Baddeley et al. (1966b)

Working memory model: The influence of acoustic and semantic similarity on long-term memory for word sequences.

There are three experiments but you only need to learn one for assessment.

In his previous study, **Baddeley (1966a)** assessed whether acoustically similar/dissimilar words and semantically similar/dissimilar words would be retrieved more accurately in the short term memory (STM). It was found that acoustically similar words showed greater forgetting than acoustically dissimilar, with forgetting for semantic words being unaffected.

Here **Baddeley (1966b)** attempted to assess whether the same trend would be shown in the long term memory (LTM). This was in contrast to previous research which tended to produce a finding for the LTM and then assess whether the STM was similarly affected.

There were four lists of 10 words:

- List A had 10 acoustically similar words; **man, cab, can, cad, cap, mad, max, mat, cat, map**
- List B had 10 acoustically dissimilar words; **pit, few, cow, pen, sup, bar, day, hot, rig, bun**
- List C had 10 semantically similar word; **great, large, big, huge, broad, long, tall, fat, wide, high**
- List D had 10 semantically dissimilar words; **good, huge, hot, safe, thin, deep, strong, foul, old, late**

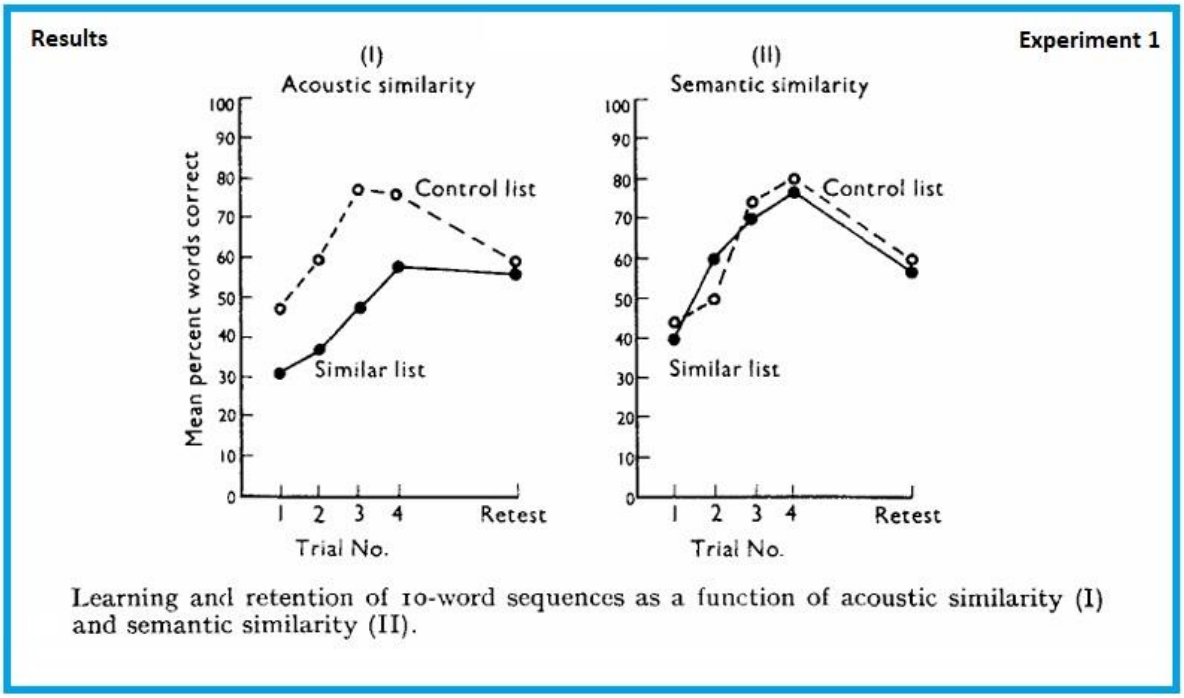
All experiments involved four recall trials, followed by a final recall retest and the words were presented by tape recorder for experiments one and two (one per 3 seconds) but visually in experiment three. The order of the words was the thing being tested (as the words were visible throughout).

Experiment One

Participants had a listening test prior to the study and 3 were excluded at this stage. Participants were young servicemen with 18 in (List A), 17 in (List B), 20 in (List C), 20 in (List D). Participants were allowed 40 seconds to write down the sequence of words. After the four trials participants spend 20 minutes on an intervening task involving memory of eight digits (they were given sequence of digits and allowed 8 seconds to write them down in order). They were then retested without warning on the 10-word list.

It was found that acoustically similar words showed a lower performance on all learning trials and unlike the other lists, the acoustically similar list showed no forgetting on the retest. Semantically similar and dissimilar lists showed no significant differences.

It was concluded that unlike STM, LTM was impaired by semantic similarity but not by acoustic similarity. Baddeley suggested this meant 4 the STM and LTM worked differently in how they coded information. Specifically, the STM relies largely on acoustic coding (and is relatively unaffected by semantic content of a message), but LTM uses semantic coding heavily (but not exclusively).



Learning and retention of 10-word sequences as a function of acoustic similarity (I) and semantic similarity (II).

Experiment Two

Participants were prevented from rehearsal by including an interference task (between encoding and retrieval, or retrieval and encoding). It was predicted that the semantically similar list would show a lower learning score and no forgetting, similar to the acoustically similar list from experiment one. The acoustically similar list was predicted to show the same results as experiment one.

Only two lists were used for this experiment – the semantically similar (List C) and acoustically similar (List A). Participants had a listening test prior to the study and 6 were excluded at this stage. Participants were housewives from a participant panel with 20 in (X), 25 in (Y), and 23 in (Z) for List A and 17 in (X), 26 in (Y), and 20 in (Z) for List C.

The conditions were:

- (X) – Learning and testing as in experiment one (baseline condition).
- (Y) – Learning and testing as in experiment one, except an interference task was interposed between encoding and retrieval (experimental condition).
- (Z) – Learning and testing as in experiment one, except an interference task was interposed between retrieval and encoding (control condition for practice effects).

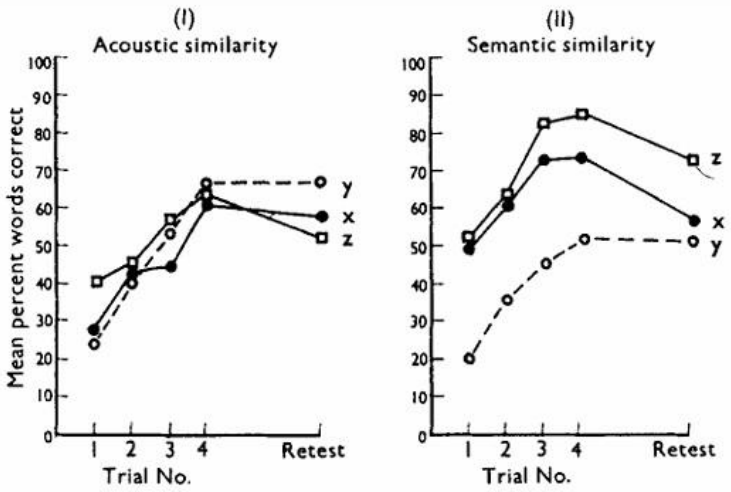
The interference task used was the same 20 minute intervening task from experiment one involving memory of eight digits, except there were six eight digit sequences for (Y) and (Z). For the acoustically similar list, only condition (Z) showed significant forgetting between trial 4 and retest. Condition (Z) also performed significantly better on trial 1 than (X) and (Y).

As predicted, condition (Y) led to significantly lower learning score across all trials and retest and was significantly less than (X) and (Z). Condition (Y) also showed no significant forgetting

between trial 4 and retest, as predicted. Condition (X) showed similar performance to experiment one and was not significantly different to (Z) throughout.

It was concluded that the effect of STM could be eliminated or minimised which showed that experiment one was not just testing LTM as expected. This means the findings from experiment one do not necessarily answer the research question they wanted to about the influence of acoustic/semantic coding in LTM.

Results **Experiment 2**



Learning and retention of word sequences as a function of acoustic similarity (I), semantic similarity (II) and learning procedure. X = Standard procedure; Y = STM control between each presentation and test; Z = STM control between each test and the subsequent presentation.

Experiment Three

Experiment three used visual presentation of the words on a slide projector which were visible for 3 seconds (with a changeover time of 2 seconds). As with experiment two, only two lists were used for this experiment – the semantically similar (List C) and acoustically similar (List A). Participants were mixed groups 5 of men and women from a participant panel with 15 in (A), 20 in (B), and 16 in (C) and 21 in (D).

The conditions this time were:

(A) - Learning and testing for List (A) as in experiment one, except an interference task was interposed between encoding and retrieval (experimental condition).

(B) - Learning and testing for List (B) as in experiment one, except an interference task was interposed between encoding and retrieval (control condition).

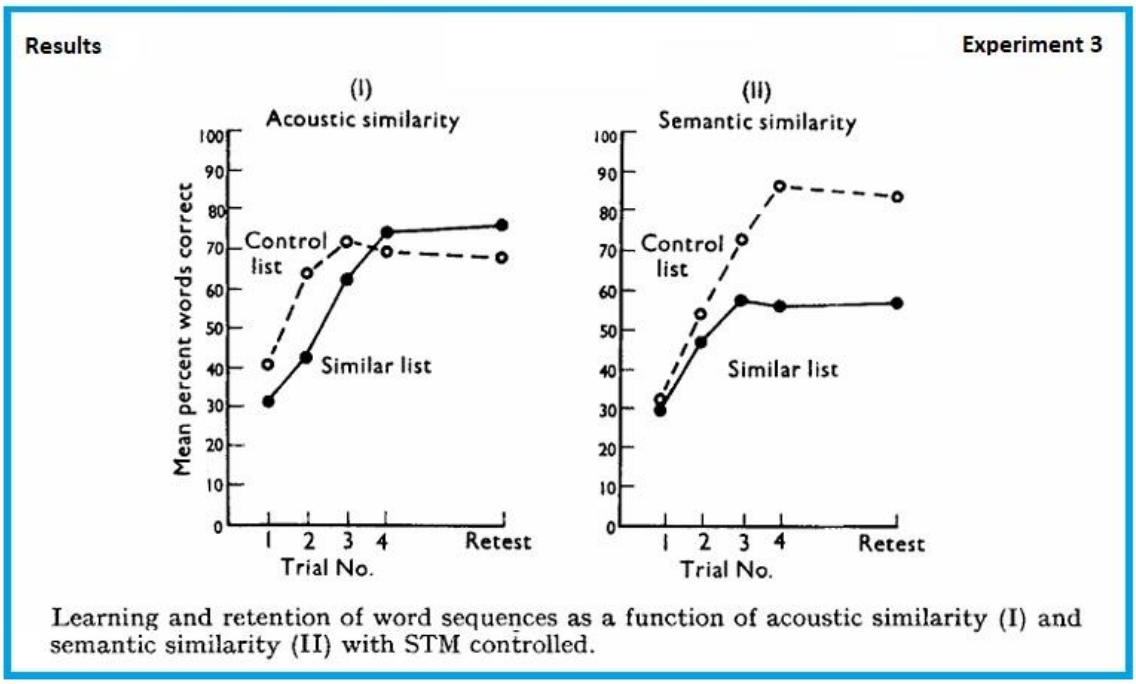
(C) - Learning and testing for List (C) as in experiment one, except an interference task was interposed between encoding and retrieval (experimental condition).

(D) - Learning and testing for List (D) as in experiment one, except an interference task was interposed between encoding and retrieval (control condition).

The interference task was the same as in experiment two, where six eight-digit sequences were read out at a one second rate. Between trial 4 and retest the interference task was done for 15 minutes in experiment three. There was no forgetting for either acoustically similar or dissimilar groups between trial 4 and retest. The similar list was more difficult on the trials 1-3, with a significant difference on trial 2, and this trend was reversed on trial 4 and retest. There was no forgetting for either semantically similar or dissimilar groups between trial 4 and retest. The similar list (C) showed slower learning and there was a significant difference in performance with List (D) on trial 4 and retest.

Experiment three showed learning words that are semantically similar leads to impaired performance. When combined with experiments one and two, this suggests that LTM may be based on the meaning or sound of words.

The findings from the previous study (Baddeley, 1966a) suggested STM is affected by acoustic coding, whereas the findings of this study suggest the LTM is affected by semantic coding, but not exclusively (as the STM was used for learning and no differences in learning in trials 1-3 in experiment three).



Learning and retention of word sequences as a function of acoustic similarity (I) and semantic similarity (II) with STM controlled.

Reference:

Baddeley, A.D., 1966. The influence of acoustic and semantic similarity on long-term memory for word sequences. *Quarterly Journal of Experimental Psychology*, *18*(4), pp.302-309.