

The Phonological Similarity Effect and the Word Length Effect: Hints for Maintenance Mechanisms in Working Memory



Gérôme Mora¹, Valérie Camos^{1,2} & Pierre Barrouillet³

¹ Laboratoire d'Etude de l'Apprentissage et du Développement, Université de Bourgogne

² Institut Universitaire de France

³ Université de Genève



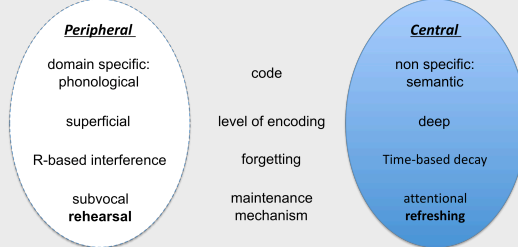
Phonological loop model

Baddeley, 1986

- verbal information are stored as phonological codes
- verbal information are maintained by subvocal rehearsal
- articulating irrelevant material impedes rehearsal
- recall of phonologically similar words suffers from acoustic confusion = PSE
- recall of long words suffers from longer articulatory duration = WLE

Extended Time-Based Resource-Sharing model

Camos, Lagner, & Barrouillet, 2009



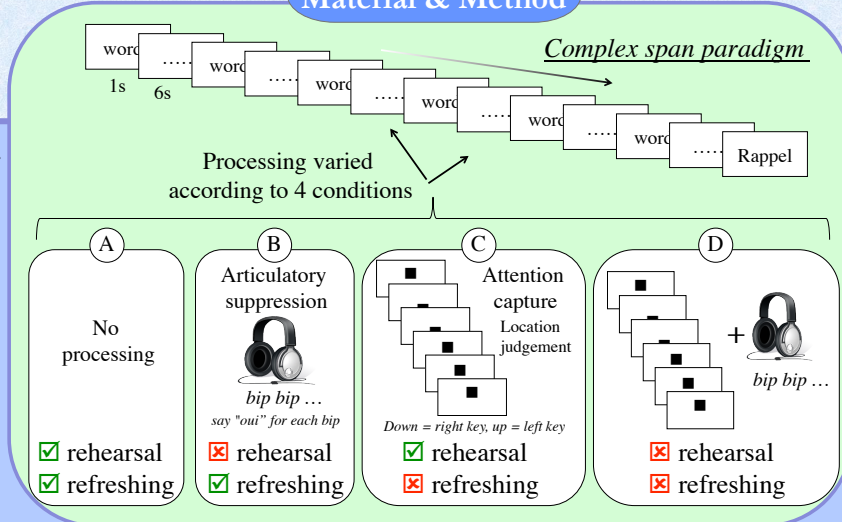
Are words maintained differently at peripheral and central levels?

Time-Based Resources-Sharing model (TBRS)

Barrouillet et al, 2007

- maintenance and processing require attention
- attention rapidly switches over maintenance and processing
- traces decay with time as soon as attention is switched away
- traces are refreshed by attentional focusing

Material & Method



Exp.1 PSE

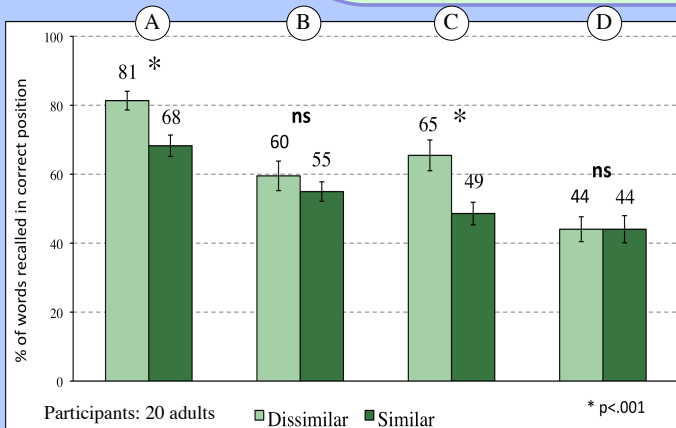
32 lists of 6 monosyllabic words to remember

Similar	Dissimilar
Same central phoneme	No common phoneme
col note roche gomme toque bosse	nage bosse mec chute ronde couche

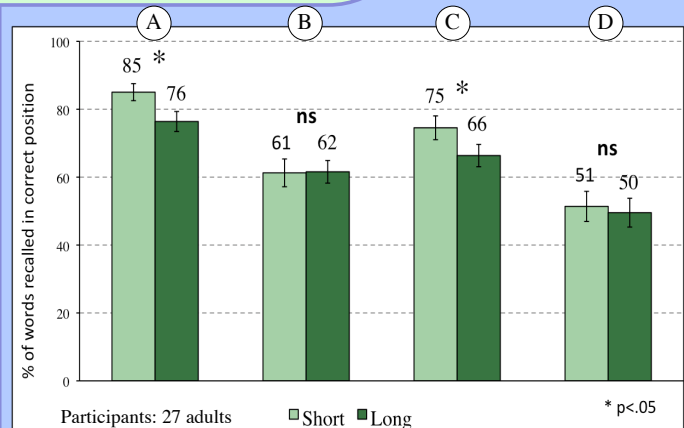
Exp.2 WLE

32 lists of 6 words to remember

Short	Long
> 1 syllable > 3 phonemes > 4 letters	> 2 syllables > 5 phonemes > 6 letters
peur tour face pied sens lieu	regard soleil milieu garçon esprit jardin



effect of similarity, $F(1,20) = 15.96$; $p < .001$, **attention**, $F(1,20) = 71.05$; $p < .001$, and **articulatory suppression**, $F(1,20) = 90.11$; $p < .001$
no interaction similarity x attention, $F < 1$
interaction similarity x articulatory suppression, $F(1,20) = 12.71$; $p < .001$



effect of length, $F(1,26) = 11.71$; $p < .01$, **attention**, $F(1,26) = 36.34$; $p < .001$, and **articulatory suppression**, $F(1,26) = 63.62$; $p < .001$
no interaction length x attention, $F < 1$
interaction similarity x articulatory suppression, $F(1,26) = 6.85$; $p < .05$

Conclusion

- Rehearsal and refreshing could work separately or jointly, and their effects on recall are additive.
- Words are stored as phonological codes when rehearsal is available and as non-phonological codes when rehearsal is impeded.
- ➔ Argue for the independence of peripheral and central levels assumed by the Extended TBRS model

Baddeley, A. D. (1986) Working Memory. Oxford: Oxford University Press
 Barrouillet, P., Bernardin, S., Portrat, S., Vergauwe, E., & Camos, V. (2007) Time and Cognitive Load in Working Memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 33(3), 570-585.

Camos, V., Lagner, P., & Barrouillet, P. (2009) Two maintenance mechanisms of verbal information in working memory. *Journal of Memory and Language* 61(3), 457-469.