Chapter 12
FALSE MEMORIES

Key Concepts

conceptual processing
cued recall
event-related potentials
familiarity
free recall
implicit associative response
perceptual processing
primacy effect
recency effect
recollection
remember–know judgments
serial position curve

Overview

Have you ever seen a face that you knew you had seen before, but you couldn't quite figure out where you'd seen it? Or have you ever heard an unusual phrase that you knew you had heard before, but couldn't quite remember when you heard it? This feeling of ***familiarity*** is one component of recognition in classic dual process theories (Jacoby & Dallas, 1981; Graf & Mandler, 1984; Mandler, 1980). Feelings of familiarity may arise with or without recollection of where an item was seen or heard. Remembering where things were seen is another component of recognition, particularly in laboratory tasks. Remembering involves specific ***recollection,*** including retrieval of information about a particular context in which items are presented.

On some occasions, people recognize sentences they have never heard (Bransford & Franks, 1971, see also Chapter 13) or words they have never read during the course of an experiment (Anisfeld & Knapp, 1968; Underwood, 1965). In some cases, repetition of an associated word appears to increase false recognition of a related experimental item (Underwood, 1965), but Hall and Kozloff (1973) found that a series of converging associates (i.e., "sugar," "bitter," "candy," for "sweet") heightens false recognition to an even greater extent than repetition of a single word. These findings suggest that an ***implicit associative response*** may occur at the time presented words are studied. That is, people either automatically or consciously think about associates to presented words to such an extent that they later recognize non-presented associates. A more recent study coupling standard behavioral measures of reaction time and accuracy with psychophysiological measures of ***event-related potentials,*** involving on-line tracking of brain waves during experimental tasks, provides evidence that semantic associations, activated automatically during study, influence performance on subsequent memory tests (Besson, Fischler, Boaz, & Raney, 1992).

Not only do people recognize things they haven't seen, but they also recall things they have never read. Whereas recognition involves a response to a presented stimulus, free recall relies exclusively on retrieval from memory. Recall is also susceptible to distortion, both for stories (Bartlett, 1932) and for words (Deese, 1959). Deese suggested that the probability that a word would be falsely recalled could be predicted by the average frequency with which it was produced as an associate to studied words.

More recently, Roediger and McDermott (1995) developed a methodology that measures both false recall and false recognition in a single experiment, permitting an assessment of the influence of false recall on false recognition. Their initial objective was to replicate the findings of Deese (1959), who demonstrated that a non-presented word would often be mentioned during free recall if the study list included several of its associates. Roediger and McDermott presented participants with lists of words that were associated with critical non-presented words. Half of the lists were followed by a free recall test, and the remainder were followed by an arithmetic task. For recalled lists, they compared the level of recall for the critical non-presented words to the level of recall for words that had been studied at different positions in the lists, by examining the ***serial position curve***. Graphs of free recall data tend to have a characteristic U-shape when percentage of recall is plotted against the ordinal position of the original stimuli. The curve generally demonstrates that stimuli at the beginning and end of a list are recalled more often than those in the middle, illustrating the ***primacy*** and ***recency effects*.**

After several lists had been studied, Roediger and McDermott gave participants a recognition test, which included presented words, critical non-presented associates, and other non-studied words. This enabled them to compare correct recognition and false recognition for words from lists that had been followed by recall to those that had been followed by arithmetic tests. Additionally, participants were asked to make ***remember–know judgments*** for all words they recognized.

The remember–know assessment was originally developed by Tulving (1985). Participants are generally told to select "remember" if their recognition of a word is accompanied by a conscious recollection of its prior occurrence in the study list. A "remember" judgment reflects the ability to become consciously aware again of some aspect or aspects of what happened or what was experienced at the time the word was first presented (e.g., aspects of the physical appearance of the word, or something that happened in the room when it was shown, or what came before or after the word). In contrast, participants are generally instructed to select "know" if they recognize that the word was in the study list, but cannot consciously recollect anything about its actual occurrence. Rajaram (1993) demonstrated that these "remember" and "know" judgments are *not* derived strictly from confidence. People can be certain an item was studied, but select a "know" judgment because they do not recollect any details of the study experience.

Research suggests that "remember" judgments are generally influenced by variables that reflect ***conceptual processing*,** consideration of aspects of an item related to its meaning or its relation to other words (Gardiner, 1988; Java, 1994; Rajaram, 1993), as well as divided attention (Gardiner & Parkin, 1990), retention interval (Gardiner, 1988), and word frequency (Gardiner & Java, 1990). In contrast, "know" judgments are generally influenced by variables that relate to ***perceptual processing***, consideration of aspects of an item related to its appearance, such as picture–word manipulations (Rajaram, 1993). These dissociations are suggestive of the dual components of recognition memory. "Remember" judgments have been positioned as a relatively pure measure of recollection, linked to episodic memory, whereas "know" judgments have been positioned as a measure of familiarity, linked to semantic memory.

Free recall is one important dependent variable in this experiment. In a free recall task, participants report the stimuli they saw or heard in any order. ***Cued recall*** is a more data-driven task (see Chapter 10), where participants receive cues to help them to remember the original stimuli.

Purpose

This experiment enables you to determine how recognition and free recall for lists of semantically-related words are affected by memory distortions or intrusions. You will also have an opportunity to assess phenomenological experience. Participants indicate whether they "remember" (can mentally re-experience the word's presentation) or "know" the words (recognize the words, but cannot recollect any specific aspects related to presentation). This experiment is based on Roediger and McDermott's (1995) second experiment.

Design

For each of 24 critical words, Roediger and McDermott formed a list that included 15 selected associates. For example, if the critical word was *candy*, the associates might be *sweet, sugary, delicious, dessert, children, treat* and so forth. The 24 lists included in the default experiment are arbitrarily divided into three sets (A, B, and C). Each participant studies two of these three sets (A and B, B and C, or A and C). To achieve effective counterbalancing, each study set must be selected equally often.

Participants study two sets of 8 lists, but the 16 lists are presented in a random sequence. One word is presented at a time. After they study a list, participants receive either an immediate free recall test or a simple math test. Each of these activities occurs equally often. These poststimulus activities form the basis of the variable known as study environment. A third level of the study environment variable is called "nonstudied." This category includes words presented in the test phase that were drawn from the 8 lists not shown during the study phase. Study environment is a within-subjects variable.

When participants complete the study phase, they engage in an unrelated task for 5 minutes to ensure that none of the stimulus words is still in working memory. Then they receive a recognition test. This test requires them to report whether each word that appears on the test appeared in one of the lists studied (i.e., it is an *old* item) or did not (i.e., it is a *new* item). For items reported as *old,* participants indicate whether they *remember* or *know* they saw it earlier.

The main dependent measures are recognition memory accuracy and metamemorial judgments of “remember” versus “know” judgments for the different study environments and study sets. In addition, recall by serial position is reported.

Suggested Procedure

Consult with your instructor to determine which of the stimulus sets to select. Then, to begin the default experiment, click FILE|START. Unless your instructor advises you otherwise, select the WITH AUTO LOGGING option.

In the first part, participants memorize the lists of words used in the Roediger and McDermott (1995) study. After studying a list, they are given either a series of math problems or a recall test. During a recall test, they type in as many of the words as they can from the last list shown. (A spelling checker helps participants to catch typographical errors.)

After studying all of the study lists, participants spend 5 minutes doing a Slider Puzzle in which they move around pieces of a picture of the Mona Lisa, re-creating the original painting by da Vinci. Finally, they receive a test that includes words previously studied and new words; their job is to decide whether each word is *old* (presented before) or *new*. In addition, for each word identified as old, participants indicate whether they “remember”(recollect details about a word’s presentation) or “know” (recognize a word, but cannot recollect details of its presentation) the word.

What’s Next?

The data are saved on the disk drive that you specify. FALSEMEM.XLS is the default file name, but you can specify any name allowed by your computer.

If there is presently a file on that disk that contains data for this experiment, and that file has the same name as the one that you specify, then your current data are appended automatically to the existing data. Note that it ***will not replace*** the original data. Study each participant’s data and combine them statistically and graphically. If your participants’ data files were saved on different disks, open one of these on the C&P3 spreadsheet, then use the FILE|MERGE WITH THIS FILE option to add data from the participants. For further instructions, see *Appendix 1*. Your ***Manuscript Mentor*** disk includes suggestions for data analysis and interpretation.

More Advanced Projects

The Menu Options on the Startup Screen

➤ *File*

Enables you to start the experiment, to save or retrieve custom experimental configurations, or to exit.

Click FILE|START to begin an experiment. At that time, you have an opportunity to supplement your .XLS data file with a log file that contains a record (log) of *every event* that occurs on *each trial*. If you elect to save an autolog file, you will be asked to provide a name for it before the experiment begins. Even if the participant quits doing the experiment before finishing all of the trials, the log file will show a record of every event that occurred up to the point when the experiment ended.

The FILE|SAVE CUSTOM SETUP and FILE|OPEN CUSTOM SETUP enable you to store and retrieve the special configurations of the experiment that you create. If you write your own problems or instructions, they will automatically be stored at the same time you save your Custom Setup. All settings of all options on each card are also stored in the configuration file.

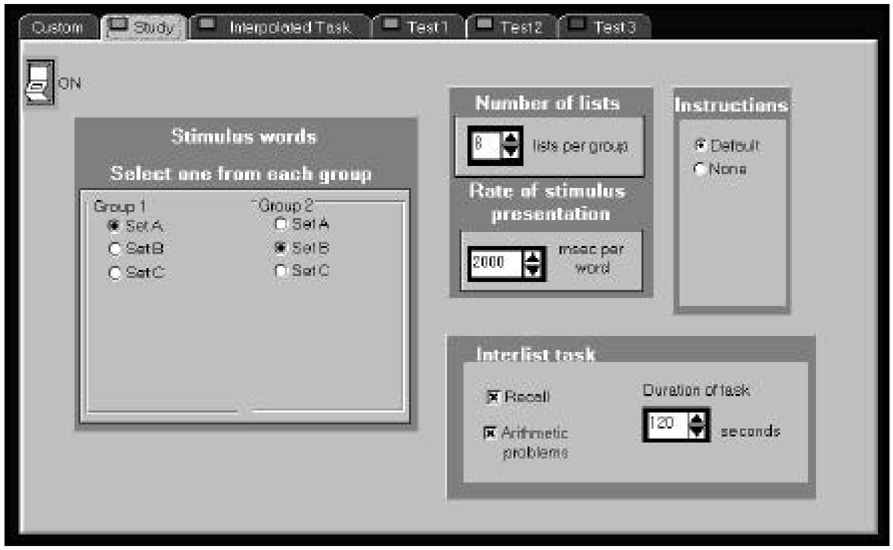
The FILE|EXIT combination enables you to branch back to the Marble Screen. *NOTE*: During the administration of the experiment, the option is also available. If you or a research participant attempts to quit an experiment before all of the trials have been administered, you will need to decide whether to save the incomplete set of data or to save no data. If you quit an experiment prematurely and accidentally tell the program at the time not to save your data, you can change your mind and save it when you return to the Startup Screen. Simply click FILE|SAVE CURRENT DATA. Once you begin the experiment again or you return to the Marble Screen, there is no further possibility to store any unsaved data from the previous administration of the experiment.

➤ *Help*

Provides extended information that you may find helpful in understanding how to use the options presented on this screen.

You can modify the basic experiment by changing combinations of variables on the Part Cards labeled Study, Interpolated Task, and Tests 1-3. You can also enter and save your own word lists and instructions using the Custom Setup Card; the *Getting Started* chapter shows you how to enter such custom materials.

The Study Card



➢ *Stimulus words*

Unless you enter your own custom stimuli, the words will be selected from those provided in Roediger and McDermott (1995). There are 24 lists, grouped together into three sets of eight lists. The first eight sets provided by Roediger and McDermott form Set A, the next eight form Set B, and the final eight comprise Set C. Specify two sets to use for study; the words from these lists that occur on the recognition test will be *old* words. Words from the set not studied will be *new* words.

The lists of words in Sets A, B, and C are arranged so that the word most strongly related to the critical associate occurs first, the next most strongly related is second, and so on. These words are always presented in the same sequence within a list. The sequencing of the lists, however, is randomly determined with each administration of the experiment.

➢ *Number of lists*

Having specified your two groups of lists, now specify the number of lists from each group to display. You can present 1-8 lists. The default experiment uses eight lists. All lists in any one experiment must be the same length.

➢ *Rate of presentation*

Click the spinner up or down to alter the rate that the words are presented during the study trials. One word every 1500 msec was the rate used in the default experiment. Rates slower than one every 2000 msec may tend to cause college participants to become bored. Rates 500 msec or faster are a real challenge.

➢ *Interlist task*

Between lists, you can have participants recall the items just studied or perform simple arithmetic problems, or do both of these tasks equally often on a random basis. You can also have no inter-item task by specifying zero time as the duration of the task.

You can specify any duration between 0 and 10000 sec for your participants to devote to the tasks that you just indicated would occur after each list that they studied. Setting this duration to zero means that no interlist tasks will be administered.

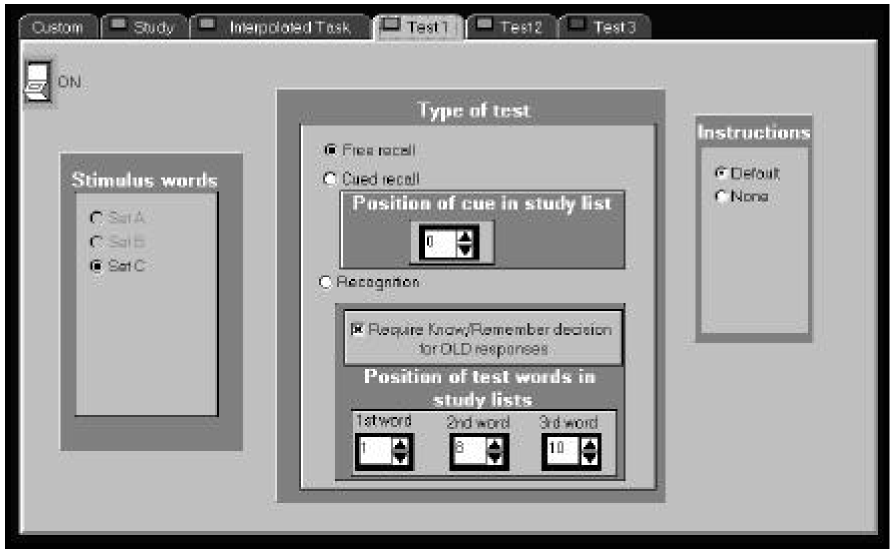
➢ *Instructions*

The default instructions are those provided by the program. To present your own instructions or to modify the default instructions in any way, refer to the *Getting Started* chapter.

The Interpolated Task Card

The collection of available interpolated tasks is described in detail in the *Getting Started* chapter. You might want to use these tasks to lengthen the retention interval between the study period and the first of the memory tests. The Slider Task was administered for 5 min during the default experiment.

The Test 1 - 3 Cards



These cards are identical, enabling you to give a free recall test, a cued recall test, or a recognition test (or any combination of them) after all study trials have been completed. If you need to give more than one test, use the Test 1 card to specify the characteristics of the first test, Test 2 for the second, and so on. If you need to give only one, specify it on the Test 1 card and leave the On/Off switch on the Test 2 and Test 3 cards in the *Off* position. The default experiment used only a recognition test. (Recall tests were also given during the default experiment, but they only occurred during, not after, the study phase.)

➤ *Stimulus words*

Specify which set of word lists will serve as the basis for the selection of stimuli during the recognition tests. This set should be one that was *not* used during the study phase. If you do not include your own word lists, the alternative that you do not specify on the Study Card will automatically be selected on the Test Cards.

➤ *Type of test*

You can administer any of these tests of memory:

- Free Recall — In this test, participants type all of the words that they can remember with no regard to the order in which they were presented. A spelling checker examines entries as they occur as an aid to reducing bias against poor typists (and poor spellers).

- Cued Recall — Participants see a stimulus word to help them to better access the words they are trying to recall. This cue, or hint, can be any word in the lists that they studied (or didn't study). Specify the word by referring to its ordinal position in the list, as indicated later.

- Recognition — This test presents words, one at a time, in alphabetic order. Half of the words are selected from the three ordinal positions specified as "Position of test words" (see later). Half of the remaining items are drawn from identical positions in the lists that were never studied; the balance are the critical associates that were also never seen during the study phase.

  In the default experiment, the recognition test contains 96 items, including 48 that appeared during the study trials at the beginning of the experiment and 48 never studied. The 48 studied items were obtained by selecting 3 items from each of the 16 presented lists (always in serial positions 1, 8, and 10). The non-studied items on this test are the 24 critical words from all lists (16 studied, 8 not) and 24 items from the 8 non-studied lists (words in serial positions 1, 8 and 10).

➤ *Position of cue in study list*

If you specify cued recall, you must tell the program to find the cue within any list. The cue must be in the same ordinal position (e.g., first, second, and so on.) within each list. The lists are arranged so that words most strongly related to the critical associate are at the top (that is, have ordinal numbers of 1 and 2) and the weakest are at the bottom (positions 14 and 15). Thus, if you want a strong cue, enter a low number; enter a larger number to deliver a weak cue. If you specify position zero, then the cue will be the critical associate, which is never presented during the study trials. (Note that if you specify position zero, you will eliminate the possibility of measuring false recall of critical associates.)

➤ *Require Know/Remember decision*

Once the participants have responded *old* or *new* to a specific word, you can also have them indicate whether they *remember* or *know* that they saw the word before.

➤ *Position of test words in study lists*

In the default experiment, words in ordinal positions 1, 8, and 10 in each list are presented during the recognition trials. You can change these to include any combination of three words. Immediately before the recognition test begins, the test words for each list are alphabetized in one presentation list. The words are presented one at a time during the recognition test.

➤ *Instructions*

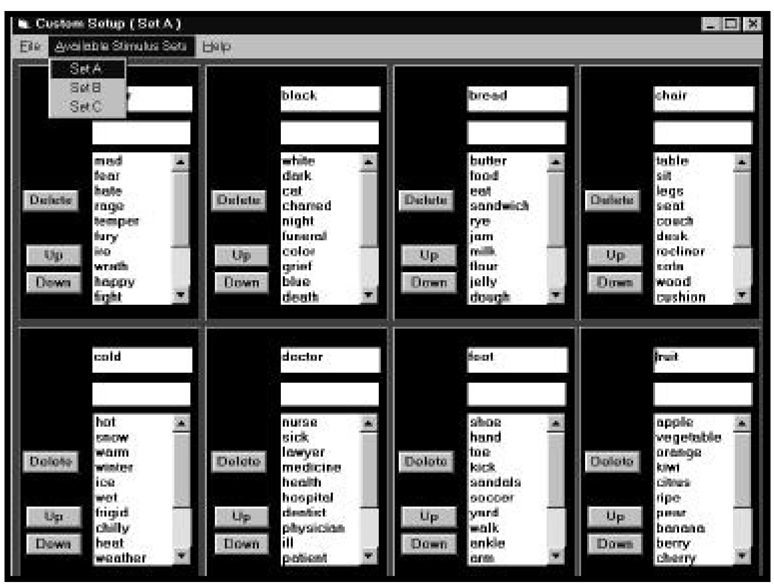
The default instructions are those provided by the program. If you need to present your own instructions or to modify these in any way, refer to the *Getting Started* chapter, then create and specify your custom instructions.

The Custom Card

The Custom Card enables you to create or edit your own stimuli and instructions. The *Getting Started* chapter tells you how to manipulate the instructions.

To prepare to use your own word lists, click Create in the Custom Stimuli panel. The view changes to a blank form that provides for entry of as many as eight lists. The lists can be any length. If you enter lists that vary in length, because the logic of the paradigm requires that all lists contain the same number of words, the number of words that will actually be presented will be determined by the length of the *shortest* list.

For each list, enter the words, one at a time, in the area labeled Word(s). The words will appear in the lower section of the panel, in the order that you list them. You can later alter the ordering of these words, without retyping them, by highlighting a word, then clicking the Up or Down button on the panel. The *Critical Associate* is the word that is normally associated with all of the items on a list, but it need not be. You can enter any term that is appropriate for your experimental design.



This illustration shows the 8 lists of words comprising Set A used in the default experiment.

The three default sets of lists (A, B, and C) are available for you to modify without having to type them in their entirety. To specify one, click Custom Groups.

You might consider customizing the experiment to address some of the following questions:

- Roediger and McDermott found a higher level of false recognition in Experiment 2 (24 lists of 15 words) than in Experiment 1 (6 lists of 12 words). How might you disentangle the effects of list length and total number of words studied on subsequent recognition? How would these factors influence remember - know judgments?
- Roediger and McDermott ordered all lists so that words that were most strongly associated with the critical non-presented words were presented first, and those that were most weakly associated were presented last. How does the ordering of presented words influence the serial position curve for recall? How does it influence false recognition? Does it affect the pattern of remember - know judgments?
- How does the strength of the presented items selected for recognition influence the extent of false recognition? What if only weakly associated words were shown? Do participants make associations to words that were previously presented on the recognition test, even though they are instructed to base responses on the study phase? Do remember–know judgments differ for critical non-presented words if only weak associates are shown at study?
- How does the rate of presentation effect recall and recognition? False recall and recognition? Remember–know judgments?
- Instead of giving a recognition test after all lists have been studied, consider using a free or cued recall test. Perhaps you can give different tests to different groups of participants. How does the level of recall for presented words differ from the level of recognition? How does the level of false recall for presented words differ from the level of false recognition? Do cued recall results differ with cue strength?
- In the default experiment, words were related to the critical non-presented word by association rather than by category. Would you expect the same effects if presented words were category members and the critical non-presented word was a category prototype? If the critical non-presented word was only a moderately typical category member? If it was an atypical member of the category? Would you expect list length and presentation order to have similar effects on non-presented category members as they do on associated words?
- If false recognition is linked to automatic processes during encoding, then by definition (automatic processes do not require attention), it should not be influenced by attentional manipulations at study. In contrast, if participants consciously process the associates of presented words, then distraction during study might reduce false recognition, or the relative proportion of false recognition to correct recognition. How might you test these possibilities? How would distraction influence remember - know judgments?

For More Information

After you conduct your experiment, you will want to study and analyze your data. *Appendix 1* describes how to use the C&P3 spreadsheet to go from data collection to printing professional-quality graphs of your findings quickly and easily. It will also help you to prepare your data for export to a statistical analysis program.

After you have had an opportunity to examine your data, you should refer to your ***Manuscript Mentor*** disk for

- suggestions about interesting questions to try to answer from these data,
- theoretical and methodological issues that you may want to think about if you prepare a written report of this experiment, and
- suggested readings to help you understand fully the background for this experiment.