The Nature of Elaborative Rehearsal

We usually learn verbal information by rehearsing it. There are two kinds of rehearsal.

Maintenance rehearsal: repeating information in its original form without relating it to anything else, like repeating the digits of your campus ID until you can recite them all correctly.

This is an unreliable way of storing information in long-term memory (which holds information up to a lifetime). Mostly what it does is keep the information circulating in short-term memory, which can only hold it for about 30 seconds without additional rehearsal.

Elaborative rehearsal: repeating information in a way that relates it to something that you have already stored in memory, like the rules of a mnemonic system (pegword system, method of loci, etc).

This is much more effective than simple repetition. Just grouping the digits of your campus ID rather than thinking of them as separate digits should facilitate learning.

Why Does Elaborative Rehearsal Work?

As discussed in the text, there are three kinds of factors that could contribute to the effectiveness of elaborative rehearsal.

1. Depth of processing: This factor refers to the degree of meaning (semantic content) that we pay attention to during rehearsal.

Shallow processing considers only surface features of the items, like what letters a word contains or how the word sounds (e.g., what word it rhymes with). Deeper processing relates the meaning of the words to networks of concepts and images already in memory.

2. Distinctiveness: This factor makes the memory of a particular item easier to discriminate from memories of other items. This could be done by highlighting the item in a different color (shallow processing) or by relating it to images or other words in memory (deeper processing).

3. Cognitive effort: This factor involves the amount of attention and number of cognitive processes that we devote to rehearsal. It's measured in terms of how well we can perform an unrelated task at the same time. More cognitive effort on the processing task produces lower performance on the unrelated task.

The effects of depth of processing and cognitive effort on free recall of a list of words was assessed by Eysenck and Eysenck (1979). The text presents a highly simplified and somewhat distorted summary of this experiment (see Fig. 9.2). A fuller picture of what they found is presented here.

Elaboration vs. depth of processing: Eysenck and Eysenck distinguished between elaboration and depth of processing. Elaboration involves the number of attributes of a word that we pay attention to. The number of attributes that we consider can be at a shallow level, like looking for 1 letter in a word vs. 2 letters, or the attributes can be at a deeper level, like considering whether a word refers to something that is edible vs. something that is *both* edible and liquid.

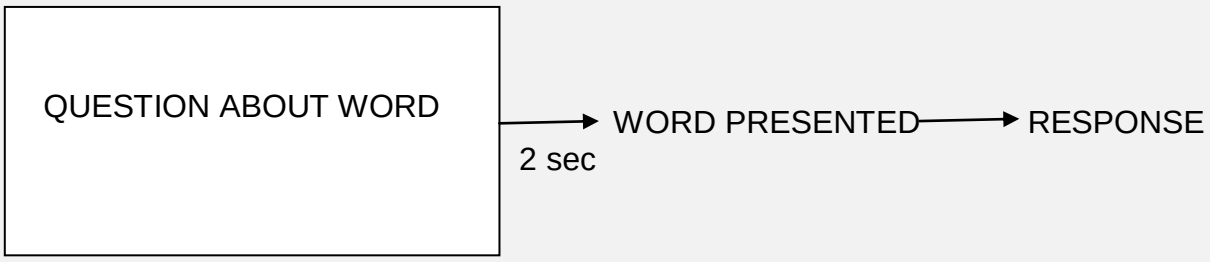
To avoid confusion with other definitions of elaboration, you could call this variable complexity of processing: the number of attributes of a stimulus that we pay attention to at one time. One attribute would be the simplest processing and two attributes would be more complex processing.

Method

The experiment looked at incidental learning rather than intentional learning. With incidental learning, participants are instructed to work with a list of words (e.g., by answering questions about them) but are not informed that they will later be asked to remember the words. With intentional learning, participants are asked to remember the words.

Main task (verbal processing): There was a total of 96 words. They were presented one at a time using the following procedure…

First, the experimenter asked a question about the word that would be shown on a screen. Two seconds later the word was shown and the participant was supposed to respond "Yes" or "No" to the question.



There were two kinds of questions, **semantic** (deep processing) and **physical** (shallow processing).

Semantic questions: could involve any of the following categories — edible vs. inedible, liquid vs. solid, man-made vs. natural. The question could refer to just 1 category (simple) or 2 categories (elaborate, complex). Examples:

1 CATEGORY
Is it edible?

2 CATEGORIES
Is it edible and solid?

Physical questions: could ask whether any of the following letters were present — A, E, I, O, R, S. The question could refer to just 1 letter (simple) or 2 letters (elaborate, complex).

1 LETTER
Does it contain the letter E?

2 LETTERS
Does it contain the letters E and R?

Secondary task (reaction time): This procedure was used to measure how much cognitive effort the participants were putting into the verbal processing task. A sound or light was presented right after the word came on the screen. Participants were instructed to press a lever as quickly as possible after they noticed the signal.

In theory, the more attention and mental work participants put into the verbal processing task, the more distracted they would be and the longer it would take them to press the lever.

Memory test: After the last word was presented, the participants were given a surprise test and were asked to write down as many of the words as they could recall in any order (free recall test).

Results

Basically, Eysenck and Eysenck found that recall did not depend on cognitive effort; it depended on depth of processing. Elaboration (complexity) was also a factor but only together with deep processing.

Specifically, they found:

(1) recall was greater after deep (semantic) processing than after shallow (physical) processing;

(2) recall was greater after more elaborate processing (2 attributes) than after simpler processing (1 attribute) ***but only at the deeper level*, *not at the shallow level*;**

(3) as measured by reaction times on the secondary task, deep processing required more cognitive effort than shallow processing; and

(4) within each level of processing, more elaborate processing (2 attributes) required more cognitive effort than less elaborate processing (1 attribute).

Combining findings 2 and 4, at the shallow level… recall did not increase with the elaborateness (complexity) of processing even though cognitive effort did increase with the elaborateness of processing.

Therefore,

Bottom line…the number of words recalled was consistently correlated with depth of processing but not with cognitive effort or elaborateness (complexity) of processing.