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Hypermnesia in the Sentence Superiority Effect

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BACKGROUND

[***Sentence Superiority Effect***] Words were more remembered when they were encoded as parts of sentences than when encodes as parst of word lists. Recent research showed that this effect could occur when minimizing semantic relatedness between words and even conducting divided-attention tasks (Baddeley et al., 2009; Jefferies et al., 2004). In these situations, it seems to be difficult to form chunks which will help remebering words later. This study examined the chunk formation by sentence presentation in LTM.
[***Hypermnesia***] We investigated whether the sentence superiority effect was due to chunk formation. The repeated testing paradigm, which was used to find hypermnesia, was useful to our goal. Hypermnesia refers to the phenomenon that repeated testing could improve memory performance without re-study of materials (Erdelyi, 1996). If presentation as sentenses made large chunks, the improvement with repeated tests would be greater for sentences than word lists, given that the unit of recall based on the chunks. This paradigm has the advantage over the traditional methods to examine chunk formation, such as cued recall, in that it enables to compare the recall performance within the same presentation formats.

METHOD

[***Participants***] 44 Japanese undergraduates (all female). Each half of the participants was assigned to one of the two item forms randomly.
[***Design***] 2 (Item Form: sentence vs. word list) x 3 (Times of Test: 1st vs. 2nd vs. 3rd) mixed design.
[***Material***] Seven types of words were selected for 6 item sets: <adjective><noun><subject person> <adjective><time adverb><object><verb>.
- sentense: Each types of words were exchanged across the 6 item set in order to make meaningful but less semantic-related sentences.
e.g., "soft glove baseballer winy night jewer search." (This word order emulated Japanese meaningful sentence. The sentence largely means that "A baseballer wearing soft glvoe searched a jewel at a winy night.")
- word list: Words were randomly ordered not to make meaningful sentences. Particles were removed.
e.g., "glove", "night", "winy", "searched", "soft", "jewel", "baseballer"
[***Procedure***] The sentences or word lists were presented auditory. After the presentation of the items, three times of free recall were administered, each lasting three minutes without any additional chance of learning.

RESULTS and DISCUSSION

[***Correct Recall***]

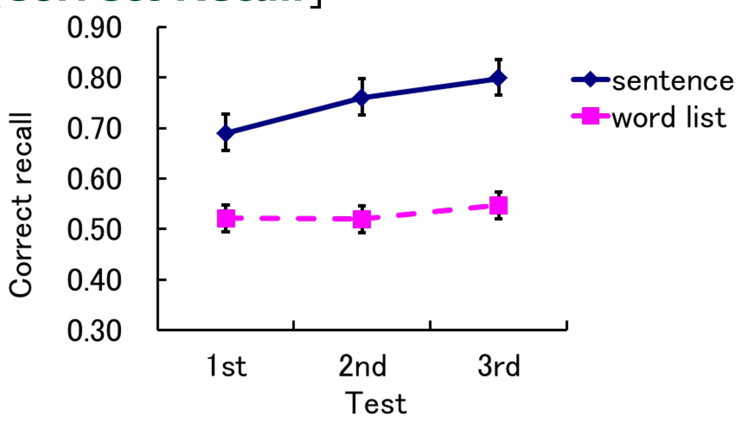

Figure 1. Recall rates for the items across three tests. The scores were based on the number of words recalled correctly.

- Effect of Item Form.
  -> **Sentence superiority effect**.
- Effect of Times of Test.
  -> **Hypermnesia effect**.
- **Interaction** between the item form and the times of test.
  -> ***sentence***:
  Significant hypermnesia.
  -> ***word list***:
  Non-significant hypermnesia.
- Recall scores for each word type showed similar patterns to overall scores.

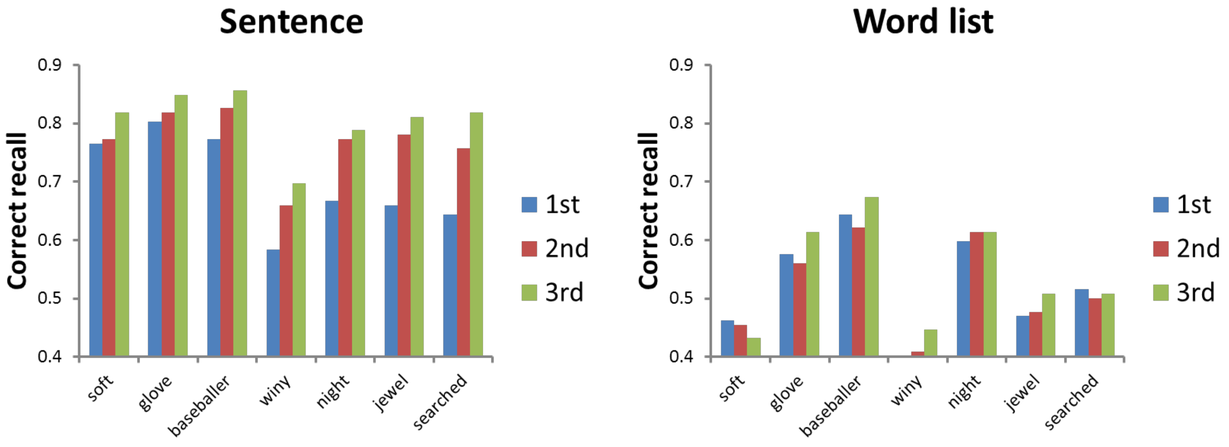

Figure 2. Recall rates for each type of words across three tests.

[***Clustering in Recall***]

To examine the potential differences in memory organization, we calculated ARC scores for the recall sequences (Roenker et al., 1971). Here, different sentences were treated as different categories. Note that categories for word list were actually not a category, since they were not psesented as sentences.

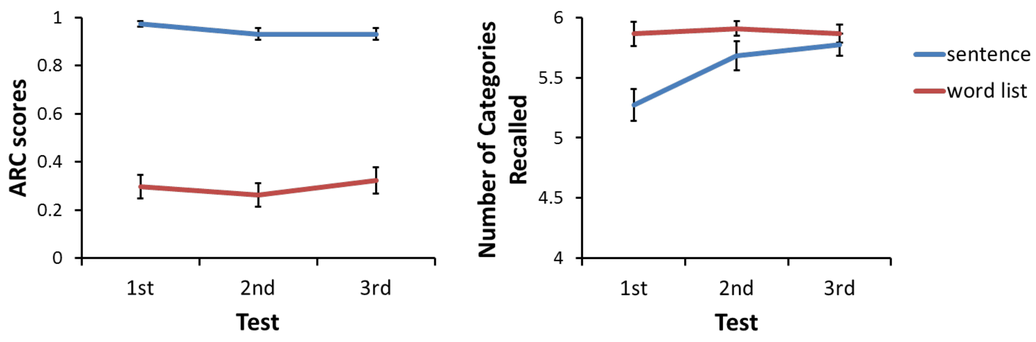

Figure 3. ARC scores (left) and the number of categories recalled (right) in the recall sequences.

[***ARC scores***]
- The ARC scores were almost ceiling for sentence condition, suggesting that the participants formed nearly perfect organization based on the sentence form.
- The ARC scores in word list indicated probably a baselin performance when there were no categories.

[***Number of categories recalled***]
- In sentence condition, the participants remember more categories as the recall tests were repeated. This suggests that the sentence form served as a unit of recall.
- In contrast, the participants remembered the words on a relatively random basis when the word list had been presented.

CONCLUSION

Presenting word in sentences created **larger chunks** than presenting them in word lists. This factor might be not only a cause of the sentence superiority effect, but **a substantial contributor** to the effect.

References

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Abstract

Word sequences were more remembered when they were encoded as sentences than when encoded as word lists. This sentence superiority effect was considered to be due to chunk formation. We used the procedure of hypermnesia, which refers to memory improvement by repeated testing without re-study, to investigate the nature of chunk formed by encoding as sentences. As tests were repeated, correct recall increased for sentences, but not for word lists. It suggests that the sizes of chunk by sentences were larger than those by words. Additionally, larger chunks seem to generate larger first burst of recall.

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