The detrimental effect of semantic similarity on immediate serial recall

Sho Ishiguro and Satoru Saito
Kyoto University, Japan

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Introduction

Detrimental effects of similarity on STM

Similarity of stimulus properties, in general, impairs short-term memory (STM) performance. For example, phonological similarity (Baddeley et al., 1984) and visual similarity (Avons & Masson, 1999) have detrimental effects on STM.

Facilitative effect of semantic similarity (?)

Nevertheless, previous studies have suggested that semantic similarity has a facilitative effect on STM (e.g., Saint-Aubin & Poirier, 1999).

Critical review on the semantic similarity effect

Ishiguro and Saito (2020a) pointed out that semantic association, which enhances STM performance, was possibly confounded with semantic similarity in previous studies. Further, results of their meta analysis showed that semantic similarity indeed had a detrimental effect, by statistically separating semantic similarity from semantic association.

Purpose of the current study

Test a possible detrimental effect of semantic similarity by conducting the immediate serial recall task

Specifically, we investigated whether and how semantic similarity impairs STM.

Method

Participants: 120 participants recruited via Prolific Ltd. (data for 114 participants were included in the analysis)

Task: a Web-based immediate serial recall task

Stimuli: 25 lists of 6 unrelated words (25 lists were randomly sampled from a pool of 100 lists for each participant)

Dependent variables: (1) correct-in-position, (2) item correct, and (3) order errors

Independent variables: (1) position (1-6), (2) semantic distance as semantic dissimilarity index (see Ishiguro & Saito, 2020a), (3) word length, (4) imageability, (5) frequency, and (6) age-of-acquisition

Analysis: We used logistic models (e.g., whether an item was recalled at the correct position (“1”) or not (“0”) for correct-in-position scoring)

Results

Logistic model for correct-in-position

As semantic distance of an item increased (semantic similarity decreased), the probability of recalling that item increased.

Logistic model for item correct

Semantic distance’s effect disappeared in item correct scores.

Logistic model for order errors

By contrast, other semantic-lexical variables had effects.

Discussion

Interpretations of Results

Semantic similarity, indexed by semantic distance, impaired STM (i.e., correct-in-position scores). Furthermore, absence and presence of semantic distance’s effect on item correct and order errors would imply that semantic similarity selectively impaired order memory, consistent with Ishiguro and Saito (2020a).

Implications

As the detrimental effect of semantic similarity is comparable to phonological and visual similarity effects in its direction, we suggest semantics-based processes or mechanisms in STM.

References


Preprint manuscript for the current study