially appear as a better memory for consistent information based on higher hit rates, may actually be an inferior ability to discriminate presented from nonpresented information as evidenced by higher false alarm rates. Thus it is important to focus on both hit rates and false alarm rates in gaining a clear picture of memory for prototype-consistent and prototype- inconsistent information.

Cantor and Mischel (1977) further examined whether a label (e.g. "extravert") was necessary to induce schematic processing (as did Woll & Graesser, 1982), since everyday encounters often do not involve such labels. Further, there may be personality types which do not lend themselves to labelling. In an explicit-label condition, subjects were presented with the label of the appropriate prototype, in conjunction with the ten presented traits (i.e. the fictional character was described as being "extraverted" or "introverted"). In the implicit-label condition, no such label was presented. This manipulation, however, made no difference to the pattern of results, an outcome which Woll and Graesser also report. Hence in the realm of person prototypes or person categories, it seems that exposure to a person exhibiting a set of associated features can activate schematic processing in the absence of an identifying label such as "extravert ". This seems to be one point of departure from studies of natural categories where labels such as "bird" or "chair" have been explicitly linked with psychologically associated features, and which, in the laboratory, have been used to activate the associated features.

In their discussion of the data they state that "implicit in our work is the assumption that a trait prototype contains a list of specific traits that are considered to be highly related to a more abstract superordinate trait that functions as a unifying category label (e.g. Extraversion: outgoing, bold, boisterous, energetic,...)"(p. 45). They do not suggest other superordinate traits that might function like "extravert" and "introvert", nor do they comment on methods to identify them. In addition, Cantor and Mischel do not comment on their finding that such unifying labels do not seem to be necessary to induce schematic processing. They do, however, present further analyses showing that activation of the label by itself, without concomitant presentation and activation of of label-related traits, is insufficient to induce schematic processing.

The effects of prototypes on recall rather than recognition of exemplar information was addressed in a follow-up study by Cantor and Mischel (1979b). This study focused primarily on the effect of degree of prototypicality on the amount of recall. They hypothesized that the more a stimulus person resembled the prototype of a category, the easier it would be to encode, store, and retrieve information about that person, and hence the greater the amount of information that could be recalled. The authors constructed three fictional characters, each consisting of nine items of information. One was a "pure" character where all nine items were consistent with a single category, e.g. all pointed to extraversion; another was a "mixed" character where six items pointed to one trait and three items pointed to another independent trait eg extraversion and helpfulness; while the remaining character was an "inconsistent" person, for whom six items pointed to one trait, while the other three items pointed to the opposite trait. The data supported the hypotheses, since recall was greatest for the pure character and least for the inconsistent character, with recall of the mixed character falling between the two.

Unfortunately, there was no analysis of the levels of recall of prototype-consistent and inconsistent traits. Such an analysis would have yielded data pertinent to the question of whether there is any advantage to category-consistent or inconsistent information at recall, and whether there is differential decay of schema-consistent and schema-inconsistent information with time. Cantor and Mischel (1979b) indicated that a preliminary analysis of this kind was performed, but the results were not given in detail. They did, however, note that "these data suggest that subjects recalled items from the different prototypes roughly in proportion to the representation of each prototype in the original character descriptions"(p. 198). This is interesting since it suggests that, while prototypicality had an effect on the amount recalled, it did not influence the type of information recalled.

Although Hastie and Kumar (1979) ostensibly addressed the same issues as Cantor and Mischel (1979b), the manner in which they framed their hypotheses, and the methodology employed, has had the effect of changing the direction of research in this area. Hastie and Kumar were interested in whether schema-relevant information was more memorable than schema-irrelevant information; and, within the domain of schema-relevant information, whether schema-congruent information was more or less memorable than schema-incongruent information. To study these questions, they first presented subjects with a trait ensemble describing a fictional person, with all traits relating to a single quality e.g.
intelligent - clever - bright - smart - quick - wise -knowledgeable - decisive
Subsequently, subjects were shown a number of sentences describing various behaviours performed by the fictional person. These sentences described behaviours that were either congruent, incongruent, or irrelevant to the single quality first described. After a few minutes of interpolated activity, subjects were asked to recall these sentences. Relative recall levels of the three types of behavioural information were then compared.

This design is substantially different from Cantor and Mischel (1979b), since it *first* initiates an impression in the subject of a kind of person, *subsequently* presents information of varying relevance to this impression, and measures memory for this *subsequent* information. The approach of Cantor and Mischel involves the *simultaneous* presentation of all information about the stimulus person, and measures memory for this *original* information. The two approaches are quite different, and address different issues. The approach of Hastie and Kumar seems to best model the situation where we have a prior expectation about the stimulus person (either from personal experience or from hearsay), while the approach of Cantor and Mischel seems to model the situation where meeting a new person does not involve any prior expectation.

Others have employed the basic strategy of Hastie and Kumar (1979) (Crocker, Hannah, & Weber, 1983; Hemsley & Marmurek, 1982; Rothbart, Evans, & Fulero, 1978; Srull, 1981; Srull, Lichtenstein, & Rothbart, 1985; Wyer, Bodenhausen, & Srull, 1983; Wyer & Gordon, 1982; Wyer & Martin, 1986). The assumption underlying these studies is that the subject can use the impression of the fictional character to induce schematic processing. It is argued in these studies that the interrelationships between the traits can be established at the time of the experiment, under the node of the character label (such as "Bob"), and that such an ad hoc structure can function as a schema for the duration of the experiment. This assumption depends on firstly, the subject remembering all the attributes equally well, and maintaining links between these qualities where no such links may have previously existed; and secondly, on the lack of influence of the subject's existing repertoire of person categories on the experimental representation of these attributes and their interrelationships.

If subjects can take an arbitrary set of traits, gain a unified impression from them, and use that impression in a schematic way, then this has implications for the Cantor and Mischel (1977, 1979a, 1979b) thesis that knowledge about others is organized into "natural" categories, and that these categories form the basis of schematic processing. The implication is that such categories, if they exist, may not be implicated in schematic processing. When an impression is gained of another, initial reference may be made to one's repertoire of person categories, but this comparison quickly becomes secondary to the impression itself which forms the frame of reference for processing subsequent information about the person.

A more radical implication is that knowledge of traits and personality attributes is not organized into categories. Rather, it may be the case that a large number of traits are simply available for use by the perceiver as required, with traits being psychologically associated on a pair-wise basis to varying degrees. These pairwise associations may be scaled multi-dimensionally, revealing axes such as valence and potency (Rosenberg & Sedlak, 1972). However, such a psychological network of interlinked traits need not imply that groups of traits constitute "natural" categories.

However, these studies concentrate on memory for information presented subsequent to the activation of a schema or prototype. To date, few studies focus on the memory for impression information that is processed simultaneous with the activation of the schema or prototype.

1.6 *Recent developments*

Memory for schema-congruent and schema-incongruent information still generates research (e.g. Stangor & Ruble, 1989), though the emphasis on this question has diminished. The preoccupation with the issue led to a view that perceivers either filtered out inconsistent information (the schema view), or had enhanced memory for inconsistent information (the associative view). Whichever may have been the case, memory for information relevant to an impression was seen as distorted in one direction or another. This pessimistic conclusion has prompted a new wave of research that seeks to reestablish the veracity of impression-formation processes.

There are at least four current areas of research in person perception that are relevant to this new concern. While all ostensibly address different questions, they are nevertheless in general accord in suggesting that person perception processes and memory are more accurate than has been suggested by earlier research. These four areas concern the effects of motivation to accuracy on person memory; the effect of contextual information on memory; the accuracy of memorially-based judgements; and the incorporation of individuating evidence in memory.

Firstly, there is a new emphasis on the effects of motivation on person perception and memory. The studies of the early 1980's did not address this issue centrally, as they commonly asked no more of the subject than a judgement of likeability of a stimulus person, and/or recall of information about the stimulus person. The subject had neither the expectation of meeting the person, nor indeed that they even existed. Consequently, there was little motivation for the subject to remember the stimulus person with any accuracy. In this case, perceiving and storing a simplified impression of the stimulus person may have been sufficient to meet the experimental demands. Recent studies have explicitly manipulated the motivation variable, commonly by inducing an expectation in the subject that they would have to interact with the stimulus person.

Devine, Sedikides and Fuhrman (1989) led subjects to expect that they would have to co-operate with a certain person in a five-person group on a problem solving task. Devine et al. then presented the subject with pieces of information about the five people in the group--their names, study majors, one trait for each person, something each person strongly disliked, and each person's favourite performer. Some subjects were given instructions that generated the expectation of interaction with the target person, while others were not. It was found that subjects who anticipated interacting with the target person recalled more information about that person than any other person in the group. Subjects in the anticipated-interaction condition were also more accurate on a person-item matching task.

In their second study, Devine et al. compared a number of processing strategies which may be used when perceiving others, such as impression formation, anticipated interaction, comparison-with-self, comparison-with-friend, and memory set. Using similar procedures to their first study, the authors again found better recall and person-item matching under the anticipated-interaction and impression-formation instructional sets. This set of data, as above, attest to the accuracy of person perception and memory processes when the perceiver is motivated to accuracy.

In a similar set of studies, Neuberg and colleagues (Neuberg, 1989; Neuberg & Fiske, 1987) have also found that motivating subjects to accuracy affects the impression-formation process. Neuberg and Fiske (1987) led subjects to expect that they would interact with a "schizophrenic" in a task that involved generating creative games. Half the subjects read neutral profiles of the stimulus person, while the other half read descriptions inconsistent with the label. Subjects gave likeability ratings of the stimulus person, and their reading times for the descriptions were measured. It was found that subjects were much more influenced by the descriptions than they were by the label, either when they anticipated interaction, or when they read inconsistent information. Only when they read neutral descriptions and did not anticipate interaction, did they record short reading times and low likeability ratings. Similarly, Neuberg (1989) found that subjects who interviewed applicants for a job were able to disregard prior negative information about the applicant in their assessment of the applicant's suitability when motivated to accuracy. They were able to do this partly by adopting more appropriate questioning of the applicant than was the case with subjects not so motivated. Overall, the evidence suggests that subjects will, when motivated, concentrate more on individuating evidence and less on category labels.

A second area of person perception research currently focuses on the positive effect on accuracy of judgement and memory of contextual information regarding the behaviour of the stimulus person. A number of studies by Mischel and associates

(Shoda, Mischel, & Wright, 1989; Wright & Mischel, 1987, 1988) have examined this question, in addition to the different ways in which we circumscribe, or qualify the overall perception and impression of another. Shoda et al. examined counsellors' impressions of stimulus children, and examined their ability to accurately predict the childrens' behaviour. In their study, actual childrens' aggressive behaviours provided the basis of both experimental materials and criterion measures. Shoda et al. found that both impressions and predictions were significantly more accurate when the judge was provided with information about the context within which the behaviour had occurred. The sensitivity to context allowed the impression formation processes to more accurately map the stimulus person. Knowledge of the context within which a stimulus person is being evaluated also allows the perceiver to qualify the judgement. Wright and Mischel (1988) found that subjects employed probabilistic qualifications such as 'person sometimes is x', or conditional statements such as 'person is x when y' to anchor judgements about the person to specific conditions. As is apparent, the emphasis in this research is on the accuracy of the perceiver, and his or her sensitivity to those factors that may qualify the impression.

A third area of research that examines accuracy is exemplified in the work of Zuroff (1989). Zuroff examined the ability of subjects to accurately predict the frequency of adjectives presented to the subject after the activation of a schema. One group of subjects first read a description of either a liberated woman or a conventional woman, under impression-set instructions. These subjects then read a number of masculine or feminine adjectives purportedly being the judgements of some others. Zuroff found that this group of subjects significantly overestimated the absolute number of schema-consistent adjectives. A second group of subjects who read the adjectives first, and then read the descriptions, did not overestimate the consistent adjectives. Yet in Experiment 2, subjects who read the description and then read the adjectives were largely accurate in their estimation of the frequency of specific adjectives. Even if asked to rank order the frequency of specific adjectives, subjects still overestimated the overall number of schema-consistent adjectives (Experiment 3). The results of Zuroff show an interesting blend of accuracy in judgements of detail, and schematically consistent distortion in global judgements of frequency of personality-related information.

Finally, the fourth area in person perception that has implications for the question of accuracy focuses on the interaction between "top-down" processing, emphasized in schematic processing, and "bottom-up" processing emphasized in associative processing. Recent data show that subjects can elect to engage in a deliberate, step-by-step assessment of a person, rather than infer the person's qualities from a schema that may have been activated. This seems especially true when the categorical status of the person is not immediately clear. Pavelchak (1989) presented subjects with information about six hypothetical students each described by four traits. In the 'piecemeal' condition, subjects rated the person for their likeability, and then made judgements about which academic major they were pursuing. In the 'categorization' condition, subjects first made the academic-major judgement and then rated the person for likeability. Pavelchak found that, in the piecemeal condition, likeability ratings were related to the likeability of the individual traits, while in the categorization condition, likeability ratings were related to the likeability of the category. On the basis of these results, Pavelchak suggested that top-down or category processing does not automatically override piecemeal processing, and subjects can be attuned to individuating evidence.

A similar two-mode processing model has been suggested by Brewer (1988), though for Brewer, motivation determines whether subjects engage in one mode or the other. In contrast, Pavelchak (1989) argues that the choice is determined by the degree of fit between the stimulus person and the category with which he or she is compared.

In a similar vein, Fiske, Neuberg, Beattie and Milberg (1987) studied the effects of the likeability of an occupational label and of the likeability of individual traits on judgements of overall likeability of stimulus persons. They found that judgements were linked to the category label when the stimulus person was depicted in a label-typical manner, but was more related to the individual traits when the person appeared atypical of the category. Their results suggest that person perception processes are attuned to the degree of congruence between category and individual attributes, and when necessary, these processes will focus on the individuating features of the person. To conclude, studies in this area demonstrate a concern with piecemeal processing, and the results suggest that subjects will focus on the stimulus person's actual attributes when there is doubt as to their categorical typicality.

In summary, each of the four research areas discussed above focuses on a different phenomenon within person perception, but the results in each case attest to the capacity for accuracy in the perceiver. Higgins and Bargh (1987) in their review of the person perception and memory, also counter the impression that may be given by earlier research that person memory processes are subject to all sorts of errors and distortions. They conclude firstly, that memory for impressions are quite accurate; secondly, that constructs and goals guide processing rather than overwhelm it; thirdly, that often highly accurate individual instances are stored apart from abstract representation; fourthly, that abstraction processes are not automatically activated, but subject to overriding strategies; and fifthly, that during retrieval, there are few passive intrusions of related but unpresented information. To return to the earlier issue of memory for schema-consistent and schema-inconsistent information, they note that more inconsistent information will be recalled only under special or constrained circumstances: Firstly, the subject must have the goal of forming an impression of another; secondly, the subject must have adequate time to consider the implications of contradictory behaviours; thirdly, the inconsistent behaviours must be clearly contradictory; and fourthly, there must be no possibility of attributing the inconsistent behaviours to situational factors. Further, recall of incongruent information is sensitive to set size effect, with superior recall of inconsistent behaviours being abolished if contradictory behaviours are in the majority.

The research reviewed above was stimulated by an interest in accuracy that had been ignored or de-emphasized while there was a preoccupation with the question of memory for schema-congruent and -incongruent information. The move away from this latter issue was also prompted by research that suggested that earlier findings were more problematic than first realized. Belmore and Hubbard (1987) focused on the earlier question of memory for congruent and incongruent information, though the results of this study have implications both for the question of accuracy, and for the associative network model advanced by Hastie (Hastie, 1980, 1981; Hastie & Kumar, 1979) and Srull (Srull, 1981, 1983; Srull & Wyer, 1979, 1980, 1986; Wyer, Bodenhausen, & Srull, 1984; Wyer & Srull, 1980; 1981; 1986).

In the study of Belmore and Hubbard (1987), one group of subjects read a trait description before reading a list of behaviours, while a second group read the trait description after reading the behaviours. The behaviours were either congruent, incongruent, or irrelevant to the trait information. A third group of subjects read the list of behaviours without any trait information. The lists of behaviors contained either a high number of incongruent behaviours (equal to the number of consistent behaviours), a medium number (half the number), or a low number (one fifth the number). Belmore and Hubbard found that the pattern of recall was similar for all three groups: better recall of incongruent behaviours when they were of medium or low frequency; an intermediate level of recall of congruent behaviours; and low recall of irrelevant behaviours. Thus, the typical pattern of better recall of incongruent behaviours occurred irrespective of whether the trait information occurred before or after the behaviours, or did not occur at all. Better recall of 'incongruent' behaviours occurred despite the absence of any trait-based schemas with which they could be compared and seen as incongruent. Thus, it is difficult to see how the explanation of better recall of inconsistent behaviours--that it is the result of additional processing due to their incongruence with a prior schema--can be sustained in the face of these results.

Belmore and Hubbard (1987) further showed that when subjects read trait information and a list of behaviours, only a minority of which were consistent with the trait information, then these minority consistent behaviours were better recalled than the majority inconsistent behaviours. This was regardless of whether the trait information preceded or followed the behaviours. Thus the superior recall of inconsistent behaviours is reversed when these incongruent behaviours form the majority of a list of behaviours. Belmore and Hubbard concluded firstly, that the impression generated by subjects is much more sensitive to the behaviours than to the trait information, and secondly, that consistency and inconsistency of behaviours is judged with respect to the body of behavioural information, not to the trait information. If the behavioural information is in accord with the supplied trait information, then there is no conflict. If, however, the body of behavioural information is at odds with the trait information, then the impression is based on the behavioural information. In this model, then, ascribed trait information (as distinct from behaviourally-based inferred trait information) is disregarded when it clashes with behavioural evidence.

The respective roles played by the two types of information, trait label and individuating behavioural evidence, echoes the recent research reported above, where category information is disregarded when needs be in favour of individuating information. Thus the subject can be quite sensitively attuned to concrete data when forming impressions. It would not be an overstatement of the Belmore and Hubbard (1987) model to assert that the role of trait information is secondary to that of behavioural evidence, as input to an impression. For many decades, the trait was equated with an impression (Asch, 1946), but the study of Belmore and Hubbard signaled a break with this tradition. The secondary role played by trait information is further evidenced in arguably the most complete and detailed model of person memory and judgement to date. This model of person memory, detailed in Srull and Wyer (1989), has been under development for a decade now (Srull, 1981, 1983; Srull & Wyer, 1979, 1980, 1986; Wyer, Bodenhausen, & Srull, 1984; Wyer & Srull, 1980, 1981, 1986), and offers further insight into the roles of traits, behavioural data, and affect in impression formation.

The model suggests that a person, in forming an impression of another, attempts to interpret the other's behaviours in terms of traits. The perceiver also attempts to construct a general concept or evaluation of the person as likeable or not likeable, based on trait concepts used to interpret the person's behaviours. If an evaluation is successfully formed, behaviours of the person are reviewed for their consistency with the evaluation. Generally, the greater the consistency, the greater the associative strength between behaviour instance and evaluative representation. Behaviours that are evaluatively inconsistent, as opposed to descriptively inconsistent (though the two often coincide), stimulate cognitive activity aimed at reconciling the inconsistency. This cognitive activity generates a complex array of associative links between the inconsistent behaviours and other behaviours. This process had been suggested earlier in the model of Hastie (Hastie, 1980, 1981; Hastie & Kumar, 1979). It is hypothesized by Srull and Wyer that this complex array forms the basis for the superior recall of incongruent behaviours (providing these are in the minority (e.g. Belmore & Hubbard, 1987; Hemsley & Marmurek, 1982)). In contrast to this complex web of links between behaviours, traits are stored separately, linked individually to a non-evaluative memorial tag of the person (such as their name), but not to each other.

This conceptualization of impression formation and memory incorporates a fundamental cleavage between descriptive knowledge and evaluative representation. Indeed, their model is not so much driven by knowledge and understanding (cognition in the generic sense), but by affect. According to the authors, the forces that impel further thinking about another's behaviours spring from inconsistency that is evaluative rather than descriptive i.e. evaluative inconsistency between individual behaviours and the overall evaluation. Furthermore, the associative network that results links individual behaviours and the overall evaluation of the person; not behaviours and traits, nor traits themselves, nor traits and the central person evaluation. By contrast, traits are stored separately, with no associative links between them. Moreover, according to the model, forming an impression seems to have no implications for memory for traits over and above that of a straightforward memory task. The authors cite Wyer and Gordon (1982) Experiment 1 as support, where subjects under either impression-formation or memory-set instructions were presented with a number of traits, either all pointing to one quality or pointing to separate qualities, and then with a list of behaviours, mostly relevant but some irrelevant to the quality or qualities. The results show that subjects recalled equal numbers of traits in the two task orientations, but subjects in the impression-formation task recalled more behaviours than subjects in the memory-set task. These data suggest that the recall of traits was essentially equivalent under these two task conditions, while the recall of behaviours was not.

This result contrasts with other studies that find recall of traits under impression-formation conditions is superior to recall under memory-set instructions (Hamilton, Katz, & Leirer, 1980; Hastie, 1981; Srull, 1981, 1983). Yet it remains the case that, in the Srull and Wyer (1989) model, inter-trait inconsistency is not the cause of further cognitive processing, nor do traits become linked to each other. The evaluation and its relationship with particular behaviours are the actors in this model. The structural position of traits in the memory trace is one of relative isolation and independence. The almost peripheral place which traits occupy in the model of Srull and Wyer contrasts with the classic position of centrality they have occupied in theorizing about impression formation since Asch (1946).

The model of Srull and Wyer (1989) is not without its problems. On the one hand they assert that inferred traits are stored separately, with no direct trait-trait links. On the other hand, the perceiver attempts to form an overall evaluation based on traits, taking into account the favourableness of each. The traits may differ in favourableness, necessitating some degree of processing before such a concept can be distilled. However, to be able to gauge whether traits differ in favourableness implies that they are thought about in relation to one another, which is just the sort of activity that would lead to direct trait-trait links. This seemingly inconsistent aspect of Srull and Wyer's (1989) model remains unaddressed.

As noted, much recent research points to a change in the essential description of the perceiver, from one dominated by schemas, to one sensitive to individuating evidence. Both pictures are, however, essentially cognitive in their bases. Much of the research into person perception and memory in the last decade, as reviewed above, is cognitive in orientation. Person perception and memory is not the only area of social knowledge that has recently been described using cognitive concepts and methodology. The cognitive processes underlying person perception and memory have also been hypothesized to be underlie a number of related domains of social knowledge. At a general level, the role of the schema has fueled much research in social psychology (Fiske & Linville, 1980; Hastie, 1981; Landman & Manis, 1983; Taylor & Crocker, 1981), particularly stereotyping (Brewer, Dull, & Lui, 1981; Cohen, 1981; Hamilton, 1979; Rothbart, Evans, & Fulero, 1979; Taylor, Fiske, Etcoff, & Ruderman, 1978)), and self-concept (Bem,1981; Markus, 1977). On a more detailed level, recent reviews of social cognition have pointed to significant parallels in the domains of person perception, stereotypes, self-concept, and attitudes (Higgins & Bargh, 1987; Sherman, Judd, & Park, 1989). Though it is beyond the scope of this review to consider these in detail, it is noteworthy that similarities between these domains exist on such dimensions as firstly, the nature and organization of information stored in memory; secondly, the implications of this information for judgements; and thirdly, changes in the content and structure of that information.

Recent research into the first dimension, the nature and organization of memorial information in person memory, has witnessed a consolidation of research initiated more than a decade ago. Sherman, Judd and Park (1989) in their review note the seminal influence of the two-memory model of Anderson and Hubert (1964). The two-memory model suggests that stored information is of two types: abstractions and instances (for a detailed review of the study of Anderson and Hubert, see Section 1.5.2). Abstractions, in the form of trait judgements for example, seem to be formed spontaneously, or with very little suggestion (Smith & Miller, 1983; Winter & Uleman, 1984). Information about others is consequently stored at varying levels of generality. The search for a "basic" level of generality or descriptiveness (Rosch, 1981) has, however, proved somewhat inconclusive (Cantor & Mischel, 1979a; Hampson, John, & Goldberg, 1986). The evidence suggests that abstraction and instance memory characterize a number of related social knowledge domains, including stereotyping (Park & Hastie, 1987), self-conceptualization (Markus & Wurf, 1987), and attitude formation (Judd & Krosnick, 1988; Sherman, 1987). Stored information can be characterized by a hierarchical structure, with abstracted general information subsuming exemplar information. Evidence of hierarchical structure has been found in person memory (Hampson et al, 1987), stereotype knowledge (Miller & Brewer, 1986), and in self knowledge (Cantor & Kihlstrom, 1987; Shavelson & Marsh, 1986).

The second dimension showing similarities among related social knowledge domains hinges on factors which influence the selection, encoding and storage of information. In person perception, these include the order in which information is processed and the associated primacy effect (Belmore, 1987), relative accessability of personality constructs (Higgins, King, Mavin, 1982), and the use to which the information is to be put (Devine, Sedikides, & Fuhrman, 1989; Lingle, 1983; Neuberg, 1989; Neuberg & Fiske, 1987; Wyer, Srull, & Gordon, 1984). Sherman, Judd and Park (1989) note these same factors influence cognition in other areas. Accessability of different types of stereotypic information (e.g. gender, age, race) influences the strength and frequency of stereotype judgements (Crocker, Fiske, & Taylor, 1984), while accessability of attitudes has been related to their differential effects on behaviour (Cacioppo, Petty, Kao, & Rodriguez, 1986; Kardes, Sanbonmatsu, Voss, & Fazio, 1986). Similarly, the relative accessability of past episodes in our own lives influences both our current behaviours and self-judgements (Campbell & Fairey, 1985). Just as concerns about the use to which the information will be put influences person perception processes (e.g. anticipated interaction), so the same concerns influence stereotyping judgements (Krueger & Rothbart, 1988; Glick, Zion, & Nelson, 1988) such that more individuating evidence and less stereotypic information is stored.

Perhaps the area which has seen least research concerns the third dimension, the changes in content and structure of representations. While some have recently begun to study the effects of such factors as primacy in formation of new representations (Belmore, 1987; Park, 1986), Sherman, Judd and Park (1989) note that at this stage "there is surprisingly little work in person perception on the evolving or changing impressions of others" (p 312). Thus, parallels between person perception and other social cognition domains on this dimension have yet to be documented.

In conclusion, research into person perception and memory over the last decade has moved through a number of stages. Initially research centered on the effects of person schemas on either memory for an initial impression (Cantor & Mischel, 1977, 1979a, 1979b), or for information about a person received subsequent to an impression (Hastie & Kumar, 1979; Srull, 1981, 1983). The first of these two themes was never fully explored, as much of the following research concentrated on the second. Gradually the interest in memory for schema-congruent and schema-incongruent behavioural information shifted to an interest in accuracy-focused processes as reviewed above. It may be noted that research in related social knowledge domains such as stereotyping, self-knowledge, and attitudes shows similar trends (Higgins & Bargh, 1987; Sherman, Judd, & Park, 1989). For a complete understanding of social cognitive processes, there needs to be an acknowledgement that social cognition processes are an interplay between schematically driven processing and accuracy-attuned processing. A complex set of factors such as the perceiver's goals, the quality of the available information, the accessability of stored information, and the degree of congruence of stimulus information and category information, will influence this interplay.

It was noted above that the first of the two initial themes in person perception and memory, memory for an original impression, was never fully explored. The work of Cantor and Mischel (1977, 1979a, 1979b) raised the question of whether we have natural categories for persons that function as schemas, guiding the encoding, storage and retrieval processes in person perception and memory. This thesis furthers the exploration of that question.

CHAPTER 2

TWO COGNITIVE PROCESSING MODELS

2.1 *The Schema Concept*

Accumulated evidence has confirmed that prototypical features of categories are used as reference points in the encoding, storage and retrieval of exemplar information. This processing strategy, or schematizing, has been the subject of much recent research. Many have commented on the complex and vague notions of schema that now abound (Alba & Hasher, 1983; Fiske & Linville, 1980; Hastie, 1981; Landman & Manis, 1983; Norman & Bobrow, 1976; Rumelhart & Ortony, 1977; Taylor & Crocker, 1981; Thorndyke & Yekovich, 1980), and on its parallels with the concept of "frame" (Minsky, 1975), and of "scripts" (Bower, Black, & Turner, 1979; Schank & Abelson, 1977). Any distillation of these various notions into one concise description is clearly risky. Despite this caveat, it is useful to note the common points of agreement :

- a schema is an abstraction of a complex concept and contains both general knowledge and specific examples; it also specifies the interrelationships between the elements making up the schema;
- schematic processing involves the encoding and organization of specific data into instances of the elements and relationships within the schema;
- schematic processing allows missing particulars of input to be probabilistically inferred in combination with presented data;
- schematic processing can give rise to characteristic errors such as false alarms to schema-related distractors in recognition tests
- schematic processing is a combination of "top-down" processing that guides attention, encoding and organization of data; and "bottom-up" or data driven processing where the actual data prompts the activation of the appropriate schema, and forms a basis of evaluation of the utility the schema.

There are a number of conceptual and operational problems with the schema concept, as any of the above reviews note. This is not to devalue its contribution to experimental social psychology which has been considerable. Some mention of these problems may better place the notion of schema in perspective.

Firstly, there is both a conceptual and empirical problem in separating and distinguishing a schema-based model of memory from, at the most fundamental level, an associative model. Without pre-empting the discussion on this point in Chapter 6, it may be noted that, in part, the schema defines the interrelationships between elements making up the schema. For example, in the restaurant schema, being shown the menu is an element that usually precedes the element of paying for the meal. The temporal relationship between these two events can be, and has been, exemplified countless times. The relationship appears to be a classic case of association by temporal contiguity. Given that the memory system is capable of encoding temporal associative relationships such as this, there is a question of whether a simple associative model of memory need be overlaid with an additional conceptual layer in the form of schema theory. Schema theorists in turn point to many empirical data which are not accountable for by classical associative theory, that is, not accountable for by the laws of contiguity, frequency, primacy, and other associative principles. While such data are indisputable, there remains the danger that many empirical data that could be accounted for by associative theory are taken as support for schema theory. Furthermore, there are data which are equally accountable by schema theory and by associative theory with no theoretical nor empirical way of establishing from which type of memory processes they flowed. In summary, there is a vagueness about schema theory that does not always allow it to be clearly separated in theory or data from other models of information processing.

Secondly, there is a fundamental problem in specifying which elements are essential to the particular schema and which are more peripheral. It is unlikely that every element of a schema is as strongly associated with associated elements as every other element. For example, in the restaurant schema, having music is neither usual nor unusual, and it is difficult to predict whether this feature would generate any expectations in restaurant-goers that there should be music. Does the music variable or element get activated when we enter the restaurant? It would seen reasonable to assume not. Yet it remains a well experienced aspect of restaurant experience. There are many elements of schemas such as this, which are compatible with the concept, but do not give rise to expectations. It may be, then, that to talk of a schema such as a restaurant schema is a convenient linguistic device that simply denotes knowledge of a range of possibilities, some of which are constrained, others of which are not.

Thirdly, if we assume for sake of argument that the schema is a psychological entity that we utilise, it remains unclear which of a number of competing schemas we apply in a given situation, and with what confidence. The embedded nature of schemas leads to the problem of defining just which schema is applied to a stimulus or situation. For example, in going to a restaurant, we are usually shown to the table by a waiter or waitress. We no doubt have schemas for serving-persons, and for tables. Do we also apply these concurrently with a restaurant schema, or do we have only one schema generally operational at a time? A related problem concerns the degree of confidence in applying a schema, and whether this has implications for processing information and memory. If a restaurant-goer is in an unfamiliar area, how does this impinge on the application of his or her restaurant schema to this new restaurant?

Fourthly, schema theory emphasizes the attention to, and encoding of features that are part of the schema. Yet in many situations, it is attention to those details that make one stimulus different from another that is critical. For example, owners of popular makes of car find it difficult to distinguish their own car from others of the same kind, especially in visually bland environments such as carparks. Thus, for the owner of such a car, it is not the essential *carness* of their own car that is of concern, but rather what distinguishes their car from other cars. Attention is given to idiosyncratic features which are not necessarily inconsistent with, or incongruent with the schema, but simply help distinguish one case from another. Schema theory does not emphasize this rôle in perception and memory.

Finally, reviewers observe that, because of the vagueness of the schema concept, it lacks the ability to make unambiguous predictions with respect to recall and recognition of different types of exemplar information. In particular, schema theory is unable to predict whether information which is inconsistent with, or atypical of a currently activated schema should be more or less memorable than consistent or typical information. In the domain of memory for impressions, schema theory is unable to predict whether traits of the person which are features of the activated schema are more or less memorable than traits in the impression which are atypical of the schema, being features of other categories. In order to generate predictions, further assumptions have to be made about the way information is encoded, stored, and retrieved. Schema theory is at a level of generality that does not itself make specific assumptions regarding these processes, but allows it to be interfaced with specific memory models such as the two below.

2.2 *Two Processing Models*

Two recent theoretical models make specific predictions regarding the memorability of exemplar information: the Schema-Pointer-Plus-Tag (SP+T) model of Graesser and colleagues (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982), and the Associative-Network-Plus-Elaborative-Processing (AN+EP) model of Hastie (Hastie, 1980, 1981; Hastie & Kumar, 1979). These two models represent different assumptions regarding the encoding, storage, and retrieval of information, and offer different predictions regarding the memorability of schema-consistent and schema-inconsistent information.

2.2.1 *The Schema-Pointer-Plus-Tag Model*

The SP+T model of Graesser and colleagues (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982), has been developed to account for data on the memory for actions in scripted activities such as going to a restaurant, or washing a car. It was not developed to account for memory for impressions. The SP+T model is, however, general enough in its formulation to allow assessment of its applicability to the realm of person impressions. It should be noted that while the SP+T model has been shown to successfully account for a large proportion of data on memory for scripts, modifications have been made to the model. The revised model, the Script-Copy-Plus-Tag model (Graesser & Nakamura, 1982), involves some ad hoc assumptions which detract from its theoretical appeal and simplicity. Since the earlier SP+T model had not been tested in the context of memory for impression information, it was unknown to whether it provided an adequate model in its own right. Consequently, this model rather than its later derivative was tested.

The SP+T model postulates that the memory trace of an exemplar is composed of two types of information. First, the memory representation for an event, object, or impression contains a copy of the generic schema or prototype activated by the event. All features of the schema are copied into the trace, not just those instanced in the exemplar. This set of features is linked to the exemplar node by a pointer that simply references them as a complete group. Secondly, items that are inconsistent with, or atypical of the schema are linked to the exemplar node with associative tags. These representation assumptions are illustrated in Figure 2.2, where the memory trace for a person is shown.

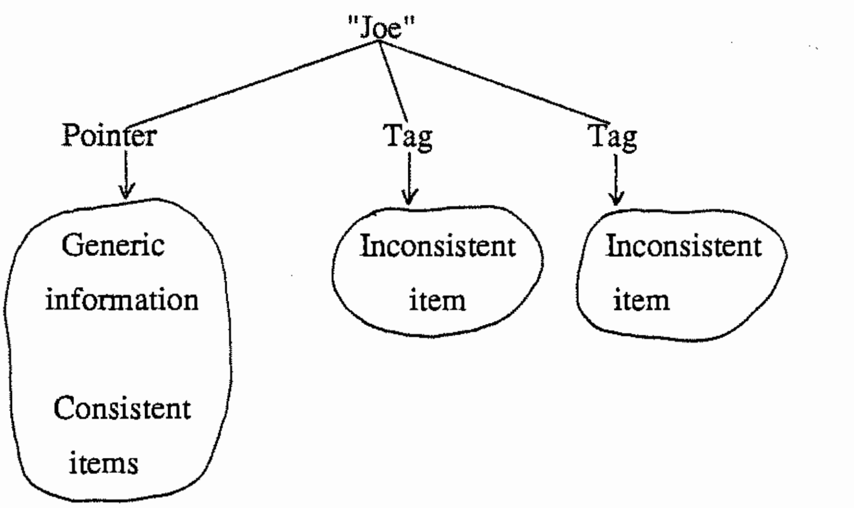

Figure 2.1 Theoretical representation of a memory trace of the impression of "Joe" containing schema-consistent and schema-inconsistent information (Adapted from Smith & Graesser, 1981).

In the SP+T model, retrieval assumptions differ for the processes of recall and recognition. The SP+T model assumes that recall of an item is directed by an organized search strategy that is conceptually driven, and is influenced by the activated schema. When exemplar information is recalled, the whole of the activated schema is recalled, such that not only is presented information correctly recalled, but nonpresented information is also recalled. As a result, recall intrusions are frequent;

indeed, the intrusion rate for schema-consistent information is comparable to the correct recall rate. Inconsistent information is recalled by accessing the associative tags or links. Over time, access to the inconsistent information is progressively lost due to interference (Smith & Graesser, 1982). In contrast to nonpresented schema-consistent information, the intrusion rate for schema-inconsistent information is expected to be minimal, since such information is not recovered in a search.

Thus, at immediate test, recall rates of consistent and inconsistent information are predicted to be equal, though with increasing delay, there will be poorer recall of inconsistent information. Recall intrusion rates are predicted to be higher for schema typical items than atypical items at all times. With respect to schema items, correct recall rates will equal recall intrusion rates, since the whole schema has been copied into the memory trace, and the subject has no mechanism by which to discriminate presented from unpresented schema items.

Graesser and colleagues discuss their recall data in terms of Memory Scores which are measures that correct for guessing. Such a measure is said to be a truer reflection of the subjects ability to locate only the presented items, and to be able to distinguish these from similar but nonpresented items. In some ways it is similar to the *d'* measure of signal detection theory (Green & Swets, 1966), which is a measure of ability to discriminate a signal from background noise. A Memory Score for recall is computed as:

$$\text{Memory Score (Recall)} = \frac{\text{p(recall)} - \text{p(intrusion)}}{1 - \text{p(intrusion)}}$$

Applying the formula to predicted recall and intrusion rates suggests that the Memory Score (Recall) for consistent impression traits will always be zero, since the probability of recall is predicted to equal the probability of intrusion at all times. The Memory Score (Recall) for inconsistent impression traits will be high initially, but as access to these items is lost over time, it will diminish to zero.

In contrast to recall, recognition of an item is accomplished either by "data-driven" processes by use of the test item as a cue (effectively a decision based on the familiarity of the item); or should this fail to return a clear decision, a conceptually driven search strategy as in recall (see Atkinson & Juola, 1974; Kintsch, 1977; Mandler, 1980). In an immediate recognition test, all schema items will be recognized regardless of whether they are targets or distractors, since all schema attributes are copied into the memory trace. It follows that the false alarm rate for schema-consistent distractors will also be high, and should be similar to the hit rate. Inconsistent attributes that were present in the exemplar and therefore tagged will also be recognized, but nonpresented inconsistent distractors will not effect false alarms.

Providing the familiarity values of schema-consistent and schema-inconsistent information decay at the same rate, hit rates for the two types of information will be equal at all times, while false alarm rates for schema-consistent distractors will continue to be higher than those for inconsistent distractors at all times. Theoretically, hit rates and false alarm rates for schema consistent items should be equivalent at all times, since the whole schema has been copied into the memory trace.

Graesser and colleagues recommend that recognition data also be computed in terms of Memory Scores:

$$\text{Memory Score (Recog)} = \frac{\text{p(hit) - p(false alarm)}}{\text{1 - p(false alarm)}}$$

Thus the Memory Score (Recog) for schema-consistent impression traits should be zero at all times, while the Memory Score (Recog) for inconsistent impression traits should be initially high, diminishing over time as the familiarity values of the impression traits return to their pre-impression levels.

In summary, the SP+T model makes the following predictions regarding the recall and recognition of impression traits:

Recall

- In immediate recall, correct recall rates of consistent and inconsistent impression traits will be equal. At sufficient delay, the correct recall rate of consistent traits will be higher than that of inconsistent traits.

- The intrusion rate of consistent nonimpression traits will be higher than that of inconsistent traits at all times.
- Thus the Memory Score (Recall) for consistent impression traits will be zero at all times, while the Score for inconsistent impression traits will be high at immediate test, diminishing over time.
- For schema consistent traits, the correct recall rate will equal the intrusion rate at all times.

Recognition

- Hit rates for consistent and inconsistent impression traits will be equal at all times.
- The false alarm rate for consistent nonimpression traits will be higher than that of inconsistent traits at all times.
- Thus the Memory Score (Recog) for consistent impression traits will be zero at all times, while the Score for inconsistent impression traits will be high at immediate test, diminishing over time.
- For schema consistent traits, the hit rate will equal the false alarm rate at all times.

2.2.2 *The Associative-Network-Plus-Elaborative-Processing Model*

The AN+EP model combines the associative network model of human memory of Anderson and Bower (1973), with the processing model articulated by Craik and Lockhart (1972). The model postulates that items of information which are inconsistent with current expectations generated by an activated schema receive "elaborative" processing. That is, multiple comparisons are made between these items and other schema items, in order to assess their import. As a consequence, additional episodic links are generated between these inconsistent items and other items. Consistent items are not given this elaborative processing, as they are in accord with expectations, and are not extra informative. Because of the additional links forged between each inconsistent item and other items, more potential retrieval paths to inconsistent items become available at recall. Thus, because of this advantage, inconsistent items are better recalled than consistent items. Figure 2.1 depicts a typical memory trace containing schema-consistent and inconsistent items.

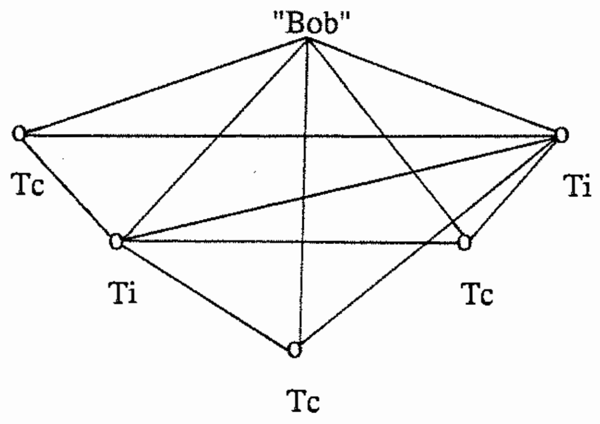

Figure 2.2 Theoretical representation of the memory trace of the impression of "Bob". *Tc* and *Ti* represent consistent and inconsistent traits respectively (Adapted from Hastie & Kumar, 1979).

The prediction of the AN+EP model of greater recall of inconsistent information is contrary to the general data trends noted in Chapter 1. However, the model has principally been developed to provide predictions on memory for information introduced *subsequent* to the activation of the schema. It has not been explicitly designed to model the situation where all items of exemplar information, including consistent and inconsistent items, are presented *simultaneously*. The model has also largely been applied to situations where the schema-activating information is on one level of abstractness e.g. trait terms, while the subsequently introduced information is on a more concrete level of description e.g. descriptions of behaviours. It has not generally been tested in the situation where, for example, inconsistent information is of the same level of description as the schema-activating information. Nonetheless, the model can be adapted to the general situation where all information is generated during formation of the impression, and is at the same level of description.

Applying the AN+EP model to memory for an impression that consists of a number of traits, most of which are features of one category, and the remainder of which are features of other categories, suggests that the latter traits may be seen as inconsistent with the dominant category, and will consequently be the focus of elaborative processing. This elaborative processing will result in relatively more retrieval paths to these inconsistent traits as detailed above. Thus the AN+EP model predicts superior recall of inconsistent traits.

Over time, the episodic links formed in the impression memory either decay or are subject to interference. However, as inconsistent traits have relatively more paths interconnecting them with other items, then even after long delay, the recall advantage to these traits should persist. There appear to be no grounds for suggesting that the advantage will be lost simply because of the passage of time. Hence the AN+EP model predicts that recall of inconsistent traits will be greater than that of consistent traits at all times.

Recall intrusions, being nonpresented items erroneously recalled, are not predicted by this model. There is no systematic process in this model which can account for intrusions at either immediate recall, or at any delay. This contrasts with the SP+T model that predicts significant degrees of intrusion of nonpresented category-consistent traits. Therefore the AN+EP model predicts zero intrusion rates for both consistent and inconsistent nonimpression traits.

The Memory Score (Recall) for inconsistent impression traits should vary only as a function of the correct recall rate of these items, since the intrusion rate for nonimpression traits are predicted to be zero at all times. Hence the Memory Score will remain high while the recall rate is high, and will diminish as the recall rate diminishes. The Memory Score (Recall) for consistent impression traits will, in a like manner, vary as a function of the correct recall rate, but will be lower than the Score for inconsistent traits, since the level of correct recall should be lower. Thus the AN+EP model predicts that the Memory Score (Recall) for inconsistent impression traits will be higher than the Score for consistent impression traits at all times.

If impression traits in the memory trace could be accessed directly, and the episodic pathways circumvented, then the advantage accrued to incongruent traits would be abolished. Such a possibility may be effected in a recognition test where access to the item is direct by virtue of presentation of the item itself in the recognition test. Srull (1981) suggested that as the episodic pathways are bypassed in a recognition test, then inconsistent traits should be correctly recognized at the same rate as consistent traits. However, this prediction is confounded by the fact that the basis on which recognition decisions are made may be differentially affected by the extra processing inconsistent traits are assumed to receive. If, as many recognition theories suggest (e.g. Anderson & Bower, 1973; Kintsch, 1974; Mandler, 1980), recognition decisions are initially made on some familiarity basis, then it follows that any factor differentially affecting the familiarity values of consistent and inconsistent traits will affect the recognition rates of the two types. As inconsistent traits receive more elaborative processing, then these traits may receive higher overall familiarity values than congruent traits. Thus a higher proportion of inconsistent traits could be expected to be correctly recognized than congruent traits. Consequently, it is argued here that the AN+EP model predicts higher correct recognition rates for inconsistent impression traits.

In those recognition theories which also postulate a second stage of processing contingent on the outcome of the first stage of processing, such as when a confident decision cannot be made about an item on the basis of its familiarity alone (e.g. Atkinson & Juola, 1974; Mandler, 1980), search processes again become important in the decisions made about test items. Simply, those items that are recovered by second-stage search processes are consequently recognized. Because of the extra paths connecting incongruent traits, their memorial advantage is retained. Thus in decisions based on a first stage familiarity value, and in decisions based on a second stage search process, inconsistent traits enjoy an advantage over consistent items (cf Srull, 1981).

Providing familiarity values for consistent and inconsistent traits have the same decay function, then the hit rate for inconsistent traits should remain higher than that for consistent traits at all retention intervals. Thus the AN+EP model suggests that in a recognition test, inconsistent traits will effect higher hit rates than consistent traits at all times.

The role of nonpresented traits in recognition, as with recall intrusions, is not systematically treated by the model. While various ad hoc assumptions may be added e.g. spreading activation (Collins & Loftus, 1975; Collins & Quillian, 1969), it seemed parsimonious to assume that nonimpression traits are not processed. Consequently, as with recall intrusions, the AN+EP model predicts zero false alarm rates for consistent and inconsistent nonimpression traits.

Memory Scores (Recognition) for consistent and inconsistent impression traits should, as in recall above, vary only as a function of hit rates. The Score for inconsistent impression traits will be higher at all times due to a higher hit rate.

In summary, the AN+EP model makes the following predictions regarding recall and recognition of impression traits:

Recall

- The correct recall rate of inconsistent impression traits will be greater than that of consistent traits at all times.
- The intrusion rates of consistent and inconsistent nonimpression traits will be zero at all times.
- Thus the Memory Score (Recall) for inconsistent impression traits will be greater than the Score for consistent traits at all times.

Recognition

- The hit rate for inconsistent impression traits will be greater than that for consistent traits at all times.
- The false alarm rates for consistent and inconsistent nonimpression traits will be zero at all times.
- Thus the Memory Score (Recognition) for inconsistent impression traits will be greater than the Score for consistent traits at all times.

2.3 *Summary*

General schema theory has difficulty offering predictions on the relative memorability of schema-consistent and schema-inconsistent information. Two recent cognitive processing models have been developed to overcome this problem, and offer different predictions with respect to the recall and recognition of schema-consistent and schema-inconsistent information. The different predictions are illustrated in Figure 2.3. To facilitate comparisons, the predictions are shown only in terms of conventional measures rather than Memory Scores.

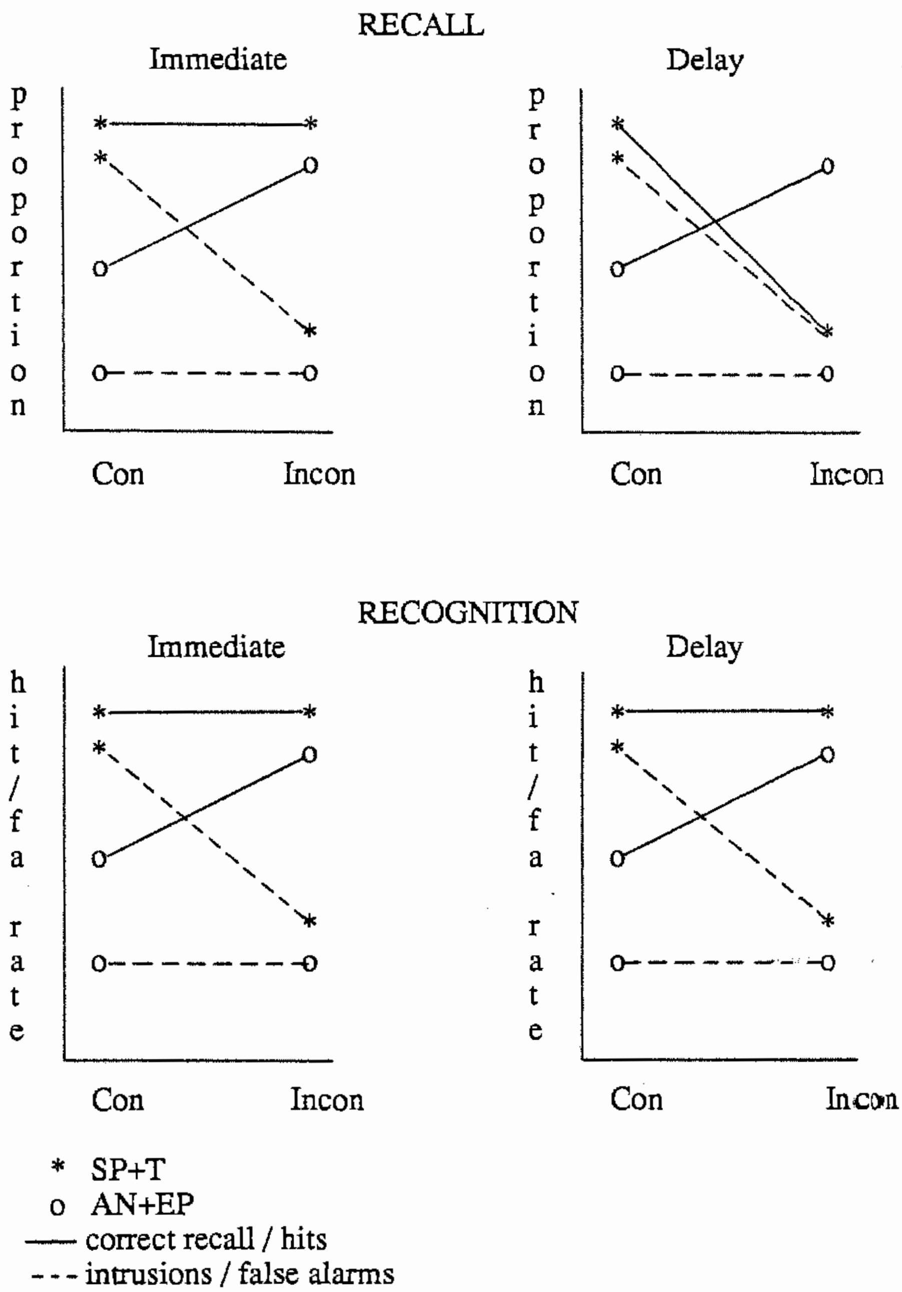

Figure 2.3 Schematic representation of recall and recognition outcomes as predicted by the AN+EP and SP+T models

CHAPTER 3

3.1 EXPERIMENT 1: RECOGNITION OF AN IMPRESSION

Recognition memory for information about another person has been examined from a number of different perspectives. Recognition of information presented prior to an occupational (Cohen, 1981), or sexual label (Bellezza & Bower, 1981; Clark & Woll, 1981; Snyder & Uranowitz, 1978), and recognition of information presented subsequent to an occupational (Cohen, 1981), or trait label (Wyer, Bodenhausen, & Srull, 1984), have both been the subject of research. Many social interactions, however, may not involve either a prior, nor a subsequent labelling of the stimulus person (especially with the authority such a label carries in an experimental setting). A first impression may include inferences concerning the stimulus person's traits, emotions, and attitudes in the absence of an explicitly communicated label. Recognition memory for this type of first impression was the focus of Experiment 1.

Recognition of first impressions has been researched to a limited extent. Cantor and Mischel (1977) found in their recognition study of schema-related and schema-unrelated personality traits (as exemplified in a particular stimulus person), that the recognition rates for schema-related targets and schema-unrelated targets were equal. By contrast, schema-related distractors were less confidently rejected than schema-unrelated distractors. In addition, recognition ratings for both related and unrelated targets fell toward the "think this item was on the list" end of the scale, while ratings for all three types of distractor fell toward the opposite end.

In a similar study, Woll and Graesser (1982) found a higher hit rate for schema-typical information, and a higher false alarm rate for schema-typical distractors which approached the schema-typical hit rate. As mooted in Chapter 1, differences in the results of these two studies may be attributable to a number of methodological factors. Cantor and Mischel (1977) employed conditions that would accentuate accuracy (four stimulus characters, memory set instructions, and an immediate test), while Woll and Graesser (1982) employed conditions that would place a greater strain on memory (10 stimulus characters, impression formation instructions, and testing after 30 minutes delay).

Nonetheless, the data of Cantor and Mischel (1977) suggest that the recognition memory for related and unrelated impression information is relatively accurate. There does appear to be some impairment of the ability of subjects to discriminate old and new schema-related information, though the impairment is limited. By contrast, the data of Woll and Graesser suggest that memory for typical information is quite different from memory for atypical information: high hit and false alarm rates for schema-related information, and low hit and false alarm rates for schema-unrelated information. Thus the data on recognition of first impressions are, at this stage, conflicting in their implications.

In addition, both studies incorporate experimental procedures that may qualify the data. Firstly, both studies presented a number of stimulus characters to be studied in quick succession (Cantor and Mischel used four, while Woll and Graesser used 10), which may have resulted in subjects' attempting to store the essential features of each character in order to keep each representationally distinct. This experimental procedure may appropriately model social interactions where a number of people are encountered, and the perceiver wishes to form an impression of each person in the group. However, it is unclear whether the same impression formation processes are utilized when a single person is encountered.

Secondly, subjects were presented with a list of trait terms which were said to characterize the stimulus person. In this manner, an important part of the impression-formation process was bypassed. Subjects were not required to make any inferences as to what traits the stimulus person did or did not possess. Consequently, subjects were not given an opportunity to utilize their own encoding and inferential strategies.

Thirdly, both studies used expressly fictional characters. This may have had the inadvertent consequence of subjects calling upon their schemas for fictional characters, rather than upon their knowledge of real people.

In addition, the Cantor and Mischel (1977) study is characterized by the use of memory-set instructions rather than impression-set instructions, which may have led to a less schematically coherent and organized memory than might otherwise have been formed (Fiske & Cox, 1979; Jeffery & Mischel, 1979). Indeed, the memory-set instructions may have resulted in different memory traces from those which would have been stored as a consequence of impression-formation processes. Cantor and Mischel's data talk to the effects of instruction to remember information, rather than to the intention to form an impression.

Due to the conflicting data and divergent methodologies, Experiment 1 examined the recognition memory for schema-related and schema-unrelated impression information in a design that attempted to model the formation of an impression of one, real person. On one occasion, subjects sorted 80 trait adjectives into groups or categories that represented different "sorts" or "types" of people. On another occasion, they viewed a video of an actual person talking about him or herself. Subjects were instructed to form an impression of the person, and having expressed their impressions in their own words, selected a number of appropriate trait adjectives from the 80 trait checklist. By the use of a matching algorithm, a single category was selected from each subject's set of categories which best matched that subject's impression. It was felt that the closest matching category would provide the basis for any schematic processing of the impression. Thus, this category was deemed the "schema" category, and impression traits that were attributes of this category were deemed "schema" traits. Remaining impression traits were designated as "peripheral" traits, and the categories that featured these traits were classified as "peripheral" categories.

Subjects were subsequently given an unanticipated recognition test for schema and peripheral impression traits. Included were three types of distractors: nonimpression traits from the schema category; nonimpression traits from the peripheral categories, and nonimpression traits from categories unrelated to the impression. Reaction times were also measured for each item.

Experiment 1 also provided a test of two competing processing models: the Schema-Pointer-Plus-Tag (SP+T) model (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982); and the Associative-Network-Plus-Elaborative-Processing (AN+EP) model (Hastie, 1980, 1981; Hastie & Kumar, 1979; Srull, 1981).

It was shown in Chapter 2 that the SP+T model predicts that a memory trace of the stimulus person is formed consisting of firstly, all traits associated with the schema category to which the stimulus person is matched, and secondly, peripheral traits which, being atypical of the schema category, are simply appended to the stimulus-person node with associative links.

Predictions made by this model of hit and false alarm rates were also developed in detail in Chapter 2. They need only be reiterated with the understanding that, in Experiment 1, schema-consistent information included all schema-category attributes, viz schema target traits, and schema distractor traits; while schema-inconsistent information included all peripheral-category attributes viz peripheral target traits, and peripheral distractor traits. Schema-inconsistent information also included all traits that were features of categories that did not contain any of the impression traits, and were classed as "unrelated" distractor traits.

In summary, the hypotheses derived from the SP+T model were:

- The hit rate for schema and peripheral impression traits will be equal at all times.
- The false alarm rate will be higher for schema distractor traits than for peripheral and unrelated distractor traits at all times.
- For schema traits, the hit rate will equal the false alarm rate at all times.
- The Memory Score (Recognition) for schema impression traits will be less than the Score for peripheral impression traits at all times.

The AN+EP model suggests that traits which are consistent with an activated schema will be processed more elaboratively, because of their atypicality. In this experiment, peripheral impression traits should receive this deeper processing, generating more retrieval links to them, and incrementing their familiarity values more than those of the schema traits. Traits not part of the impression will not be processed or be part of the memory trace.

In summary, the hypotheses derived from the AN+EP model were:

- The hit rate for schema impression traits will be less than that of peripheral impression traits at all times.

- The false alarm rates for schema, peripheral, and unrelated distractor traits will be equal at all times.
- For schema traits, the hit rate will be greater than the false alarm rate at all times.
- The Memory Score (Recognition) for schema impression traits will be less than the Score for peripheral impression traits at all times.

The predictions made by each model with respect to hit rates and false alarm rates are summarized in Table 3.1.

Table 3.1

Predictions of the SP+T and AN+EP Models of Recognition Performance in Experiment 1

	Model	
Hypothesis	SP+T	AN+EP
H 1: Hit rates	S = P	S < P
H 2: False alarm rates	S > P = U	S = P = U
H 3: S: Hit v FA rates	H = FA	H > FA

Note. S = Schema trait; P = Peripheral trait; U = Unrelated trait.

As noted above, this experiment examined decision times rather than confidence ratings as used by Cantor and Mischel (1977). Neither the SP+T nor the AN+EP model makes specific predictions regarding decision times for the different item types. This could be altered by marrying a reaction time model such as the two-stage model of Atkinson and Juola (1974) to the two models. However, this would cause problems of data interpretation and model evaluation, since it would be difficult to disambiguate any source of failure: memory model or reaction time model. Instead, a number of simple comparisons were planned without making firm predictions. The comparisons mirrored the hypotheses outlined above, such that wherever recognition rates were compared, the reaction times pertinent to those decisions were also compared. Thus, for example, the hypothesis that centres on schema and peripheral hits is mirrored by a comparison of decision times for schema and peripheral hits. Systematic differences in reaction times may reflect differences in processing that are not mirrored in accuracy rates, and are therefore a valuable source of insight into the structure of the memory trace.

3.2 METHOD

3.2.1 *Subjects*

Ninety-two subjects enrolled in the introductory psychology course at the Australian National University completed the experiment. Forty-one were males, and 51 were females. The median age was 19 years. Subjects received course credit for voluntary participation.

3.2.2 *Materials*

Stimuli. Two videotapes, each of five minutes duration, were compiled from screened television programmes. One showed a male in his thirties (estimated) and his family talking to a psychologist about problems within the family. The other showed a woman in her early twenties (estimated) with her friends expressing to an interviewer her own views on current issues of sex roles and sex discrimination. No further biographical details were available for either stimulus person. Each video showed the stimulus person revealing their thoughts and feelings to a group of significant others, and it was judged that each person provided sufficient self-disclosure for an impression to be formed.

Trait Vocabulary. Eighty trait terms were selected from Anderson's (1968) 555 personality trait terms as the materials for both the Category Construction task and the Impression Formation task described below. Anderson's list was divided into five equal sections of 111 terms each, and 16 traits were selected by the experimenter from each section. Forty of the traits were positive in valence, while 40 were negative. Traits were selected with a view to their utility in describing a first impression, and to achieve an approximately even distribution of trait rankings across the 555 term list.

3.2.3 *Apparatus*

Subjects were tested individually in an experimental room where they undertook, on different occasions, the Category Construction and Impression Formation tasks.

The Recognition Test took place in a sound-attenuated room adjoining the original experimental room. During this test, subjects were seated at a VDU which presented items for recognition. Presentation of the items was controlled by the subject via a control panel placed between the subject and the screen. The panel incorporated three keys, one large unlabelled key, and two smaller keys, one labelled "YES" and the other "NO". A recognition trial was initiated by the subject pressing the large key, which resulted in the display of the question "DID YOU DESCRIBE THE PERSON AS (TRAIT TERM)?" The subject was instructed to keep his or her finger on the large key until they had decided which answer they would give. When they released the large key, the question disappeared from the screen, and the subject then pressed a response key. A PDP11 computer recorded the type of response, the time the subject kept the question on the screen (milliseconds), and the time from initiation of the trial to response (milliseconds). The latter times were input to reaction time analyses. The subject initiated the next trial by pressing the large key. The two response keys were equidistant from the large key, and the subject used the preferred hand throughout.

3.2.4 *Design*

The design incorporated three between-subject factors and one within-subject factor in a split-plot design. The between-subject factors were sex of Stimulus person (male and female), Valence of impression (positive and negative), and test Interval (immediate and delayed), and the within-subject factor was Trait Type (schema and peripheral targets, schema, peripheral, and unrelated distractors). While assignment of subjects to the levels of the factors of Stimulus and Interval was random, the assignment of subjects to the Valence groups was on the basis of subjects' impressions. Those expressing favourable impressions (see 3.2.7 *Valence Measure*) were assigned to the positive Valence group, and those expressing negative impressions were assigned to the negative Valence group. Unequal numbers of subjects formed positive and negative impressions, resulting in a nonorthogonal design.

3.2.5 *Procedure*

Each subject was tested in three stages: Category Construction, Impression Formation, and Recognition Test.

Category Construction. This task involved sorting traits into groups. Subjects were given 80 trait terms on individual cards, and instructed to sort them into groups, such that each group represented a basic "sort" or "type" of person. Subjects were allowed to construct as many groups as they wished, with a minimum of two required. Each trait group had to include at least four traits. Individual trait terms could be used in more than one group, and traits that the subject felt did not belong to any particular group could be placed in a "Miscellaneous" group (with a limit of ten).

Subjects were allowed up to 1.5 hours to complete this task, with many subjects taking between 30 minutes and one hour. A lengthy time was allowed in order to maximize the reliability of the sortings, as it was not feasible to ask subjects to resort the traits to check on reliability.

Impression Formation. One week later, subjects undertook the impression formation task. Subjects were told that the experiment at this stage involved studying the processes people go through when forming impressions. They were told that they would see a video of a person (sex specified in the instructions), and to form an impression of the person's personality. In this manner it was anticipated that subjects' would utilize their person schemas in forming the impression. Subjects were also told that they would have to write down their impressions in their own words at the end of the video, this direction aimed at encouraging subjects to verbalize to themselves how they saw the stimulus person.

At the completion of the video, the experimenter checked whether any of the subjects had previously seen the television programmes featuring these people. No subject could recall seeing these segments. Five minutes was then given for the writing of impressions.

In order to condense subjects' impressions into a coherent and measurable form suitable for a recognition task, subjects were handed three stapled sheets, the top sheet listing the 80 traits (see Trait Vocabulary above) in one of five random orders. The second and third sheets contained a total of ten response scales, with each scale consisting of three qualifiers -- "somewhat", "quite", and "very" -- typed on the left, centre, and right of the scale respectively. Subjects were instructed to select at least four, but no more than ten traits, which they felt best summarized their impression of the stimulus person. They were further instructed to place each selected trait after a qualifier of their choosing, with one selected trait per response scale.

Recognition Test. The third phase involved a recognition test of the traits previously selected to summarize the impression. The recognition set comprised all impression traits, (targets), plus sixteen unselected traits (distractors), plus four traits not seen before by the subject. The recognition test started with five practice items (not included in analysis), and proceeded to a random ordering of the targets and distractors.

Sex of stimulus person, and time of recognition test were counterbalanced across subjects. Half the subjects who watched the male video, and half the subjects who watched the female video were engaged for ten minutes after completing the impression-formation task with administrative forms (to receive the credit points for completing the experiment) before participating in the immediate recognition phase of the experiment. The remaining subjects were asked to return one week later, purportedly for further experimentation, for the delayed recognition test. The category construction task always preceded the impression formation/recognition tasks as the constructed categories were necessary for the selection of the different kinds of distractors.

3.2.6 *Classification of Impression Traits*

Unweighted classification. Impression traits were classified as either "schema" or "peripheral" on a subject-by-subject basis. The Experimenter located each subject's impression traits in his or her categories produced in the sorting task. The category which contained the highest number of impression traits was chosen as the schema category, and these impression traits were classified "schema" traits. This category also provided the four schema distractors or traits that were attributes of this category, but not selected by the subject in the impression-formation task. The remaining impression traits were classified "peripheral" traits, and the categories in which they occurred furnished the six peripheral distractors. Some categories did not contain any of the impression traits, and these categories furnished the six unrelated distractors. Selection of distractors from the relevant categories was random.

This method of classification of traits did not allow the utilization of data from every subject. Some subjects had all impression traits occurring in one category, precluding the identification of peripheral targets or distractors. Others had categories that contained equal numbers of impression traits, which prevented identification of a single or schema category to supply the schema targets and distractors.

Weighted classification. The weighted classification procedure was similar to that above. Impression traits were weighted according to whether they had been qualified with "somewhat", "quite", or "very". A trait qualified by "somewhat" counted as one point; one qualified by "quite" as two points; and a trait qualified by "very" as three points. In a manner similar to that used in the unweighted classification scheme, that category which contained impression traits yielding the highest number of points was selected as the schema category. The remaining categories were classed as either peripheral (if they contained any impression traits), or unrelated. All targets and distractors were selected in a manner like that above. Again, as above, not every subject's data could be utilized. Those subjects who had all impression traits occurring in the one category, and those who had two or more categories equal in the number of points, were excluded from analysis.

In many cases, these two selection procedures resulted in the same outcome i.e. they both nominated a particular category as the schema category. Remaining categories were then either peripheral (if they contained any impression traits), or unrelated (if they did not). In other cases, the two selection procedures resulted in different categories being nominated as the schema category. Whenever this occurred, the case was resolved in favour of the unweighted classification procedure, and recognition items were selected accordingly.

3.2.7 *Valence Measure*

The valence of each subject's impression was computed by averaging the like-dislike rankings of each trait in the impression. These ranks were taken from Anderson's (1968) ranking of 555 traits. If the mean rank was less than 277.5, then the impression was classed as positive. Otherwise, it was classed as negative. This was done on both a weighted and unweighted basis. In the unweighted measure, each trait was weighted equally in computing the mean ranking. In the weighted measure, each trait was weighted according to the qualifier as in the weighted classification scheme above, before the mean ranking was computed.

3.3 RESULTS

3.3.1 *Data sets*

Of the 92 subjects who completed the experiment, 76 subjects returned data suitable for analysis. Of the remaining 16 subjects, 10 were unsuitable because neither the unweighted, nor the weighted classification schemes resulted in the unambiguous identification of a "schema" category. The other six subjects produced impressions whose traits resided entirely within the one category, thus precluding the selection of "peripheral" targets and distractors.

Of the 76 suitable subjects, 54 formed a core group whose impression classification was the same using either of the classification procedures. That is, for these subjects, the schema category was the same before and after weighting, and the valence of the impression was the same before and after weighting.

Six subjects had an identifiable schema category before, but not after weighting. In addition, one subject had a different schema category after weighting, and one subject had an impression whose valence changed after weighting. The core group of 54 combined with these eight subjects made a pool of 62 for the "unweighted" analysis.

Thirteen subjects had identifiable schema categories only after weighting. These 13 combined with the core group of 54 plus the subject whose impression changed in valence after weighting made a pool of 68 for the "weighted" analysis. The subject whose schema category changed after weighting could not be included in the weighted pool as the selection of distractors was based on the unweighted schema category.

3.3.2 *Data analyses*

Separate analyses were conducted on the three data pools, yielding very similar patterns of results (for full details of all ANOVA tables, see Appendix A). The most conservative analysis based on the core group of 54 subjects whose protocols were exactly the same before and after weighting is reported here.

In the analyses below, the between-subject factors are Stimulus, Valence, and Interval. Unequal numbers of subjects occupy each level of each factor, and are given in Table 3.2. The within-subject factor varies with the particular analysis, but is always a repeated measures factor with equal numbers of subjects in each level.

Due to the unequal cell sizes, analysis was by application of the General Linear Model, with each factor in the design being adjusted for all other factors and interactions (Herr & Gaebelein, 1978; Kirk, 1982; Overall & Spiegel, 1969). Because of the nonorthogonality of the design, Geisser and Greenhouse (1958) advise modification of the degrees of freedom for testing the repeated measures factor where the number of levels of the repeated factor is greater than two. The analyses which involved three levels of the repeated factor were modified accordingly.

A number of analyses compare two measures for each subject, these measures themselves being based on unequal *n*'s. For example, the proportion of schema targets recognized is compared with the proportion of peripheral targets recognized. Often, though, the number of schema targets was unequal to the number of peripheral targets for any given subject. Thus the proportions are based on unequal *n*'s. While this is not in itself a problem, it does have implications for all the between-subject analyses. In the between-subject analyses, these two measures are simply combined for each subject to obtain an overall average. For example, the proportion of targets recognized at immediate test is the mean of the proportions of schema and peripheral traits recognized. This is then compared with the proportion recognized at delayed test which is computed in a similar way. Consequently, the between-subject analyses are not based on a strictly true arithmetic measure of each subject's overall performance, since the two averaged measures are not first weighted by their respective n's before being combined.

It is arguably preferable to treat the two measures as though they were based on equal sample sizes (i.e. an unweighted means approach) and give each of the populations they represent equal weight in the analysis. This makes comparisons between groups of subjects more meaningful, since the overall measures of performance are based on equally weighted components, and any differences found between groups cannot be attributed to differences in the weighting of components making up the measure. Secondly, the two measures are based on quite comparable n's. An analysis reported below showed no significant difference between the mean numbers of schema and peripheral targets. Similarly, the numbers of distractors in each category were held nearly equal, since there were four schema, six peripheral and six unrelated distractors in each recognition test. Hence the overall measures of performance for each subject are, in effect, based on equal n's, and so the unweighted measures would be very close to the exact, weighted measures.

3.3.3 *Preliminary analyses*

Number of impression traits The mean numbers of schema and peripheral traits selected to summarize the impression in each experimental condition are given in Table 3.3.

These data were subjected to a Stimulus x Valence x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that subjects selected different numbers of schema traits (M = 3.74) and

Table 3.2

Number of Subjects by Condition

Interval	*n*	Stimulus	*n*	Valence	*n*
Immediate	29	Male	24	Positive	39
Delay	25	Female	30	Negative	15

Interval x Stimulus x Valence

Immediate	29	Male	12	Positive	8
				Negative	4
		Female	17	Positive	16
				Negative	1
Delayed	25	Male	12	Positive	4
				Negative	8
		Female	13	Positive	11
				Negative	2

peripheral traits ($M = 3.17$), $F(1, 46) = 0.32$, $p > .50$. There were no significant interactions between Trait Type and any other factors.

None of the between-subject factors significantly affected the number of impression traits selected, and there were no significant interactions.

Table 3.3

Mean Number of Impression Traits Selected by Condition

	Trait type	
Condition	Schema	Periph
Stimulus		
Male	3.75	3.25
Female	3.73	3.10
Valence		
Positive	3.72	3.18
Negative	3.80	3.13
Interval		
Immediate	3.72	3.14
Delayed	3.76	3.20

3.3.4 *RECOGNITION MEASURES*

Hit rates

The mean hit rates for schema and peripheral target traits in each experimental condition are given in Table 3.4.

Hit rates were subjected to a Stimulus x Valence x Interval x Target Type analysis with repeated measures on Target Type (schema and peripheral).

There was no significant effect for Target Type. Thus there was no evidence to suggest that subjects recognised schema traits (M = 0.90) and peripheral traits (M =

Table 3.4

Mean Hit Rates for Impression Traits by Condition

Condition	Trait type: Schema	Periph
Stimulus		
Male	.91	.87
Female	.90	.92
Valence		
Positive	.89	.92
Negative	.95	.85
Interval		
Immediate	.93	.97
Delayed	.88	.81

0.90), at different rates, $F = 0.00$, $p > .90$. There were no significant interactions between Target Type and any other factors.

None of the between-subject factors significantly affected hit rates, although the difference between hit rates at immediate and delayed test approached significance, $F(1, 46) = 3.46$, $p < .07$. There were no significant interactions between these factors.

False alarm rates

The mean false alarm rates for schema, peripheral, and unrelated distractor traits in each experimental condition are given in Table 3.5.

Table 3.5

Mean False Alarm Rates for Distractors by Condition

	Trait type		
Condition	Schema	Periph	Unrel
Stimulus			
Male	.15	.11	.03
Female	.23	.12	.04
Valence			
Positive	.20	.11	.05
Negative	.20	.14	.01
Interval			
Immediate	.12	.05	.02
Delayed	.29	.19	.05

False alarm rates were subjected to a Stimulus x Valence x Interval x Distractor Type analysis with repeated measures on Distractor Type (schema, peripheral, and unrelated).

Distractor Type significantly affected subjects' false alarm rates, $F(2, 92) = 6.45$, $p<.01$ (Geisser & Greenhouse (1958) critical degrees of freedom: 1, 46). Tukey's HSD post-hoc test revealed that the alarm rate for schema distractors ($M = .20$) was greater than the rate for peripheral distractors ($M = .12$), $p<.05$; which in turn was greater than the rate for unrelated distractors ($M = .04$), $p.<05$. There were no significant interactions between Distractor Type and any other factors.

Of the between-subject factors, only Interval significantly affected false alarm rates, with the mean at delay (M = .18) being greater than the mean at immediate test (M = .07), $F(1, 46) = 6.00$, $p<.02$. There were no significant interactions between these factors.

Schema hit and false alarm rates

The mean hit and false alarm rates for schema targets and schema distractors in each experimental condition are given in Table 3.6.

Table 3.6
Mean Hit and False Alarm (FA) Rates for Schema Traits by Condition

	Response type	
Condition	Hits	FA's
Stimulus		
Male	.91	.15
Female	.90	.23
Valence		
Positive	.89	.20
Negative	.95	.20
Interval		
Immediate	.93	.12
Delayed	.88	.29

Rates were subjected to a Stimulus x Valence x Interval x Response Type analysis with repeated measures on Response Type (hit and false alarm).

Response Type significantly affected rates, with the subjects' hit rates being greater than their false alarm rates, $F(1, 46) = 207.11$, $p<.0001$. In addition, there was a significant interaction between Response Type and Interval, $F(1, 46) = 6.34$, $p<.02$. Analyses reported above show the basis of this interaction: Hit rates did not decline over the one week interval, while false alarm rates increased in the same interval.

None of the between-subject factors significantly affected rates, and there were no significant interactions.

Memory Scores

The mean Memory Scores for schema and peripheral traits in each experimental condition are given in Table 3.7.

Scores were subjected to a Stimulus x Valence x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that subjects' recognition memory for schema traits ($M = .85$) was different from their memory for peripheral traits ($M = .89$), $F(1, 46) = 0.00$, $p>.90$. There were no significant interactions between Trait Type and any other factors.

None of the between-subject factors significantly affected Memory Scores, although the difference between immediate and delayed Scores approached significance ($F(1, 46) = 3.36$, $p<.08$. There were no significant interactions between these factors.

Summary

A summary of each data analysis reported above and its implication for the SP+T and AN+EP models is given in Table 3.8.

3.3.5 *REACTION TIMES*

Two separate sets of analyses of reaction times were performed, one on untransformed times, the other on logarithmically transformed times (base 10). The

Table 3.7

Mean Memory Scores for Impression Traits by Condition

Condition	Trait type: Schema	Periph
Stimulus		
Male	.88	.86
Female	.83	.91
Valence		
Positive	.82	.91
Negative	.94	.83
Interval		
Immediate	.88	.97
Delayed	.82	.79

latter set was performed because of positively skewed distributions and heterogeneous variances. However, the patterns of results from both sets of analyses were quite similar, and consequently analyses of untransformed times are reported here (for analyses of transformed times, see Appendix A).

Hit times

The mean times to make schema and peripheral hits in each experimental condition are given in Table 3.9.

Times were subjected to a Stimulus x Valence x Interval x Target Type analysis with repeated measures on Target Type (schema and peripheral). Two subjects could

Table 3.8

Summary of Accuracy Results and Implications for the SP+T and AN+EP Models

		Model	
Measure	Data	SP+T	AN+EP
Hit rates	S = P	yes	no
FA rates	S > P > U**	yes	no
Hit v FA rates	H > FA***	no	yes
Memory Scores	S = P	no	no

Note. S = Schema; P = Peripheral; U = Unrelated;
H = Hit; FA = False Alarm.
$^{**}p<.01$ $^{***}p<.001$

not be included in this analysis, as one had made no hits for schema targets, and the other had made no hits for peripheral targets.

There was no significant effect for Target Type. Thus there was no evidence to suggest that subjects' time to make a schema hit (M = 3.25 secs.) was different from their time to make a peripheral hit (M = 3.32 secs.), $F(1, 44) = 0.01, p>.90$. There were no significant interactions between Target Type and any other factors.

None of the between-subject factors significantly influenced hit times, and there were no significant interactions.

False alarm times

Only five subjects made all three types of false alarms, that is gave false alarms to schema, peripheral, and unrelated distractors. Consequently no analysis was performed.

Correct rejection times

Table 3.9

Mean Times (Seconds) for Hits by Condition

Condition	Trait type: Schema	Periph
Stimulus		
Male	3.22	4.03
Female	3.27	2.76
Valence		
Positive	3.38	3.34
Negative	2.88	3.29
Interval		
Immediate	3.29	3.44
Delayed	3.20	3.17

The mean times to correctly reject schema, peripheral, and unrelated distractors in each experimental condition are given in Table 3.10.

Times were subjected to a Stimulus x Valence x Interval x Distractor Type analysis with repeated measures on Distractor Type (schema, peripheral, and unrelated). Two subjects could not be included in this analysis as neither had made any correct rejections of schema distractors.

Distractor Type significantly affected times, $F(2, 88) = 6.15$, $p<.05$ (Geisser & Greenhouse (1958) critical degrees of freedom: 1, 44). Tukey's HSD post-hoc test revealed that the time to reject schema distractors ($M = 4.46$ secs.) was greater than

Table 3.10

Mean Times (Seconds) for Correct Rejections by Condition

Condition	Trait type		
	Schema	Periph	Unrel
Stimulus			
Male	4.68	3.40	3.04
Female	4.28	2.99	2.26
Valence			
Positive	4.42	3.09	2.34
Negative	4.57	3.41	3.31
Interval			
Immediate	3.79	2.57	2.30
Delayed	5.25	3.90	3.00

the time to reject peripheral distractors(M = 3.18 secs.), p<.05; which in turn was greater than the time to reject unrelated distractors (M = 2.62 secs.), p<.05.

None of the between-subject factors significantly affected times, and there were no significant interactions between any of these factors.

Schema hit and false alarm times

The mean times to make hits and false alarms by subjects making both types of responses by Interval are given in Table 3.11. The factors of Stimulus and Valence were omitted from this analysis because of the many empty cells that would have resulted had they been included.

Table 3.11

Mean Times (Seconds) for Schema Hits and False Alarms (FA) by Interval

	Response type	
Condition	Hits	FA's
Interval		
Immediate	2.61	6.30
Delayed	3.03	7.07

For the 27 subjects who made both hits and false alarms to schema items, the times for each type of response were subjected to a Interval x Response Type analysis with repeated measures on Response Type (hit and false alarm).

Interval did not significantly affect times, although Response Type did. Subjects took less time to make hits (M = 2.90 secs.) than false alarms (M = 6.84 secs.), $F(1, 25) = 10.56$, $p<.005$. The factors of Interval and Response Type did not significantly interact.

Summary

A summary of reaction time results in conjunction with recognition rates is given in in Table 3.12.

Table 3.12

Summary of Reaction Times and Recognition Rates

Response	Times	Rates
Hits	S = P	S = P
CR's	S > P > U*	S < P < U**
Hits & FA's	H < FA**	H > FA***

Note. S = Schema; P = Peripheral; U = Unrelated;
H = Hit; FA = False Alarm.
*p<.05 **p<.01 ***p<.001

3.4 DISCUSSION

In this experiment, subjects formed an impression of a person, and on another occasion, defined their own person categories. The impression was matched to one category--the schema category--and impression traits were classified as either "schema" or nonschema, that is "peripheral". Subsequently, subjects recognized the impression traits in an unexpected recognition task. Subjects recognized both types of impression trait equally well, and were able to distinguish impression traits from distractor traits. Subjects did, however, make more false alarms to schema distractors than to peripheral distractors. Data trends were independent of the sex of the stimulus person, and of the valence of the impression.

The results suggest that schema and peripheral impression traits share similar representations in memory, as evidenced by the equal hit rates. That is, both schema and peripheral impression traits are stored in the memory trace with a quality or attribute (such as familiarity) that leads to an equiprobability of each type of trait being identified as an impression trait or as not an impression trait.

There is, however, one point to consider in this regard. The memory for impression traits seems to have been quite strong, as the hit rates were near perfect even after one week's delay. Impression traits seem to have been cognitively processed extensively during the impression-formation task, and it may be the case that a methodological "ceiling" in the recognition task has prevented any detection of differences between the hit rates of schema and peripheral impression traits, and with that the representations of the two types on trait in memory. Thus the data on hit rates, while suggesting similar representations of schema and peripheral impression traits maybe seen as somewhat equivocal.

Evidence of differential representations in memory of schema and peripheral information can be found in analyses of the false alarm rates. As schema distractors induced higher false alarm rates than peripheral distractors, which in turn induced higher false alarm rates than unrelated distractors, it appears that different distractors do not share equivalent representations in memory. It should be noted that the difference in false alarm rates cannot be attributed to methodological artifact arising from distractors being related to different numbers of targets, since there was no significant difference between the numbers of schema and peripheral impression traits in the target set. In summary, false alarm rates point to different representations of schema and peripheral distractors.

The data further suggest that the target and distractor traits remain quite distinguishable, resulting in low overall error rates. The data reported here are depicted in Figure 3.1 in terms of conventional familiarity values.

Finally, discrimination of impression from nonimpression traits was not as accurate for schema traits as for peripheral traits. The data show a higher false alarm rate for schema items than for peripheral traits, though the hit rates for the two types of impression trait were equal. Memory Scores which reflect different levels of discriminability do not, however, reflect this difference. Graesser and colleagues (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982) emphasize the need for such an index which functions in a similar manner to the *d'* measure , and the failure of both the SP+T and AN+EP models to accurately predict Memory Scores is instructive.

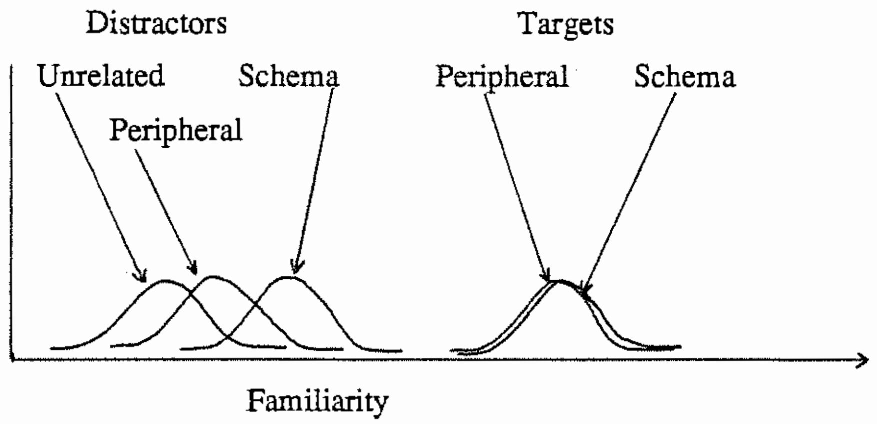

Figure 3.1 Distribution of schema and peripheral target familiarity values; and of schema, peripheral, and unrelated distractor familiarity values as suggested by the data of Experiment 1

Firstly, the SP+T model does not predict that hit rates for the two types of targets will differ, but rather that the false alarm rates for schema distractors will be higher than the alarm rate for peripheral distractors. It is a property of the Memory Score formula that the Score for schema targets will, as a consequence, be lower than for peripheral targets. However, when the hit rates of the two types of targets are maximized, that is, there are no misses, the numerator of the equation will always equal the denominator, and the computed Memory Score will always equal unity. Even though there may be a large difference in false alarm rates for the two types of items, the Memory Scores will not reflect this difference. Hence where there are perfect hit rates for both schema and peripheral targets (and this is not contrary to the model), false alarm rates must be examined for evidence of differential treatment of schema and peripheral items.

Perfect hit rates were achieved by thirty of the fifty-four subjects. The Memory Score for each of these subjects is unity, regardless of the false alarm rate. The separate analyses of the hit rates and the false alarm rates presented above show that first, hit rates were not significantly different (which accords with the SP+T model); and second, the false alarm rate for schema distractors was significantly greater than the alarm rate for peripheral distractors (which also accords with the SP+T model).

Thus while the SP+T model is technically in error with respect to Memory Scores, it does concord with the data on the hit and false alarm rates that are manipulated in the Memory Score formula.

Secondly, the AN+EP model predicts that Memory Scores for schema items will be lower than Memory Scores for peripheral items. This prediction is infirmed for different reasons. The AN+EP model predicts lower hit rates for schema targets, but equal false alarm rates for distractors, which leads to a lower Score for schema items. However the data show equal hit rates, and higher false alarm rates for schema distractors. Thus the erroneous predictions of the AN+EP model cannot be attributed to an artifact of the Memory Score formula.

The recognition data of Experiment 1 are more akin to those of Cantor and Mischel (1977) who found equal hit rates and low false alarm rates, than to those of Woll and Graesser (1982) who found a higher hit rate for schema targets, and an equally high false alarm rate for schema distractors. This is despite the fact that Experiment 1 used an impression-formation instruction set as in Woll and Graesser, and a delayed test as in Woll and Graesser. The single critical difference between the two earlier studies seems to relate to the number of stimulus characters studied: Subjects in the Woll and Graesser study formed impressions of 10 characters, which is a substantial memory load. This may be the cause of the higher hit rate for related information, and very high false alarm rate. Subjects in the Cantor and Mischel study remembered four characters, and those in Experiment 1 formed impressions of only one person. This may account for the high and equal hit rates for schema and peripheral impression traits, and low overall false alarm rates in Experiment 1.

The reaction time data parallel the accuracy data in many respects. Where there were no differences in rate, there were no differences in reaction time; and where there were differences in rate, there were differences in response time. The mean times to make a hit for schema and peripheral targets did not significantly differ. This result, in combination with accuracy data, suggests that the recognition processes are not sensitive to any differences between schema and peripheral targets (although the over-processing hypothesis above remains). There seems no differential representation of schema and peripheral targets to the extent that these representations impinge on recognition processes.

By contrast, the mean time to correctly reject distractors was dependent on the type of distractor. Unrelated distractors were rejected significantly faster than peripheral distractors; and these in turn were rejected significantly faster than schema distractors. These data, in combination with accuracy data, suggest that schema distractors were more difficult to reject than peripheral distractors, and peripheral distractors were more difficult to reject than unrelated distractors. It is noteworthy that these data on reaction times pertain only to correct rejections, and do not reflect contributions from false alarms. Correct rejection times, coupled with correct rejection/false alarm rates, suggest that where fewer correct rejections are occurring, correct rejection times will also be longer. This relationship has been reported in other studies (Biederman & Stacy, 1974; Pike, Dalgleish, & Wright, 1977; Ratcliff, 1978).

Finally, the reaction time data on schema hits and false alarms show that the time to make a hit was significantly less than the time to make a false alarm. This is additional evidence that schema distractors were not copied into the memory trace of the impression alongside schema targets as modelled by the SP+T model, but rather that the two types of items were stored with quite different qualities. Although the SP+T model does not make specific predictions with regard to reaction time, it does suggest schema distractors should be intermixed with schema targets in the memory trace, and that these two types should be represented in a similar manner, and that this similiarity of representation should effect similar reaction times. As the data show, this prediction is not supported.

The two models that attempt to account for the memory data receive only qualified support. The SP+T model is supported by the equal hit rates for schema and peripheral targets, whereas these same data infirm predictions of the AN+EP model. The SP+T model is also supported by the higher false alarm rate for schema distractors, whereas again this infirms predictions of the AN+EP model. By contrast, the AN+EP model is supported by the schema hit rate exceeding the schema false alarm rate, which infirms the SP+T model. Thus the data on schema versus peripheral trait recognition rates support the SP+T model, while the data on schema targets versus distractors support the AN+EP model.

In view of both recognition and reaction time data, it cannot be said that either the SP+T model or the AN+EP model has been convincingly supported. Both models would need radical changes to their assumptions to accomodate the data of Experiment 1. The SP+T model would have to be revised with respect to the assumption that all schema traits are copied into the memory trace, and the AN+EP model would have to be revised with respect to the assumption that extra processing is given to atypical traits. Revisions along these lines would significantly alter the character of both these models.

The data may be interpreted as showing that there are, in fact, no meaningful cognitive differences as pertaining to their storage in memory between "schema" and "peripheral" traits. It may be that this purported difference is rather academic, and that both types of information are stored identically, and when subjected to the interrogations invoked in a recognition task, effect the same outcome. This conclusion may yet be premature, since there is evidence in the false alarm rates, if not in the hit rates, that schema-typical traits have different implications for recognition to schema-atypical traits. It is perhaps prudent though, to consider alternate approaches and explanations of the data from Experiment 1.

In an experiment showing some parallels to the present study, Herrmann, Frisina, and Conti (1978) also tested recognition memory and reaction times to a group of targets from various categories interspersed amongst various types of distractors. On Day 1, subjects learned a list of items, some of which (A) were from category A , and some of which (B) were from category B. On Day 2, subjects learned a new list of items, some of which (A') were again from category A, and some of which (C) were from a new category C. On Day 3, a recognition test consisted of targets drawn from the words learned on Day 1, A and B. As distractors, subjects were shown words learned on Day 2, A' and C; some new distractors selected from categories A (A*) and C (C*) but not learned before; plus some new distractors from a novel category D (D). Noteworthy is that targets from list A were intermixed with other category-A distractors (i.e. A' and A*), but targets from list B were not intermixed with category-B distractors. Subjects were made aware of this manipulation before the start of the experiment. The data showed that distractors related categorically to the targets (A' and A* distractors) were more slowly rejected than distractors unrelated to the targets

(C and C* distractors). This pattern held for both the A' and C distractors, and for A* and C* distractors.

Thus when the subject was exposed to distractors from the same category as the targets, a slowing of reaction times was effected. When the distractors were from a category different to the targets, faster reaction times were possible. This finding has also been reported in other studies (Atkinson, Herrmann, & Wescourt, 1974; Herrmann, McLaughlin, & Nelson, 1975; Homa, 1973; Reynolds & Goldstein, 1974), and was found in Experiment 1. Herrmann, Frisina, and Conti (1978) argue that such results can only be explained by reference to what the authors term a three stage model of item processing viz a model of the recognition task that involves three stages of decision-making by the subject. In the first stage, the category status of the item is assessed, and if it comes from the same category as the targets, then further processing is needed before a decision can be made. If however, the item comes from a category different from the targets, then a rapid rejection of that item can be made. If the item needs further processing, then its familiarity is checked: If the familiarity is above a certain criterion, then the item is called "target", and if its familiarity is below a different, lower criterion, then the item is called "distractor". Finally, if the item's familiarity falls between these two criteria, then an extended search of the items in memory is needed before a decision can be made.

Of relevance here is the first stage which involves a category membership check. In an experiment involving items from such disparate categories as occupations, weapons, sports, and birds, as in Herrmann et al., then such a check is a simple operation. However, in Experiment 1, the categories did not have any clear superordinate labels which could be easily have been used for such a check; and neither did they range over such a disparate array of attributes. Thus two differing conclusions may be drawn with respect to the data of Herrman, Frisina and Conti and Experiment 1: First, subjects used attributes of an item less specific than the name of the category to which it belonged in order to make the first stage category membership decision; or second, subjects in Experiment 1 may have regarded the categories of people constructed by themselves as being as different as, for example, occupations and birds. The latter would have enabled subjects in Experiment 1 to make fast rejections of trait distractors from other categories.

It is interesting that, in Experiment 1, reaction times for peripheral category distractors, although less than times for schema category distractors, were still greater than those for unrelated category distractors. Thus, by the Herrmann, Frisani and Conti (1978) model, subjects must have been aware that more than one category (the schema category) supplied the targets for the test. If subjects had remembered only the schema category, then peripheral items, both targets and distractors, would have all been treated as category-unrelated distractors. Thus these items would have been rejected quickly at the first stage of processing. That this did not happen is evidence that subjects must have been aware that targets were drawn from a number of categories. The results also imply, according to the 3-stage model, that subjects could easily distinguish which categories contributed (peripheral) targets and which (unrelated) categories did not, since this is the mechanism used by Herrmann et al to explain fast unrelated-category distractor rejections. In this study, numerous categories could function as peripheral categories, with each category supplying as little as one trait term to the group of targets. Thus, this implied ability of subjects to readily distinguish peripheral categories from unrelated categories is surprising. Perhaps these considerations suggest that the ability to quickly reject unrelated-category distractors is not so much due to a subjects ability to judge which category they came from, but some other mechanism.

Herrmann, Frisina and Conti (1978) considered a model of spreading activation (Collins & Loftus, 1975; Collins & Quillian, 1969) in interpreting their results. Although they conceded that there was no direct test of this model, and were thus unable to determine if it had any explanatory power, they argued that such a model could not explain all the results of their experiment. While it may not account for their results, it offers a radically different interpretation of Experiment 1, and of the underlying assumptions regarding the way we organize knowledge about people and personality attributes.

The model suggests that the psychological representation of traits has as its basis an associative network rather than categorical groupings of traits. In a categorical or schematic organization, it is assumed that, in part, each trait is associated both with a label such as "extravert" (denoting a group of people that exhibit a group of common attributes), which in turn is associated with other traits, and directly with these other traits, and that each trait has a property amongst its many properties that denotes it as a feature or attribute of such-and-such a category or schema. In the associative model, a trait does not have a property that denotes it as being a feature of a category or schema, and is not therefore seen as being associated with a label or with a group of traits as discussed above. Terms such as "extravert" in this analysis become personality descriptors like "happy", and do not serve to organize traits into groups of attributes of categories. In the associative model, traits are conceptualized as nodes in a network, linked simply to each other by paths of varying strengths representing their degree of psychological association.

In a task such as the sorting task given to subjects in Experiment 1, subjects may enter this network at various nodes, and explore the pathways in those localities. By the use of some idiosyncratic clustering algorithm, the subject may group together into a category all those trait-nodes encountered in some particular locality. When some of these traits are selected to make up the impression of the stimulus person, then not only do these trait-nodes get activated, but the nearby nodes, through spreading activation, also get activated. Where a "category" has occurred which has a majority of the impression-nodes contained within it (i.e. the schema category in this experiment), then many of the adjoining nodes in that "category" will also receive activation. By contrast, where a "category" has occurred that has, for example, only one impression-node within it (a peripheral category), then comparatively fewer nodes in that "category" will also be activated. Thus the nodes in the schema "category" will on the whole receive more activation than nodes in the peripheral "categories". This has the implication that schema traits will cause greater difficulty for the subject in their role as distractors than will the peripheral traits. Similarly, traits in those unrelated "categories" will receive little or no activation as none of them was activated during formation of the impression. Thus these traits should cause least difficulty in their role as distractors. These assumptions are represented in Figure 3.2.

These considerations could also apply to targets. The "schema" targets may activate each other to an extent since they all receive activation and are in close proximity to each other. By contrast, "peripheral" target traits would not as a rule activate each other. Hence their overall level of activation may be less than that of "schema" traits. This would imply that the hit rate of "schema" targets would be greater than that of

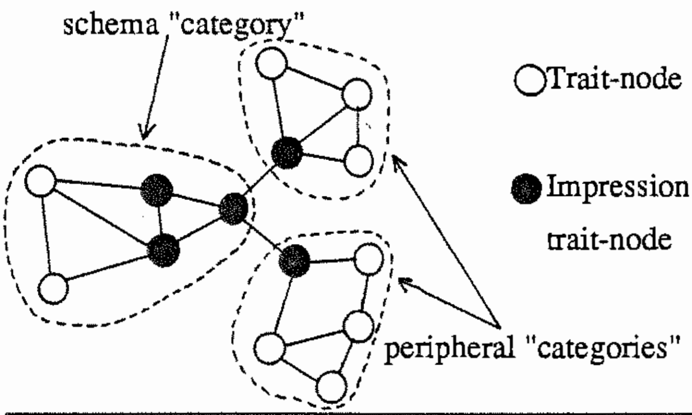

Figure 3.2 Representation of an associative network model of trait representation, showing schema and peripheral impression traits and "categories".

"peripheral" targets. However, spreading activation assumptions include the assumption that the level of activation of any one node is constrained to an asymptotic level (e.g. Anderson, 1976, 1983), such that endlessly spiraling cross-activation does not occur. Such a maximum level is usually thought to occur whenever an item enters consciousness, and consequently, both "schema" and "peripheral" traits would receive maximum levels of activation. This suggests that the hit rates for "schema" and "peripheral" targets should actually be equal.

The data reported here support the predictions derived from the simple associative network of traits coupled with assumptions of spreading activation. Hit rates on "schema" and "peripheral" targets were equal; while "schema" distractors were more difficult to reject than "peripheral" distractors", which provided more difficulty than "unrelated" distractors. Thus once the assumption of elaborative processing of peripheral traits is abandoned, then the AN+EP model becomes a viable model for the data of Experiment 1. This model is investigated in Chapters 6 and 7.

In conclusion, Experiment 1 found that schema and peripheral impression traits were equally recognizable, while schema distractors were more unlikely to be rejected than peripheral distractors, which were more unlikely to be rejected than peripheral distractors. The recognition procedure may not have revealed all differences in the memory for impression traits. Other differences may be evident when subjects recall impression traits. Chapter 4 examines the recall of impression traits, further evaluating the memory for schema-consistent and schema-inconsistent information, and assesses the SP+T and AN+EP models of impression processing.

CHAPTER 4

4.1 EXPERIMENT 2: RECALL OF AN IMPRESSION

Recall of information about either a person or group presented subsequent to identifying trait labels (Hastie & Kumar, 1979; Hemsley & Marmurek, 1982; Lingle, Geva, Ostrom, Leippe, & Baumgardner, 1979; Rothbart, Evans, & Fulero, 1979; Srull, 1981; Srull, Lichtenstein, & Rothbert, 1985; Wyer & Gordon, 1982; Wyer, Bodenhausen, & Srull, 1984), or biographical labels (Brewer, Dull, & Lui, 1981), has been shown to be a function of the congruity between the label and subsequent information. However, as noted in the previous chapter, first impressions of a person may be formed in the absence of explicitly communicated labels. The factors governing recall in this situation cannot be a matter of congruity between prior and subsequent information. Experiment 2 was a study of the processes implicated in the recall of a first impression.

The literature on the recall of personality impressions lacks studies which focus on the recall of impression traits which are consistent with an activated person schema, and those which are not. However, two studies present data bearing on the issue of differential processing of consistent and inconsistent impression information. Bargh and Thein (1985) studied the recall of behaviours rather than traits that exemplified or contradicted a single trait dimension (honesty-dishonesty), while Cantor and Mischel (1979b) studied the effects of the degree of featural overlap between an impression and a category on the amount of overall recall.

Bargh and Thein (1985) instructed subjects to read a number of statements describing behaviours performed by a person, and to form an impression of that person. Eighteen of the 24 sentences were related to the trait of honesty, while six were irrelevant to this trait. Twelve of the 18 implied honesty (or dishonesty), and thus, assumedly, activated the schema of an honest (or dishonest) person. Six traits implied the opposite trait, and were seen as incongruent behaviours. In one experimental condition, sentences were presented rapidly by the experimenter, rather than being perused by the subject. According to Bargh and Thein, the results of this rapid presentation group allow "generalizability of findings and models ... to the environment outside the laboratory" (p. 1144). In this group, subjects for whom honesty (or dishonesty) was not abnormally salient, recalled equal proportions of honest and dishonest behaviours. Subjects for whom honesty (or dishonesty) was salient, recalled proportionally more of the behaviours implying the incongruent trait. The implication that can be drawn from this study is that if an everyday impression is associated with a schema or category that is not overly salient for the subject, the recall rates of schema and peripheral impression traits should be equal.

There are some noteworthy features of Bargh and Thein's (1985) study. Firstly, the stimulus person was fictional, which may have induced subjects to utilize their fiction schemas, rather than their personal, experientially based schemas for processing information about real people. Whether these two types of schema are the same is unknown. Secondly, all behaviours related to the single trait dimension of honesty. This distinguishes the experimental situation from everyday situations where the stimulus information pertains to many dimensions of personality. Thirdly, the impression-formation process was rendered somewhat artificial by the experimental procedure of rapidly projecting the behaviour statements onto a screen.

Cantor and Mischel (1979b) studied the effect of varying the relative amounts of schema and peripheral information within an impression on the overall level of recall, and on the overall level of impression elaboration. Two of the characters studied by subjects were "mixed" characters, each character being described by nine pieces of information. Six pieces were congruent or consistent with one schema, while the remaining three pieces were congruent or consistent with a different and (hopefully) orthogonal schema. One of the mixed characters was predominantly extravert plus other independent attributes, while the other was predominantly introvert plus other independent attributes. Cantor and Mischel report that the relative levels of recall of the two types of information were "roughly in proportion to the representation of each prototype (schema) in the original character descriptions" (p. 198). However, the reported data were based only on the extravert-plus-other character. No data were presented on the introvert-plus-other character; no inferential statistics were reported; and it is not reported whether the data were from the immediate test or from the delayed test or both. Nevertheless, the data are consistent with Bargh and Thein

(1985), since proportional levels of schema and peripheral information were recalled.

The recall study of Cantor and Mischel (1979b) was similar in design to their earlier recognition study (1977) in that seven (rather than four) characters were studied in quick succession. Descriptions of characters were presented partly at the level of traits, again circumventing subjects' inferential and encoding processes. Stimulus characters were expressly fictional, and all were identified as females. The significant change introduced in the recall experiment was the use of impression-formation instructions, rather than memory-set instructions. While this represents a more pertinent procedure than the memory-set instructions of Cantor and Mischel (1977), the criticisms of the recognition study outlined in Chapter 3 are also pertinent here.

In conclusion, the data on the relative recall of schema and peripheral traits are, at present, sparse and open to criticism. Consequently, Experiment 2 examined the relative recall of schema and peripheral traits within an impression. In addition, this experiment tested the two processing models under review, the SP+T model (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982) , and the AN+EP model (Hastie, 1980, 1981; Hastie & Kumar, 1979; Srull, 1981). These two models make different predictions regarding recall of schema and peripheral traits, as detailed in Chapter 2.

The SP+T model suggests that recall is unlike recognition, in that recall involves only a single process of retrieval of items, which is termed "conceptually-driven" retrieval. In contrast, recognition may involve the joint operation of two processes, "data-driven" retrieval where the item is presented as a cue, possibly followed by a second stage of "conceptually-driven" retrieval (as in Atkinson and Juola, 1974). In recall, retrieval is directed by an organized search strategy, which is dependent upon the schema for direction. The SP+T model suggests that at an immediate recall test, the memory of the relevant schema is activated as a whole, and a search starts recovering all items within it. Consequently, not only are the to-be-recalled items retrieved, but non-presented items that are part of the schema are also retrieved. These items are intrusions in the recall process, and are equivalent to the schema false alarms predicted by the SP+T model in a recognition test. By contrast, to-be-recalled items that are not part of the schema are individually "tagged" or linked to the stimulus-person node. When these peripheral items are accessed, there will be no intrusions of other non-presented peripheral items.

The SP+T model also suggests that, over time, access to presented schema items is maintained by using the schema to direct search processes. Access to tagged peripheral items is, however, lost. Thus schema intrusions would still be expected, since they will also be recovered by the search process (and since the subject is unable to distinguish which recovered items were actually presented and which were not).

In summary, the hypotheses derived from the SP+T model were:

- In immediate recall, correct recall rates of schema and peripheral impression traits will be equal. At sufficient delay, the correct recall rates of schema traits will be higher than that of peripheral traits.

- The intrusion rate for schema nonimpression traits will be higher than that of peripheral nonimpression traits at all times.

- Thus the Memory Score (Recall) for schema impression traits will be low at all times, while the Score for peripheral impression traits will be high at immediate test, diminishing over time.

- For schema traits, the correct recall rate of impression traits will equal the intrusion rate of nonimpression schema traits.

The AN+EP model makes different predictions regarding the recall of schema and peripheral traits. This model has as its premise the assumption that information which is incongruent with an activated schema is cognitively processed more elaboratively. The subject attempts to give the incongruent information meaning, with the effect that more episodic links are generated between individual incongruent items and other items, than between individual schema items and other items. This has the effect of making more retrieval pathways available for the recall of incongruent items than congruent items. Consequently, the recall of incongruent items should exceed that of schema items. This effect is independent of time of testing, and should be observed at both immediate and delayed test. If it is assumed that non-schema (peripheral) traits function in manner similar to incongruent traits, then the AN+EP model predicts that peripheral traits will be relatively better recalled than schema traits.

Unlike the SP+T model, the AN+EP model does not suggest that recall should exhibit the sorts of intrusions predicted by the SP+T model. This is because the latter model presumes that the memory trace consists only of those items actually presented. However, psychological processes are not totally deterministic, but are rather probabilistic, and if intrusions do occur, then the rates for schema and peripheral nonimpression traits should be equal.

In summary, the hypotheses derived from the AN+EP model were:

- The correct recall rate of peripheral impression traits will be greater than that of schema impression traits at all times.
- The intrusion rate of schema and peripheral nonimpression traits will be minimal at all times.
- Thus the Memory Score (Recall) for peripheral traits will be greater than the Score for schema impression traits at all times.
- For schema traits, correct recall rates of impression traits will exceed intrusion rates of nonimpression traits.

The predictions made by each of the processing models with respect to correct recall rates and intrusion rates are summarized in Table 4.1.

4.2 METHOD

4.2.1 *Subjects*

Two hundred subjects enrolled in the introductory Behavioural Science course at the Canberra College of Advanced Education completed the experiment. Eighty-nine were males, and 111 were females. The median age was 18 years. Subjects received course credit for voluntary participation.

4.2.2 *Materials*

Stimuli. The two video tapes used in Experiment 1, one depicting a male, the other

Table 4.1

Predictions of the SP+T and AN+EP Models of Recall Performance in Experiment 2

	Model			
Measure	SP+T		AN+EP	
	Immed	Delay	Immed	Delay
Correct recall	S = P	S > P	S < P	S < P
Intrusions	S > P	S > P	S = P	S = P
Memory Scores	S < P	S < P	S < P	S < P
CR & Int's	CR=In	CR=In	CR>In	CR>In

Note. S = Schema traits; P = Peripheral traits.

a female, were again used in this experiment.

Trait Vocabulary. The 80 traits selected from Anderson's (1968) 555 trait list used in Experiment 1 were again used in this experiment.

4.2.3 *Design*

The design incorporated three between-subject factors and one within-subject factor in a split-plot design. The between-subject factors were sex of Stimulus person (male and female), Valence of impression (positive and negative), and test Interval (immediate and delayed); and the within-subject factor was Trait Type (schema and peripheral impression traits, schema and peripheral intrusions). While assignment assignment of subjects to the levels of Stimulus and Interval was random, the assignment of subjects to the Valence groups was on the basis of subjects' impressions. Those expressing favourable impressions (see 4.2.6 *Valence Measure*) were assigned to the positive Valence group, and those expressing negative impressions were assigned to the negative Valence group. Unequal numbers of subjects formed positive and negative impressions, resulting in a nonorthogonal design.

4.2.4 *Procedure*

The experiment involved three separate stages: Category Construction, Impression Formation, and Recall.

Category Construction. The category construction task was the same as that used in Experiment 1. Subjects were required to sort the 80 traits into groups that represented different "sorts" or "types" of people.

Impression Formation. The impression formation task was the same as used in Experiment 1. Subjects were instructed to watch the video of the person with a view to forming an impression of their personality. After a free description stage, subjects were required to select from four to ten traits from the 80-trait checklist to summarize their impression.

Recall. Subjects were required to free recall the impression traits they had selected in the impression-formation task. Subjects were instructed to write down the traits in the order in which they came to mind. Five minutes was allowed for this task.

The order in which subjects participated in these three stages was counterbalanced to the extent possible. Half the subjects completed the category construction task before proceeding, one week later, to the impression-formation and recall tasks. The other half completed the impression-formation and recall tasks before proceeding, one week after the recall test, to the category construction task. Unlike Experiment 1 where counterbalancing was not possible, this control procedure was introduced here since it was felt that some subjects who completed the category construction task first may be influenced in the selection of impression traits to select traits that they felf normally go together rather than were pertinent to the stimulus person. Conversely, subjects who selected traits initially to describe a particular person may later group them in the category construction task feeling that that stimulus person was a typical sort or type of person. By counterbalancing the order of tasks, this mutual interaction between tasks would be minimized.

Sex of stimulus person and time of recall test were counterbalanced across subjects.

Half the subjects who watched the male video and half the subjects who watched the female video were engaged for five minutes with administrative forms before participating in the immediate recall test. The remaining subjects were asked to return one week later, purportedly for further experimentation, for the delayed recall test.

4.2.5 *Classification of Impression Traits*

Unweighted classification Classification was done on a subject-by-subject basis, as in Experiment 1. In this classification scheme, that category of traits which contained the highest number of impression traits was designated the "schema" category. The impression traits in this category were classified "schema" traits. The remaining impression traits were classified "peripheral" traits.

This method of classification of traits did not allow the utilization of every subject. Some subjects had all impression traits occurring in the one category, precluding the identification of peripheral traits. Others had categories that contained equal numbers of impression traits, which prevented identification of a schema category.

Weighted classification In this classification analysis, impression traits were weighted according to whether they had been qualified with "somewhat", "quite", or "very". The same weighting scheme as used in Experiment 1 was used. That category of traits which yielded the highest number of points was designated the "schema" category. Again, as above, not all subjects could be utilized in analysis. Those subjects who had all impression traits occurring in the one category, and those who had two or more categories equal in the number of points, were excluded from analysis.

4.2.6 *Valence Measure*

The same method of determining the valence of each subject's impression as used in Experiment 1 was used. The average ranking was computed from the individual trait rankings (Anderson, 1968), and those less than 277.5 were classed positive, and those greater, negative. As in Experiment 1, this mean ranking was calculated on equally weighted impression traits, and on traits weighted according to their qualifier as above.

4.3 RESULTS

4.3.1 *Data sets*

Of the 200 subjects who completed the experiment, 163 subjects returned data suitable for analysis. Of the remaining 37, 20 were unsuitable because neither the unweighted, nor weighted, classification schemes resulted in the unambiguous selection of a schema category. Four of the 37 subjects produced impressions whose traits resided entirely within the one category, thus precluding the identification of peripheral traits. Finally, 13 subjects were unable to recall any of the traits.

Of the 163 suitable subjects, 113 formed a core group whose impression classification was the same both before and after weighting. That is, for these subjects, the schema category was the same before and after weighting; and the valence of the impression was the same before and after weighting.

Eighteen subjects had an identifiable schema category before, but not after weighting, and four subjects had a different schema category after weighting. The core group of 113 combined with these 22 subjects made a pool of 135 for the "unweighted" analysis.

Twenty-eight subjects had identifiable schema categories only after weighting. These combined with the core group of 113 plus the four subjects whose schema categories changed after weighting made a pool of 145 for the "weighted" analysis.

4.3.2 *Data analyses*

Separate analyses were conducted on the three data pools, yielding essentially similar patterns of results (for details of all ANOVA tables, see Appendix B). The most conservative analysis based on the core group of 113 subjects whose protocols are exactly the same before and after weighting is reported here.

In the analyses below, the between-subject factors are test Interval, sex of Stimulus person, and Valence of impression. Unequal numbers of subjects occupy each level of each factor, and are given in Table 4.2. The single within-subject factor varies with the particular analysis, but is always a repeated measures factor with equal numbers of subjects at each of the two levels. Due to unequal cell sizes, analysis was performed by application of the General Linear Model.

Table 4.2

Number of Subjects by Condition

Interval	*n*	Stimulus	*n*	Valence	*n*
Immediate	57	Male	51	Positive	68
Delay	56	Female	62	Negative	45

Interval x Stimulus x Valence

Immediate	57	Male	23	Positive	13
				Negative	10
		Female	34	Positive	23
				Negative	11
Delay	56	Male	28	Positive	14
				Negative	14
		Female	28	Positive	18
				Negative	10

4.3.3 *Preliminary analysis: Number of impression traits*

The mean numbers of schema and peripheral traits selected by subjects in each experimental condition are given in Table 4.3.

Table 4.3
Mean Number of Impression Traits Selected by Condition

	Trait type	
Condition	Schema	Periph
Stimulus		
Male	3.49	2.69
Female	3.52	3.27
Valence		
Positive	3.57	2.99
Negative	3.40	3.04
Interval		
Immediate	3.51	2.93
Delayed	3.50	3.09

The numbers of schema and peripheral traits selected to summarize the impression were subjected to a Stimulus x Valence x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

Trait Type significantly affected selection. Subjects selected more schema traits ($M = 3.50$) than peripheral traits ($M = 3.01$), $F(1, 105) = 8.24$, $p<.01$. There were no significant interactions between Trait Type and any other factors.

None of the between-subject factors significantly affected the number of traits selected, and there were no significant interactions.

4.3.4 *RECALL MEASURES*

Correct recall rates

The mean proportions of schema and peripheral traits recalled in each experimental condition are given in Table 4.4.

Table 4.4
Mean Proportions of Traits Recalled by Condition

	Trait type	
Condition	Schema	Periph
Stimulus		
Male	.50	.48
Female	.57	.53
Valence		
Positive	.55	.54
Negative	.52	.47
Interval		
Immediate	.64	.72
Delayed	.44	.30

The proportions of schema and peripheral traits correctly recalled were subjected to a Stimulus x Valence x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

There was no significant effect for Trait Type. Thus, there was no evidence to suggest that subjects recalled different proportions of schema (M = .54) and peripheral traits (M = .51), $F(1, 105) = 0.39$, $p>.50$. There was, however, a significant interaction between Trait Type and Interval, $F(1, 105) = 8.81$, $p<.005$. An analysis of simple effects revealed that at the delayed test, more schema traits were recalled than peripheral traits, $F(1, 105) = 6.58$, $p<.05$. At the immediate test, the simple effects analysis showed that schema and peripheral traits were recalled equally well, $F(1, 105) = 2.70$, $p>.10$.

Of the between-subject factors, only Interval significantly affected the proportions recalled, with more traits being recalled at immediate test (M = .68) than at the delayed test, (M = .37), $F(1, 105) = 62.44$, $p<.0001$. There were no significant interactions between any of these factors.

Recall intrusion rates

The mean rates of recall intrusions for schema and peripheral traits in each experimental condition are given in Table 4.5.

The intrusion rates of schema and peripheral traits were subjected to a Stimulus x Valence x Interval x Intrusion Type analysis with repeated measures on Intrusion Type (schema and peripheral).

There was a significant effect for Intrusion Type. Subjects made more schema intrusions (M = .03) than peripheral intrusions (M = .01), $F(1, 105) = 8.45$, $p<.005$. There was also a significant interaction between Intrusion Type and Interval, $F(1, 105) = 4.93$, $p<.05$. An analysis of simple effects showed that at immediate test, the rate of schema intrusions did not differ from the rate of peripheral intrusions, $F(1, 53) = 0.50$, $p>.40$. At the delayed test, however, the intrusion rate for schema traits was greater than the intrusion rate for peripheral traits, $F(1, 52) = 8.67$, $p<.005$.

Of the between-subject factors, Interval significantly affected intrusion rates, with the rate of intrusions at delayed test (M = .04) being greater than the rate at immediate

Table 4.5
Mean Recall Intrusion Rates by Condition

Condition	Trait type	
	Schema	Periph
Stimulus		
Male	.04	.02
Female	.03	.01
Valence		
Positive	.03	.02
Negative	.04	.01
Interval		
Immediate	.02	.01
Delayed	.05	.02

test (M = .01), $F(1, 105) = 10.01$, $p<.002$. There was a significant interaction between Interval, Stimulus, and Valence, $F(1, 105) = 5.14$, $p<.05$.

Memory Scores

The mean Memory Scores for schema and peripheral traits were computed. Mean Memory Scores for schema and peripheral traits in each experimental condition are given in Table 4.6.

Memory Scores were subjected to a Stimulus x Valence x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

Table 4.6

Mean Memory Scores for Impression Traits by Condition

Condition	Trait type: Schema	Periph
Stimulus		
Male	.47	.47
Female	.56	.52
Valence		
Positive	.54	.52
Negative	.47	.46
Interval		
Immediate	.63	.72
Delayed	.40	.28

There was no significant effect for Trait Type. Thus there was no evidence to suggest that subjects' Memory Scores for schema traits (M = .52) was different form their Memory Scores for peripheral traits (M = .50), $F(1, 105) = 0.07, p>.70$. There was, however, a significant interaction with Interval, $F(1, 105) = 6.73, p<.02$. An analysis of simple effects found that at immediate test, Scores for schema traits were not different from Scores for peripheral traits, $F(1, 105) = 2.68, p>.10$. At delay, however, Scores for schema traits were greater than Scores for peripheral traits, $F(1, 105) = 4.15, p<.05$.

Of the between-subject factors, only Interval significantly affected Memory Scores, with Scores at immediate test (M = .67) being greater than at the delayed test (M =

.34), $F(1, 105) = 65.70$, $p<.0001$. There were no significant interactions between the factors.

Summary of results

A summary of results reported above and their implications for the two processing models is given in Table 4.7.

Table 4.7
Summary of Results and Implications for the SP+T and AN+EP Models

			Model			
Measure	Data		SP+T		AN+EP	
	Immed	Delay	Imm	Del	Imm	Del
Recall	S = P	S > P	yes	yes	no	no
Intrusion	S = P	S > P	no	yes	yes	no

Note. S = Schema; P = Peripheral.

4.3.5 *Clustering of schema traits*

Recall protocols were scored for clustering using the Adjusted Ratio of Clustering (ARC)(Murphy & Puff, 1982; Pellegrino & Hubert, 1982). Only the clustering of items from the schema category was of interest, since the peripheral items are drawn from a number of categories and their clustering cannot be meaningfully interpreted. As a consequence, schema traits were classed as coming from the single category, while each peripheral trait was classed as coming from a separate category. This makes no difference to the functioning of the ratio, and if schema traits are recalled in adjacent positions, then the ARC will still equal unity. If the distribution of schema items throughout the recall protocol is as chance would predict, then the ARC ratio will equal zero.

Two separate analyses were performed, one using only correctly recalled trait terms (as reported in the Correct Recall section above), and another incorporating recall intrusions (as reported in the Intrusions section above).

Many recall protocols could not be analyzed (62 in the former group, and 45 in the latter) since they either had only a single schema trait item, or had only schema trait items and no peripheral items.

Fifty-one recall protocols were subjected to the strict accuracy analysis, and the mean ARC was .00. The mean ratios in both immediate and delayed conditions was .00.

Sixty-eight recall protocols were scored with intrusions, and the mean ARC was .10. By a signed-ranks test, this mean was not significantly different from zero, $T = 238.5$, $p>.10$. The mean at immediate test of -.02 was not significantly different from zero, $T = 24.5$, $p>.70$. However, the mean at delay of .31 was significantly greater than zero, $T = 75$, $p<.05$. This suggests clustering of schema traits at delayed recall.

4.3.6 *First recalled trait*

The status of the first trait term recalled was evaluated in the all recall protocols. In protocols scored only for accurately recalled items, there was no tendency for schema traits to be the first recalled (or not to be the first recalled), either at immediate test ($X^2(1, n = 57) = 0.20, p>.50$), at delayed test ($X^2(1, n = 56) = 0.00, p>.99$), or overall ($X^2(1, n = 113) = 0.07, p>.30$).

In protocols scored for intrusions in addition to accurately recalled items, there was no tendency for schema traits to be the first recalled (or not to be the first recalled), at immediate test ($X^2(1, n = 56) = 0.20, p>.50$), at delayed test ($X^2(1, n = 57) = 0.10$, $p>.70$), or overall ($X^2(1, n = 113) = 0.34, p>.50$).

4.4 DISCUSSION

In this experiment, subjects formed an impression of a person, and on another occasion, defined their person categories. The impression was matched to one category--the schema category--and impression traits were classified as either "schema" or "peripheral". Subsequently, subjects free recalled their impressions in an unexpected recall task. In an immediate recall test, schema and peripheral traits were recalled equally well. The rates of schema and peripheral intrusions were also equal, each being quite low. At the delayed test, the rate of recall of schema traits was greater than that of peripheral traits, and the rate of schema intrusions was greater than that of peripheral intrusions. Data trends were independent of the sex of the stimulus person, and of the valence of the impression.

The enhanced recall of schema traits, and the elevated level of novel schema trait intrusions, both appearing some time after the impression was formed, suggests that differential memory processes for schema and peripheral traits are implicated in the retrieval stage. There was also evidence in Experiment 1 where recognition measures were used that differential effects also occurred at the encoding and storage stages, since subjects gave more schema than peripheral false alarms.

It may be noted that intrusions of non-impression traits seemed to have been output from two distinct cognitive processes, one conscious, the other unconscious. Subjects seemed, on the whole, to have written down only those traits they believed they had used in the impression. Any non-impression traits included by the subject were genuine intrusions, representing unconscious errors. Occasionally subjects remarked that they remembered having used say five terms, and therefore they should write down five terms. If they could not remember all five, they would guess the remaining terms. Hence, these were not genuine intrusions, but the output of a conscious process. However, these latter items are still informative, in that they reveal, as do genuine intrusions, the organization basis of this erroneous information. If these guesses were based upon the schema category, then this is just as informative as intrusions being based upon the schema category. It shows that the schema category is providing a central reference point for both conscious and unconscious processes involved in providing and outputing information about a stimulus person. For this reason, the two types of error were not partitioned, nor could they be, in analyses.

The data of Experiment 2 contrast with the data of Bargh and Thein (1985), and Cantor and Mischel (1979b). Both these studies found equal recall rates of consistent and inconsistent impression information. Reconciliation of this disparity may rest on methodological differences. Bargh & Thein rapidly presented statements about a person's behaviour to subjects, these statements implying opposite positions on a single trait dimension (being simultaneously honest and dishonest). Subjects may have found this contradictory evidence difficult to incorporate into a coherent impression, and may have stored both types of information. Cantor and Mischel (1979b) focused on the effects of congruence on the amount of recall, and do not appear to have analysed the data on recall of congruent and incongruent information, reporting only their impressions that the levels were approximately equal.

The data again offer mixed support for the two processing models, the SP+T and AN+EP models, which have been adapted to memory for first impressions. The SP+T model is supported by the equal recall rates of schema and peripheral traits at immediate test, the greater recall of schema traits at delay, and the greater intrusion rate for schema traits at delay. The AN+EP model is infirmed by these same data. The AN+EP model is, however, supported by the equal intrusion rates for schema and peripheral intrusions at immediate test. The SP+T model is infirmed by the same data. Thus the majority of evidence favours the SP+T model, as it did in Experiment 1.

It must be noted that the intrusion rate for novel schema traits was always very low, and far below that of the level of correct recall of schema traits. Similarly, the data of Experiment 1 show that the schema false alarm rate was far below that of the correct recognition rate. Hence, the assumption of the SP+T model which suggests that unselected schema traits are copied into the memory trace, and are indistinguishable from the original impression traits, again appears in need of modification.

The data from the present experiment also suggest that there is a need to modify or reject that assumption of the AN+EP model that extra processing is given to the peripheral traits of the impression. There was no evidence that extra processing had been given to these traits thereby resulting in additional retrieval paths to peripheral traits. Rather, the evidence from the immediate test showed no difference in the rates of recall, while the delayed test showed that peripheral traits were recalled at a lesser rate than schema traits. In addition, the AN+EP model has no mechanism by which it can account for the higher rate of intrusions associated with schema traits found at delay. Thus the AN+EP model fares poorly with respect to the data of this experiment.

While the SP+T model provides a better fit to the data than the AN+EP model, there are additional aspects of the data which provide difficulty for the SP+T model. The clustering analyses suggest that there was no clustering of schema items at immediate test, although there was at delayed test. If the schema was providing a search strategy, then there should have been a clustering of schema items at both stages. In defence of the SP+T model, it is possible that, at immediate test, the search strategy was interacting with the linked peripheral traits, with this interaction disappearing as the peripheral links decayed. Just what sort of interaction would account for this is, however, unknown.

Other evidence providing some difficulty for the SP+T model concerns the status of the first recalled trait. In the delayed test where more schema items were recalled than peripheral items, there was no evidence that the search began with access to schema traits. This is puzzling if the schema was directing the search processes as the SP+T model suggests.

The data of Experiment 2 are possibly confounded by the list-length effect, where the probability of recalling an item is inversely related to the length of the list in which it appeared (Murdock, 1962; Roberts, 1972). In this experiment, there were more schema traits than peripheral traits in impressions, although the mean difference was only 0.5 of an item. Thus the list length effect, if it had any role here, would have led to proportionally more peripheral traits being recalled. This prediction coincidentally accords with the predictions made by the AN+EP model, but is contrary to the predictions made by the SP+T model. However, the data are contrary to the list length prediction, and consequently the better recall of schema traits was achieved despite this effect.

A second point of possible confounding rests on the fact that schema traits were from one category, while peripheral traits were from a number of different categories (which varied from subject to subject but was on average approximately three). Tulving and Pearlstone (1966) found in their study of recall of words from categorized lists that for lists of equal length, it was irrelevant how many categories were represented in each list, and with that how many words per category were present. Thus a list of twelve words with each word from a different category was recalled as well as a list of twelve words comprising three categories and four words per category. On these grounds, there is no reason to suggest that schema traits would have been recalled to any greater or lesser extent than peripheral traits.

In Chapter 3, a model of memory for impression traits was suggested which gave a reasonable fit to the data of Experiment 1. Essentially, this model represents a subject's vocabulary of traits as nodes in an associative network, through which activation spreads as traits are processed. "Schema" traits are conceptualized as closely linked nodes in one particular locality within the network (localities being the basis of person "categories"), while "peripheral" traits are conceptualized as relatively isolated nodes, only weakly linked to the "schema" impression nodes. These assumptions are represented in Figure 4.1.

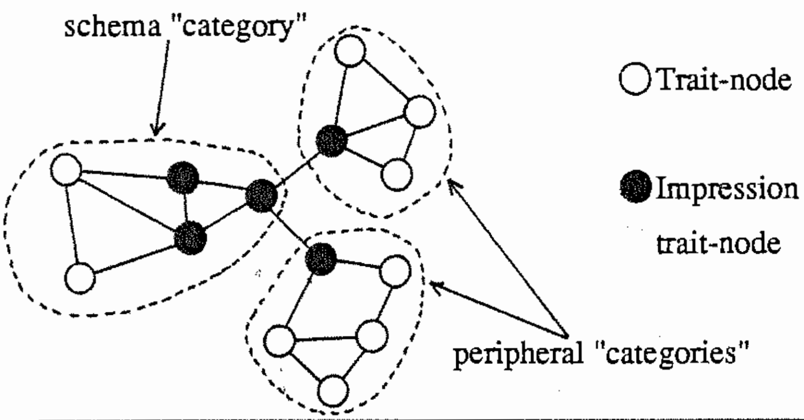

Figure 4.1 Representation of an associative network model of trait representation, showing schema and peripheral impression traits and "categories".

The data of Experiment 2 can also be shown to accord with this model. Schema traits were better recalled since they are in close proximity to each other in the network, and more retrieval links are available to access them. Peripheral traits were not recalled as well since they lie at various unorganized locations throughout the network with fewer available retrieval paths. Novel schema traits figured as intrusions more frequently than novel peripheral traits, since novel schema traits received more activation from adjoining schema impression traits. Peripheral intrusions were less likely to occur, since there are fewer peripheral impression traits in their network vicinity, and consequently less activation flowed to novel peripheral traits.

This model does not postulate the existence of distinct categories consisting of personality attributes. Rather, it suggests a simple cognitive network of traits, which can give rise to memory effects that give the appearance of "schematizing". This associative network model is tested in Experiments 4 and 5.

CHAPTER 5

5.1 EXPERIMENT 3: RECALL OF AN IMPRESSION: EXTENSION OF EXPERIMENT 2

Experiment 2 showed that when a personality impression is recalled after some time, there is better recall of impression traits congruent with the "type" of person most like that impression, than there is of impression traits which are not congruent. This differential recall of parts of an impression contrasts with the lack of any effect in Bargh and Thein (1985), and Cantor and Mischel (1979a). There appeared a reasonable need to consolidate these findings by extending Experiment 2 before theoretical judgement could be made on the memory models under review, and any additional theoretical territory mapped.

Further, the traits selected by subjects in Experiment 2 for their impressions, and later recalled, were chosen from a checklist supplied by the experimenter from Anderson's (1968) 555 trait study. The checklist could not offer the subject the full range of expression and nuance often associated with impressions. Schematizing behaviour of subjects may therefore have been attenuated by the checklist. In order to establish a clearer picture of cognitive processes in everyday impression formation, subjects in Experiment 3 were allowed to furnish their own impression traits, drawn from their own psychological vocabularies.

Finally, in the previous experiments, the same list of 80 experimenter-supplied traits was used in both the Category Construction and Impression-formation tasks, and some subjects commented on this. This common pool, and source, of traits may have prompted subjects to sort together those traits previously selected for the impression, or to select for the impression those traits previously sorted together. Nonetheless, this problem was minimized in this experiment as subjects worked with only a few traits generated by themselves in the impression/recall tasks, but worked with a (largely) experimenter-supplied list of 80 common traits in the sorting task. Thus the impression/recall and sorting tasks in this experiment are less likely to have elicited cross-task influenced responses than in previous experiments. In summary, Experiment 3 sought to consolidate the results of Experiment 2, allowed subjects to work within their own psychological vocabularies, and minimized the potential for cross-task response interference.

Experiment 3 comprised three consecutive stages. First, an impression-formation task was administered identical to that used in the previous two experiments, with the exception that subjects had to furnish their own traits to summarize their impressions. Second, a surprise free recall task followed either immediately or after a delay of one week, as in the previous experiment. In this task, subjects were required to recall the traits they had furnished as summaries of their impressions. Third, a sorting task identical to that of the previous two experiments was administered, with the exception that those traits furnished earlier by the subject were combined with the requisite number of traits from the checklist used in previous experiments to make a pool of 80. The experimenter then classified the impression traits into those that were attributes of the category most closely matching the impression (the "schema" traits), and those that were not (the "peripheral" traits). The level of recall of these two types of traits was then compared.

Other methodological differences existed between Experiment 3 and Experiments 1 and 2. Firstly, Experiment 3 could not incorporate the counterbalancing of the sorting task and impression/recall tasks as in Experiment 2. Because the subject had to furnish traits in the impression-formation task before these traits could be utilized in the sorting task, the impression-formation task had to precede the sorting task.

Secondly, the study of recall intrusions pursued in Experiment 2 was not continued in this experiment. Two reasons prompted this course of action. Firstly, Experiment 2 showed that even when subjects had been using a checklist of 80 common trait terms, the intrusion rate from this list was very low (maximum of five percent of all possible nonimpression schema-trait intrusions at delay). Secondly, in this experiment, if all furnished impression traits, plus intrusions produced at recall had been incorporated in the sorting task, then this may have made for a large group of synonyms. Consequently, the subject's attention may have been drawn to them, thereby encouraging subjects to link the impression/recall tasks with the sorting task. For all these reasons, intrusions were not examined in this experiment. As a consequence, Memory Scores for schema and peripheral traits were not computed.

Finally, valence of the impression was not included as a factor in the present study, since many of the traits furnished by subjects were not to be found on Anderson's (1968) list of ranked traits, thus preventing the experimenter from guaging their ranking on Anderson's likeability scale, and subjects were not required to specify whether they viewed the furnished traits as positive or negative in valence. Thus there was no means by which the experimenter could determine if a particular impression was, overall, positively or negatively valenced. This was not considered problematic in the design, since valence did not affect the pattern of recall or recognition of impression traits in Experiments 1 and 2.

To summarize, Experiment 3 studied the correct recall of schema and peripheral traits as furnished by the subject. The between-subjects factors were sex of stimulus-person, and time of recall test. The within-subjects factor was trait type, involving schema and peripheral traits.

The two models of schematic processing evaluated in Experiments 1 and 2, the SP+T and AN+EP models, offer different predictions as to the rates of recall of schema and peripheral traits. These predictions were developed in detail in Chapters 1 and 4.

The SP+T model predicts that, at immediate test, schema traits and peripheral traits will be recalled equally well, though after sufficient delay, schema traits will be better recalled than peripheral traits. This increasing advantage for schema traits is hypothesized to be due to the search processes being driven by the schema. Consequently schema traits will be retrieved at a greater rate than peripheral traits.

The AN+EP model predicts that peripheral traits will be better recalled than schema traits at all intervals, as a consequence of the elaborative processing given to peripheral traits. These predictions are summarized in Table 5.1.

Table 5.1

Predictions of the SP+T and AN+EP Models of Recall Performance in Experiment 3

Hypothesis	Model			
	SP+T		AN+EP	
	Immed	Delay	Immed	Delay
Correct recall	S = P	S > P	S < P	S < P

Note. S = Schema traits; P = Peripheral traits.

5.2 METHOD

5.2.1 *Subjects*

Eighty subjects enrolled in the introductory Behavioural Science course at the Canberra College of Advanced Education completed the experiment. Thirty-six were males, and forty-four were females. The median age was 19 years. Subjects received course credit for participation which was voluntary.

5.2.2 *Materials*

Stimuli. The two video tapes, one depicting a male, the other depicting a female, which were used in Experiments 1 and 2 were again used in this experiment.

Trait Vocabulary. The 80 traits selected from Anderson's (1968) 555 trait list which were used in the Experiments 1 and 2 were again used in this experiment.

5.2.3 *Design and Procedure*

The experiment involved three sequential stages: Impression Formation, Recall, and Category Construction. All subjects followed this order, since the Category Construction task was not possible until the Impression Formation and Recall tasks had been completed.

Impression Formation. The impression-formation task was similar to that used in the previous experiments. Briefly, subjects were instructed to watch the video of the person with a view to forming an impression of their personality. After a free description stage, subjects were required to summarize their impressions by furnishing from four to ten traits. Subjects were instructed not to use terms that evaluated the physical appearance, sex, age, race, or social class of the stimulus-person.

Recall. In the unanticipated recall test, subjects had to free recall the traits they had produced to summarize their impressions. Subjects were instructed to write down the traits in the order in which they came to mind.

Category Construction. The category construction task involved a sorting task similar to that used in the previous experiments. Subjects were again required to sort 80 traits into groups that were perceived as commonly co-occurring in people. The 80 traits were made up of those traits furnished in the impression-formation stage, plus the requisite number of traits from the original group of 80 traits used in previous experiments to make a total of 80 traits. Traits deleted from the original group were chosen from those traits most often occurring in the "Miscellaneous" group from the previous two experiments. It should be noted that for a proportion of subjects, the furnished traits were all represented in the original group of 80, thus removing the need to delete any items from that original group. For other subjects, only one or two traits had to be replaced. Consequently, less deletion occurred than is suggested by this procedure. An alternate procedure would have been to delete synonyms of the furnished traits from the original group of 80 rather than traits that often occurred in the Miscellaneous category. However, this would have involved judgements by the experimenter or others as to the closest synonym in the list, a judgement not necessarily supported by the subject, and a lack of uniformity as to whether the closest synonym was quite close in meaning to the particular trait or somewhat distantly related. For these reasons, deleted traits were taken from the Miscellaneous category.

There are no untoward implications of this procedure. It means that the subject may construct a schema category that contains a number of impression traits plus a number of similar traits from the remaining traits on the list, leading to a slightly larger category than other categories, but this has no bearing on the recall measure for the impression traits themselves.

Sex of stimulus person and time of test were counterbalanced across subjects. Half the subjects who watched the male video and half who watched the female video were engaged for five minutes with administrative tasks before performing the immediate recall task. The remaining subjects were asked to return one week later, purportedly for further experimentation, for the delayed recall test. All subjects completed the category construction task one week after the recall test.

5.2.4 *Classification of Impression Traits*

Unweighted classification. Classification of impression traits into schema and peripheral traits was done on a subject-by-subject basis, in the same manner as in Experiments 1 and 2: The category of traits which contained the highest number of impression traits was designated the "schema" category. The impression traits in this category were classified "schema" traits, while the remaining impression traits were classified "peripheral" traits.

This method of classification of traits did not allow the utilization of every subject's data. For some subjects, all impression traits fell in the one category, precluding the identification of peripheral traits. Others had categories that contained equal numbers of impression traits, preventing identification of a schema category.

Weighted classification. In this classification scheme, impression traits were weighted according to whether they had been qualified with "somewhat", "quite", or "very". The same weighting scheme as used in Experiments 1 and 2 was used. That category of traits which yielded the highest number of points was designated the "schema" category. Again, as above, not all subjects could be utilized in analysis. Those subjects who had all impression traits occurring in the one category, and those who had two or more categories equal in the number of points, were excluded from analysis.

5.3 RESULTS

5.3.1 *Data sets*

Of the 80 subjects who completed the experiment, 74 returned data suitable for analysis. Of the remaining six, four were unsuitable because neither the unweighted, nor the weighted classification procedures resulted in the unambiguous identification of a schema category. Finally, two were unsuitable since they produced impressions whose traits resided entirely within the one category, thus precluding the identification of peripheral traits.

Of the 74 suitable subjects, 55 formed a core group whose schema categories were the same both before and after weighting of impression traits. Three subjects had an identifiable schema category before, but not after weighting, and one subject had a different schema category after weighting. The core group of 55, together with these four subjects, made a pool of 59 for the "unweighted" analysis.

Fifteen subjects had identifiable schema categories only after weighting. These, together with the core group of 55 and one subject whose schema category changed after weighting, made a pool of 71 for the "weighted" analysis.

5.3.2 *Data analyses*

Separate analyses were conducted for each of the three data sets (for details of all ANOVA tables, see Appendix C). These yielded essentially similar patterns of results. Only the most conservative analysis based on the core group of 55 subjects is reported here.

In the analyses below, the between-subject factors were Stimulus and Interval. Unequal numbers of subjects occupied each level of each factor, and are given in Table 5.2. Each analysis also involved a single within-subject factor, the exact nature of which varied with the particular analysis, but was always a repeated measures factor with equal numbers of subjects at each of two levels. In view of the unequal cell sizes, analysis was performed by application of the General Linear Model.

Table 5.2
Number of Subjects by Condition

Interval	*n*	Stimulus	*n*
Immediate	28	Male	27
Delay	27	Female	28
Interval x Stimulus			
Immed Male	14	Delay Male	13
Immed Female	14	Delay Female	14

5.3.3 *Preliminary analysis: Number of impression traits*

The mean numbers of schema and peripheral traits furnished by subjects to summarize their impressions in each experimental condition are given in Table 5.3.

The numbers of schema and peripheral traits furnished to summarize the impression were subjected to a Stimulus x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

There was no significant effect for Trait Type, although the difference between the mean number of schema traits supplied and the mean number of peripheral traits supplied approached significance, $F(1, 51) = 3.99, p<.06$. There were no significant interactions between the factor of Trait Type and any other factors.

None of the between-subject factors significantly affected the number of traits supplied, and there were no significant interactions.

5.3.4 *Correct recall rates*

Table 5.3

Mean Number of Impression Traits Furnished by Condition

Condition	Trait type: Schema	Periph
Stimulus		
Male	2.67	2.37
Female	2.68	2.14
Interval		
Immed	2.64	2.50
Delay	2.70	2.00

The mean proportions of schema and peripheral traits correctly recalled in each experimental condition are given in Table 5.4.

The proportions of schema and peripheral traits correctly recalled were subjected to a Stimulus x Interval x Trait Type analysis with repeated measures on Trait Type (schema and peripheral).

There was a significant effect for Trait Type. Subjects recalled proportionally more schema traits ($M = .69$) than peripheral traits recalled ($M = .56$), $F(1, 51) = 4.74$, $p<.05$. There were no significant interactions between Trait Type and any other factors.

Of the between-subject factors, only time of test significantly affected the proportions recalled, with subjects recalling more impression traits at immediate test ($M = .78$) than at delay ($M = .47$), $F(1, 51) = 25.63$, $p<.0001$. There were no significant interactions between any of the between-subject factors.

Table 5.4

Mean Proportions of Impression Traits Recalled by Condition

	Trait type	
Condition	Schema	Periph
Stimulus		
Male	.69	.59
Female	.68	.52
Interval		
Immed	.84	.71
Delay	.53	.40

5.3.5 *Clustering of schema traits*

Recall protocols were scored for clustering of schema traits using the Adjusted Ratio of Clustering (Murphy & Puff, 1982; Pellegrino & Hubert, 1982). Schema traits were all classed as coming from a single category, while each peripheral trait was classed as coming from a separate category. If schema traits are recalled in adjacent positions, then the ARC will equal unity. If the distribution of schema items throughout the recall protocol is as chance would predict, then the ARC will equal zero.

Twenty-four recall protocols could not be analyzed, since they either had only a single schema trait item, or had only schema trait items and no peripheral trait items.

Thirty-one recall protocols were subjected to analysis, yielding a mean ARC of 0.33. This ratio was significantly different from zero (signed ranks test, $T = 109$, $p<.03$). This indicates a significant degree of clustering of schema traits at recall.

5.3.6 *First recalled trait*

The status of the first trait term recalled was evaluated for each recall protocol. There was no tendency for a schema-trait to be the first recalled, (or not to be the first recalled), either overall ($X^2(1, n = 55) = 0.00$), at immediate test ($X^2(1, n = 28) = 2.53$, $p>.10$), or at delay ($X^2(1, n = 27) = 2.82$, $p>.05$.

5.4 DISCUSSION

In this experiment, subjects furnished between four and ten traits to summarize their impressions of a person, and in an unanticipated recall task, recalled these traits. Later, subjects sorted 80 traits, including the impression traits, into categories. The impression was matched to one category--the schema category--and impression traits were classified as either "schema" or "peripheral". The levels of recall of schema and peripheral recall were compared.

Subjects recalled proportionally more schema traits than peripheral traits. This trend was evident at both immediate test, and after one week's delay. It is evident that the retrieved impression had altered with respect to the original composition of the impression in terms of schema and peripheral traits, with a greater proportion of schema traits occurring in the remembered impression. Thus the original impression lost some of its original complexity and dimensionality, and became more like a particular "sort" or "type" of person.

The pattern of data found in Experiment 3, while similar to that of Experiment 2, is more consistent. The data of Experiment 3 show a main effect overall with no significant interaction: schema traits were better recalled than peripheral traits at both intervals. In Experiment 2, there was a significant interaction though no main effect for Trait type, a simple effect at delay but none at immediate test. Hence in both experiments schema traits were better recalled at the delayed test, and in Experiment 3, also at the immediate test.

In the present experiment, there was no significant interaction between Trait Type and Interval, as there was in Experiment 2. This indicates that there was no change in the proportions of schema and peripheral recalled after a week's interval. Thus the depressed level of recall of peripheral traits which occurred immediately did not become more pronounced over the week. Whether further depression in the recall of peripheral traits would be observed after a longer interval is open to speculation. Hanawalt (1937) found that recall of drawings was influenced by notions of good form, but found that the degree of influence on recall did not vary as the interval to first recall attempt varied. Thus it may also be the case that the first attempt at recall of impressions does not evidence greater assimilation to the prototype simply with the passage of time. Repeated attempts at recall of the one impression may show increasing assimilation over time, but as yet there are no data that speak to this issue.

Another difference between Experiments 2 and 3 concerns the overall levels of recall in the two experiments. An analysis of the data from both experiments showed that the overall proportion of correct recall in the present experiment of 0.62 was significantly greater than the overall level of recall of 0.52 in the previous experiment ($F(1, 160) = 7.48, p<.01$ -- see Appendix C for details). The higher level of recall in the present experiment may be due to a number of reasons. Firstly, subjects in the present experiment had to supply their own traits from their own psychological vocabularies, rather than select them from a checklist. Consequently the furnished traits may have been encoded more elaboratively than the checklist traits. Secondly, subjects' impression traits may have suffered less interference as each subject supplied no more than ten traits, whereas in the previous experiment, the selected impression traits were drawn from a list of 80 trait terms. Both of these factors may well have been aided by a third factor. An analysis of the number of impression traits in the two experiments showed a significant difference in the number of traits to be recalled. The mean number of impression traits in the present experiment (5.92) was significantly less than the mean number of impression traits (7.51) in the previous experiment ($F(1, 160) = 29.25, p<.0001$). Thus, in the present experiment, there were fewer traits to be encoded, and fewer to cause interference. Indeed, it is often reported that the proportion of a list of words recalled declines as the list length increases (e.g. Roberts, 1972), and the data from this experiment concord with these findings. Consequently, superior recall was to be expected in the present experiment.

Both Experiments may be contrasted with studies that failed to find any difference in the respective levels of recall (Cantor & Mischel, 1979b; Bargh & Thein, 1985). It will be recalled that the study of Cantor and Mischel addressed the issue of the amount of overall recall rather than the respective levels of recall, and the data on respective levels of recall were anecdotally recorded; while the study of Bargh and Thein employed a rapid slide presentation of sentences describing behaviours all of which revolved around one trait dimension, and which had conflicting implications for the impression. Consequently, when the focus is on respective levels of recall of schema and peripheral information, and subjects are allowed to work at their own pace selecting or furnishing traits they feel best sum up their impressions, superior recall of schema information is evidenced.

Experiment 3 provides further support for the notion of schematic influences in everyday cognitions about others. It will be recalled that the experimental design imposed few constraints on the impression-formation and memory processes. Subjects formed an impression of just one real person. They furnished their own impression traits (any number from 4 to 10) from their psychological vocabularies. These impressions were matched to the subject's own categories, which also had been constructed with as few constraints as possible. By isolation of a category that best matched the impression, the natural category most likely to function in a schematic way was identified. Thus the experimental procedure was designed to closely reflect subjects' everyday cognitive processing. In view of the fact that the difference in recall between schema and peripheral traits was even greater in this experiment than in Experiment 2, this experiment adds to the claim of schematic processing in everyday cognitions.

With respect to the two models of processing under review, the data again offer some support to the SP+T model, and little to the AN+EP model. The former model predicts a superior recall of schema traits at delay and equal recall at immediate test, while the latter model predicts superior recall of peripheral traits at immediate and delayed test. Since schema traits were better recalled at both intervals, the data provide a closer fit to the SP+T model.

The SP+T model's prediction of equal recall of schema and peripheral traits at immediate test was not supported, as the data showed superior recall of schema traits. However this may not be a serious error, as the model predicts that after sufficient delay, this advantage to schema traits will appear. The mechanism postulated to be causing the deterioration in the recall of peripheral traits is "some type of interference" (Smith & Graesser, 1981, p. 551), such that access to the individual peripheral items is lost. Consequently, it may be argued that this interference had already begun emerging at the immediate recall test, thereby bringing the data within the ambit of the SP+T model. As discussed above, however, the fact that there was no further loss of access to peripheral traits over the week interval causes some difficulty for the SP+T model.

The SP+T model is supported by the significant degree of clustering of schema items in recall protocols. This clustering will occur if, as the SP+T model suggests, the schema is guiding the search processes during recall. There was also some suggestion that the first recalled trait at delay was a schema trait, but the statistic just failed to reach significance. The AN+EP model predicts a degree of alternating recall of schema and peripheral traits, since each peripheral trait is hypothesized to be linked to a number of schema traits which are unlikely to be linked to each other. Search process thus move backwards and forwards from schema to peripheral traits. The clustering of schema traits in recall contradicts this hypothesized pattern of retrieval, and disconfirms the AN+EP model.

Before it is concluded that the SP+T model provides a veridical model for processing impressions, it must be recalled that the model incorrectly predicts high intrusion/false alarm rates. Experiments 1 and 2 show low levels of such errors. This type of error was not studied in Experiment 3 for reasons outlined in the introduction. These erroneous predictions on error rates pose serious questions for the SP+T model, since they suggest that the notion of a "schema pointer" which unilaterally activates the whole schema is incorrect. Consequently, while the SP+T model makes some correct predictions, it also makes others which are substantially incorrect.

As noted above, the data provide little if any support for the AN+EP model, since this model predicts superior recall of the peripheral traits at all intervals, while the data show inferior recall of peripheral traits at all intervals. Low error rates do, however, accord with this model. Thus the main premise of this model of elaborative processing of non-schema traits, resulting in more encoded retrieval links to those traits, has not been supported.

A simple model comprising an associative network of traits, through which search processes are directed, was shown to offer a plausible post hoc account of the data in Experiments 1 and 2. The application of this model to the data in Experiment 3 will not be repeated, as it is substantially the same as that applied to the data of Experiment 2. The model is developed in detail in the next chapter, and hypotheses based on the model are tested.

CHAPTER 6

6.1 EXPERIMENT 4: RECALL OF AN IMPRESSION: A SIMPLE ASSOCIATIVE NETWORK MODEL

Experiment 1 showed that in a recognition test, subjects could accurately distinguish impression traits from non-impression traits. Accuracy was evident at both immediate test, and after a delay of one week. The two types of impression trait, schema and peripheral, were associated with equal hit rates at each retention interval. The three types of nonimpression traits, schema, peripheral, and unrelated, were associated with different false alarm rates. At each interval, schema distractors produced the highest false alarm rate, peripheral distractors an intermediate rate, and unrelated distractors the lowest rate. The overall level of false alarms was higher at the delayed test than at the immediate test. In summary, hit rates were always quite high, and false alarm rates were always quite low.

Experiment 2 was similar to Experiment 1, save for the fact that subjects were required to recall, rather than recognize, impression traits. The data show that at immediate test, subjects recalled schema and peripheral traits equally well, while at delayed test, subjects recalled more schema than peripheral traits. In addition, the overall rate of recall was higher at immediate than at delayed test. The rate of recall intrusions was much lower than the rate of correct recall, just as false alarms had been far fewer than hits in Experiment 1. At immediate test, schema and peripheral intrusions were equally frequent, but there were more schema than peripheral intrusions after one week. In summary, correct recall was high at immediate test and lower at delayed test, while intrusion rates were always very low.

Experiment 3 also examined the free recall of impression traits, though the impression traits in this study were furnished by the subjects rather than chosen from a checklist. The pattern of results in this experiment closely paralleled that in Experiment 2, with the difference that, in Experiment 3, there was a significantly greater recall of schema traits at the immediate test. No such difference was found in

Experiment 2.

The results of Experiments 1, 2 and 3 have provided limited support to the SP+T and AN+EP models. Evidence supporting the SP+T model includes the equal correct recognition rates for schema and peripheral targets, and the greater false alarm rate for schema distractors (Experiment 1); the equal recall of schema and peripheral traits at immediate test (Experiment 2); the superior recall of schema traits at delay (Experiments 2 & 3); and finally, the clustering of schema traits at recall (Experiments 2 & 3). The greater recall of schema traits at immediate test in Experiment 3 does not fit the model, but this difference is unimportant, as the greater recall was predicted after an interval.

There are, however, other data in Experiments 1, 2 and 3 which pose problems for the SP+T model. Firstly, the false alarm rate for schema distractors was very low (Experiment 1). Secondly, the intrusion rate for schema items in recall was likewise very low (Experiment 2). Both effects are contrary to the predictions of high false-alarm rates and intrusion rates which follow from the assumption that the entire schema, not just the particular attributes of the schema exemplified in the stimulus, is copied into the memory trace. Thirdly, there is no evidence to suggest that schema traits were accessed before peripheral traits in recall protocols (Experiments 2 & 3). This is puzzling if, as the SP+T model suggests, the schema is used to direct search processes during recall.

The data from Experiments 1, 2 and 3 suggest that a particular impression is quite distinguishable from the subject's general lexicon of trait terms. Thus impression traits can be accurately recognized and recalled. Additionally, there is an modest advantage in recall to schema impression traits. Certainly the large scale copying of other nonimpression schema traits into the memory trace as suggested by the SP+T model does not seem to occur. Certainly there is no evidence of advantage in recall to peripheral traits as suggested by the AN+EP model. Since the memory for the impression is quite strong, and since the difference in recall of schema and peripheral traits is small, the data suggest that encoding, storage, and retrieval of impression traits resembles the encoding, storage, and retrieval of any list of common words. Within this perspective, there remain, however, recall differences for schema and peripheral traits. Alternate models of impression memory therefore seemed worthy of investigation.

The principal theoretical assumptions that underpinned Experiments 1, 2 and 3 were firstly, that person categories are in all respects similar to our categories for birds or fruit for example; and secondly, that these categories are actively employed when processing an impression of one particular person. Upon review of the data of Experiments 1, 2 and 3, it seemed warranted to consider a model that discarded the assumption of active use of categories in processing exemplar information, and to also consider a model that discarded altogether the assumption of categories of people, and therefore by necessity, the assumption that impression processing is by reference to these categories.

If the assumption of category-referenced processing is eschewed, though the assumption of the existence of categories is retained, Experiments 1, 2 and 3 may be seen as studies in the recognition and recall of lists of words that are attributes of categories. Subjects could be said to have selected words associated with various categories, and stored them in an episodic trace that was no different from that which would have been formed if subjects had simply been asked to study a number of trait terms. Several studies have examined memory for words from categorized lists, and the similarity between the results of these studies and the results of Experiments 1, 2 and 3 can be established.

The task for subjects in Experiment 1 was to correctly recognize a list of words which were attributes of several categories, interspersed amongst a number of distractors which were attributes of the same and other categories. Unfortunately, there is little research specifically on the effects on hit rates for different types of targets which could provide a basis for post hoc predictions of hit rates in Experiment 1. Most studies have concentrated on either error patterns (Anisfeld & Knapp, 1968; Cramer & Eagle, 1972; Elias & Perfetti, 1973; Mandler, Pearlstone, & Koopmans, 1969; Underwood, 1965; Underwood & Freund, 1968) or latencies (Atkinson, Herrmann, & Wescourt, 1974; Herrmann, Frisina, & Conti, 1978; Herrmann, McLaughlin, & Nelson, 1975; Reynolds & Goldstein, 1974). Unfortunately, the error and latency data of these studies do not allow straightforward generalization to expected error and latency patterns in Experiment 1. In addition, predictions of error patterns in Experiment 1 are complicated by the fact that there were three types of distractor, and there were different numbers of targets for each type of distractor. Although it would seem natural to presume that false alarm rates would be higher for distractors related to several target items, Gillund and Shiffrin (1984) note that it is difficult to find experiments that test this hypothesis. There is, however, some evidence that synonyms of targets induce higher false alarm rates than unrelated distractors (Anisfeld & Knapp, 1968; Underwood & Freund, 1968). In keeping with this, the false alarm rate for related (schema and peripheral) distractors was higher than that for unrelated distractors in Experiment 1. In summary, there is little evidence in the recognition literature which provides clear indications as to the expected outcome of Experiment 1. The small amount of relevant data on false alarm patterns accords with the alarm data in Experiment 1.

The tasks in Experiments 2 and 3 may be seen as the recall of one list of words which were associated with one category (schema traits), and another list of words which were associated with a number of different categories (peripheral traits). The factors affecting the ability to recall lists have been found to be firstly, the length of the list; secondly, the number of categories represented in the list; and thirdly, the number of items per category (Bousfield & Cohen, 1956; Cohen & Bousfield, 1956; Dallett, 1964; Mathews, 1954; Tulving & Pearlstone, 1966). The data from these studies are conflicting in their implications for Experiments 2 and 3. However, in general it seems that a list representing fewer categories is better recalled, and a shorter list is relatively better recalled. In Experiments 2 and 3, the schema impression traits may be seen as as comprising a one-category list of three items (on average), while the peripheral impression traits constituted a multi-category list, also of three items (on average). Therefore, it would be predicted that schema impression traits should have been better recalled than peripheral impression traits. The data from Experiments 2 and 3 are consistent with this pattern.

Although the recognition and recall data of Experiments 1 to 3 accord with other results on the recognition and recall of categorized lists, there are qualifications to this analysis. Firstly, previous studies have used lists which combined markedly different categories e.g. occupations and animals. This contrasts with Experiments 1, 2 and 3 which utilized related categories, namely categories of different types of people. Secondly, these studies examined recall of exemplars of categories, while Experiments 2 and 3 examined recall of attributes of categories. Thirdly, lists were employed which incorporated equal numbers of exemplars of each category, while Experiments 2 and 3 used lists containing varying numbers of attributes of each category. Fourthly, the studies were expressly addressing recognition and recall, and subjects were instructed accordingly (and sometimes the category structure of the list was expressly brought to the subjects' notice). This contrasts with Experiments 1, 2 and 3 which strove to avoid subjects deliberately rehearsing impression traits in anticipation of recognition or recall. Overall, there are marked differences between the reviewed studies and Experiments 1, 2 and 3. Despite these differences, the recognition and recall of impression traits may still be a special case of recognition and recall from categorized lists.

Thus far the analysis of memory for impression traits has proceeded on the assumption that categories of people are a psychological reality, though they are not actively employed in the processing of exemplar information. A second analysis can be made which discards the assumption of categories of people altogether, and with that of category-referenced processing. In this analysis, it is assumed that trait concepts are organized in a non-random, psychological, associative network. Trait concepts simply vary in the degree to which they are associated with each other, such that some are closely associated, while others may not be associated at all. Research into the properties of such associative networks has yielded ample evidence that the recall of associated (but not categorized) words mimics recall from categorized lists, such that the greater associative strength between words, the higher the level of recall, and the more clustering there is of associated items at recall (Cofer, 1965; Deese, 1959; Jenkins & Russell, 1952).

Further, with common categories such as "fruit", the strength of interitem associations within the category has been shown to influence both the level of recall and the degree of clustering of recalled categorized items (Cofer, 1965; Cofer, Bruce, & Reicher, 1966; Jenkins, Mink, & Russell, 1958). Thus pairwise associations play a significant role in recall with respect to both categorizable, and non-categorizable words.

Consequently, on the basis of recall and recognition data alone, memory for words seen to be attributes of categories may be indistinguishable from memory for words that are seen as simply associated attributes. Hence the two domains may not be distinguishable on the basis of empirical data.

Whether categories are distinguishable from simple associations on theoretical grounds is also open to debate. It can be argued that the concept of category includes the assumption that there is some associative link between each of a number of attributes or properties and a unifying referent, usually a category label (e.g. "cars"), though it may be a visual image (e.g. an image of a particular type of earth-moving equipment), or an emotional state (e.g. a feeling of emptiness whenever one of the members of this category is encountered). The process of categorization is based on the understanding that the world is being divided as far as possible into two classes of stimuli: those that are members of a particular class and those that are not. A class of stimuli is denoted by the unifying referent in that the referent denotes those stimuli that possess the attributes associated with the referent.

The association between individual attributes and a unifying referent allows the perceiver to judge whether a particular object is a strong, weak, or non-exemplar of the category. This unifying referent-attribute link is in addition to any links or associations between attributes themselves (e.g Homa, 1984). The unifying referent-attribute associative link may be strong as with common categories as in "bird-feathers" or weak as with ad hoc categories such as in "garage-sale item--old" (see Barsalou, 1983).

By contrast, Mandler (1967, 1968; Mandler, Pearlstone, & Koopmans, 1969) implies that there is no difference between a category and a group of associated words, since in his studies, subjects are given a group of randomly selected words and requested to sort them into "categories", and subsequent recall of those words is related to the number of categories being constructed by the subject. Still others such as Pavelchak (1989) adopt a middle-ground position, whereby categories are defined by groups of associated features, but the term "*category label* refers to the stimulus feature that a perceiver uses to organize the remaining features" (p. 354). This argument suggests that a stimulus feature may function as a unifying referent, but for any given group of associated attributes, the attribute selected to take on this role may change from situation to situation.

To sum up, it may be argued that for the concept of category to have any currency, it would appear that the assumption of a unifying referent that denotes a class is necessary, as is the unifying referent-attribute associative link.

The data of Experiments 1, 2 and 3 do not force the conclusion that subjects categorize people on the basis of trait attributes, since the associative network model suggests that the same pattern of data would have resulted given that traits were simply associated with each other. Therefore, the most parsimonious set of assumptions was adopted in Experiment 4, whereby traits were conceptualized as being associated to varying degrees, and were not linked to any unifying referents. A corollary assumption was that there was no category-referenced processing of exemplar information.

The model sketched in Chapter 3 that made fewer assumptions than either the SP+T or AN+EP model, and which, post hoc, gave a plausible account of the data, can be described as a simple associative network model similar to those of Collins and Quillian (1973), Anderson and Bower (1973), or Raaijmakers and Shiffrin (1981). In this model, traits concepts are conceptualized as nodes which are interlinked by pathways of various associative strengths (Collins & Loftus, 1975; Hampson, 1982; Harris & Hampson, 1980). The associative links that exist between trait nodes reflect both the perceived degree of co-occurrence of the traits in people, and the semantic similarity of the trait concepts (Gara & Rosenberg, 1981). In addition, the associations may be mediated by relation-defining arcs of the kind envisaged by Anderson and Bower (1973), but this assumption is not important. It may be noted that a model of this kind has already been used to account for the data on recall from categorized lists (e.g. Anderson, 1972; Raaijmakers & Shiffrin, 1980), though the analysis to be applied here is more radical, since it proceeds on the assumption of an absence of categories.

It was hypothesized that in recall, the preexisting trait network is first accessed by episodic or contextual links, and relevant traits retrieved. Associative links from these retrieved traits to other associated traits are explored, and recovered traits are tested or sampled for their appropriateness for recall. Thus in any recall test, the likelihood of recalling an item is dependent on the number of retrieval links accessing that item. This advantage may be due to greater probability of "tagging" or encoding at least one retrieval link as in Anderson's FRAN (1972); or simply a greater probability of sampling the trait as in the SAM model of Raaijmakers and Shiffrin (1980, 1981).

The first hypothesis suggested by these considerations was:

- Recalled traits are accessed by more links than nonrecalled traits.

This hypothesis predicts a superior recall of highly interlinked traits, and can be shown to account post hoc for the data of Experiments 1, 2 and 3. Schema traits were better recalled since they are interlinked with each other, whereas peripheral traits were less well recalled because of less interlinking. Thus if the retrieval search started at any of the schema trait nodes, it would proceed to the other related schema trait nodes. Consequently, many schema traits would be recovered. If, however, the search started at one of the peripheral trait nodes, then it would not proceed to very many other trait nodes of the impression. Thus not very many other traits, especially peripheral traits, would be recovered in one given executed search. Consequently, for peripheral traits to be recalled at a rate comparable to schema traits, proportionally more peripheral nodes would have to be directly accessed from the episodic-contextual links. This would come about if peripheral traits were processed more elaboratively than schema traits, but as seen in Experiments 1, 2 and 3, there is no evidence to suggest that this happens. In summary, schema traits were better recalled since they are relatively more interlinked.

A second hypotheses derived from the network model of recall was:

- Recalled traits are accessed by more links from other recalled traits than nonrecalled traits.

Recalled traits should be accessed by more links from other, already recalled traits, if recall is an organized search process. That is, there should be a tendency for one recalled trait to be linked to another recalled trait. An example may show how this hypothesis differs from the first. Imagine, for example, two groups of three traits which make up an impression, as in Figure 6.1.

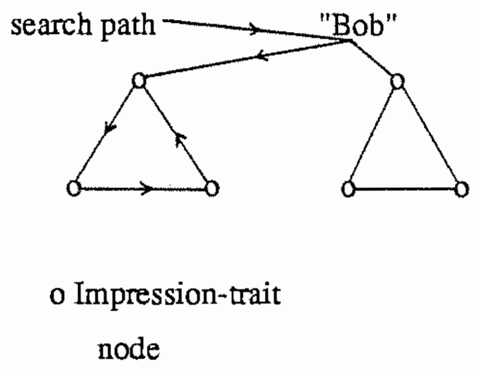

Figure 6.1 Schematic representation of an impression of six traits, with associative links between traits. Search processes recover the left triad, but not the right.

The three traits in each group are interlinked with each other. If one group of three were recalled, but the other was not, then the average number of links to recalled and nonrecalled traits would be equal (in this case, two). Consequently, Hypothesis 1 would fail. However, the search may have, in a quite orderly fashion, traversed the links between the three in the first group, but never have encountered the second group. In this case, the average number of links to recalled traits from other recalled traits (two), would exceed the average number of links from recalled traits to nonrecalled traits (zero). Consequently, Hypothesis 2 would succeed.

Finally, the third hypothesis suggested was:

- More links emanate from recalled traits than from nonrecalled traits.

The first words recalled are, according to Anderson (1972), the "entry-set" words that link the general associative network to the specific episodic memory of having learned a list of words. These entry-set words are selected by the subject on the basis of their ability to access other words in the list. The more links issuing from a word, the more likely it is to be placed in the entry-set. This suggests the third hypothesis: Recalled traits should include the entry-set traits, and therefore, more links should emanate from recalled traits than from nonrecalled traits.

Experiment 4 repeated the procedures and conditions of Experiments 1, 2, and 3 as far as possible. To this end, similar impression-formation and free recall tasks were used. The major change incorporated in Experiment 4 involved the measurement of preexisting links between pairs of traits, rather than the sorting of traits into categories. In this task, subjects were required to make judgements about whether people who possessed one specific trait would also, in general, be expected to possess another specific trait.

As stated above, the three hypotheses tested were:

- Recalled traits are accessed by more links than nonrecalled traits.
- Recalled traits are accessed by more links from other recalled traits than nonrecalled traits.
- More links emanate from recalled traits than from nonrecalled traits.

6.2 METHOD

6.2.1 *Subjects*

Seventy subjects enrolled in the introductory Behavioural Science course at the Canberra College of Advanced Education completed the experiment. Twenty three were males, and 47 were females. The median age was 19 years. Participation was voluntary, for which subjects received course credit.

6.2.2 *Materials*

Stimuli. The two video tapes used in the previous experiments, one depicting a male, the other a female, were again used in this experiment.

Trait Vocabulary. The 80 traits selected from Anderson's (1968) 555 trait list used in earlier experiments, were again used in this experiment.

6.2.3 *Design*

The design incorporated two between-subject factors and one within-subject factor in a split-plot design. The between-subject factors were sex of Stimulus person (male and female), and Valence of impression (positive and negative), and the within-subject factor was Trait Type (recalled and nonrecalled). While assignment of subjects to the levels of Stimulus was random, the assignment of subjects to the Valence groups was on the basis of subjects' impressions. Those expressing favourable impressions (see 6.2.5 *Valence measure*) were assigned to the positive Valence group, and those expressing negative impressions were assigned to the negative Valence group. Unequal numbers of subjects formed positive and negative impressions, resulting in a nonorthogonal design.

6.2.4 *Procedure*

The experiment involved three stages: Impression Formation, Recall, and Network Construction. All subjects followed this order, since the Network Construction task was not possible until the Impression Formation and Recall tasks had been completed. One week separated each stage.

Impression Formation. The impression-formation task was similar to that used in previous experiments. Briefly, subjects were instructed to watch the video of the person with a view to forming an impression of their personality. After a free description stage, subjects were required to summarize their impressions by selecting six traits from the checklist.

There are two noteworthy modifications of previous procedures in this experiment. In previous Experiments, subjects either chose, or furnished, from four to ten traits to summarize their impressions. In this experiment, there was a need for all subjects to select the same number of impression traits, in order to make the size of the network construction task, which revolved around the impression traits, uniform for all subjects. Subjects were required to select six impression traits in this experiment since in Experiments 1 and 2, subjects selected, on average, between six and seven traits, and it was felt that this number would suit most subjects. Secondly, subjects chose checklist traits rather than furnish their own as introduced in Experiment 3 in order to disguise the fact that the Network Construction task was heavily focused on just those traits chosen for the impression. By keeping the tasks psychologically separate, it was hoped the subject would give unbiased estimates of trait co-occurrence.

Recall. In the surprise recall task, subjects had to free recall the traits they had selected to summarize their impressions. Subjects were instructed to write down the traits in the order in which they came to mind.

Network Construction. The network construction task involved answering a series of questions concerning the co-occurrence of traits in people. Each question was of the same format and asked:

"How likely is it that someone who is *first-trait*
will also be *second-trait* ?"

Subjects were instructed to think about people in general, and not to think of specific individuals. They were also informed that the order in which the two traits appeared in the sentence was important, such that if most who have trait-1 also have trait-2, it does not necessarily follow that most who have trait-2 will also have trait-1. An example of the non-transitivity of properties (being bearded and being male) was given to illustrate the point.

The sets of questions were constructed on a subject-by-subject basis, and revolved around the six impression traits each subject had selected. In order to disguise the fact that the questions related to the impression traits selected the previous week, an additional five traits from the list of 80 were included. Two traits were of the same valence as the impression, and three were of the opposite valence. Traits of opposite valence were included in order to give the subject cases where it was (hopefully) unlikely that the two would co-occur, thus demonstrating to the subject the full range of possible relationships between two traits. Within these constraints, the additional five traits were selected randomly.

Each impression trait was twice paired with each of the ten other traits, once in the first position in the question, and once in the second. This procedure was undertaken for each of the six impression traits. One outcome of this procedure was that a number of questions were systematically repeated i.e. each question about two given impression traits was eventually repeated on one other occasion. These repeats were retained to provide a basis for assessing the consistency of a subject's responses.

Each subject answered a total of 120 questions (including 30 repeats) which were randomly ordered. Questions were divided into two booklets of 30 pages each, with two questions per page. The experimenter paced the task, allowing thirty seconds per page for the first 20 pages (i.e. 40 questions), and twenty seconds per page thereafter. A two minute break separated first and second booklets. The experimenter signalled the subjects verbally at the due time to move to the next page.

The subject was allowed one of three response options: "Likely" (L), "Unlikely" (U), or "Neither likely nor unlikely" (N). Subjects indicated their response by writing either an "L", "U", or "N" to the right of each question.

6.2.5 *Valence Measure*

The same method of determining the valence of each subject's impression as used in Experiments 1 and 2 was used. The average ranking was computed from the individual trait rankings (Anderson, 1968), and those less than 277.5 were classed positive, and those greater, negative.

6.3 RESULTS

6.3.1 *Data set*

Of the 70 subjects who completed the experiment, 64 subjects returned data suitable for analysis. Of the six unsuitable subjects, four were unable to recall any of the selected traits. One subject answered all the questions in the network construction task with the same response ("Likely"); and the remaining subject failed to answer at least half the repeated questions in the Network Construction task with the same response. These latter two subjects were regarded as having returned unreliable data, and were not included in analyses.

6.3.2 *Reliability of Network Construction Task*

Within the Network Construction task, there were 30 repeated questions randomly distributed amongst the remaining 90 questions. The average distribution of subjects' responses to these questions on the first and second attempts is given in Table 6.1. Results have been rounded to the nearest whole number for clarity of presentation.

Table 6.1
Distribution of Responses to Thirty Repeated Questions

	First Response			
	Likely	Neither	Unlikely	
Second Response				
Likely	11	3	0	14
Neither	3	9	1	13
Unlikely	0	1	2	3
	14	13	3	30

The data show that on average 73% of repeated questions were answered with the same response, compared to a chance level of 33%. As noted above, only one subject in 65 failed to reach a 50% level of consistency, and was excluded from analysis. The Goodman-Kruskal coefficient Γ of correlation between two ordinal measures represented in a bivariate frequency table was .90 for these data. Thus these data show a satisfactory level of reliability in the Network Construction task.

6.3.3 *Data analyses*

In the analyses below, the between-subject factors were Stimulus and Valence. The number of subjects at each level of each factor varies, as given in Table 6.2. The single within-subject factor varies with the particular analysis, but is always a repeated measures factor with equal numbers of subjects in each level. Due to the unequal cell sizes, analysis was performed by application of the General Linear Model (for details of all ANOVA tables, see Appendix D).

Table 6.2

Number of Subjects in each Experimental Condition

Stimulus	*n*	Valence	*n*
Male	33	Positive	16
Female	31	Negative	48
Stimulus x Valence			
Male Positive	9	Female Positive	7
Male Negative	24	Female Negative	24

6.3.4 *RECALL AND INTRA-IMPRESSION LINKS*

Links between impression traits

The mean numbers of links to recalled and nonrecalled traits for each experimental condition are given in Table 6.3.

The numbers of links leading to recalled traits and to nonrecalled traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that there were more, or less, links to recalled impression traits (M = 1.76) than to nonrecalled impression traits (M = 1.84), $F(1, 60) = 0.47$, $p>.50$. There were no significant interactions between Trait Type and the other two factors.

Of the between-subject factors, only Valence significantly affected the overall number of links, with the mean number of links in the positive impressions (M = 1.15) being significantly less than the mean number of links in the negative impressions (M

Table 6.3

Mean Number of Links to Impression Traits by Condition

Condition	Trait type	
	Recall	Nonrec
Stimulus		
Male	1.95	1.90
Female	1.55	1.78
Valence		
Positive	1.06	1.23
Negative	1.99	2.05

= 2.02), $F(1, 60) = 11.51$, $p<.005$. There was no significant interaction between Stimulus and Valence.

Links from recalled impression traits

The mean numbers of links to recalled and nonrecalled traits from other recalled traits for each experimental condition are given in Table 6.4. The number of links to recalled traits was adjusted by the formula

$$\text{adjusted mean} = \text{mean} \times \frac{\text{number of recalled traits}}{\text{number recalled traits} - 1}$$

as the number of links to nonrecalled traits could always exceed the number of links to recalled traits by one, since there was no link leading from a recalled trait to itself.

The numbers of links from recalled traits to other recalled traits and to nonrecalled traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated

Table 6.4

Mean Number of Links to Impression Traits from Recalled Traits by Condition

Condition	Trait type: Recall	Nonrec
Stimulus		
Male	1.16	1.37
Female	0.70	0.91
Valence		
Positive	0.44	0.70
Negative	1.06	1.25

measures on Trait Type (recalled and nonrecalled). Of the 64 subjects, only 47 subjects could be included in this analysis as the remainder had recalled only one trait.

There was no significant effect for Trait Type. Thus there was no evidence to suggest that there were more, or less, links to recalled traits ($M = 0.91$) than to nonrecalled traits ($M = 1.12$), $F(1, 43) = 2.54$, $p > .10$. There were no significant interactions between Trait Type and the other two factors.

Of the between-subject factors, only Valence significantly affected the overall number of links, with the mean number of such links in positive impressions ($M = 0.57$) being significantly less than the mean number of links in negative impressions ($M = 1.15$), $F(1, 43) = 6.55$, $p < .05$. There was no interaction between Stimulus and Valence.

Links emanating from impression traits

The mean number of links emanating from recalled and nonrecalled traits for each experimental condition are given in Table 6.5.

Table 6.5
Mean Number of Links Emanating from Impression Traits by Condition

	Trait type	
Condition	Recall	Nonrec
Stimulus		
Male	1.99	1.80
Female	1.62	1.82
Valence		
Positive	1.05	1.17
Negative	2.07	2.03

The numbers of links emanating from recalled traits and from nonrecalled traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled & nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that there were more, or less, links emanating from recalled traits (M = 1.81) than from nonrecalled traits (M = 1.80), $F(1, 60) = 0.47$, $p>.50$. There were no significant interactions between Trait Type and the other two factors.

Of the between-subject factors, only Valence significantly affected the overall number of links, with the mean number of emanating links in the positive impressions (M = 1.11) being significantly less than the mean number in the negative impressions (M = 2.05), $F(1, 60) = 13.54$, $p<.001$. There was no significant interaction between

Stimulus and Valence.

6.4 DISCUSSION

In this experiment, subjects selected six checklist traits to express an impression of a person, and, in a delayed surprise recall task, recalled the impression traits. Later, subjects elaborated the associative links between impression traits. Recalled and nonrecalled impression traits were contrasted with respect to the number of links with other impression traits.

There was no evidence that the number of associative links to, or from, an impression trait influenced the probability of its recall. The hypothesis that recalled traits are accessed by more links was not supported. There was no significant difference between the numbers of links to recalled and nonrecalled traits. The hypothesis that recalled traits are accessed by more links from other recalled impression traits was also not supported. There was no significant difference between the numbers of such links to recalled and nonrecalled traits. Finally, the hypothesis that traits which are the source of more associative links will be better recalled was not supported. The data show an equal number of such links emanating from recalled and nonrecalled traits.

The general hypothesis that memory effects such as those obtained in Experiments 1, 2 and 3 are the result of simple associative processes appears to have been disconfirmed. Three separate hypotheses based on the associative model failed to win support. The null data were independent of the sex of the stimulus person, and valence of the impression. Consequently, it appears that recall of impression traits is not simply recall of associated words. The model which assumes that traits are simply associated and not organized in any other way appears overly simplistic.

The valence data in this experiment shows two interesting points. Firstly, in this experiment unlike Experiments 1 and 2, more subjects formed a negative impression of the female stimulus person than formed a positive impression. The explanation for this reversal (which reverts to the normal positively biased impressions in the next experiment) may be concerned with the particular subjects who watched the video of the female. These subjects were unlike the majority of subjects enrolled in an administration course, in that they were young sports studies students engaged in high level competitive sports. Their sometimes hostile reaction to the feminism-oriented stimulus person was evident in the testing sessions.

Secondly, negative traits were more interlinked than positive traits. Thus if a person possessed one particular negative trait, then it was more likely he or she possessed another negative trait than it was likely that if a person possessed a positive trait he or she would possess another positive trait. Subjects seemed more willing to infer the presence of other bad traits given one bad trait than to infer the presence of other good traits given one good trait. This effect does not however have bearing on the probability of recall of impression traits generally since when a number of negative traits in an impression are being recalled, both recalled and nonrecalled traits are interlinked to the same extent; and the same argument applies when attempting to recall a number of positive traits in an impression. It remains an interesting feature of perceived trait co-occurrence that negative traits are more likely to be seem to co-occur than positive traits.

It will be recalled that another model was sketched earlier which postulated that traits are organized into categories, and that recall of impression traits is essentially recall from categorized word lists. The data suggest that this model may also be overly simplistic. If it is assumed that traits are attributes of categories, and that memory for impression traits is simply memory for attributes of different categories, then recalled traits should, within the boundaries of the category, be the most interlinked (Cofer, 1965; Deese, 1959; Jenkins & Russell, 1952). However, the data of Experiment 4 appear to disconfirm this model. The disconfirmation is not complete however, since the model assumes that the links between unifying referents and members do not play a role in recall, whereas they may. Because of this possibility, the model which suggests that recall of impression traits is simply recall from categorized word lists cannot be entirely ruled out. To summarize, one conclusion remains clear: Memory for impression traits was not influenced by the degree of interassociation between traits, regardless of whether traits are assumed to be further linked to unifying referents or not.

Before the network model is rejected, a number of points should be made. Firstly, the data from Experiments 1, 2, and 3 showed low false alarm and recall intrusion rates, suggesting that the episodic trace of the impression was strongly differentiated from the network from which the impression traits were drawn. Consequently, this experiment focused on the preexisting links between impression traits themselves, separate from the total network in which they reside, since it appeared that the important retrieval links would be those directly linking one impression trait to another. This may have been an overly narrow focus, since recall may be a function of the entire trait network. In attempting to recall any list of items, many nonlist items are recovered and evaluated but usually judged to be inappropriate for output. It may be important to focus on retrieval links from all traits to each impression trait, and not just links from other impression traits. This hypothesis is tested in Experiment 5.

Secondly, the Network Construction task measured perceived pairwise co-occurrence, but co-occurrence may not be reflected by a perceived association between the two traits in question. That is, while two traits may, on reflection, be judged to probably co-occur, they may not be readily associated with each other. Conversely, traits that are readily associated may, on reflection, be judged to be unlikely to co-occur. Subjects may use associative links rather than perceptions of co-occurrence when retrieving traits. This suggests that the groups of traits produced by subjects in Experiments 1, 2 and 3 may be essentially different from those which would be expected on the basis of perceived pairwise co-occurrence. The associative links may have been captured inadvertently in the Category Construction task of Experiments 1, 2 and 3, but not in the Network Construction task of Experiment 4. Consequently, the failure of Experiment 4 to demonstrate a link effect may have been due to the assumption that traits perceived as co-occurring were also associatively linked in the mind of the subject. The relationship between trait categories and pairwise trait co-occurrence is explored in Experiment 6.

Two alternate interpretations of the data of Experiment 4 can, however, be discounted. Firstly, some argue that the determinant of recall of impression traits is the number of links from an impression trait to its referent behaviours, actions, and so on, (Wyer & Gordon, 1984), rather than the number of links between impression traits themselves. Traits that have more links to referent behaviours may be easier to recall than traits that have fewer links. This effect may arise if subjects recall traits by first recalling the stimulus persons actions and behaviours, and then sampling traits associated with these behaviours.

This argument would account for the data from Experiments 1, 2 and 3 by first assuming that subjects categorize traits which have similar behavioural referents. Thus the basis of trait groupings is behavioural similarity, rather than experientially based judgements of their co-occurrence in different types of people. Further, in forming an impression, the traits that capture the bulk of the persons' behaviour would probably be based on similar and overlapping behaviour referents. These same traits would probably have been placed in the same category due to their overlapping referents, and since they capture the bulk of the person's personality, this category would probably have been the schema category. Thus schema impression traits are easier to recall since they they are accessed by more behaviour referents than are peripheral traits.

This argument is similar to the argument elaborated in the introduction of this experiment, in that natural categories are an unnecessary assumption at this stage. Rather, associative links play the crucial role in recall. It differs in that it assigns a much greater importance to encoding of behaviours, and the memorial representation based on them. The recall of traits becomes secondary to the recall of actual behaviours. Yet the argument suffers from the weakness that if subjects construct categories (as in Experiments 1, 2 & 3) on the basis of behavioural similarity of traits, then they would also answer questions about pairwise co-occurrence of traits (as in this experiment) on the same basis. Pairs of traits that had similar behavioural referents would be seen as associated in people. Therefore, closely associated traits should be recalled since they share common behavioural referents. However, as this experiment has shown, there is no evidence to suggest that associated traits are recalled more than nonassociated traits. Therefore, the data cannot be accounted for on the basis of recalled traits having more behavioural referents.

Secondly, the argument as outlined in the introduction cannot be "stood on its head". The associative model suggests that traits which are accessed by more associative paths should be better recalled. The number of links accessing a trait is gauged from a subject's answer to the question: "How likely is it that someone who is X will also be Y?". Subjects may believe that that for a wide range of X's, it is likely that such people will also be (a particular) Y. In this case, the particular Y will be accessed by many paths. Hence, the characteristic Y is associated with a variety of people, rendering it somewhat nondiscriminative with respect to distinguishing this particular person from all others. Because the trait is not informative, then it may be recalled less than those traits which are more informative, and which apply to only a narrow range of people. Hence, this argument suggests that traits with many associative links should be recalled less than traits with fewer links. Despite the plausible nature of this hypothesis, it was not supported by the data. While sample mean differences were in the correct direction, their differences did not reach significance.

While the recall of traits shows no relationship to judgements of co-occurrence of those same traits, recall of impression traits has been shown to be dependent upon whether they were attributes of a schema or peripheral category as shown in Experiments 1, 2, and 3. For a group of traits to constitute a category, and be more than just a group of associated traits, then a minimum requirement seems to be that each trait is linked to or associated with a psychological unifying referent such that whenever this referent is activated, the person understands that there are a number of qualities, features or attributes including traits commonly associated with it. Such a psychological referent may be a verbal label such as "intelligent person", an affective representation, a visual image, or whatever. It is not necessary to specify the exact nature of this unifying referent: all that is necessary is that it admits the possibility of use of the associative links between the referent and the associated qualities or attributes, in this case traits. The data of Experiment 4 allow for the possibility that the important retrieval links may not be those between traits themselves, but rather those between unifying referents and particular traits. These issues are further discussed in Chapter 8.

In the next chapter, two hypotheses are tested. First, the hypothesis that recall of impression traits depends on the entire network of links in the trait vocabulary of the perceiver is tested. Second, the hypothesis that attributes of trait categories are predictable on the basis of pairwise trait co-occurrences is tested.

CHAPTER 7

7.1 EXPERIMENT 5: RECALL OF AN IMPRESSION: ROLE OF INTRA & EXTRA IMPRESSION ASSOCIATIONS

Experiment 4 examined the recall of impression traits in the context of an associative network model. The data showed that, within the limits of preexperimental links between impression traits, recalled traits were no more interlinked than nonrecalled traits. This disconfirmed the hypotheses that the number of associative links to, or from, impression traits governs their recall.

The number of links to, and from, an impression trait was measured only in relation to the other traits in the impression. This measure was based on the assumption that the episodic trace of the impression encompassed all relevant retrieval links which played a role in recovery of impression traits. Consequently, there was no measure of the number of links to, and from, an impression trait with respect to the either the remaining checklist traits, or the entire vocabulary of traits possessed by the subject. Yet in recall, many items apart from those in the to-be-recalled set are recovered and assessed for appropriateness for output. These nontarget items in turn provide access to target traits through associative links (see especially Gillund & Shiffrin, 1984; Raaijmakers & Shiffrin, 1980, 1981). In a similar way, nonimpression traits encountered in a retrieval search may play an important role in gaining access to target impression traits. Thus the general associative network of traits, rather than the impression traits themselves, may be fundamentally important in determining recall of impression traits. Consequently, Experiment 5 tested the hypothesis that:

- Recalled impression traits are accessed by more links from all other traits than are nonrecalled traits.

Theoretical considerations similar to those underlying Experiment 4 lead to two additional hypotheses:

- Recalled impression traits are accessed by more links from all other recalled traits than are nonrecalled traits.

- More links emanate from recalled impression traits to all other traits than from nonrecalled traits.

This set of hypotheses is similar to the set of hypotheses tested in Experiment 4, with the difference residing in the group of associative links thought to underlie recall. In Experiment 4, the focus was on the links between impression traits themselves, while in Experiment 5, the focus was on the links between both impression and nonimpression traits. Shifting the focus is not without some cost in explanatory simplicity. The assumptions of Experiment 4 were straightforward: Schema traits are better recalled because, in the impression, there are more links between them than there are between peripheral traits. The assumptions of Experiment 5 suggest that schema traits are better recalled because, within the general trait network, they are more interlinked than peripheral traits. This is an important difference, and it suggests that some cognitive mechanism is at work that selects traits for an impression such that a proportion are highly interlinked with all other traits (schema traits), and the remainder are less interlinked with all other traits (peripheral traits). The rationale of Experiment 5 cannot rest on the assumption which was tenable in Experiment 4 that, in general, all traits are more or less equally interlinked, their status as schema or peripheral traits in an impression notwithstanding. Experiment 5 requires the assumption that, in general, some traits are more interlinked than others. In summary, Experiment 5 tested the hypothesis that recall of schema traits is greater than recall of peripheral traits in an impression, since the former are more interlinked in the general associative network than are the latter.

The experimental procedure followed was similar to that used in Experiment 4, though with a wider focus in defining the trait network. Links between each impression trait and all other traits in the vocabulary of the subject could not be manageably explored, since the subject may have a vocabulary of hundreds of traits. Instead, as an approximation to the entire network, all links between each impression trait and each of the remaining traits on a 20 trait checklist were measured. Two points need to be made regarding this procedure. Firstly, each of the 20 traits was a very simple common English trait term that could be reasonably be expected to be in the vocabulary of a tertiary student. Secondly, a 20 trait checklist was used rather than the subject's entire vocabulary and rather than the 80 term list used in the previous four experiments, since an unmanageable number of pairwise judgements would have resulted in the Network Construction task had the entire network or even the 80 trait list been used. By using a shortened list, it was possible to measure the interlinking of an impression trait within a sample of the person's entire vocabulary of traits.

In the delayed unanticipated recall task, subjects were required to recall not only the selected impression traits, but also the remaining checklist traits. In this manner, it was possible to test whether recall of impression traits was mediated by recall of other checklist traits.

In summary, the three hypotheses tested were:

- Recalled impression traits are accessed by more links from all other traits than are nonrecalled traits.
- Recalled impression traits are accessed by more links from all other recalled traits than are nonrecalled traits.
- More links emanate from recalled impression traits to all other traits than from nonrecalled traits.

7.2 METHOD

7.2.1 *Subjects*

Fifty subjects enrolled in the introductory Behavioural Science course at the Canberra College of Advanced Education completed the experiment. Twenty-two were males, and 28 were females. The median age was 18 years. Participation was voluntary, for which course credit was received.

7.2.2 *Materials*

Stimuli. The two video tapes used in previous experiments, one depicting a male, the other a female, were also used in this experiment.

Trait Vocabulary. Two checklists of 20 traits each were constructed, one for each stimulus person. Each list contained the 10 most frequently selected positive traits, and the 10 most frequently selected negative traits for each person in Experiments 1, 2, and 4. The two checklists are given in Appendix E.

7.2.3 *Design*

The design incorporated two between-subject factors and one within-subject factor in a split-plot design. The between-subject factors were sex of Stimulus person (male and female), and Valence of impression (positive and negative), and the within-subject factor was Trait Type (recalled and nonrecalled). While assignment of subjects to the levels Stimulus was random, the assignment of subjects to the Valence groups was on the basis of subjects' impressions. Those expressing favourable impressions (see 7.2.5 *Valence Measure*) were assigned to the positive Valence group, and those expressing negative impressions were assigned to the negative Valence group. Unequal numbers of subjects formed positive and negative impressions, resulting in a nonorthogonal design.

7.2.4 *Procedure*

The experiment involved three stages: Impression Formation, Recall, and Network Construction. All subjects followed this order, since the Network Construction task was not possible until the Impression Formation and Recall tasks had been completed. One week separated each stage.

Impression Formation. The impression-formation task was similar to that used in previous experiments. Briefly, subjects were instructed to watch the video of the person with a view to forming an impression of their personality. After a free description stage, subjects were required to summarize their impressions by selecting five traits from the checklist. Subjects in the previous experiment were required to select six traits from an 80-trait checklist, while in this experiment there were only 20 traits to choose from, and because of the more limited choice, the subject was required to select only five.

Recall. In the unanticipated recall task, subjects were required to free recall the traits they had selected to summarize their impressions, and to recall the other checklist traits. Subjects were instructed to write down the impression traits on the right side, and the remaining checklist traits on the left side of the answer sheet, in the order in which they came to mind.

Network Construction. The network construction task involved answering a series of questions concerning the co-occurrence of traits in people. Each question was of the same format and asked:

"How likely is it that someone who is *first-trait*
will also be *second-trait* ?"

Subjects were instructed to think about people in general, and not to think of specific individuals. Subjects were also informed that the order in which the two traits appeared in the sentence was important, such that if most who have trait-1 also have trait-2, it does not necessarily follow that most who have trait-2 will also have trait-1. An example of the non-transitivity of properties (being bearded and being male) was given to illustrate the point.

The set of questions for each subject was constructed on a subject-by-subject basis, and revolved around the five impression traits he or she had selected. Each impression trait was twice paired with each of the 19 other traits, once in the first position in the question, and once in the second. This procedure was undertaken for each of the five impression traits. One outcome of this procedure was that a number of questions were systematically repeated i.e. each question about two given impression traits was eventually repeated on one other occasion. These repeats were retained to provide a basis for assessing the consistency of a subject's responses.

Each subject answered a total of 190 questions (including 20 repeats) which were randomly ordered. Questions were divided into three booklets, the first of 64 pages, the other two of 63 pages each, with one question per page. The experimenter paced the task, allowing 15 seconds per question for the first booklet, and 10 seconds per question thereafter. A two minute break separated booklets. The experimenter signalled the subjects verbally at the due time to move to the next question.

The subject was allowed one of three response options: "Likely" (L), "Unlikely" (U), or "Neither likely nor unlikely" (N). Subjects indicated their response by writing either an "L", "U", or "N" to the right of each question.

7.2.5 *Valence Measure*

Valence of the impression was measured by simply determining whether there were more positive or negative traits in the impression. The average ranking measure used in Experiments 1,2, and 4 was not followed on this occasion since the checklist was shortened to 20 traits, and subjects may have been somewhat constrained in their selection of traits.

7.3 RESULTS

7.3.1 *Data set*

Of the 50 subjects who completed the experiment, 40 subjects returned data suitable for analysis. Of the remaining subjects, eight were unable to recall any impression traits, and two failed to answer at least half the repeat questions in the Network Construction task with the same response. These latter two subjects were deemed to have returned unreliable data, and were not included in analyses.

7.3.2 *Reliability of Network Construction Task*

Within the Network Construction task there were 20 repeated questions randomly distributed amongst the remaining 170 questions. The average distribution of subjects' responses to these questions on the first and second attempts is given in Table 7.1. Results have been rounded to the nearest whole number for clarity of presentation.

The data show that on average 75% of repeated questions were answered with the same response, compared to a chance level of 33%. As noted above, two subjects in 50 failed to reach a 50% level of consistency, and were excluded from analysis. The Goodman-Kruskal coefficient Γ for these data was .82. Thus these data show a satisfactory level of reliability in the Network Construction task.

Table 7.1

Distribution of Responses to Twenty Repeated Questions

	First Response			
	Likely	Neither	Unlikely	
Second Response				
Likely	10	2	1	13
Neither	1	4	1	6
Unlikely	0	0	1	1
	11	6	3	20

7.3.3 *Data analyses*

In all the analyses below, the between-subject factors are Stimulus and Valence. Unequal numbers of subjects occupy each level of each factor, and are given in Table 7.2. The single within-subject factor varies with the particular analysis, but is always a repeated measures factor with equal numbers of subjects in each level. Due to unequal cell sizes, analysis was by application of the General Linear Model (for details of all ANOVA tables, see Appendix E).

The first set of analyses focuses on intra-impression links only, and parallels the analyses of Experiment 4. The second set of analyses focuses on links to, and from, all checklist traits, and tests hypotheses of Experiment 5.

7.3.4 *RECALL AND INTRA-IMPRESSION LINKS*

Table 7.2

Numbers of Subjects by Condition

Stimulus	*n*	Valence	*n*
Male	20	Positive	22
Female	20	Negative	18
Stimulus x Valence			
Male Positive	10	Female Positive	12
Male Negative	10	Female Negative	8

Links with impression traits

The mean numbers of links to recalled and nonrecalled impression traits from other impression traits for each experimental group are given in Table 7.3.

The numbers of links to recalled and nonrecalled impression traits from other impression traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links to recalled impression traits (M = 1.91), differed from the number of links to nonrecalled impression traits (M = 1.94), $F(1, 36) = 0.02$, $p>.50$. There were no significant interactions between Trait Type and the other two factors.

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of links, and there was no significant interaction between them.

Links with recalled impression traits

The mean numbers of links to recalled and nonrecalled impression traits from other

Table 7.3

Mean Number of Retrieval Links to Impression Traits from Other Impression traits by Condition

Condition	Trait type: Recall	Nonrec
Stimulus		
Male	1.96	1.92
Female	1.87	1.95
Valence		
Positive	1.93	1.97
Negative	1.89	1.90

recalled impression traits for each experimental group are given in Table 7.4 below.

Of the 40 subjects, only 26 subjects could be included in this analysis as the remainder recalled only one impression trait. The mean number of links to recalled traits in each impression was adjusted by the formula given in 6.3.4.

The numbers of links from recalled impression traits to recalled and nonrecalled impression traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links to recalled impression traits from other recalled impression traits (M = 1.01), differed from the number of links to nonrecalled trait traits (M = 1.16), $F(1, 21) = 0.68$, p>.40. There were no significant interactions between Trait Type and the other two factors.

Table 7.4

Mean Number of Retrieval Links to Impression Traits from Other Recalled Impression Traits by Condition

Condition	Trait type: Recall	Nonrec
Stimulus		
Male	1.12	1.24
Female	0.93	1.10
Valence		
Positive	1.07	1.16
Negative	0.94	1.17

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of links, and there was no significant interaction between them.

Links emanating from impression traits

The mean numbers of links emanating from recalled and nonrecalled impression traits to other impression traits for each experimental group are given in Table 7.5.

The numbers of links emanating from recalled and nonrecalled impression traits to other impression traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links emanating from recalled impression traits (M = 1.82), differed from the number of links emanating from nonrecalled impression traits (M =

Table 7.5

Mean Number of Links Emanating from Impression Traits to Other Impression Traits by Condition

Condition	Trait type: Recall	Nonrec
Stimulus		
Male	1.90	1.99
Female	1.75	1.91
Valence		
Positive	1.84	1.96
Negative	1.81	1.94

1.95), $F(1, 36) = 0.88$, $p>.30$. There were no significant interactions between Trait Type and the other two factors.

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of emanating links, and there was no significant interaction between them.

7.3.4 *RECALL AND ALL CHECKLIST LINKS*

Links with all checklist traits

The mean numbers of links to recalled and nonrecalled impression traits from all checklist traits for each experimental group are given in Table 7.6.

The numbers of links to recalled and nonrecalled impression traits from all checklist traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated

Table 7.6

Mean Number of Retrieval Links to Impression Traits from All Checklist Traits by Condition

Condition	Trait type: Recall	Nonrec
Stimulus		
Male	6.51	7.01
Female	5.92	6.04
Valence		
Positive	6.33	6.81
Negative	6.07	6.19

measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links from other checklist traits to recalled impression traits (M = 6.21), differed from the number of links to nonrecalled impression traits (M = 6.53), $F(1, 36) = 0.50$, $p > .40$. There were no significant interactions between Trait Type and the other two factors.

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of links, and there was no significant interaction between them.

Links with all recalled checklist traits

The mean numbers of links to recalled and nonrecalled impression traits from all recalled checklist traits for each experimental group are given in Table 7.7.

Of the 40 subjects, only 33 subjects could be included in this analysis as the remainder recalled only one impression trait and no other checklist traits. The mean number of links to recalled traits was again adjusted by the same formula given in 6.3.4.

Table 7.7

Mean Number of Retrieval Links to Impression Traits from All Recalled Checklist Traits by Condition

	Trait type	
Condition	Recall	Nonrec
Stimulus		
Male	1.58	1.55
Female	1.15	1.39
Valence		
Positive	1.46	1.62
Negative	1.26	1.31

The numbers of links from all recalled checklist traits to recalled and nonrecalled impression traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links from other recalled checklist traits to recalled impression traits (M = 1.36), differed form the the number of links to nonrecalled impression traits (M = 1.47), $F(1, 29) = 0.31, p>.50$. There were no significant interactions between Trait Type and the other two factors.

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of links, and there was no significant interaction between them.

Links emanating from impression traits

The mean numbers of links emanating from recalled and nonrecalled impression traits to all checklist traits for each experimental group are given in Table 7.8.

Table 7.8

Mean Number of Links Emanating from Impression Traits to All Checklist Traits by Condition

	Trait type	
Condition	Recall	Nonrec
Stimulus		
Male	6.42	6.48
Female	5.67	5.87
Valence		
Positive	6.00	6.39
Negative	6.09	5.92

The numbers of links emanating from recalled and nonrecalled impression traits to all checklist traits were subjected to a Stimulus x Valence x Trait Type analysis with repeated measures on Trait Type (recalled and nonrecalled).

There was no significant effect for Trait Type. Thus there was no evidence to suggest that the number of links emanating from recalled impression traits to all checklist traits (M = 6.04), differed from the number of links emanating from nonrecalled impression traits (M = 6.17), $F(1, 36) = 0.13$, $p>.50$. There were no significant interactions between Trait Type and the other two factors.

Neither of the between-subject factors of Stimulus and Valence significantly affected the number of emanating links, and there was no significant interaction between them.

7.4 DISCUSSION

In this experiment, subjects selected five checklist traits to express an impression of a person, and, in a delayed surprise recall task, recalled the impression traits and remaining checklist traits. Later, subjects elaborated the associative links between checklist traits. Recalled and nonrecalled impression traits were contrasted with respect to the number of links with other impression traits, and with all checklist traits.

There was no evidence to suggest that the number of associative links leading to, or from, an impression trait influenced the probability of its recall. The first hypothesis, that impression traits accessed by more links have a higher probability of recall, was not supported. As with Experiment 4, the numbers of intra-impression links to recalled and nonrecalled traits were not significantly different. Further, the numbers of links from all checklist traits to recalled and nonrecalled traits were not significantly different. Neither was there any support for the hypothesis that impression traits which are accessed by more links from other recalled traits, have a higher probability of recall. Again, as in Experiment 4, the numbers of such intra-impression links to recalled and nonrecalled traits were not significantly different. Further, the numbers of such links from all checklist traits to recalled and nonrecalled traits, were not significantly different. Finally, the hypothesis that impression traits which are the source of more links have a higher probability of recall was not supported. As in Experiment 4, the numbers of links emanating from recalled and nonrecalled traits were not significantly different. Further, the numbers of links emanating from recalled and nonrecalled traits to all checklist traits were not significantly different.

The failure of the data to support the hypotheses may be due in part to the restriction of the checklist to 20 traits. Even though the checklists were composed of the most frequently selected traits from previous experiments, individual subjects may generally wish to select a mixture of common and idiosyncratic traits. Restriction of the list to 20 common traits may have forced subjects to give distorted impressions. An alternate strategy would have been to use the 80 trait checklist for the impression formation stage, thus allowing full expression of the impression, with subsequent selection of a smaller number of checklist traits for examination of the links between each impression trait and the traits in this smaller group. However, with this strategy, there is no way of evaluating whether recall of impression traits is mediated by other (remembered) checklist traits, since some of these (remembered) checklist traits may not have been contained in the smaller subset examined in the pairwise judgement task. Further, it may be noted that the intra-impression links data of Experiment 5 parallel those of Experiment 4, as shown in Table 7.9, suggesting that the checklist procedure has not in itself contributed to the null results.

Table 7.9

Mean Numbers of Links to and from Impression Traits in Experiments 4 and 5

	Exp. 4		Exp. 5	
Links	Rec	Non	Rec	Non
From other imp traits	1.76	1.84	1.91	1.94
From recalled traits	0.91	1.12	1.01	1.16
Emanating from traits	1.81	1.80	1.82	1.95

Note. Rec = Recalled trait; Non = Nonrecalled trait

Various explanations for the failure of hypotheses based on the associative network model were canvassed in the previous chapter. Apart from the argument that the recall of impression traits is influenced by the categorical status of the trait, and not by the associative profile of the trait, two hypotheses which remained with the ambit of the simple associative model were elaborated. Firstly, it was hypothesized that the focus should be on both intra-impression and extra-impression links, rather than intra-impression links alone. Experiment 5 tested this hypothesis, but failed to find any supporting evidence.

Secondly, it was hypothesized that the associative paths involved in retrieval were not those captured in the Network Construction task. It was argued that the perception of trait co-occurrences may not always reflect the associability of traits. Traits that are, on reflection, be judged to be co-occurring may not be readily associated by the subject. This difference may emerge when traits are seen in combinations such as in the Category Construction task of Experiments 1, 2 and 3. In this task, judgements about group associations come into play which may not be reflected by simple pairwise co-occurrence judgements. Further, recognition and recall processes may be influenced by these complex patterns of group trait associations. Thus the use of simple pairwise co-occurrence knowledge may be constrained by judgements of group associations.

The difference between pairwise co-occurrence and group associations may be illustrated in the situation where two traits seen as generally co-occurring may be associated with quite different groups of traits. Consider Figure 7.1, where the traits of "warm" and "helpful" largely overlap in terms of their occurrence. That is, if a person is warm, then it is likely that they will also be helpful, and vice versa. It is important to note here that although these examples are described in terms of sets, this is interchangeable with a network representation (Hollan, 1975). While the two traits of "warm" and "helpful" may imply each other, they may be subsets of more general traits that in themselves are unlikely to be seen co-occurring. Figure 7.1a depicts these possibilities. The trait of being "placid" overlaps more than half of "warm" but less than half of "helpful", and the trait of "conscientious" overlaps more than half of "helpful" but less than half of "warm". On the basis of these properties, a person may well associate "warm" with "placid", and "conscientious" with "helpful", but not "warm" and "helpful". Conversely, "warm" and "helpful" may imply each other but be differentiated on the basis of other more specific traits, as in Figure 7.1b. The trait of being "warm" subsumes "relaxed", while "helpful" subsumes "keen". Again, a person may see some people as warm and relaxed, and some as helpful and keen, but may not see warm people as helpful. In both these illustrations, two traits that would be judged to co-occur on a pairwise basis are not readily associated when viewed in combination with other traits.

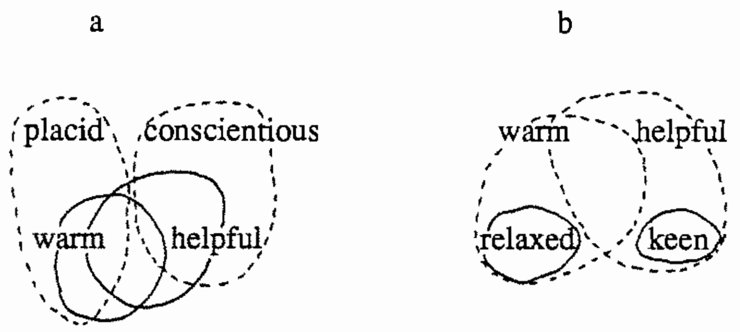

Figure 7.1 Co-occurrence of traits in people and their probability of association.

Similarly, two traits that do not co-occur on a pairwise basis may be associated because of their mutual association with a third trait. The traits of "aggressive" and "untrustworthy" may not strictly imply each other, as in Figure 7.2a, but because they are subsumed by "ambitious", they are readily associated. In addition, if these two traits partially subsume "belligerent", as in Figure 7.2b, then again they may be associated where they would not normally be.

Hence, groups of traits may constrain the associative links accessing individual traits such that an individual trait (e.g. "warm") may not be accessed by another trait with which it co-occurs (e.g. "helpful"). Further, an individual trait in a group (e.g. "aggressive") may be associated with a non co-occurring trait (e.g. "untrustworthy") because of a common link with another trait (e.g. "ambitious"). Since the impression includes a number of traits, then the recall of the impression traits may be governed by these complex relationships, and not by simple pairwise co-occurrences. Experiment

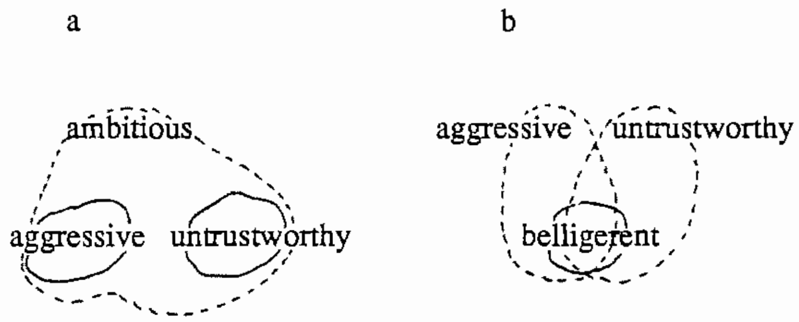

Figure 7.2 Co-occurrence of traits in people and their probability of association.

6 examined the relationship between groups of traits and pairwise co-occurrences.

7.5 EXPERIMENT 6:

RELATIONSHIP BETWEEN TRAIT GROUPS AND PAIRWISE TRAIT CO-OCCURRENCES

Experiments 4 and 5 rested on the assumption that subjects represent traits in an associative network, and when asked to "categorize" these traits, simply group those that are closely interassociated. Experiment 6 explored the relationship between subjects' trait groups and perceived pairwise trait co-occurrences. Subjects were given a Category Construction task similar to that used in Experiments 1 to 3, but using only 20 traits as in Experiment 5. They also undertook a Network Construction task similar to that used in Experiments 4 and 5, using the same 20 traits. The hypothesis tested was:

- Trait groups reflect pairwise trait co-occurrences.

7.6 METHOD

7.6.1 *Subjects*

Twenty-four subjects enrolled in the introductory Behavioural Science course at the Canberra College of Advanced Education completed the experiment. Sixteen were males, and eight were females. The median age was 18 years. Subjects received course credit for participation which was voluntary.

7.6.2 *Materials*

Trait Vocabulary. The two checklists of 20 traits each used in Experiment 5 were used in this experiment. Each list contained 10 positive traits, and 10 negative traits.

7.6.3 *Procedure*

The experiment involved two stages: Category Construction, and Network

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The experiment involved two stages: Category Construction, and Network

Construction. All subjects followed this order, since the Network Construction task was not possible until the Category Construction task had been completed. Two weeks separated the stages.

Category Construction. This task involved sorting traits into groups. Half the subjects were given one list of 20 trait terms on separate cards, and half were given the other list. Subjects were instructed to sort the traits into groups, such that each group represented a "basic sort" or "type" of person. Subjects were allowed to construct as many groups as they wished, with a minimum of two groups required. Each group had to have at least four traits. Individual trait terms could be used in more than one group, and traits that the subject felt did not belong to any particular group could be placed in a "Miscellaneous" group (with no more than four items).

Network Construction. The network construction task involved answering a series of questions concerning the co-occurrence of traits in people. Each question was of the same format and asked:

"How likely is it that someone who is *first-trait*
will also be *second-trait* ?"

The same instructions as given in Experiment 5 were given in this experiment.

The set of questions for each subject was constructed on a subject-by-subject basis. In each subject's list of categories, the first category which comprised just four traits was selected. If there was no such category, then the next largest category was found, and the first four traits in that category were selected. This quartet of traits from the one category formed the basis of the Network Construction task.

Each trait in this quartet was twice paired with each of the 19 other traits, once in the first position in the question, and once in the second. An outcome of this procedure was that a number of questions were systematically repeated i.e. each question about two given quartet traits was eventually repeated on one other occasion. These repeats were retained to provide a basis for assessing the consistency of a subject's responses.

Each subject answered a total of 152 questions (including 12 repeats) which were randomly ordered. Questions were divided into three booklets, the first of 52 pages and the other two of 50 pages each, with one question per page. The experimenter paced the task, allowing 15 seconds per question for the first booklet, and 10 seconds per question thereafter. A two minute break separated each booklet. The experimenter signalled the subjects verbally at the due time to move to the next question.

The subject was allowed one of three response options: "Likely" (L), "Unlikely" (U), or "Neither likely nor unlikely" (N). Subjects indicated their response by writing either an "L", "U", or "N" to the right of each question.

7.7 RESULTS

7.7.1 *Data Set*

Of the 24 subjects who completed the experiment, only one subject returned data unsuitable for analysis. This subject failed to answer half the repeated questions with the same response.

7.7.2 *Response matrix*

Subjects judged the likelihood of association between the two members of 70 pairs of traits. A pair was treated as linked if each trait implied the presence of the other, and not linked if they did not. Each pair of traits was also treated as either from the same group if they appeared in any group together, or from different groups if they did not. The mean numbers of pairs occurring within each of the four possible outcomes are given in Table 7.10. Means have been rounded for clarity of presentation (complete details are given in Appendix E).

Approximately 76% of decisions regarding pairwise co-occurrences were paralleled by comparable decisions regarding group membership. Responses on the two measures were correlated across the 70 pairs of traits for each subject. The mean correlation coefficient (McNemar, 1969) was .45, $p<.001$. Thus a statistically significant relationship between group membership and pairwise co-occurrences was established.

Table 7.10

Mean Numbers of Trait Pairs by Classification Procedure

	Category Assignment		
	Same	Different	
Linked	9	13	22
Not Linked	4	44	48
	13	57	70

7.8 DISCUSSION

In this experiment, subjects sorted traits into groups, and later judged the likelihood of co-occurrence of pairs of these traits. A reliable relationship between the two measures was found. Thus the content of trait groups could, to some extent, be predicted from the co-occurrence relationships between pairs of traits. The hypothesis that group associations and pairwise co-occurrences were independent was rejected.

However, the results also suggest that the relationship between the two measures is less than perfect. This may be due to firstly, unreliability of both the measures. This would lessen the apparent size of the true correlation between them. That the two measures correlated as highly as they did indicates that each measure is to some extent reliable, and each samples a common domain. Secondly, as discussed above, there are probably occasions when co-occurring traits are treated as members of different groups, and where non co-occurring traits are treated as associates.

The data suggest that it is more likely that co-occurring traits become assigned to different groups, than vice versa. Parallels may be drawn here with natural categories, where features that are shared amongst members of a general domain, but become associated with just one category. For example, most animals make noises and bite, but "biting" may be an attribute that is associated more with dogs than with other animals. Consequently, it may not be unusual for traits that co-occur to be treated as features of different categories.

Table 7.10 indicates that there were cases where traits that did not normally co-occur were assigned to the same group. This type of trait combination implies that there would not be many exemplars of this peculiar combination of features. It may be that this type of group appears to be something of an "unnatural" group, in that these would be infrequent combinations of attributes.

To summarize, Experiment 6 found that there is a relationship between trait groups and pairwise co-occurrences, though there remain instances where the one cannot be predicted from the other. The implication to be drawn from Experiment 6 is that Experiments 4 and 5 were based on a tenable assumption that co-occurrence links largely parallel the type of links incorporated in judgements of group membership. Subjects' judgements about which traits were associated as a group were largely reflected by their judgements about pairwise co-occurrences of those same traits. Thus the failure of Experiments 4 and 5 to support the simple associative network model is not due to either an overly narrow focus on the trait network (Experiment 5), or to a difference between trait group associations and perceived pairwise trait co-occurrences.

It remains to be determined whether the traits within a group are also linked to a unifying referent which makes them members of a true category and more than just a group of associated traits. For the moment, the full implications of the data of Experiments 1 to 6 for the simple associative model, and for more complex models of impression processing are discussed in the next chapter.

CHAPTER 8

OVERVIEW AND CONCLUSIONS

This thesis has reported a series of experiments on the memory for impressions of people. The experiments sought to determine whether some parts of an impression are more memorable than others, and in particular, whether impression information that is consistent with general expectations is processed a similar manner to inconsistent information. The experiments also tested two information-processing models which, although developed for different cognitive phenomena, make pertinent predictions regarding recall and recognition of a first impression.

The experiments incorporated procedures designed to reflect the processes underlying natural social cognitions, thus avoiding the artificiality of some previous laboratory studies of person memory. In each experiment, subjects watched a single video of a real person describing him or herself in an open manner, and were asked to form an impression in a normal everyday fashion. Subjects then expressed their impressions in their own words, and summarized the impression by selecting up to ten traits from an 80 trait checklist (Experiments 1, 2 & 3). In an unanticipated memory task, subjects either recognized or recalled the impression traits. In a separate task, subjects defined their own trait categories, and these categories were used to classify impression traits (as either schema or peripheral) This experimental procedure encouraged natural processes of social cognition, and may be contrasted with other studies which have utilized numerous fictional characters, often explicitly described at the level of trait information, and which have used memory-set instructions so that subjects were anticipating a memory test (Cantor & Mischel, 1977, 1979b; Woll & Graesser, 1982).

Two variables were incorporated wherever possible in each experiment: sex of stimulus person, and valence of impression. The former was under experimental control, subjects being assigned at random to the male and female treatments. There were no main effects for sex of stimulus person, nor did this factor interact with any of the between-subject or within-subject factors in any of the measures on memory performance. Thus, where schema-like processes were found to be operating, they were operating independently of the sex of the stimulus person upon whom attention was centered. This result indicates a generality in processing operations, suggesting schema-like processes operate on personality types, and not on persons of only one sex (be it the same or opposite to that of the perceiver) but not the other.

The variable of valence of impression was dependent on the particular impressions formed by subjects. Subjects were assigned to positive and negative valence conditions in a post hoc fashion. As with sex of stimulus person, the factor of valence of impression did not have any significant main effects, nor did it interact with any of the between-subject or within-subject factors in any of the measures of memory performance. As with the factor of sex of stimulus person above, the factor of valence of impression is orthogonal to schema-like processes that operate, indicating again the generality of those processes.

It is interesting to note that the variance in the valency values of the traits of the remembered impression must be less than the variance of the original impression. This is so since people remember less of the peripheral traits which add variance to the impression. Schema traits would be more homogenous in their values, so the remembered impression would contain less variance. This is not to say that positive impressions would as a whole become more positive, and negative impressions become more negative, as measured by some measure of central tendency. There is a beguiling intuitiveness about the assumption that a positive impression, say, may also contain a few peripheral traits that are less positive or even negative, which, since they are peripheral and tend to be remembered less, thereby lead to a somewhat more positive remembered impression overall (and vice versa for negative impressions). However, for every positive impression that contains less positive/negative peripheral traits, there may be a positive impression that contains extra-positive peripheral traits, which, being remembered less well, leads to a less positive remembered impression overall (and vice versa for negative impressions). Consequently it cannot be reasonably assumed that positive impressions get more positive, and negative impressions get more negative as they are later remembered. It can be reasonably hypothesized that the variance in the remembered traits in terms of valence is less than the variance in the original impression. Overall, though, the data indicate that schema-like processes operate regardless of whether the impression is negative or positive.

There was one set of data that indicated the presence of an effect due to valence, and that is the effect of valence on the number of intra-impression links in Experiment 4. The implications of this were explored in the Discussion of that experiment, and it suffices to say here that negative impressions appear to have more intra-impression-trait links than positive impressions. The effect is to offer more potential retrieval routes to all (negative) traits in a negative impression, both schema and peripheral. Hence, while neither type of trait (schema and peripheral) would be advantaged in this, it may be hypothesized that overall, negative traits are recalled to a greater extent than positive traits. It must be noted that, in Experiment 5, negative impressions were no more interlinked than positive impressions. However, in Experiment 5, subjects were only allowed to choose from 20 traits rather than 80, of which 10 were positive and 10 were negative. Consequently, the checklist of 20 traits may not have allowed typical impressions to be formed, obscuring differences in positive and negative intra-impression link patterns.

To conclude, there was no evidence in this series of experiments that either of the factors of sex of stimulus person, or valence of impression, differentially affected either recognition or recall.

In Experiment 1, recognition memory for impression traits was examined, especially the ability to recognize schema and peripheral traits. The results show that subjects were able to distinguish impression traits from distractor traits, and recognized schema and peripheral traits equally well. Thus, the hit rate data suggest that schema and peripheral traits were processed in similar ways. However, subjects took more time and made more errors in rejecting schema distractors than peripheral or unrelated distractors. These data suggest that impression traits had, after all, been encoded with respect to subjects' trait categories, even though this encoding had not affected recognition rates of old items. In Experiments 2 and 3, recall memory for impression traits was examined, particularly the ability to recall schema and peripheral traits. The data show that subjects recalled more schema traits than peripheral traits (except in the immediate recall condition of Experiment 2). Recall intrusions were quite infrequent, though schema intrusions were more frequent than peripheral intrusions (just as schema false alarms had been more frequent than peripheral false alarms). Thus the retrieval processes of recall facilitated better recovery of schema traits. The ability of subjects to recall impression traits was further investigated in Experiments 4 and 5. Impression traits were measured with respect to preexisting inter-trait associative links, which were thought to underlie the superior recall of schema traits. However, the number of associative paths to, or from, an impression trait did not affect its likelihood of being recalled. Experiment 6 investigated the relationship between trait-group structure and pairwise associative links, and found a significant correlation between the two. That is, traits likely to be associated when considered on a pairwise basis, were also likely to be seen as members of the same group. The results of Experiment 6 ruled out methodological differences as the cause of the different pattern of results found in Experiments 1, 2 and 3, and Experiments 4 and 5.

To conclude, the recall data (Experiments 2 & 3) suggest that memory for impressions is organized with reference to person categories, resulting in better recall of category-consistent information. This is independent of an impression trait's associative-link profile, which does not influence recall (Experiments 4 & 5). Notwithstanding this, the data suggest that trait categories do reflect pairwise inter-trait associations (Experiment 6). Taking these three pieces of information together, it may be inferred that the retrieval process underlying recall is influenced by some quality of trait categories that is independent of simple trait-trait associations.

The retrieval process may utilize links between each attribute trait and the associated unifying category referent rather than between individual traits. Such a process would mean that person categories are essentially different from groups of inter-associated traits which lack any unifying referent through which all traits are linked. Rather, it would mean that the person categories defined by subjects in Experiments 1, 2 and 3 are organized around a unifying referent to which traits are individually linked, and that they therefore have a basis in psychological reality, and are not an artifact of experimental procedures.

An alternate interpretation suggests that the categories defined by subjects in Experiments 1, 2 and 3 are neither categories with unifying referent-to-trait links, nor simple reflections of pairwise associations. This argument makes the case that there are no grounds for presuming that traits are organized into categories, since there is no evidence to suggest that all traits in each group are linked to some overarching unifying referent. Nor are they simply reflections of pairwise associations, since the level of correlation between category structure and pairwise associations is low (Experiment 6). Instead, person categories delineated by subjects in Experiments 1, 2 and 3 may in reality be statements about trait groups that reflect complex trait interrelationships, based on the conditional probabilities of combinations of such traits occurring in a person. These patterns of interrelationships may determine a complex array of associative paths that are not identical with pairwise associative paths, nor involve any link to unifying referents. This complex network may influence recall.

In summary, two interpretations of the data of Experiments 1 to 6 are possible. Firstly, person categories are explicitly organized around unifying referents, and memories for persons are organized with respect to these categories. Further, the unifying referent-attribute links within these categories may be implicated in recall processes. The second interpretation suggests that subjects have preexisting conceptions about likely trait groups, these groups being complex in structure but lacking any unifying referent. Memory is organized with reference to these groups, such that recall of impression traits from within a group is better than recall of impression traits from different groups.

The first of these two interpretations suffers from the difficulty that there are as yet no specific data to show that unifying referent-attribute links exist, or that they direct recall. Consequently, this interpretation may be regarded more as a set of hypotheses than as a set of inescapable conclusions. It also follows that the second interpretation, the group interpretation, which avoids these assumptions, is the more parsimonious interpretation of the data.

In order to decide between these two interpretations, experimental research would need to establish whether recall that utilized the link between trait and unifying referent was both possible and likely under the recall conditions that characterize Experiments 2 to 5. Data on attempts to determine whether recall of categorizable words is meditated by the link to a category label, rather than by item-item links, have proved equivocal. Ross and Bower (1981) examined cued recall of related and unrelated word quintets, and found support for the schema model which assumes a unifying label for related words. However, Jones (1976, 1978, 1984) found support for his "fragment" model which assumes that only some of the associative links are encoded and can be utilized in retrieval, and argued that a version of this model can account for data on recall of related words as in Ross and Bower (1981). Thus far there has been no decisive test of these two competing models. Given the difficulties experienced in testing these two models with simple experimental stimuli, no less difficulty could be expected in applying these models to recall of impression traits.

The data of Experiments 1 to 6 also have implications for current information-processing models. The Script-Pointer-Plus-Tag model of Graesser and colleagues (Graesser & Nakamura, 1982; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Woll & Graesser, 1982) was weakly supported. The principal assumptions that underlie this model are that the entire schema or prototype is copied into the trace, while exemplar information that is inconsistent with the schema or prototype is appended to the trace. There has been little support in these experiments for this set of assumptions as they apply to the processing of a first impression. Support has also been mixed in other domains, such as memory for scripted activities, which has prompted a relaxation of these assumptions such that it is now assumed that only very schema-consistent information is copied into the trace, while moderately consistent exemplar information is tagged in the same manner as inconsistent information (Graesser & Nakamura, 1982). The essential problem in testing this version of the model, the Script-Copy-Plus-Tag model, is how to determine, a priori, which items are very consistent and which are only moderately consistent. Regardless, the data from Experiments 1, 2 and 3 suggest little copying of nonpresented schema-consistent information into the memory trace.

The Associative-Network-Plus-Elaborative- Processing model (Hastie, 1980, 1981; Hastie & Kumar, 1979; Srull; 1981) was generally not supported by the results of these Experiments. The AN+EP model assumes that extra-processing is given to schema-inconsistent information, thereby facilitating its recall. There were no data in Experiments 1, 2 and 3 that showed greater recall of this information. Thus the AN+EP model does not appear to be an appropriate model for the processing of first impressions.

The AN+EP model is disconfirmed by the data if the peripheral or non-schema impression traits are seen as incongruent or inconsistent with the schema, thereby attracting extra processing. However, if non-schema traits are regarded as irrelevant rather than incongruent, then the assessment of the model is quite different. As studies on recall of relevant and irrelevant information have shown, recall of irrelevant information is less than recall of consistent information (and also of incongruent information) (Belmore & Hubbard, 1987; Bower, Black, & Turner, 1979; Hastie & Kumar, 1979; Hemsley & Marmurek, 1982). This mirrors the data pattern of Experiments 2 and 3. Thus, if peripheral traits are seen as irrelevant, the AN+EP model is supported by the data of Experiments 2 and 3.

Peripheral traits have been treated or classified as inconsistent or incongruent throughout this series of experiments for a number of reasons. Chief amongst these was an implicit model of information integration and weighting believed to be underlying the impression formation process (Belmore, 1987; Belmore & Hubbard, 1987; Park, 1986). Reason suggests that in forming an impression, every perceived trait is a vital piece of information in determining the sort of person being perceived. Thus the first trait perceived may point to one sort, but the second trait may point to a different. As perceived traits accumulate, so different categories begin to via for dominance. Until all traits are inferred, one category may not be an obvious prospect over another. When one category seems to coincide more with the impression than other categories, then this category has the opportunity to function as a schema. Perceived traits that are not members of this category point to other competing categories, and these categories may become dominant with the addition of newly perceived traits. Other categories always remain potential models or schemas for the impression. As Belmore and Hubbard (1987) concluded: the "impression is a dynamic working hypothesis, that is constantly checked against incoming behavioral evidence" (p. 69).

The decision that matches one particular category with the impression is a probabilistic one. On the balance of the evidence, one category is favoured over others. Once the subject has made this decision, it would not seem unlikely that the subject would review the decision in the light of the evidence both for and against it, in order to assess the confidence with which the decision can be held. In reviewing the evidence, particular traits that are not attributes of the matched category must, to some extent, be seen as inconsistent and incongruent with the schema category. It is not unrealistic to assume that they receive extra processing as the subject attempts to integrate them into the judgement. In the realm of probabilistic decisions, these disconfirmatory pieces of information can not be simply irrelevant.

In addition, the type of data that was classed as irrelevant in earlier studies and found to be poorly recalled, was concerned with information that in no way had a bearing on the functioning of the schema. Nor did this information give contra-indications to the validity of the activated schema. For instance, in a restaurant schema which involves waiting at the entrance to be seated, proceeding to the table, reviewing the menu, etc, a piece of information such as the colour of the carpet is irrelevant to the sequence of events. It would appear that non-schema traits are quite different in their nature from this kind of irrelevant information.

While this argument is logically plausible, there is no guarantee that the impression-former processes information in such a logical manner. It may yet be the case that subjects, having crystallized their impressions by selecting the schema category, proceed to discount and give lesser weight to non-schema traits, treating them as effectively irrelevant. What begins as a probabilistic decision becomes one made with unwarranted confidence. There may be very little review of all the evidence both for and against the activated schema once the decision is made. Empirical evidence in support of this hypothesis can be found in Pavelchak (1989) who found that the evaluation of a hypothetical student was related to the evaluation of the category label (academic major) relevant to that student, and neither the ease of categorization nor judgements about the typicality of the hypothetical student had a moderating effect on this relationship. Thus there is evidence that once a schema is applied to a stimulus person, the discrepant evidence is discounted (which is not to say that it cannot be remembered).

If subjects process information in this manner in forming an impression, as in the experimental impression-formation task performed in Experiments 2 and 3, then the recall of peripheral traits would, by the AN+EP model, be less than the recall of schema traits. As noted above, the data accord with this prediction.

An additional argument that supports the AN+EP model suggests that the model is designed to predict memory for incongruent traits or behaviours that are the opposite of those used to activate the schema. For example, Bargh and Thein (1985) used the traits of honesty and dishonesty in this context. Thus to apply the model to the recall of traits that are not the opposite of schema traits, but rather are different from the schema traits, may be to do the model an injustice. Peripheral traits may, on occasions, be opposite to schema traits, but are often somewhere between being identical to, and being the opposite of, schema traits. Thus to suggest that peripheral traits should attract extra processing may be seen as an unjustified test of the model.

This argument may be contrasted with the proposition that a model that only makes predictions about memory for traits and behaviours that are the opposite to those expected, is a rather empty model. It is a matter of conjecture as to the everyday incidence of encountering evidence, either in the form of ascribed traits or behaviours, that is clearly the opposite of our operating schema. If the model does not make predictions about the recall of non-schema traits and behaviours that are not the opposite of (nor the same as) schema attributes, then it does not make predictions regarding a significant and important part of our impression. In this sense, the model may be seen as constrained. To conclude, the AN+EP model can be interpreted as being in harmony with the data of Experiments 2 and 3. Either peripheral traits are treated as irrelevant, or the model is more constrained in its predictions than has been suggested in this thesis. Either way, there is the suggestion that a more predictive model is worth pursuing.

As neither the SP+T nor the AN+EP models appeared to model impression processing well (excepting the case for AN+EP model outlined above), and the simple associative network model tested in Experiments 4 and 5 was also unsupported, it appears that any successful model will have to be more complex that one assuming simple associative links, but less complex than one which assumes schema-dominated processing. Such a conclusion has also been reached by others (e.g. Landman & Manis, 1983).

The present data also have implications for other research areas. The data show a small but robust assimilation of the memory for an impression to a matching category/cluster. This must qualify much recent research in person memory which first induces subjects to form an impression of a character, and then equates the impression with a *schema* of that person (Crocker, Hannah, & Weber, 1983; Hastie & Kumar, 1979; Hemsley & Marmurek, 1982; Srull, 1981; Srull, Lichtenstein, & Rothbart, 1985; Wyer, Bodenhausen, & Srull, 1983; Wyer & Gordon, 1982; Wyer & Martin, 1986). It is assumed that the impression will be used as a reference point in the processing of new information about that person, new information being tagged as either congruent, incongruent, or irrelevant to the impression. Such an account rests on the assumption that the impression is static in nature, and that the relevance or irrelevance of later information can be assessed with reference to this original impression. The data from Experiments 1, 2 and 3 show that the impression is not static, and therefore the relevance of new information about the person will change as the impression changes. The results of these earlier studies must be interpreted in the light of this present finding, which makes their interpretation problematic.

Any model of impression processing should have the flexibility to account not only for data such as those from Experiments 1 to 5, but should also be consonant with memory for impressions in other contexts. Experiments 1 to 5 focused on the first attempt at recognition or recall of an impression in the absence of further information about the stimulus person. At least two other everyday situations constitute contexts in which impression memory may be studied. Firstly, Sherman, Judd, and Park (1989) note that there is little work in person perception on the evolution of impressions, reinforcing the suggestion that research could examine the consequences of encountering further information about a person subsequent to the formation of the impression. It remains to be determined if the memory of a person interacts with new information: Does new information make aspects of the original impression more or less accessible? In the person memory literature, the emphasis to date has been on the memory for the subsequent information, and not on the memory for the impression. A notable exception is O'Sullivan and Durso (1984) who examined memory for the original impression after presentation of subsequent information about the person. Subjects were presented with a stereotype label, such as "Jesus freak", and two supporting facts, and after an interpolated typicality rating task, information varying in congruence with the impression. Their data show that firstly, subjects recalled more of an impression (at least the core components of it) when followed by incongruent rather than congruent information. It seems that the incongruent information, in some manner, made the original impression in its essential aspects more accessible. O'Sullivan and Durso (1984) concluded that this supports the model of Hastie (1980,1981 - AN+EP model) with its extra processing induced by the incongruent information. Secondly, their data (Experiment 1) show that subjects in the Incongruent condition recalled more original impression information (averaging over both core and minor information) than subsequent incongruent information. By contrast, subjects in the Congruent condition almost equal amounts of original impression information and subsequent congruent information. That is, there was no significant difference between the two groups on recall of original impression items, but recall of subsequent congruent items was significantly greater than recall of incongruent items. Thus, there was poorer recall of incongruent information (or peripheral information as defined in this thesis). This concords with the pattern of data in Experiments 2 and 3.

The second context in which person memory should be studied is suggested by the fact that the data of Experiments 1 to 5 pertain to the first recall or recognition of an impression. The data do not directly pertain to the repeated recall or recognition of the impression. While evidence that the interrelationships between parts of a memory trace will remain substantially unaltered if left unretrieved (Woodworth & Schlosberg, 1954), the act of retrieval itself introduces added complexity. The current memory for an object, event, or impression cannot fail to be influenced by the memory of previous attempts at retrieving the trace (e.g. Bartlett, 1932). In social interaction, an impression of another may be recalled many times, and the impression that is output on each occasion will be influenced by previous attempts to retrieve the impression. Further research is needed to address the issue of repeated retrieval of an impression. Indeed, it is difficult to imagine that these two influences on impression memory -- interaction with subsequent information and repeated retrieval -- would often occur in the absence of each other, since it is most likely that everyday social intercourse involves expressing one's opinions, hearing others' opinions, reevaluating and further expressions of one's own opinion, and so on. Nevertheless, in the study of this social interaction and its effect on memory for an impression, there needs to be account given of both factors and their independent and interactive effects.

Finally, any model of person perception must acknowledge current research in this and related areas. As reviewed in Chapter 1, there has recently been a move away from purely schema-based research, to a new interest in accuracy (Higgins & Bargh, 1987; Sherman, Judd, & Park, 1989). Accurate impressions, memories and judgements have been recorded under a number of different conditions. Briefly, these are firstly, the positive effect of motivation on accuracy such as the expectation of interaction with the stimulus person (Devine, Sedikides, & Fuhrman, 1989; Neuberg, 1989; Neuberg & Fiske 1987); secondly, the use of contextual evidence and the opportunity to qualify statements about others' personalities (Shoda, Mischel, & Wright, 1989; Wright & Mischel, 1987, 1988); thirdly, the ability to make accurate judgements on a specific level, if not on the global level, about aspects of another's personality (Zuroff, 1989); and fourthly, the rejection of labels such as an occupational or trait label and its concomitant effects on the impression when the label is contrary to specific individuating evidence (Belmore & Hubbard, 1987; Brewer, 1988; Fiske, Neuberg, Beattie, & Milberg, 1987; Pavelchak, 1989).

It is interesting to note the extent to which these factors operated through this series of experiments. Indeed, the general experimental procedure of the research reported in this thesis may been seen as promoting those factors that increase accuracy, and minimizing those factors that hinder accuracy.

Firstly, subjects reviewed the personality of a real person, albeit on a video recording. They reviewed only one person. There should have been no conviction or belief, as there has been in much pencil-and-paper based research, that the stimulus person was a hypothetical person. While the subjects in the experiments reported in this thesis may not have had the expectation that they would actually meet the stimulus person, they were at least convinced that they were viewing a real person. Research noted earlier has shown the motivating effects on impression formation of expectations that a real person was the target of the impression-formation task. The video based impression-formation task used throughout this series of experiments may have increased subjects' motivation to accuracy.

Secondly, subjects had access to the natural context in which the behaviours of the stimulus person were displayed. That is, they were able to watch the stimulus person interacting with a number of significant others on the video recording. The behaviours of the stimulus person were not simply typed statements that person X had done behaviour Y, as they have often been in previous research. Further, when subjects were required to express their impressions in the form of trait adjectives, they were afforded the opportunity to qualify those traits by the use of qualifiers 'somewhat', 'quite', and 'very'. Thus, they were allowed access to a range of linguistic terms that are normally used in expressing and qualifying impressions of others' personalities. Thus two factors, contextual information and linguistic qualifiers were present and available in this series of experiments. These factors would also have worked to increase accuracy.

Thirdly, subjects made specific judgements about the personality of the stimulus person, rather than a global judgement of, for example, likeability. This focus on specific attributes may have increased the level of accuracy in, for example, recognition judgements about which trait attributes were present and which were not. If subjects had been required to recognize or recall a more global judgement, there may have been evidence of greater error, as there has been in other research noted above.

Finally, in this series of experiments, there were no labels in the form of occupational labels or trait labels presented in the video recording of the stimulus person. Such labels could have biased subjects' perceptions. Although this is not equivalent to presenting inappropriate labels which stimulates attention to individuating evidence (an experimental strategy used in current research), the absence of any labels would necessitate the initial use of 'bottom-up' processing by the subject, with its focus on detail and concrete evidence. Thus, the subject selected only those traits for his or her impression that were firmly anchored in behavioural data.

It is perhaps not surprising that subjects showed the degree of accuracy evident in the data of this thesis. This underlies the conclusion that memory for impressions remains the outcome of a complex interplay of expectations about types of people, level of motivation to accuracy, availability of contextual evidence, and personality and other category labels volunteered by others.

REFERENCES

Alba, J. W., & Hasher, L. (1983). Is memory schematic? *Psychological Bulletin*, **93**, 203-231.

Anderson, J. R. (1972). FRAN: A simulation model of free recall. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol.5, pp. 315-378). New York: Academic Press.

Anderson, J. R. (1976). *Language, memory, and thought.* Hillsdale, N.J.: Erlbaum.

Anderson, J. R. (1983). A spreading activation theory of memory. *Journal of Verbal Learning and Verbal Behavior*, **22**, 261-295.

Anderson, J. R., & Bower, G. H. (1973). *Human Associative Memory*. Washington, D.C.: V. H. Winston & Sons.

Anderson, N. H. (1962). Application of an additive model to impression formation. *Science*, **138**, 817-818.

Anderson, N. H. (1965). Primacy effects in personality impression formation using a generalized order effect paradigm. *Journal of Personality and Social Psychology*, **2**, 1-9.

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

Anderson, N. H., & Hubert, S. (1963). Effects of concomitant recall on order effects in personality impression formation. *Journal of Verbal Learning and Verbal Behavior*, **2**, 379-391.

Anisfeld, M., & Knapp, M. (1968). Association, synonymity, and directionality in false recognition. *Journal of Experimental Psychology*, **77**, 171-179.

Asch, S. E. (1946). Forming impressions of personality. *Journal of Abnormal and Social Psychology*, **41**, 258-290.

Ashmore, R. D. (1981). Sex stereotypes and implicit personality theory. In D. L. Hamilton (Ed.), *Cognitive processes in sterotyping and intergroup behavior* (pp 37-81). Hillsdale, N.J.: Erlbaum.

Atkinson, R. C., Herrmann, D. J., & Wescourt, K. T. (1974). Search processes in recognition theory. In R. L. Solso (Ed.), *Theories in cognitive psychology: The Loyola Symposium* (pp. 101-146). Hillsdale, N.J.: Erlbaum.

Atkinson, R. C., & Juola, J. F. (1974). Search and decision processes in recognition memory. In D. H. Kantz, R. C. Atkinson, R. D. Luce, & P. Suppes (Eds.), *Contemporary developments in mathematical psychology: Learning, memory, and thinking* (pp. 242-293). San Francisco: Freeman.

Atkinson, R. C. & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence (Ed.), *The psychology of learning and motivation* (Vol. 2, pp. 89-198). New York: Academic Press.

Bargh, J. A., & Thein, R. D. (1985). Individual construct accessibility, person memory, and the recall-judgment link: The case of information overload. *Journal of Personality and Social Psychology*, **49**, 1129-1146.

Barsalou, L. W. (1983). Ad hoc categories. *Memory & Cognition*, **11**, 211-227.

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. London: Cambridge University Press.

Bellezza, F. S., & Bower, G. H. (1981). Person stereotypes and memory for people. *Journal of Personality and Social Psychology*, **41**, 856-865.

Belmore, S. M. (1987). Determinants of attention during impression formation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, **13**, 480-489.

Belmore, S. M., & Hubbard, M. L. (1987). The role of advance expectancies in person memory. *Journal of Personality and Social Psychology*, **53**, 61-70.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, **88**, 354-364.

Biederman, I., & Stacy, E. W. Jr. (1974). Stimulus probability and stimulus set size in memory scanning. *Journal of Experimental Psychology*, **102**, 1100-1107.

Bobrow, D. G., & Norman, D. A. (1975). Some principles of memory schemata. In D. G. Bobrow & A. Collins (Eds.), *Representation and understanding: Studies in cognitive science* (pp. 131-149). New York: Academic Press.

Bourne, L. E. Jr. (1970). Knowing and using concepts. *Psychological Review*, **77**, 546-556.

Bousfield, W. A., & Cohen, B. H. (1956). The occurrence of clustering in the recall of randomly arranged words of different frequencies of usage. *Journal of General Psychology*, **52**, 83-95.

Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in memory for text. *Cognitive Psychology*, **11**, 177-220.

Bransford, J. D., & Franks, J. J. (1971). The abstraction of linguistic ideas. *Cognitive Psychology*, **2**, 331-350.

Brewer, M. B. (1988). A dual-process model of impression formation. In R. S. Wyer, Jr. & T. K. Srull (Eds.), *Advances in social cognition* (pp 1-36). Hillsdale, NJ: Erlbaum.

Brewer, M. B., Dull, V., & Lui, L. (1981). Perceptions of the elderly: Stereotypes as prototypes. *Journal of Personality and Social Psychology*, **41**, 656-670.

Brooks, L. (1978). Nonanalytic concept formation and memory for instances. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp. 169-211). Hillsdale N.J.: Erlbaum.

Bruner, J. S., & Tagiuri, R. (1954). The perception of people. In G. Lindzey (Ed.), *Handbook of social psychology* (pp. 634-654). Cambridge, MA: Addison-Wesley.

Cacioppo, J. T., Petty, R. E., Kao, C. F., & Rodrigeuz, R. (1986). Central and peripheral routes to persuasion: An individual difference perspective. *Journal of Personality and Social Psychology*, **51**, 1032-1043.

Campbell, J. D., & Fairey, P. J. (1985). Effects of self-esteem, hypothetical explanations, and verbalizations of expectancies on future performance. *Journal of Personality and Social Psychology*, **48**, 1097-1111.

Cantor, N., & Kihlstrom, J. F. (1987). *Personality and Social Intelligence*. Englewood Cliffs, N.J.: Prentice Hall.

Cantor, N., & Mischel, W. (1977). Traits as prototypes: Effects on recognition memory. *Journal of Personality and Social Psychology*. **35**, 38-48.

Cantor, N., & Mischel, W. (1979a). Prototypes in person perception. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 12, pp. 3-52). New York: Academic Press.

Cantor, N., & Mischel, W. (1979b). Prototypicality and personality: Effects on free recall and personality impressions. *Journal of Research in Personality*, **13**, 187-205.

Clark, L. F., & Woll, S. B. (1981). Stereotype biases: A reconstructive analysis of their role in reconstructive memory. *Journal of Personality and Social Psychology*, **41**, 1064-1072.

Cofer, C. N. (1965). On some factors in the organizational characteristics of free recall. *American Psychologist*, **20**, 261-272.

Cofer, C. N., Bruce, D. R., & Reicher, G. M. (1966). Clustering in free recall as a function of certain methodological variations. *Journal of Experimental Psychology*, **71**, 858-866.

Cohen, B. H., & Bousfield, W. A. (1956). The effect of a dual-level stimulus word list on the occurrence of clustering in recall. *Journal of General Psychology*, **55**, 51-58.

Cohen, C. E. (1981). Person categories and social perception: Testing some boundaries of the processing effects of prior knowledge. *Journal of Personality and Social Psychology*, **40**, 441-452.

Cohen, C. E., & Ebbesen, E. B. (1979). Observational goals and schema activation: A theoretical framework for behavior perception. *Journal of Experimental Social Psychology*, **15**, 305-329.

Collins, A. M., & Loftus, E.F. (1975). A spreading- activation theory of semantic processing. *Psychological Review*, **82**, 407-428.

Collins, A. M., & Quillian, M. R. (1969). Retrieval time from semantic memory. *Journal of Verbal Learning and Verbal Behavior*, **8**, 240-247.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, **11**, 671-684.

Cramer, P., & Eagle, M. (1972). Relationship between conditions of CrS presentation and the category of false recognition errors. *Journal of Experimental Psychology*, **94**, 1-5.

Crocker, J., Fiske, S. T., & Taylor, S. E. (1984). Schematic bases of belief change. In J. R. Eiser (Ed.), *Attitudinal Judgement* (pp.197-226). New York: Springer.

Crocker, J., Hannah, D. B., & Weber, R. (1983). Person memory and causal attributions. *Journal of Personality and Social Psychology*, **44**, 55-66.

Dallett, K. M. (1964). Number of categories and category information in free recall. *Journal of Experimental Psychology*, **68**, 1-12.

Deese, J. (1959). Influence of inter-item association strength upon immediate free recall. *Psychological Reports*, **5**, 305-312.

Devine, P. G., Sedikides, C., & Fuhrman, R. W. (1989). Goals in social information processing: The case of anticipated interaction. *Journal of Personality and Social Psychology*, **56**, 680-690.

Dreben, E. K., Fiske, S. T., & Hastie, R. (1979). The independence of evaluative and item information: Impression and recall order effects on behavior-based impression formation. *Journal of Personality and Social Psychology*, **37**, 1758-1768.

Elias, C. S., & Perfetti, C. A. (1973). Encoding task and recognition memory: The importance of semantic encoding. *Journal of Experimental Psychology*, **99**, 151-156.

Fiske, S. T., & Cox, M. G. (1979). Person concepts: The effect of target familiarity and descriptive purpose on the process of describing others. *Journal of Personality*, **47**, 136-161.

Fiske, S. T., & Linville, P. W. (1980). What does the schema concept buy us? *Personality and Social Psychology Bulletin*, **6**, 543-557.

Fiske, S. T., Neuberg, S. L., Beattie, A. E., & Milberg, S. J. (1987). Category-based and attribute-based reactions to others: Some informational conditions of stereotyping and individuating processes. *Journal of Experimental Social Psychology*, **23**, 399-427.

Forgas, J. P., & Bower, G. H. (1987). Mood effects on person-persception judgements. *Journal of Personality and Social Psychology*, **53**, 53-60.

Franks, J. J., & Bransford, J. D. (1971). Abstraction of visual patterns. *Journal of Experimental Psychology*, **90**, 65-74.

Gara, M. A., & Rosenberg, S. (1981). Linguistic factors in implicit personality theory. *Journal of Personality and Social Psychology*, **41**, 450-457.

Geisser, S., & Greenhouse, S. W. (1958). An extension of Box's results on the use of the *F* distribution in multivariate analysis. *Annals of Mathematical Statistics*, **29**, 885-891.

Gillund, G., & Shiffrin, R. M. (1984). A retrieval model for both recognition and recall. *Psychological Review*, **91**, 1-67.

Glick, P., Zion, C., & Nelson, C. (1988). What mediates sex discrimination in hiring decisions? *Journal of Personality and Social Psychology*, **55**, 178-186.

Graesser, A. C., Gordon, S. E., & Sawyer, J. D. (1979). Recognition memory for typical and atypical actions in scripted activities: Tests of a script-pointer+tag hypothesis. *Journal of Verbal Learning and Verbal Behavior*, **18**, 319-332.

Graesser, A. C., & Nakamura, G. V. (1982). The impact of a schema on comprehension and memory. *The Psychology of Learning and Motivation*, **16**, 59-109.

Graesser, A. C., Woll, S. B., Kowalski, D. J., & Smith, D. A. (1980). Memory for typical and atypical actions in scripted activities. *Journal of Experimental Psychology: Human Learning and Memory*, **6**, 503-515.

Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley.

Hanawalt, N. G. (1937). Memory traces for figures in recall and recognition. *Archives of Psychology*, (No. 216).

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

Hamilton, D. L., Katz, L. B., & Leirer, V. O. (1980). Cognitive representation of personality representations: Organizational processes in first impression formation. *Journal of Personality and Social Psychology*, **39**, 1050-1063.

Hampson, S. E. (1982). Person memory: A semantic category model of personality traits. *British Journal of Psychology*, **73**, 1-11.

Hampson, S. E., John, O. P., & Goldberg, L. R. (1986). Category breadth and heirarchical structure in personality: Studies of asymmetries in judgements of trait implications. *Journal of Personality and Social Psychology*, **51**, 37-54.

Harris, P. L., & Hampson, S. E. (1980). Processing information within implicit personality theory. *British Journal of Social and Clinical Psychology*, **19**, 235-242.

Hartwick, J. (1979). Memory for trait information: A signal detection analysis. *Journal of Experimental Social Psychology*, **15**, 533-552.

Hastie, R. (1980). Memory for behavioral information that confirms or contradicts a personality impression. In R. Hastie, T. M. Ostrom, E. B. Ebbesen, R. S. Wyer, D. L. Hamilton, & D. E. Carlston (Eds.), *Person memory: The cognitive basis of social perception* (pp. 155-177). Hillsdale, N.J.: Erlbaum.

Hastie, R. (1981). Schematic principles in human memory. In E. T. Higgins, C. P. Herman, & M. P. Zanna (Eds.), *Social cognition: The Ontario symposium* (Vol. 1, pp 39-88). Hillsdale, N.J.: Erlbaum.

Hastie, R., & Kumar, P. A. (1979). Person memory: Personality traits as organizing principles in memory for behaviors. *Journal of Personality and Social Psychology*, **37**, 25-38.

Hastie, R., & Park, B. (1986). The relationship between memory and judgment depends on whether the judgment is memory-based or on-line. *Psychological Review*, **93**, 258-268.

Heider, F. (1944). Social perception and phenomenal causality. *Psychological Review*, **51**, 358-374.

Hemsley, G. D., & Marmurek, H. H. C. (1982). Person memory: The processing of consistent and inconsistent person information. *Personality and Social Psychology Bulletin*, **8**, 433-438.

Herr, D. G., & Gaebelein, J. (1978). Nonorthogonal two-way analysis of variance. *Psychological Bulletin*, **216**, 207-216.

Herrmann, D. J., Frisina, R. D., & Conti, G. (1978). Categorization and familiarity in recognition involving a well-memorized list. *Journal of Experimental Psychology: Human Learning and Memory*, **4**, 428-440.

Herrmann, D. J., McLaughlin, J. P., & Nelson, B. C. (1975). Visual and semantic factors in recognition from long-term memory. *Memory & Cognition*, **3**, 381-384.

Higgins, E. T., & Bargh, J. A. (1987). Social cognition and social perception. *Annual Review of Psychology*, **38**, 369-425.

Higgins, E. T., King, G. A., & Mavin,, G. H. (1982). Individual construct accessability and subjective impressions and recall. *Journal of Personality and Social Psychology*, **43**, 35-47.

Hintzman, D. L., & Ludlam, G. (1980). Differential forgetting of prototypes and old instances: Simulation by an exemplar-based classification model. *Memory & Cognition*, **8**, 378-382.

Hollan, J. D. (1975). Features and semantic memory: Set-theoretic or network model? *Psychological Review*, **82**, 154-155.

Homa, D. (1973). Organization and long-term memory research. *Memory & Cognition*, **1**, 369-379.

Homa, D. (1984). On the nature of categories. *The Psychology of Learning and Motivation*, **18**, 49-94.

Homa, D., Cross, J., Cornell, D., Goldman, D., & Shwartz, S. (1973). Prototype abstraction and classification of new exemplars as a function of number of instances defining the prototype. *Journal of Experimental Psychology*, **101**, 116-122.

Homa, D., Sterling, S., & Trepel, L. (1981). Limitations of exemplar-based generalization and the abstraction of categorical information. *Journal of Experimental Psychology: Human Learning and Memory*, **7**, 418-439.

Jeffery, K. M., & Mischel, W. (1979). Effects of purpose on the organization and recall of information in person perception. *Journal of Personality*, **47**, 397-419.

Jenkins, J. J., Mink, W. D., & Russell, W. A. (1958). Associative clustering as a function of verbal association strength. *Psychological Reports*, **4**, 127-136.

Jenkins, J. J., & Russell, W. A. (1952). Associative clustering during recall. *Journal of Abnormal and Social Psychology*, **47**, 818-821.

Jones, G. V. (1976). Tests of a structural theory of the memory trace. *British Journal of Psychology*, **69**, 351-367.

Jones, G. V. (1978). A fragmentation hypothesis of memory: Cued recall of pictures and of sequential position. *Journal of Experimental Psychology: General*, **105**, 277-293.

Jones, G. V. (1984). Fragment and schema models for recall. *Memory & Cognition*, **12**, 250-263.

Judd C. M., & Krosnick, J. A. (1988). The structural bases of consistency among political attitudes: Effects of political expertise and attitude importance. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude Structure and Function*. Hillsdale, H.J.: Erlbaum.

Kardes, F. R., Sanbonmatsu, D. M., Voss, R. T., & Fazio, R. H. (1986). Self-monitoring and attitude accessability. *Personality and Social Psychology Bulletin*, **12**, 468-474.

Kintsch, W. (1974). *The representation of meaning in memory.* Hillsdale, N.J.: Erlbaum.

Kintsch, W. (1977). *Memory and cognition.* New York: Wiley.

Kirk, R. E. (1982). *Experimental design: Procedures for the behavioral sciences.* Monterey, Ca.: Brooks/Cole

Krueger, J., & Rothbart, M. (1988). The use of categorical and individuating information in making inferences about personality. *Journal of Personality and Social Psychology,* **55**, 187-195.

Landman, J., & Manis, M. (1983). Social cognition: Some historical and theoretical perspectives. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 16, pp. 49-123). New York: Academic Press.

Levine, M. J. (1975). *A cognitive theory of learning: Research on hypothesis testing.* Hillsdale, N.J.: Erlbaum.

Lingle, J. H. (1983). Tracing memory-structure activation during person judgements. *Journal of Experimental Social Psychology,* **19**, 480-496.

Lingle, J. H., Geva, N., Ostrom, T. M., Leippe, M. R., & Baumgardner, M. H. (1979). Thematic effects of person judgements on impression organization. *Journal of Personality and Social Psychology,* **37**, 674-687.

Mandler, G. (1967). Organization and memory. In K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation* (Vol. 1, pp. 327-372). New York: Academic Press.

Mandler, G. (1968). Association and organization: Facts, fancies, and theories. In T. R. Dixon & D. L. Horton (Eds.), *Verbal* *learning and general behavior theory* (pp. 109-119). Englewood Cliffs, N.J.: Prentice-Hall.

Mandler, G. (1980). Recognizing: The judgment of previous occurrence. *Psychological Review*, **87**, 252-271.

Mandler, G., & Pearlstone, Z. (1966). Free and constrained concept learning and subsequent recall. *Journal of Verbal Learning and Verbal Behavior*, **5**, 126-131.

Mandler, G., Pearlstone, Z., & Koopmans, H. S. (1969). Effects of organization and semantic similarity on recall and recognition. *Journal of Verbal Learning and Verbal Behavior*, **8**, 410-423.

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology*, **35**, 63-78.

Markus, H., & Wurf, E. (1987). The dynamic self-concept: a social psychological perspective. *Annual Review of Psychology*, **38**, 299-337.

Mathews, R. (1954). Recall as a function of number of classificatory categories. *Journal of Experimental Psychology*, **47**, 241-247.

McCloskey, M. E., & Glucksburg, S. (1978). Natural categories: Well defined or fuzzy sets? *Memory & Cognition*, **6**, 462-472.

McNemar, Q. (1969). *Psychological Statistics*. New York: John Wiley & Sons.

Medin, D. L., & Schaffer, M. M. (1978). Context theory of classification learning. *Psychological Review*, **85**, 207-238.

Mervis, C. B., & Rosch, E. (1981). Categorization of natural objects. *Annual Review of Psychology*, **32**, 89-115.

Miller, N., & Brewer, M. B. (1986). Categorization effects on ingroup and outgroup perception. In F. J. Dovido, & S. L. Gaertner (Eds.), *Prejudice, Discrimination, and Racism* (pp. 209-230). Orlando, Fl: Academic Press.

Minsky, M. (1975). A framework for representing knowledge. In P. H. Winston (Ed.), *The psychology of computer vision*. Englewood Cliffs, N.J.: Prentice-Hall.

Murdock, B. B. Jr. (1962). The serial position effect of free recall. *Journal of Experimental Psychology*, **64**, 482-488.

Murphy, M. D., & Puff, C. R. (1982). Free recall: Basic methodology and analyses. In C. R. Puff (Ed.), *Handbook of research methods in human memory and cognition* (pp. 99-128). New York: Academic Press.

Neuberg, S. L. (1989). The goal of forming accurate impressions during social interactions: Attenuating the impact of negative expectancies. *Journal of Personality and Social Psychology*, **56**, 374-386.

Neuberg, S. L., & Fiske, S. T. (1987). Motivational influences on impression formation: Outcome dependency, accuracy-driven attention, and individuating processes. *Journal of Personality and Social Psychology*, **53**, 431-444.

Norman, D. A., & Bobrow, D. G. (1976). On the role of active memory processes in perception and cognition. In C. Cofer (Ed.), *The structure of human memory* (pp. 114-132). San Francisco: Freeman.

O'Sullivan, C. S., & Durso, F. T. (1984). Effect of schema-incongruent information on memory for stereotypical attributes. *Journal of Personality and Social Psychology*, **47**, 55-70.

Overall, J. E., & Siegel, D. K. (1969). Concerning least squares analysis of experimental data. *Psychological Bulletin*, **72**, 311-322.

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

Park, B., & Hastie, R. (1987). The perception of variability in category development: instance- versus abstraction-based stereotypes. *Journal of Personality and Social Psychology*, **53**, 621-635.

Pavelchak, M. A. (1989). Piecemeal and category-based evaluation: An idiographic analysis. *Journal of Personality and Social Psychology*, **56**, 354-363.

Pellegrino, J. W., & Hubert, L. J. (1982). The analysis of organization and structure in free recall. In C. R. Puff (Ed.), *Handbook of research methods in human memory and cognition* (pp. 129-172). New York: Academic Press.

Pike, R., Dalgleish, L., & Wright, J. (1977). A multiple-observation model for response latency and the latencies of correct and incorrect responses in recognition memory. *Memory & Cognition*, **5**, 580-589.

Podell, J. E. (1961). A comparison of generalization and adaptation-level as theories of connotation. *Journal of Abnormal and Social Psychology*, **62**, 593-597.

Posner, M. I., & Keele, S. W. (1968). On the genesis of abstract ideas. *Journal of Experimental Psychology*, **77**, 353-363.

Posner, M. I., & Keele, S. W. (1970). Retention of abstract ideas. *Journal of Experimental Psychology*, **83**, 304-308.

Raaijmakers, J. G. W., & Shiffrin, R. M. (1980). SAM: A theory of probabilistic search of associative memory. In G. H. Bower (Ed.) *The psychology of learning and motivation* (Vol. 14, pp. 207-262). New York: Academic Press.

Raaijmakers, J. G. W., & Shiffrin, R. M. (1981). Search of associative memory. *Psychological Review*, **88**, 93-134.

Ratcliff, R. (1978). A theory of memory retrieval. *Psychological Review*, **85**, 59-108.

Reitman, J. S., & Bower, G. H. (1973). Storage and later recognition of exemplars of concepts. *Cognitive Psychology*, **4**, 194-206.

Reynolds, J H., & Goldstein, J. A. (1974). The effects of category membership on memory scanning for words. *American Journal of Psychology*, **87**, 487-495.

Riskey, D. R. (1979). Verbal memory processes in impression formation. *Journal of Experimental Psychology: Human Learning and Memory*, **5**, 271-281.

Roberts, W. A. (1972). Free recall of word lists varying length and rate of presentation: A test of total-time hypotheses. *Journal of Experimental Psychology*, **92**, 365-372.

Rosch, E. (1973). Natural categories. *Cognitive Psychology*, **4**, 328-350.

Rosch, E. (1975). Cognitive reference points. *Cognitive Psychology*, **7**, 532-547.

Rosch, E. (1978). Principles of categorization. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp. 26-48). Hillsdale, N.J.: Erlbaum.

Rosch, E., & Mervis, C. B. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology*, **7**, 593-605.

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology*, **8**, 382-439.

Rosenberg, S., & Sedlak, A. (1972). Structural representations of implicit personality theory. *Advances in Experimental Psychology*, **6**, 235-297.

Ross, B. H., & Bower, G. H. (1981). Comparisons of models of associative recall. *Memory & Cognition*, **9**, 1-16.

Rothbart, M., Evans, M., & Fulero, S. (1979). Recall for confirming events: Memory processes and the maintenance of social stereotypes. *Journal of Experimental Social Psychology*, **15**, 343-355.

Rumelhart, D. E., & Ortony, A. (1977). The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 99-135). Hillsdale, N.J.: Erlbaum.

Rywick, T., & Schaye, P. (1974). Use of long-term memory in impression formation. *Psychological Reports*, **34**, 939-945.

Schank, R., & Abelson, R. (1977). *Scripts, plans, goals and understanding: An inquiry into human knowledge structures.* Hillsdale, N.J.: Erlbaum.

Shavelson, R. J., & Marsh, H. W. (1986). On the structure of self-concept. In R. Schwarzer (Ed.), *Anxiety and Cognitions* (pp. 305-330). Hillsdale, N.J.: Erlbaum.

Sherman, S. J. (1987). Cognitive processes in the formation, change, and expression of attitudes. In M. P. Zanna, J. M. Olson, & C. P. Herman (Eds.), *Social Influence: The Ontario Symposium*, (Vol. 5, pp. 75-106). Hillsdale NJ: Erlbaum.

Sherman, S. J., Judd, C. M., & Park, B. (1989). Social Cognition. *Annual Review of Psychology*, **40**, 281-326.

Shoda, Y., Mischel, W., & Wright, J. C. (1989). Intuitive interactionism in person perception: Effects of situation-behavior relations on dispostional judgements. *Journal of Personality and Social Psychology*, **56**, 41-53.

Smith, D. A., & Graesser, A. C. (1981). Memory for actions in scripted activities as a function of typicality, retention interval, and retrieval task. *Memory & Cognition*, **9**, 550-559.

Smith, E. R., & Miller, F. D. (1983). Mediation among attributional influences and comprehension processes: Initial findings and a general method. *Journal of Personality and Social Psychology*, **44**, 492-505.

Snyder, M., & Uranowitz, S. W. (1978). Reconstructing the past: Some cognitive consequences of person perception. *Journal of Personality and Social Psychology*, **36**, 941-950.

Srull, T. K. (1981). Person memory: Some tests of associative storage and retrieval models. *Journal of Experimental Psychology: Human Learning and Memory*, **7**, 440-463.

Srull, T. K. (1983). Organizational and retrieval processes in person memory: An examination of processing objectives, presentation format, and the possible use of self-generated cues. *Journal of Personality and Social Psychology*, **44**, 1157-1170.

Srull, T. K., Lichtenstein, M., & Rothbart, M. (1985). Associative storage and retrieval processes in person memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, **11**, 316-345.

Srull, T. K., & Wyer, R. S. (1979). The role of category accessibility in the interpretation of information and about others: Some determinants and implications. *Journal of Personality and Social Psychology*, **37**, 1660-1672.

Srull, T. K., & Wyer, R. S. (1980). Category accessability and social perception: Some implications for the study of person memory and interpersonal judgement. *Journal of Personality and Social Psychology*, **38**, 841-856.

Srull, T. K., & Wyer, R. S. (1986). The role of chronic and temporary goals in social information processing. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition* (pp. 503-549). New York: Guilford Press.

Srull, T. K., & Wyer, R. S. Jr. (1989). Person memory and judgement. *Psychological Review*, **96**, 58-83.

Stangor, C., & Ruble, D. N. (1989). Strength of expectancies and memory for social information: What we remember depends on how much we know. *Journal of Experimental Social Psychology*, **25**, 18-35.

Strange, W., Kenney, T., Kessel, F. S., & Jenkins, J. J. (1970). Abstraction over time of prototypes from distortions of random dot patterns. *Journal of Experimental Psychology*, **83**, 508-510.

Taylor, S. E., & Crocker, J. (1981). Schematic bases of social information processing. In E. T. Higgins, C. P. Herman, & M. P. Zanna (Eds.), *Social cognition: The Ontario symposium* (Vol. 1, pp. 89-134). Hillsdale, N.J.: Erlbaum.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical and contextual bases of person memory and stereotyping. *Journal of Personality and Social Psychology*, **36**, 778-793.

Thorndyke, P. W., & Yekovich, F. R. (1980). A critique of schema-based theories of human story memory. *Poetics*, **9**, 23-49.

Trabasso, T., & Bower, G. H. (1968). *Attention in learning: Theory and research.* New York: Wiley.

Tulving, E., & Pearlstone, Z. (1966). Availability versus accessibility of information in memory for words. *Journal of Verbal Learning and Verbal Behavior*, **5**, 381-391.

Underwood, B. J. (1965). False recognitions produced by implicit verbal responses. *Journal of Experimental Psychology*, **70**, 122-129.

Underwood, B. J., & Freund, J. S. (1968). Errors in recognition learning and retention. *Journal of Experimental Psychology*, **78**, 55-63.

Wishner, J. (1960). Reanalysis of "impressions of personality". *Psychological Review*, **67**, 96-112.

Winter, L., & Uleman, J. S. (1984). When are social judgements made? Evidence for the spontaneousness of trait inferences. *Journal of Personality and Social Psychology*, **47**, 237-252.

Wittgenstein, L. (1953). *Philosophical investigations*. New York: Macmillan.

Woll, S. B., & Graesser, A. C. (1982). Memory discrimination for information typical or atypical of person schemata. *Social Cognition*, **1**, 287-310.

Woodworth, R. S. (1938). *Experimental psychology*. New York: Henry Holt.

Woodworth, R. S., & Schlosberg, H. (1954). *Experimental Psychology*. London: Methuen.

Wright, J. C., & Dawson, V. L. (1988). Person perception and the bounded rationality of social judgement. *Journal of Personality and Social Psychology*, **55**, 780-794.

Wright, J. C., & Mischel, W. (1988). Conditional hedges and the intuitive psychology of traits. *Journal of Personality and Social Psychology*, **55**, 454-469.

Wyer, R. S., Bodenhausen, G. V., & Srull, T. K. (1984). The cognitive representation of persons and groups and its effect on recall and recognition memory. *Journal of Experimental Social Psychology*, **20**, 445-469.

Wyer, R. S., & Gordon, S. E. (1982). The recall of information about persons and groups. *Journal of Experimental Social Psychology*, **18**, 128-164.

Wyer, R. S., & Gordon, S. E. (1984). The cognitive representation of social information. In R. S. Wyer & T. K. Srull (eds.), *Handbook of social cognition* (pp. 73- 150). Hillsdale, N.J.: Erlbaum.

Wyer, R. S., & Srull, T. K. (1980). The processing of social stimulus information: A conceptual integration. In R. Hastie, T. M. Ostrom, E. B. Ebbensen, R. S. Wyer, D. L. Hamilton, & D. E. Carlston (Eds.), *Person Memory: The cognitive basis for social* *perception* (pp. 227-300). Hillsdale, NJ: Erlbaum.

Wyer, R. S., & Srull, T. K. (1981). Category accessibility: Some theoretical and empirical issues concerning the processing of social stimulus information. In E. T. Higgins, C. P. Herman, & M. P. Zanna (Eds.) *Social cognition: The Ontario symposium* Vol 1, pp. 161-197). Hillsdale, NJ: Erlbaum.

Wyer, R. S., & Srull, T. K. (1986). Human cogntion in its social context. *Psychological Review*, **93**, 322-359.

Wyer, R. S., Srull, T. K., & Gordon, S. E. (1984). The effects of predicting a person's behavior on subsequent trait judgements. *Journal of Experimental Social Psychology*, **20**, 29-46.

Zadeh, L. S. (1965). Fuzzy sets. *Information & Control*, **8**, 338-375.

Zuroff, D. C. (1989). Judgements of frequency of social stimuli: How schematic is person memory? *Journal of Personality and Social Psychology*, **56**, 890-898.

APPENDIX A

EXPERIMENT 1: RECOGNITION OF AN IMPRESSION

The 80 trait checklist compiled from Anderson's (1968) 555 trait list is given in A.1. Data analyses based on the core data set are given in A.2. Data analyses based on the unweighted data set are given in A.3. Finally, data analyses based on the weighted data set are given in A.4.

A.1 TRAIT CHECKLIST

Table A.1 shows the 80 traits selected for the checklist with their likability rankings as reported by Anderson (1968).

Table A.1

Eighty Trait Checklist Selected From Anderson's (1968) 555 Trait List

No	Rank	Trait	No	Rank	Trait
1	1	sincere	41	273	naive
2	3	understanding	42	291	self-satisfied
3	7	intelligent	43	294	opinionated
4	9	open-minded	44	305	critical
5	10	thoughtful	45	307	radical
6	13	good-natured	46	317	tough
7	16	warm	47	323	inhibited
8	19	friendly	48	329	timid
9	27	humorous	49	338	tense
10	33	gentle	50	341	absent-minded
11	41	pleasant	51	345	sarcastic
12	47	imaginative	52	359	insecure
13	65	conscientious	53	367	nervous
14	75	perceptive	54	369	stubborn
15	97	sensible	55	395	pompous
16	110	independent	56	401	cynical
17	118	cultured	57	406	domineering
18	119	frank	58	408	depressed
19	127	realistic	59	410	pessimistic
20	129	optimistic	60	412	boisterous
21	131	entertaining	61	416	smug
22	148	charming	62	431	immature
23	150	modest	63	433	showy
24	157	practical	64	438	neurotic
25	170	easy-going	65	451	tactless
26	171	out-going	66	463	irrational
27	179	calm	67	468	vain
28	182	confident	68	474	dull
29	188	direct	69	483	egotistical
30	199	idealistic	70	486	cold
31	202	serious	71	494	superficial
32	208	sophisticated	72	508	humorless
33	224	sensitive	73	512	intolerant
34	226	talkative	74	514	boring
35	239	cautious	75	517	self-centered
36	251	quiet	76	527	belligerent
37	253	aggressive	77	533	narrow-minded
38	255	conservative	78	537	thoughtless
39	256	shy	79	539	conceited
40	264	emotional	80	549	obnoxious

A.2 CORE-DATA ANALYSES

Tables A.2 to A.13 are based on the those subjects whose protocols were the same before and after weighting of selected impression traits (the Core group). Weighting of impression traits is detailed in Chapter 3: Method.

Table A.2

Summary Core-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	1.4962	1	1.4962	0.77	.38
Sex	0.1806	1	0.1806	0.09	.76
Time x Sex	1.3721	1	1.3721	0.71	.40
Valence	0.0069	1	0.0069	0.00	.95
Time x Valence	3.0329	1	3.0329	1.57	.22
Sex x Valence	2.6487	1	2.6487	1.37	.25
Time x Sex x Val	0.0010	1	0.0010	0.00	.98
Error	89.0057	46	1.9349		
	Tests for Within-subjects effects				
Trait Type	0.8133	1	0.8133	0.32	.58
Trait x Time	1.3240	1	1.3240	0.51	.48
Trait x Sex	0.1242	1	0.1242	0.05	.83
Trait x Time x Sex	2.9611	1	2.9611	1.15	.29
Trait x Valence	0.0474	1	0.0474	0.02	.89
Trait x Time x Val	0.1987	1	0.1987	0.08	.78
Trait x Sex x Val	4.6490	1	4.6490	1.81	.19
Trait x Time x Sex x Valence	4.6490	1	4.6490	1.81	.19
Error	118.2784	46	2.5713		

Table A.3

Summary Core-Data Analysis of Category Size

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	8.4663	1	8.4663	0.29	.59
Sex	0.3123	1	0.3123	0.01	.92
Time x Sex	0.3716	1	0.3716	0.01	.91
Valence	2.4472	1	2.4472	0.08	.77
Time x Valence	19.4325	1	19.4325	0.67	.42
Sex x Valence	31.8353	1	31.8353	1.10	.30
Time x Sex x Val	4.3697	1	4.3697	0.15	.70
Error	1333.7944	46	28.9955		
	Tests for Within-subjects effects				
Trait Type	57.3196	2	28.6598	2.36	.10
Trait x Time	21.7014	2	10.8507	0.89	.41
Trait x Sex	26.4526	2	13.2263	1.09	.34
Trait x Time x Sex	4.1883	2	2.0941	0.17	.84
Trait x Valence	12.5246	2	6.2623	0.52	.60
Trait x Time x Val	1.7990	2	0.8995	0.07	.93
Trait x Sex x Val	39.1441	2	19.5720	1.61	.21
Trait x Time x Sex x Valence	26.9064	2	13.4531	1.11	.33
Error	1117.7091	92	12.1490		

Table A.4

Summary Core-Data Analysis of Hit Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subjects effects			
Time	0.1529	1	0.1529	3.46	.07
Sex	0.0000	1	0.0000	0.00	.98
Time x Sex	0.0551	1	0.0551	1.25	.27
Valence	0.0112	1	0.0112	0.25	.62
Time x Valence	0.0399	1	0.0399	0.90	.35
Sex x Valence	0.0064	1	0.0064	0.14	.71
Time x Sex x Val	0.0255	1	0.0255	0.58	.45
Error	2.0326	46	0.0442		
		Tests for Within-subjects effects			
Trait Type	0.0037	1	0.0037	0.11	.74
Trait x Time	0.0313	1	0.0313	0.97	.33
Trait x Sex	0.0053	1	0.0053	0.16	.69
Trait x Time x Sex	0.0151	1	0.0151	0.47	.50
Trait x Valence	0.0171	1	0.0171	0.53	.47
Trait x Time x Val	0.0002	1	0.0002	0.01	.94
Trait x Sex x Val	0.0030	1	0.0030	0.09	.76
Trait x Time x Sex x Valence	0.0000	1	0.0000	0.00	.98
Error	1.4868	46	0.0323		

Table A.5

Summary Core-Data Analysis of False Alarm Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subjects effects			
Time	0.3315	1	0.3315	6.00	.02
Sex	0.0182	1	0.0182	0.33	.57
Time x Sex	0.0171	1	0.0171	0.31	.58
Valence	0.0140	1	0.0140	0.25	.62
Time x Valence	0.0026	1	0.0026	0.05	.83
Sex x Valence	0.0003	1	0.0003	0.01	.94
Time x Sex x Val	0.0000	1	0.0000	0.00	.99
Error	2.5410	46	0.0552		
		Tests for Within-subjects effects			
Trait Type	0.2678	2	0.1339	6.45	.00
Trait x Time	0.0970	2	0.0485	2.34	.10
Trait x Sex	0.0176	2	0.0088	0.42	.66
Trait x Time x Sex	0.0084	2	0.0042	0.20	.82
Trait x Valence	0.0230	2	0.0115	0.55	.58
Trait x Time x Val	0.0413	2	0.0206	0.99	.37
Trait x Sex x Val	0.0695	2	0.0347	1.67	.19
Trait x Time x Sex x Valence	0.0022	2	0.0011	0.05	.95
Error	1.9096	92	0.0208		

Table A.6

Summary Core-Data Analysis of Memory Scores

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.2181	1	0.2181	3.36	.07
Sex	0.0043	1	0.0043	0.07	.80
Time x Sex	0.0817	1	0.0817	1.26	.27
Valence	0.0283	1	0.0283	0.44	.51
Time x Valence	0.0538	1	0.0538	0.83	.37
Sex x Valence	0.0008	1	0.0008	0.01	.91
Time x Sex x Val	0.0365	1	0.0365	0.56	.46
Error	2.9831	46	0.0649		
	Tests for Within-subjects effects				
Trait Type	0.0000	1	0.0000	0.00	.99
Trait x Time	0.0465	1	0.0465	0.78	.38
Trait x Sex	0.0073	1	0.0073	0.12	.73
Trait x Time x Sex	0.0135	1	0.0135	0.23	.64
Trait x Valence	0.0693	1	0.0693	1.16	.29
Trait x Time x Val	0.0027	1	0.0027	0.05	.83
Trait x Sex x Val	0.0001	1	0.0001	0.00	.97
Trait x Time x Sex x Valence	0.0016	1	0.0016	0.03	.87
Error	2.7501	46	0.0598		

Table A.7

Summary Core-Data Analysis of Hit and False Alarm Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.0697	1	0.0697	1.09	.30
Sex	0.0032	1	0.0032	0.05	.82
Time x Sex	0.0410	1	0.0410	0.64	.43
Valence	0.0008	1	0.0008	0.01	.91
Time x Valence	0.0020	1	0.0020	0.03	.86
Sex x Valence	0.0442	1	0.0442	0.69	.41
Time x Sex x Val	0.0024	1	0.0024	0.04	.85
Error	2.9503	46	0.0641		
	Tests for Within-subjects effects				
Trait Type	7.4639	1	7.4639	207.11	.00
Trait x Time	0.2284	1	0.2284	6.34	.02
Trait x Sex	0.0155	1	0.0155	0.43	.52
Trait x Time x Sex	0.0241	1	0.0241	0.67	.42
Trait x Valence	0.0436	1	0.0436	1.21	.28
Trait x Time x Val	0.0530	1	0.0530	1.47	.23
Trait x Sex x Val	0.0057	1	0.0057	0.16	.69
Trait x Time x Sex x Valence	0.0113	1	0.0113	0.31	.58
Error	1.6577	46	0.0360		

Table A.8

Summary Core-Data Analysis Reaction Times for Hits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.0154	1	0.0154	0.00	.97
Sex	9.4872	1	9.4872	1.08	.30
Time x Sex	2.9720	1	2.9720	0.34	.56
Valence	5.2245	1	5.2245	0.59	.44
Time x Valence	0.1119	1	0.1119	0.01	.91
Sex x Valence	0.0565	1	0.0565	0.01	.94
Time x Sex x Val	1.3901	1	1.3901	0.16	.69
Error	386.4905	44	8.7839		
	Tests for Within-subjects effects				
Trait Type	0.0514	1	0.0514	0.01	.91
Trait x Time	0.2942	1	0.2942	0.07	.79
Trait x Sex	2.1457	1	2.1457	0.53	.47
Trait x Time x Sex	6.4393	1	6.4393	1.60	.21
Trait x Valence	0.0585	1	0.0585	0.01	.90
Trait x Time x Val	4.0869	1	4.0869	1.01	.32
Trait x Sex x Val	0.0392	1	0.0392	0.01	.92
Trait x Time x Sex x Valence	2.6000	1	2.6000	0.64	.43
Error	177.4570	44	4.0331		

Table A.9

Summary Core-Data Analysis of Logged Reaction Time for Hits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.0216	1	0.0216	0.33	.57
Sex	0.1040	1	0.1040	1.60	.21
Time x Sex	0.0269	1	0.0269	0.41	.52
Valence	0.0345	1	0.0345	0.53	.47
Time x Valence	0.0000	1	0.0000	0.00	.99
Sex x Valence	0.0003	1	0.0003	0.00	.95
Time x Sex x Val	0.0715	1	0.0715	1.10	.30
Error	2.8648	44	0.0651		
	Tests for Within-subjects effects				
Trait Type	0.0002	1	0.0002	0.01	.93
Trait x Time	0.0025	1	0.0025	0.10	.75
Trait x Sex	0.0188	1	0.0188	0.76	.39
Trait x Time x Sex	0.0979	1	0.0979	3.93	.06
Trait x Valence	0.0001	1	0.0001	0.01	.94
Trait x Time x Val	0.0371	1	0.0371	1.49	.23
Trait x Sex x Val	0.0056	1	0.0056	0.22	.64
Trait x Time x Sex x Valence	0.0060	1	0.0060	0.24	.63
Error	1.0962	44	0.0249		

Table A.10

Summary Core-Data Analysis Reaction Times for Correct Rejections

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	23.9153	1	23.9153	2.60	.11
Sex	19.3710	1	19.3710	2.11	.15
Time x Sex	0.0101	1	0.0101	0.00	.97
Valence	2.7938	1	2.7938	0.30	.58
Time x Valence	1.4932	1	1.4932	0.16	.69
Sex x Valence	12.7067	1	12.7067	1.38	.25
Time x Sex x Val	0.7594	1	0.7594	0.08	.78
Error	404.5023	44	9.1932		
	Tests for Within-subjects effects				
Trait Type	29.3115	2	14.6558	6.15	.00
Trait x Time	2.1635	2	1.0818	0.45	.64
Trait x Sex	1.5322	2	0.7661	0.32	.73
Trait x Time x Sex	1.3191	2	0.6595	0.28	.76
Trait x Valence	6.7776	2	3.3888	1.42	.25
Trait x Time x Val	1.5025	2	0.7513	0.32	.73
Trait x Sex x Val	3.5846	2	1.7923	0.75	.47
Trait x Time x Sex x Valence	0.0055	2	0.0027	0.00	.99
Error	209.8533	88	2.3847		

Table A.11

Summary Core-Data Analysis of Logged R.T.'s for Correct Rejections

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.4106	1	0.4106	4.63	.04
Sex	0.2884	1	0.2884	3.25	.08
Time x Sex	0.0022	1	0.0022	0.03	.87
Valence	0.0341	1	0.0341	0.38	.54
Time x Valence	0.0013	1	0.0013	0.01	.90
Sex x Valence	0.1521	1	0.1521	1.72	.20
Time x Sex x Val	0.0375	1	0.0375	0.42	.52
Error	3.9006	44	0.0886		
	Tests for Within-subjects effects				
Trait Type	0.2973	2	0.1487	8.23	.00
Trait x Time	0.0198	2	0.0099	0.55	.58
Trait x Sex	0.0116	2	0.0058	0.32	.73
Trait x Time x Sex	0.0162	2	0.0081	0.45	.64
Trait x Valence	0.0771	2	0.0385	2.13	.12
Trait x Time x Val	0.0110	2	0.0055	0.30	.74
Trait x Sex x Val	0.0249	2	0.0125	0.69	.50
Trait x Time x Sex x Valence	0.0012	2	0.0006	0.03	.97
Error	1.5890	88	0.0181		

Table A.12

Summary Core-Data Analysis of R.T.'s for Hits and False Alarms

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	3.9317	1	3.9317	0.21	.65
Error	472.8402	25	18.9136		
	Tests for Within-subjects effects				
Trait Type	168.6530	1	168.6530	10.56	.00
Trait x Time	0.3469	1	0.3469	0.02	.88
Error	399.2892	25	15.9716		

Table A.13

Summary Core-Data Analysis Logged R.T.'s for Hits and False Alarms

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.0108	1	0.0108	0.12	.73
Error	2.2471	25	0.0899		
	Tests for Within-subjects effects				
Trait Type	0.9355	1	0.9355	16.13	.00
Trait x Time	0.0034	1	0.0034	0.06	.81
Error	1.4495	25	0.0580		

A.3 UNWEIGHTED-DATA ANALYSES

Tables A.14 to A.18 are based on the core group as above plus those subjects whose protocols were amenable to scoring before weighting of impression traits.

Table A.14

Summary Unweighted-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
			Tests for Between-subjects effects		
Time	0.0281	1	0.0281	0.01	.90
Sex	0.1850	1	0.1850	0.10	.76
Time x Sex	2.8603	1	2.8603	1.48	.23
Valence	0.5358	1	0.5358	0.28	.60
Time x Valence	1.9774	1	1.9774	1.03	.32
Sex x Valence	1.0350	1	1.0350	0.54	.47
Time x Sex x Val	0.2921	1	0.2921	0.15	.70
Error	104.1246	54	1.9282		
			Tests for Within-subjects effects		
Trait Type	0.2336	1	0.2336	0.09	.76
Trait x Time	0.5329	1	0.5329	0.21	.65
Trait x Sex	0.2114	1	0.2114	0.08	.77
Trait x Time x Sex	2.8668	1	2.8668	1.14	.29
Trait x Valence	0.2776	1	0.2776	0.11	.74
Trait x Time x Val	0.0023	1	0.0023	0.00	.98
Trait x Sex x Val	4.5272	1	4.5272	1.80	.19
Trait x Time x Sex x Valence	4.9729	1	4.9729	1.97	.17
Error	135.9849	54	2.5182		

Table A.15

Summary Unweighted-Data Analysis of Category Size

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.1350	1	0.1350	0.00	.95
Sex	6.4865	1	6.4865	0.22	.64
Time x Sex	0.3316	1	0.3316	0.01	.92
Valence	2.3066	1	2.3066	0.08	.78
Time x Valence	1.4705	1	1.4705	0.05	.82
Sex x Valence	100.4305	1	100.4305	3.41	.07
Time x Sex x Val	11.6137	1	11.6137	0.39	.53
Error	1588.5120	54	29.4169		
	Tests for Within-subjects effects				
Trait Type	52.4169	2	26.2085	2.40	.10
Trait x Time	25.7340	2	12.8670	1.18	.31
Trait x Sex	19.0937	2	9.5469	0.87	.42
Trait x Time x Sex	3.6360	2	1.8180	0.17	.85
Trait x Valence	20.2657	2	10.1329	0.93	.40
Trait x Time x Val	3.8428	2	1.9213	0.18	.84
Trait x Sex x Val	38.9864	2	19.4932	1.79	.17
Trait x Time x Sex x Valence	19.3146	2	9.6573	0.88	.42
Error	1178.9187	108	10.9159		

Table A.16

Summary Unweighted-Data Analysis of Hit Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.1673	1	0.1673	4.02	.05
Sex	0.0003	1	0.0003	0.01	.94
Time x Sex	0.1063	1	0.1063	2.56	.12
Valence	0.0005	1	0.0005	0.01	.92
Time x Valence	0.0370	1	0.0370	0.89	.35
Sex x Valence	0.0008	1	0.0008	0.02	.89
Time x Sex x Val	0.0140	1	0.0140	0.34	.56
Error	2.2465	54	0.0416		
	Tests for Within-subjects effects				
Trait Type	0.0023	1	0.0023	0.07	.79
Trait x Time	0.0059	1	0.0059	0.19	.67
Trait x Sex	0.0320	1	0.0320	1.02	.32
Trait x Time x Sex	0.0559	1	0.0559	1.78	.19
Trait x Valence	0.0046	1	0.0046	0.15	.70
Trait x Time x Val	0.0012	1	0.0012	0.04	.85
Trait x Sex x Val	0.0154	1	0.0154	0.49	.49
Trait x Time x Sex x Valence	0.0079	1	0.0079	0.25	.62
Error	1.7000	54	0.0315		

Table A.17

Summary Unweighted-Data Analysis of False Alarm Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.4297	1	0.4297	8.56	.00
Sex	0.0059	1	0.0059	0.12	.73
Time x Sex	0.0184	1	0.0184	0.37	.55
Valence	0.0130	1	0.0130	0.26	.61
Time x Valence	0.0004	1	0.0004	0.01	.93
Sex x Valence	0.0024	1	0.0024	0.05	.83
Time x Sex x Val	0.0070	1	0.0070	0.14	.71
Error	2.7115	54	0.0502		
	Tests for Within-subjects effects				
Trait Type	0.3440	2	0.1720	8.15	.00
Trait x Time	0.1091	2	0.0545	2.58	.08
Trait x Sex	0.0102	2	0.0051	0.24	.79
Trait x Time x Sex	0.0081	2	0.0041	0.19	.83
Trait x Valence	0.0292	2	0.0146	0.69	.50
Trait x Time x Val	0.0302	2	0.0151	0.71	.49
Trait x Sex x Val	0.0299	2	0.0150	0.71	.49
Trait x Time x Sex x Valence	0.0034	2	0.0017	0.08	.92
Error	2.2806	108	0.0211		

Table A.18

Summary Unweighted-Data Analysis of Memory Scores

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subjects effects			
Time	0.2679	1	0.2679	4.47	.04
Sex	0.0141	1	0.0141	0.24	.63
Time x Sex	0.1656	1	0.1656	2.77	.10
Valence	0.0023	1	0.0023	0.04	.85
Time x Valence	0.0677	1	0.0677	1.13	.29
Sex x Valence	0.0000	1	0.0000	0.00	.98
Time x Sex x Val	0.0142	1	0.0142	0.24	.63
Error	3.2336	54	0.0599		
		Tests for Within-subjects effects			
Trait Type	0.0230	1	0.0230	0.40	.53
Trait x Time	0.0045	1	0.0045	0.08	.78
Trait x Sex	0.0596	1	0.0596	1.04	.31
Trait x Time x Sex	0.0783	1	0.0783	1.37	.25
Trait x Valence	0.0223	1	0.0223	0.39	.54
Trait x Time x Val	0.0023	1	0.0023	0.04	.84
Trait x Sex x Val	0.0118	1	0.0118	0.21	.65
Trait x Time x Sex x Valence	0.0091	1	0.0091	0.16	.69
Error	3.0850	54	0.0571		

A.4 WEIGHTED-DATA ANALYSES

Tables A.19 to A.23 are based on the core group of subjects as above plus those subjects whose protocols were amenable to scoring after weighting of impression traits.

Table A.19

Summary Weighted-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subjects effects			
Time	0.4004	1	0.4004	0.21	.65
Sex	1.2175	1	1.2175	0.64	.43
Time x Sex	1.9527	1	1.9527	1.02	.32
Valence	0.1086	1	0.1086	0.06	.81
Time x Valence	1.9527	1	1.9527	1.02	.32
Sex x Valence	4.4983	1	4.4983	2.35	.13
Time x Sex x Val	0.3152	1	0.3152	0.16	.69
Error	114.8109	60	1.9135		
		Tests for Within-subjects effects			
Trait Type	5.7243	1	5.7243	2.16	.15
Trait x Time	0.0353	1	0.0353	0.01	.91
Trait x Sex	2.4230	1	2.4230	0.92	.34
Trait x Time x Sex	0.4200	1	0.4200	0.16	.69
Trait x Valence	2.6502	1	2.6502	1.00	.32
Trait x Time x Val	2.0857	1	2.0857	0.79	.38
Trait x Sex x Val	19.1370	1	19.1370	7.24	.01
Trait x Time x Sex x Valence	0.3433	1	0.3433	0.13	.72
Error	158.6775	60	2.6446		

Table A.20

Summary Weighted-Data Analysis of Category Size

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	11.8878	1	11.8878	0.48	.49
Sex	0.0519	1	0.0519	0.00	.96
Time x Sex	0.6331	1	0.6331	0.03	.87
Valence	10.8590	1	10.8590	0.43	.51
Time x Valence	28.1077	1	28.1077	1.13	.29
Sex x Valence	44.2159	1	44.2159	1.77	.19
Time x Sex x Val	0.6435	1	0.6435	0.03	.87
Error	1479.9181	60	24.9653		
	Tests for Within-subjects effects				
Trait Type	119.9748	2	59.9874	5.78	.00
Trait x Time	18.4651	2	9.2326	0.89	.41
Trait x Sex	7.3231	2	3.6616	0.35	.70
Trait x Time x Sex	0.4668	2	0.2334	0.02	.98
Trait x Valence	13.8097	2	6.9049	0.66	.52
Trait x Time x Val	11.1399	2	5.7045	0.55	.58
Trait x Sex x Val	17.1399	2	8.5700	0.83	.44
Trait x Time x Sex x Valence	9.8281	2	4.9140	0.47	.62
Error	1246.0142	120	10.3835		

Table A.21

Summary Weighted-Data Analysis of Hit Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.2127	1	0.2127	5.45	.03
Sex	0.0045	1	0.0045	0.11	.74
Time x Sex	0.0886	1	0.0886	2.27	.14
Valence	0.0087	1	0.0087	0.22	.64
Time x Valence	0.0216	1	0.0216	0.55	.46
Sex x Valence	0.0102	1	0.0102	0.26	.61
Time x Sex x Val	0.0178	1	0.0178	0.46	.50
Error	2.3409	60	0.0390		
	Tests for Within-subjects effects				
Trait Type	0.0167	1	0.0167	0.62	.43
Trait x Time	0.0218	1	0.0218	0.80	.37
Trait x Sex	0.0112	1	0.0112	0.41	.52
Trait x Time x Sex	0.0277	1	0.0277	1.02	.32
Trait x Valence	0.0314	1	0.0314	1.16	.29
Trait x Time x Val	0.0013	1	0.0013	0.05	.83
Trait x Sex x Val	0.0003	1	0.0003	0.01	.92
Trait x Time x Sex x Valence	0.0015	1	0.0015	0.06	.81
Error	1.6262	60	0.0271		

Table A.22

Summary Weighted-Data Analysis of False Alarm Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subjects effects				
Time	0.8333	1	0.8333	14.64	.00
Sex	0.0158	1	0.0158	0.28	.60
Time x Sex	0.0208	1	0.0208	0.36	.55
Valence	0.1221	1	0.1221	2.14	.15
Time x Valence	0.0007	1	0.0007	0.01	.91
Sex x Valence	0.0014	1	0.0014	0.02	.88
Time x Sex x Val	0.0149	1	0.0149	0.26	.61
Error	3.4155	60	0.0569		
	Tests for Within-subjects effects				
Trait Type	0.5430	2	0.2715	12.43	.00
Trait x Time	0.2418	2	0.1209	5.53	.00
Trait x Sex	0.0170	2	0.0085	0.39	.68
Trait x Time x Sex	0.0027	2	0.0014	0.06	.94
Trait x Valence	0.0702	2	0.0351	1.61	.21
Trait x Time x Val	0.0156	2	0.0078	0.36	.70
Trait x Sex x Val	0.0329	2	0.0165	0.75	.47
Trait x Time x Sex x Valence	0.0033	2	0.0016	0.07	.93
Error	2.6218	120	0.0218		

Table A.23

Summary Weighted-Data Analysis of Memory Scores

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subjects effects			
Time	0.4897	1	0.4897	7.71	.00
Sex	0.0027	1	0.0027	0.04	.84
Time x Sex	0.0672	1	0.0672	1.06	.31
Valence	0.0924	1	0.0924	1.45	.23
Time x Valence	0.0015	1	0.0015	0.02	.88
Sex x Valence	0.0236	1	0.0236	0.37	.54
Time x Sex x Val	0.0034	1	0.0034	0.05	.82
Error	3.8113	60	0.0635		
		Tests for Within-subjects effects			
Trait Type	0.0047	1	0.0047	0.08	.78
Trait x Time	0.0045	1	0.0045	0.08	.78
Trait x Sex	0.0010	1	0.0010	0.02	.89
Trait x Time x Sex	0.0029	1	0.0029	0.05	.83
Trait x Valence	0.2229	1	0.2229	3.78	.06
Trait x Time x Val	0.0199	1	0.0199	0.34	.56
Trait x Sex x Val	0.0004	1	0.0004	0.01	.93
Trait x Time x Sex x Valence	0.0000	1	0.0000	0.00	.99
Error	3.5367	60	0.0589		

APPENDIX B

EXPERIMENT 2: RECALL OF AN IMPRESSION

B.1 CORE-DATA ANALYSES

Tables B.1 to B.8 detail the analyses reported in Chapter 4: Experiment 2. Tables B.1 to B.4 are based on the those subjects whose protocols were the same before and after weighting of selected impression traits (the Core group). Weighting of impression traits is detailed in Chapter 3: Method.

Table B.1

Summary Core-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	0.7350	1	0.7350	0.39	.53
Sex	4.1637	1	4.1637	2.22	.14
Int x Sex	0.3813	1	0.3813	0.20	.65
Valence	0.0332	1	0.0332	0.02	.89
Int x Valence	0.6875	1	0.6875	0.37	.55
Sex x Valence	2.4137	1	2.4137	1.29	.26
Int x Sex x Val	0.8178	1	0.8178	0.44	.51
Error	196.6195	105	1.8726		
	Tests for Within-subjects effects				
Trait Type	13.5138	1	13.5138	8.24	.00
Trait x Int	0.9652	1	0.9652	0.59	.44
Trait x Sex	5.4589	1	5.4589	3.33	.08
Trait x Int x Sex	0.7928	1	0.7928	0.48	.49
Trait x Valence	1.1099	1	1.1099	0.68	.41
Trait x Int x Val	0.5023	1	0.5023	0.31	.58
Trait x Sex x Val	0.1018	1	0.1018	0.06	.80
Trait x Int x Sex x Valence	0.0119	1	0.0119	0.01	.93
Error	172.2588	105	1.6406		

Table B.2

Summary Core-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	5.2633	1	5.2633	62.44	.00
Sex	0.0201	1	0.0201	0.24	.63
Int x Sex	0.2370	1	0.2370	2.81	.10
Valence	0.0256	1	0.0256	0.30	.58
Int x Valence	0.0409	1	0.0409	0.49	.49
Sex x Valence	0.0606	1	0.0606	0.72	.40
Int x Sex x Val	0.0189	1	0.0189	0.22	.64
Error	8.8501	105	0.0843		
	Tests for Within-subjects effects				
Trait Type	0.0332	1	0.0332	0.39	.54
Trait x Int	0.7579	1	0.7579	8.81	.00
Trait x Sex	0.0080	1	0.0080	0.09	.76
Trait x Int x Sex	0.0095	1	0.0095	0.11	.74
Trait x Valence	0.0223	1	0.0223	0.26	.61
Trait x Int x Val	0.0097	1	0.0097	0.11	.74
Trait x Sex x Val	0.0677	1	0.0677	0.79	.38
Trait x Int x Sex x Valence	0.2127	1	0.2127	2.47	.12
Error	9.0335	105	0.0860		

Table B.3

Summary Core-Data Analysis Recall Intrusion Rates

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	0.0268	1	0.0268	10.01	.00
Sex	0.0034	1	0.0034	1.25	.27
Int x Sex	0.0005	1	0.0005	0.17	.68
Valence	0.0001	1	0.0001	0.03	.87
Int x Valence	0.0079	1	0.0079	2.95	.09
Sex x Valence	0.0021	1	0.0021	0.79	.38
Int x Sex x Val	0.0137	1	0.0137	5.14	.03
Error	0.2806	105	0.0027		
	Tests for Within-subjects effects				
Trait Type	0.0200	1	0.0200	8.45	.00
Trait x Int	0.0117	1	0.0117	4.93	.03
Trait x Sex	0.0007	1	0.0007	0.31	.58
Trait x Int x Sex	0.0049	1	0.0049	2.08	.15
Trait x Valence	0.0036	1	0.0036	1.51	.22
Trait x Int x Val	0.0084	1	0.0084	3.53	.07
Trait x Sex x Val	0.0056	1	0.0056	2.35	.13
Trait x Int x Sex x Valence	0.0048	1	0.0048	2.03	.16
Error	0.2485	105	0.0024		

Table B.4

Summary Core-Data Analysis of Memory Scores

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	6.1687	1	6.1687	65.70	.00
Sex	0.0456	1	0.0456	0.49	.49
Int x Sex	0.2521	1	0.2521	2.68	.11
Valence	0.0979	1	0.0979	1.04	.31
Int x Valence	0.1481	1	0.1481	1.58	.21
Sex x Valence	0.0115	1	0.0115	0.12	.73
Int x Sex x Val	0.1166	1	0.1166	1.24	.27
Error	9.8589	105	0.0939		
	Tests for Within-subjects effects				
Trait Type	0.0060	1	0.0060	0.07	.80
Trait x Int	0.6026	1	0.6026	6.73	.02
Trait x Sex	0.0265	1	0.0265	0.30	.59
Trait x Int x Sex	0.0040	1	0.0040	0.04	.83
Trait x Valence	0.0002	1	0.0002	0.00	.96
Trait x Int x Val	0.0618	1	0.0618	0.69	.41
Trait x Sex x Val	0.0351	1	0.0351	0.39	.53
Trait x Int x Sex x Valence	0.3483	1	0.3483	3.89	.06
Error	9.3973	105	0.0895		

B.2 UNWEIGHTED-DATA ANALYSES

Tables B.5 to B.6 are based on the core group as above plus those subjects whose protocols were amenable to scoring before weighting of impression traits.

Table B.5

Summary Unweighted-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	1.6824	1	1.6824	0.84	.36
Sex	5.0001	1	5.0001	2.51	.12
Int x Sex	0.0015	1	0.0015	0.00	.98
Valence	0.0767	1	0.0767	0.04	.84
Int x Valence	1.7001	1	1.7001	0.85	.36
Sex x Valence	0.3334	1	0.3334	0.17	.68
Int x Sex x Val	0.5670	1	0.5670	0.28	.59
Error	253.1091	127	1.9930		
	Tests for Within-subjects effects				
Trait Type	6.2317	1	6.2317	3.86	.06
Trait x Int	0.0740	1	0.0740	0.46	.50
Trait x Sex	4.5999	1	4.5999	2.85	.10
Trait x Int x Sex	0.3255	1	0.3255	0.20	.65
Trait x Valence	2.5944	1	2.5944	1.61	.21
Trait x Int x Val	0.0001	1	0.0001	0.00	.99
Trait x Sex x Val	0.0801	1	0.0801	0.05	.82
Trait x Int x Sex x Valence	1.5478	1	1.5478	0.96	.33
Error	205.2465	127	1.6161		

Table B.6

Summary Unweighted-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	5.7420	1	5.7420	65.22	.00
Sex	0.0503	1	0.0503	0.57	.45
Int x Sex	0.2840	1	0.2840	3.23	.08
Valence	0.0003	1	0.0003	0.00	.95
Int x Valence	0.0013	1	0.0013	0.01	.90
Sex x Valence	0.0903	1	0.0903	1.03	.31
Int x Sex x Val	0.0001	1	0.0001	0.00	.97
Error	11.1815	127	0.0880		
	Tests for Within-subjects effects				
Trait Type	0.0014	1	0.0014	0.02	.90
Trait x Int	0.5131	1	0.5131	5.84	.02
Trait x Sex	0.0046	1	0.0046	0.05	.82
Trait x Int x Sex	0.0358	1	0.0358	0.41	.52
Trait x Valence	0.1192	1	0.1192	1.36	.25
Trait x Int x Val	0.0041	1	0.0041	0.05	.83
Trait x Sex x Val	0.1348	1	0.1348	1.53	.22
Trait x Int x Sex x Valence	0.1086	1	0.1086	1.24	.27
Error	11.1676	127	0.0879		

B.3 WEIGHTED-DATA ANALYSES

Tables B.7 to B.8 are based on the core group as above plus those subjects whose protocols were amenable to scoring after weighting of impression traits.

Table B.7

Summary Weighted-Data Analysis of Number of Selected Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	0.2970	1	0.2970	0.15	.70
Sex	4.1977	1	4.1977	2.07	.15
Int x Sex	0.4926	1	0.4926	0.24	.62
Valence	0.4325	1	0.4325	0.21	.65
Int x Valence	0.3003	1	0.3003	0.15	.70
Sex x Valence	0.5398	1	0.5398	0.27	.61
Int x Sex x Val	0.2218	1	0.2218	0.11	.74
Error	277.9186	137	2.0286		
	Tests for Within-subjects effects				
Trait Type	0.4743	1	0.4743	0.23	.63
Trait x Int	1.0171	1	1.0171	0.49	.49
Trait x Sex	0.2200	1	0.2200	0.11	.75
Trait x Int x Sex	0.3573	1	0.3573	0.17	.68
Trait x Valence	3.5789	1	3.5789	1.71	.19
Trait x Int x Val	0.1715	1	0.1715	0.08	.78
Trait x Sex x Val	1.0782	1	1.0782	0.52	.47
Trait x Int x Sex x Valence	0.0947	1	0.0947	0.05	.83
Error	286.5530	137	4.1832		

Table B.8

Summary Weighted-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subject effects			
Interval	6.3624	1	6.3624	68.45	.00
Sex	0.0483	1	0.0483	0.52	.47
Int x Sex	0.3162	1	0.3162	3.40	.07
Valence	0.0482	1	0.0482	0.52	.47
Int x Valence	0.0656	1	0.0656	0.71	.40
Sex x Valence	0.2172	1	0.2172	2.34	.13
Int x Sex x Val	0.0012	1	0.0012	0.01	.91
Error	12.7332	137	0.0929		
		Tests for Within-subjects effects			
Trait Type	0.1048	1	0.1048	1.10	.30
Trait x Int	0.6208	1	0.6208	6.51	.02
Trait x Sex	0.0091	1	0.0091	0.10	.76
Trait x Int x Sex	0.0405	1	0.0405	0.42	.52
Trait x Valence	0.0148	1	0.0148	0.16	.69
Trait x Int x Val	0.0071	1	0.0071	0.07	.76
Trait x Sex x Val	0.0818	1	0.0818	0.86	.36
Trait x Int x Sex x Valence	0.3036	1	0.3036	3.18	.08
Error	13.0710	137	0.0954		

APPENDIX C

EXPERIMENT 3: RECALL OF AN IMPRESSION:

EXTENSION OF EXPERIMENT 2

C.1 CORE-DATA ANALYSES

Tables C.1 to C.8 detail the analyses reported in Chapter 5: Experiment 3. Tables C.1 to C.4 are based on the those subjects whose protocols were the same before and after weighting of selected impression traits (the Core group). Weighting of impression traits is detailed in Chapter 3: Method.

Table C.1

Summary Core-Data Analysis of Number of Produced Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	1.2777	1	1.2777	1.63	.21
Sex	0.3073	1	0.3073	0.39	.53
Sex x Int	0.3073	1	0.3073	0.39	.53
Error	39.9258	51	0.7829		
	Tests for Within-subjects effects				
Trait Type	4.9493	1	4.9493	3.99	.06
Trait x Int	2.1784	1	2.1784	1.75	.19
Trait x Sex	0.3401	1	0.3401	0.27	.60
Trait x Sex x Int	0.8360	1	0.8360	0.67	.42
Error	63.3324	51	1.2418		

Table C.2

Summary Core-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	2.6632	1	2.6632	25.63	.00
Sex	0.0304	1	0.0304	0.29	.59
Sex x Int	0.0009	1	0.0009	0.01	.93
Error	5.2997	51	0.1039		
	Tests for Within-subjects effects				
Trait Type	0.4423	1	0.4423	4.74	.04
Trait x Int	0.0000	1	0.0000	0.00	.99
Trait x Sex	0.0240	1	0.0240	0.26	.61
Trait x Sex x Int	0.0002	1	0.0002	0.00	.96
Error	4.7572	51	0.0933		

Table C.3

Summary Core-Data Analysis of Number of Impression Traits by Experiment

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Experiment	44.0025	1	44.0025	29.25	.00
Interval	0.1886	1	0.1886	0.13	.72
Exp x Int	2.0003	1	2.0003	1.33	.25
Sex	0.8283	1	0.8283	0.55	.46
Exp x Sex	3.3005	1	3.3005	2.19	.14
Int x Sex	0.6753	1	0.6753	0.45	.50
Exp x Int x Sex	0.0072	1	0.0072	0.00	.95
Error	240.7308	160	1.5046		
	Tests for Within-subjects effects				
Trait Type	16.9415	1	16.9415	11.42	.00
Trait x Exp	0.2282	1	0.2282	0.15	.70
Trait x Int	0.4492	1	0.4492	0.30	.58
Trait x Exp x Int	3.0397	1	3.0397	2.05	.15
Trait x Sex	0.6085	1	0.6085	0.41	.52
Trait x Exp x Sex	3.0060	1	3.0060	2.03	.16
Trait x Int x Sex	0.0322	1	0.0322	0.02	.88
Trait x Exp x Int x Sex	1.7313	1	1.7313	1.17	.28
Error	237.3579	160	1.4834		

Table C.4

Summary Core-Data Analysis of Proportions Recalled by Experiment

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subject effects			
Experiment	0.6686	1	0.6686	7.48	.01
Interval	7.1899	1	7.1899	80.48	.00
Exp x Int	0.0002	1	0.0002	0.00	.97
Sex	0.0002	1	0.0002	0.00	.97
Exp x Sex	0.0743	1	0.0743	0.83	.36
Int x Sex	0.0937	1	0.0937	1.05	.30
Exp x Int x Sex	0.0664	1	0.0664	0.74	.39
Error	14.2934	160	0.0893		
		Tests for Within-subjects effects			
Trait Type	0.4185	1	0.4185	4.76	.04
Trait x Exp	0.1942	1	0.1942	2.21	.14
Trait x Int	0.2519	1	0.2519	2.86	.09
Trait x Exp x Int	0.2449	1	0.2449	2.78	.10
Trait x Sex	0.0451	1	0.0451	0.51	.48
Trait x Exp x Sex	0.0017	1	0.0017	0.02	.89
Trait x Int x Sex	0.0100	1	0.0100	0.11	.74
Trait x Exp x Int x Sex	0.0153	1	0.0153	0.17	.68
Error	14.0781	160	0.0880		

C.2 UNWEIGHTED-DATA ANALYSES

Tables C.5 to C.6 are based on the core group as above plus those subjects whose protocols were amenable to scoring before weighting of impression traits.

Table C.5

Summary Unweighted-Data Analysis of Number of Produced Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	1.7645	1	1.7645	2.03	.16
Sex	0.8827	1	0.8827	1.02	.32
Sex x Int	0.0014	1	0.0014	0.00	.97
Error	47.6970	55	0.8672		
	Tests for Within-subjects effects				
Trait Type	3.6276	1	3.6276	3.02	.09
Trait x Int	1.8579	1	1.8579	1.55	.21
Trait x Sex	0.1319	1	0.1319	0.11	.74
Trait x Sex x Int	1.5914	1	1.5914	1.32	.25
Error	66.1226	55	1.2022		

Table C.6

Summary Unweighted-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subject effects			
Interval	2.7601	1	2.7601	27.46	.00
Sex	0.0642	1	0.0642	0.64	.43
Sex x Int	0.0029	1	0.0029	0.03	.87
Error	5.5282	55	0.1005		
		Tests for Within-subjects effects			
Trait Type	0.4624	1	0.4624	4.55	.04
Trait x Int	0.0163	1	0.0163	0.16	.69
Trait x Sex	0.0235	1	0.0235	0.23	.63
Trait x Sex x Int	0.0138	1	0.0138	0.14	.71
Error	5.5885	55	0.1016		

C.3 WEIGHTED-DATA ANALYSES

Tables C.7 to C.8 are based on the core group as above plus those subjects whose protocols were amenable to scoring after weighting of impression traits.

Table C.7

Summary Weighted-Data Analysis of Number of Produced Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Interval	0.2905	1	0.2905	0.38	.54
Sex	0.7905	1	0.7905	1.05	.31
Sex x Int	0.5098	1	0.5098	0.67	.41
Error	50.6687	67	0.7562		
	Tests for Within-subjects effects				
Trait Type	0.4028	1	0.4028	0.30	.58
Trait x Int	0.4537	1	0.4537	0.34	.56
Trait x Sex	0.6557	1	0.6557	0.49	.49
Trait x Sex x Int	0.3045	1	0.3045	0.23	.63
Error	89.1624	67	1.3308		

Table C.8

Summary Weighted-Data Analysis of Proportions of Traits Recalled

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subject effects			
Interval	3.1435	1	3.1435	28.32	.00
Sex	0.0090	1	0.0090	0.08	.78
Sex x Int	0.0125	1	0.0125	0.11	.74
Error	7.4359	67	0.1110		
		Tests for Within-subjects effects			
Trait Type	0.4883	1	0.4883	5.50	.03
Trait x Int	0.0004	1	0.0004	0.00	.95
Trait x Sex	0.0443	1	0.0443	0.50	.48
Trait x Sex x Int	0.0119	1	0.0119	0.13	.72
Error	5.9493	67	0.0888		

APPENDIX D

EXPERIMENT 4: RECALL OF AN IMPRESSION: A SIMPLE ASSOCIATIVE NETWORK MODEL

Tables D.1 to D.3 detail the analyses reported in Chapter 6: Experiment 4.

Table D.1

Summary Analysis of Number of Links to Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	0.2949	1	0.2949	0.20	.66
Valence	17.3342	1	17.3342	11.51	.01
Sex x Valence	3.3606	1	3.3606	2.23	.14
Error	90.3775	60	1.5063		
	Tests for Within-subjects effects				
Trait Type	0.26989	1	0.2698	0.47	.50
Trait x Sex	0.0852	1	0.0852	0.15	.70
Trait x Valence	0.0643	1	0.0643	0.11	.74
Trait x Sex x Val	0.6861	1	0.6861	1.19	.28
Error	34.6257	60	0.5771		

Table D.2

Summary Analysis of Number of Links from Other Recalled Traits to Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
		Tests for Between-subject effects			
Sex	1.5529	1	1.5529	1.69	.20
Valence	6.0299	1	6.0299	6.55	.01
Sex x Valence	1.2863	1	1.2863	1.40	.24
Error	39.5765	43	0.9204		
		Tests for Within-subjects effects			
Trait Type	0.8925	1	0.8925	2.54	.12
Trait x Sex	0.0207	1	0.0207	0.06	.81
Trait x Valence	0.0210	1	0.0210	0.06	.81
Trait x Sex x Val	0.0673	1	0.0673	0.19	.66
Error	15.1076	43	0.3513		

Table D.3

Summary Analysis of Number of Links Emanating from Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	0.2959	1	0.2959	0.19	.66
Valence	20.5727	1	20.5727	13.54	.00
Sex x Valence	1.0645	1	1.0645	0.70	.41
Error	91.1372	60	1.5190		
	Tests for Within-subjects effects				
Trait Type	0.0647	1	0.0647	0.11	.75
Trait x Sex	1.0530	1	1.0530	1.73	.19
Trait x Valence	0.1955	1	0.1955	0.32	.57
Trait x Sex x Val					
Error	36.4194	60	0.6070		

APPENDIX E

EXPERIMENT 5: RECALL OF AN IMPRESSION:

ROLE OF INTRA AND EXTRA IMPRESSION ASSOCIATIONS

E.1 TRAIT CHECKLIST

The 20 most frequently selected traits for the two stimulus persons in Experiments 1, 2, and 4 (within the constraint that 10 were positive and 10 negative) are listed in Table E.1. The 20 served as the respective checklists in Experiments 5 and 6.

Table E.1

Twenty Most Frequently Selected Traits For Stimulus Persons

No	Trait	No	Trait
	Male		Female
	Positive Traits		
1	friendly	1	independent
2	easy-going	2	confident
3	frank	3	intelligent
4	direct	4	frank
5	aggressive	5	practical
6	good-natured	6	talkative
7	talkative	7	open-minded
8	practical	8	direct
9	conservative	9	idealistic
10	sincere	10	thoughtful
	Negative Traits		
11	domineering	11	critical
12	opinionated	12	opinionated
13	narrow-minded	13	insecure
14	intolerant	14	radical
15	critical	15	domineering
16	tough	16	narrow-minded
17	insecure	17	thoughtless
18	tactless	18	intolerant
19	tense	19	superfical
20	nervous	20	humorless

E.2 INTRA-IMPRESSION LINKS ANALYSES

Tables E.2 to E.7 detail analyses reported in Chapter 7: Experiment 5. Tables E.2 to E.4 are based on data pertaining to intra-impression links only. Tables E.5 to E.8 are based on data for all links, both intra-impression and extra-impression.

Table E.2

Summary Analysis of Number of Intra-Impression Links to Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	0.0202	1	0.0202	0.01	.91
Valence	0.0601	1	0.0601	0.04	.85
Sex x Valence	0.0744	1	0.0744	0.05	.83
Error	58.2559	36	1.6182		
	Tests for Within-subjects effects				
Trait Type	0.0069	1	0.0069	0.02	.90
Trait x Sex	0.0547	1	0.0547	0.14	.71
Trait x Valence	0.0018	1	0.0018	0.00	.95
Trait x Sex x Val	0.0018	1	0.0018	0.00	.95
Error	14.3511	36	0.3986		

Table E.3

Summary Analysis of Number of Intra-Impression Links from Other Recalled Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	0.0479	1	0.0479	0.04	.85
Valence	0.3764	1	0.3764	0.28	.60
Sex x Valence	0.0152	1	0.0152	0.01	.92
Error	29.2359	22	1.3289		
	Tests for Within-subjects effects				
Trait Type	0.2951	1	0.2951	0.68	.42
Trait x Sex	0.0618	1	0.0618	0.14	.71
Trait x Valence	0.0082	1	0.0082	0.02	.89
Trait x Sex x Val	0.0000	1	0.0000	0.00	.99
Error	9.5158	22	0.4325		

Table E.4

Summary Analysis of Number of Intra-Impression Links Emanating from Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	0.2497	1	0.2497	0.15	.70
Valence	0.0279	1	0.0279	0.02	.90
Sex x Valence	0.0995	1	0.0995	0.06	.81
Error	61.0324	36	1.6953		
	Tests for Within-subjects effects				
Trait Type	0.3559	1	0.3559	0.88	.35
Trait x Sex	0.0375	1	0.0375	0.09	.76
Trait x Valence	0.0018	1	0.0018	0.00	.95
Trait x Sex x Val	0.0502	1	0.0502	0.12	.73
Error	14.5054	36	0.4029		

E.3 INTRA- AND EXTRA-IMPRESSION LINKS ANALYSES

Tables E.5 to E.8 are based on data pertaining to all links, both intra-impression and extra-impression.

Table E.5

Summary Analysis of Total Number of Links to Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	13.9133	1	13.9133	0.84	.37
Valence	5.3906	1	5.3906	0.32	.57
Sex x Valence	0.2481	1	0.2481	0.01	.90
Error	599.6928	36	16.6581		
	Tests for Within-subjects effects				
Trait Type	1.2196	1	1.2196	0.50	.49
Trait x Sex	1.2690	1	1.2690	0.52	.48
Trait x Valence	0.8889	1	0.8889	0.36	.55
Trait x Sex x Val	3.4068	1	3.4068	1.38	.25
Error	88.6721	36	2.4631		

Table E.6

Summary Analysis of Total Number of Links from Other Recalled Traits to Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	1.8373	1	1.8373	0.78	.38
Valence	1.4631	1	1.4631	0.63	.44
Sex x Valence	0.1530	1	0.1530	0.07	.80
Error	67.8805	29	2.3407		
	Tests for Within-subjects effects				
Trait Type	0.1615	1	0.1615	0.31	.58
Trait x Sex	0.2670	1	0.2670	0.52	.48
Trait x Valence	0.0234	1	0.0234	0.05	.83
Trait x Sex x Val	0.0010	1	0.0010	0.00	.96
Error	14.9886	29	0.5168		

Table E.7

Summary Analysis of Total Number of Links Emanating from Impression Traits

Factor	Sums of Squares	df	Mean Square	F ratio	p
	Tests for Between-subject effects				
Sex	12.0781	1	12.0781	0.79	.38
Valence	1.4987	1	1.4987	0.10	.76
Sex x Valence	10.0182	1	10.0182	0.65	.43
Error	553.8141	36	15.3837		
	Tests for Within-subjects effects				
Trait Type	0.2442	1	0.2442	0.13	.72
Trait x Sex	0.0474	1	0.0474	0.03	.87
Trait x Valence	1.4646	1	1.4646	0.78	.38
Trait x Sex x Val	0.1256	1	0.1256	0.07	.80
Error	67.4389	36	1.8733		

Table E.8

Mean Numbers of Trait Pairs by Classification Procedure in Experiment 6

	Cluster Assignment		
	Same	Different	
Linked	9.35	12.78	22.13
Not Linked	4.13	43.74	47.87
	13.48	56.52	70.00