European Working Memory Symposium: X

Resource reallocation in working memory through semantic chunks: Computational and behavioural evidence

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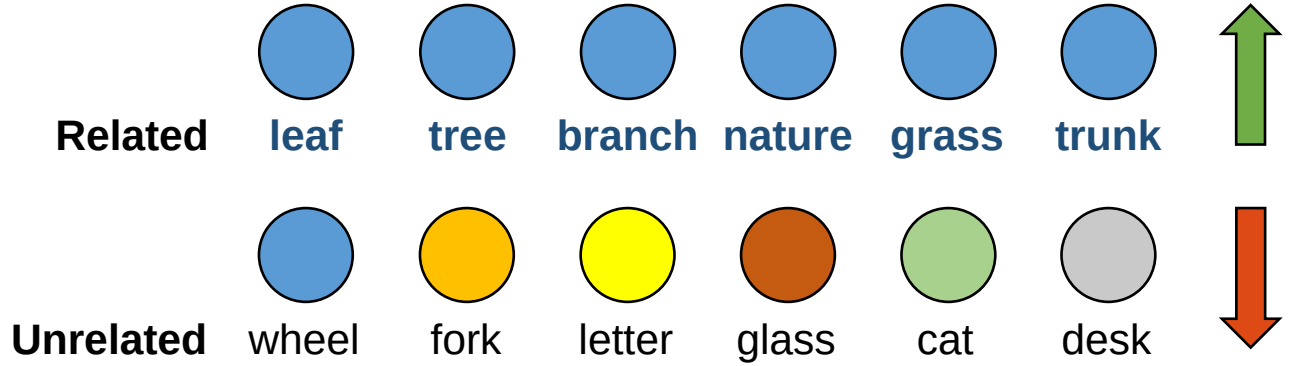
AGENCE NATIONALE DE LA RECHERCHE

Introduction

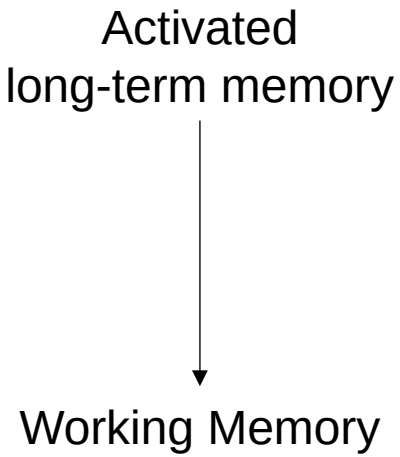
Linguistic knowledge impacts Working Memory (WM) performance

Semantic relatedness. Semantically related vs. unrelated words



Poirier & Saint-Aubin (1996)

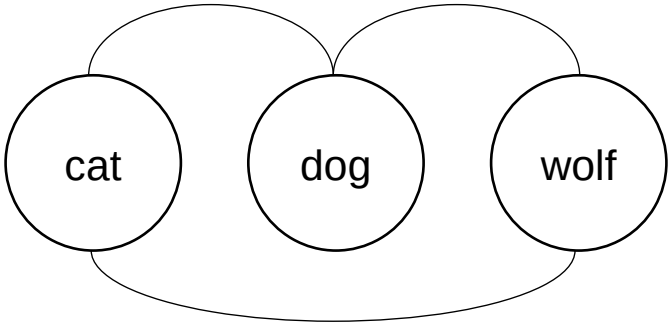
Introduction



Cowan (1995)

Introduction

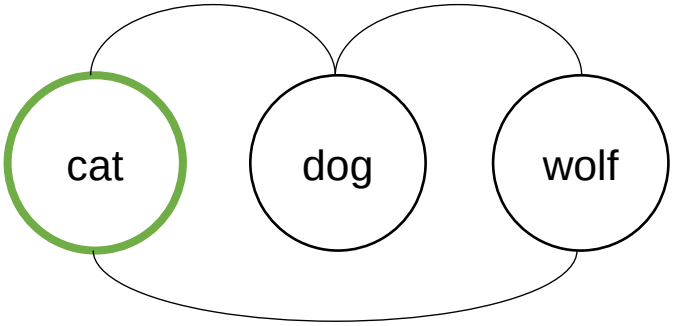
Interactive activation principles



McClelland & Elman (1981)
Dell et al. (1997)

Introduction

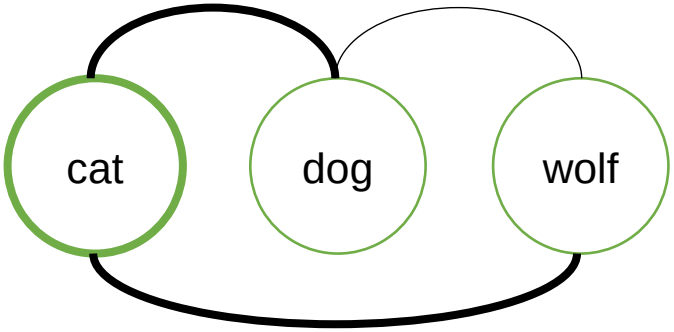
Interactive activation principles



McClelland & Elman (1981)
Dell et al. (1997)

Introduction

Interactive activation principles



Semantically related items reactive each other
Better recall performance due to higher activation levels

McClelland & Elman (1981)
Dell et al. (1997)

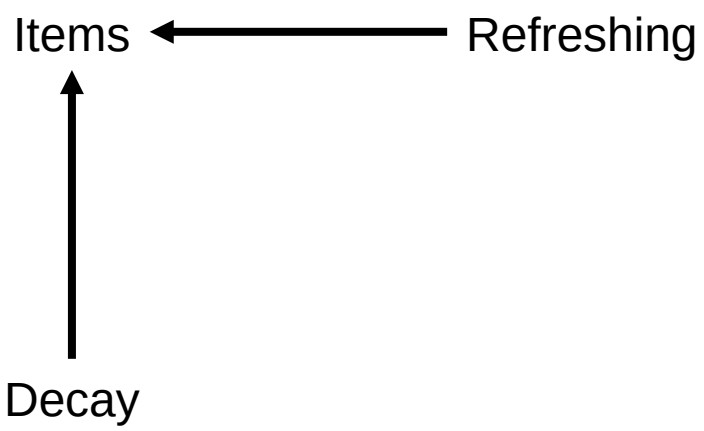
Introduction

Interactive activation models

Poor description of WM maintenance mechanisms.

Introduction

Time-Based Resource Sharing (TBRS) model



Barrouillet, Bernardin & Camos (2004)

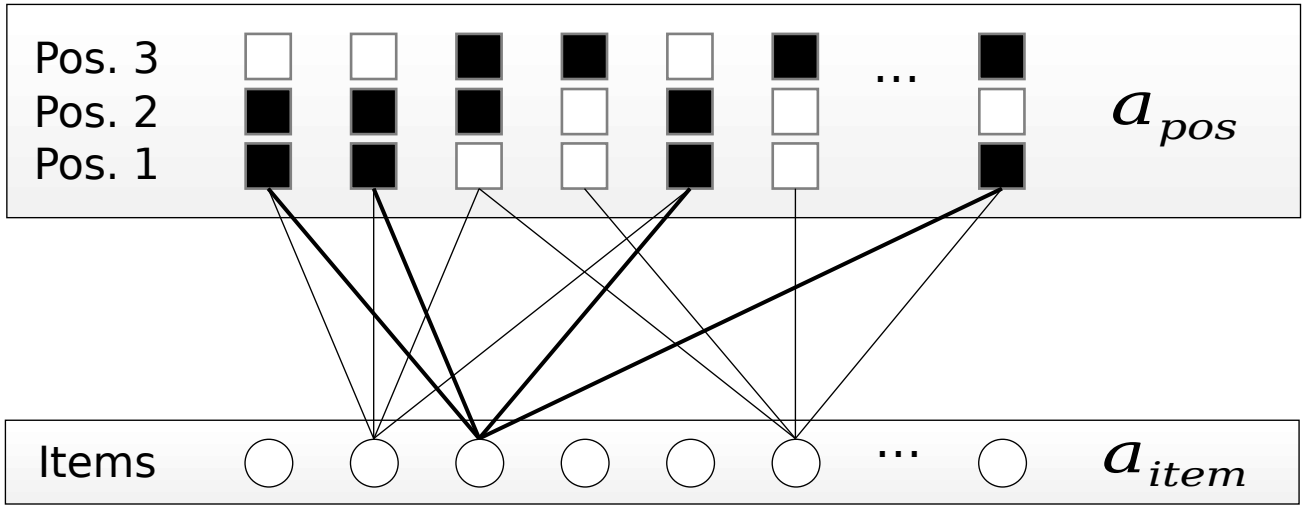
Introduction

Interactive activation models
Poor description of WM maintenance mechanisms.

TBRS model
Poor description of the long-term memory knowledge base.

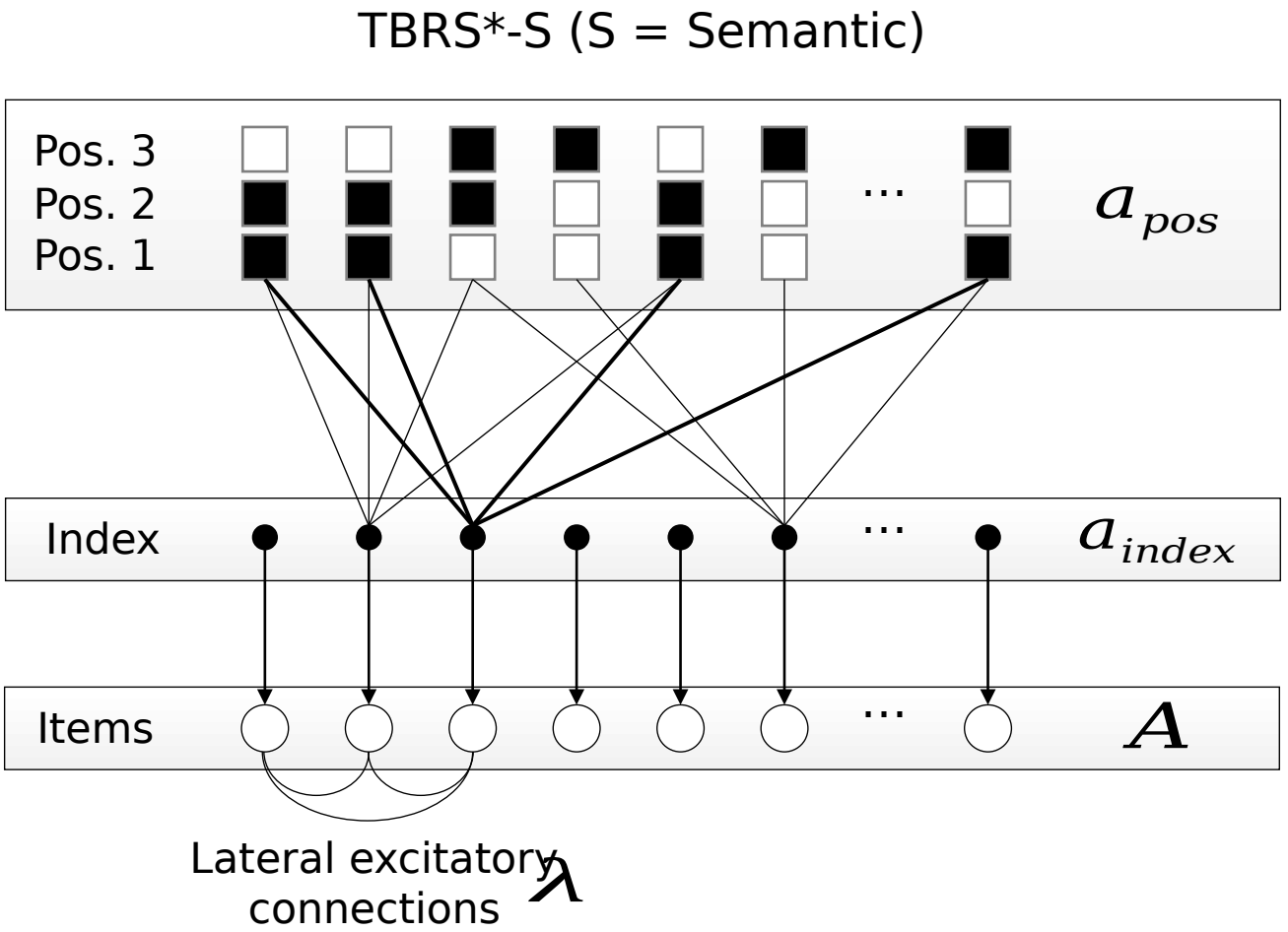
Architecture

TBRS*



Oberauer & Lewandowsky (2011)

Architecture



Kowialiewski, Lemaire & Portrat (*submitted*)

Architecture

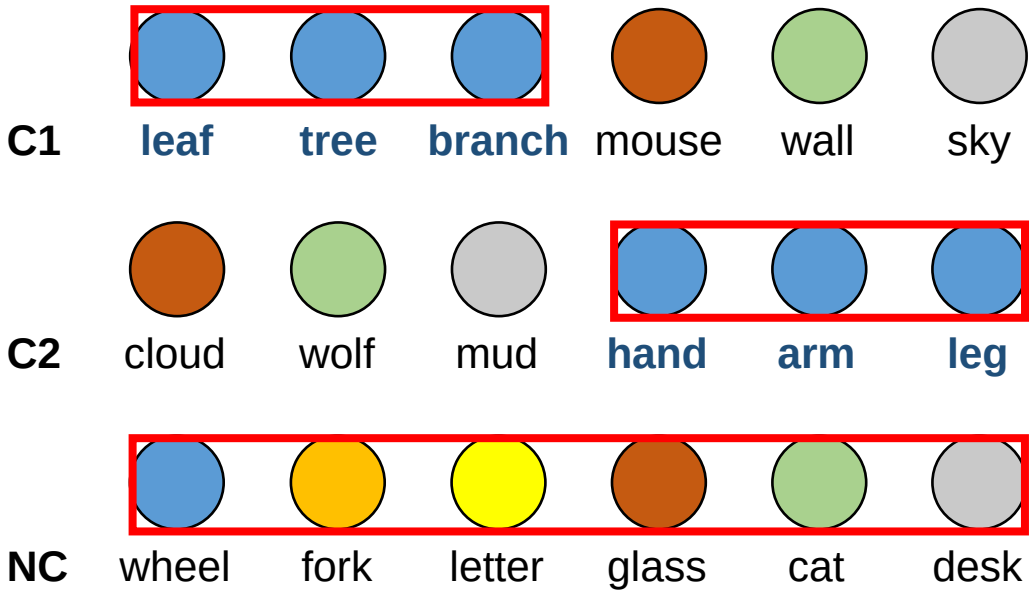
Prediction:

The presence of semantic relatedness should free up attentional WM resources.

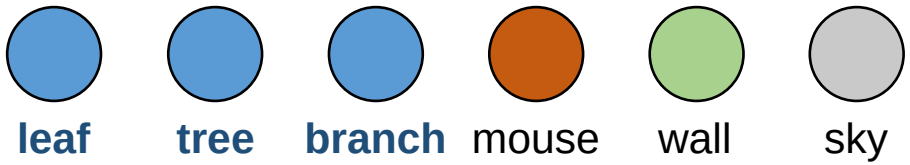
Methods

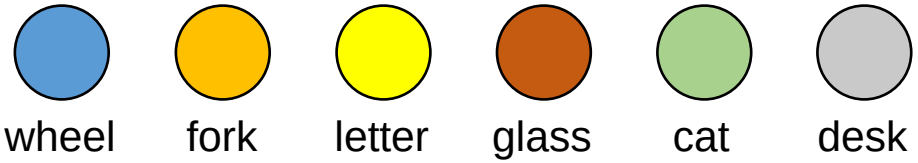
Experiment: Human participants

Semantic chunks

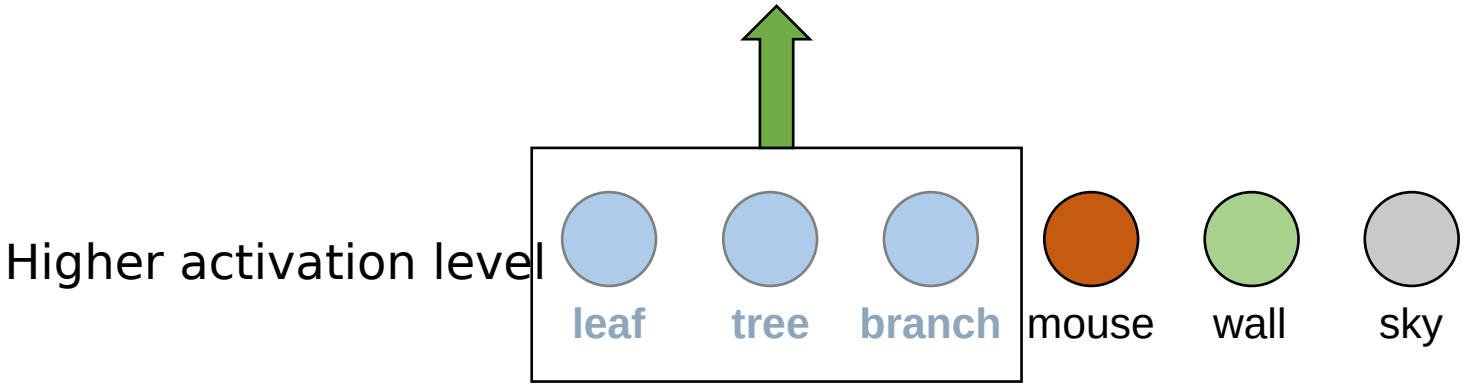


Methods

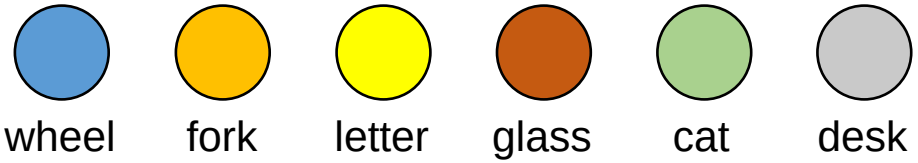

leaf
tree
branch
mouse
wall
sky


wheel
fork
letter
glass
cat
desk

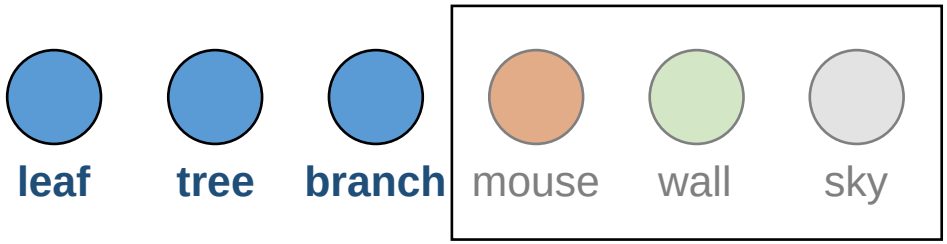
Methods



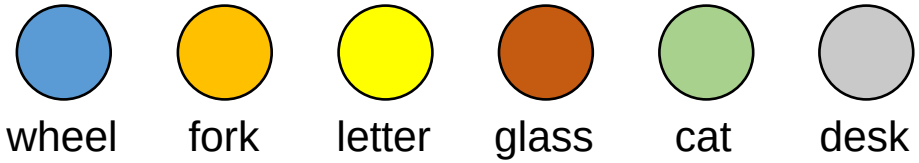
Less refreshing attempts should be required to keep them active!



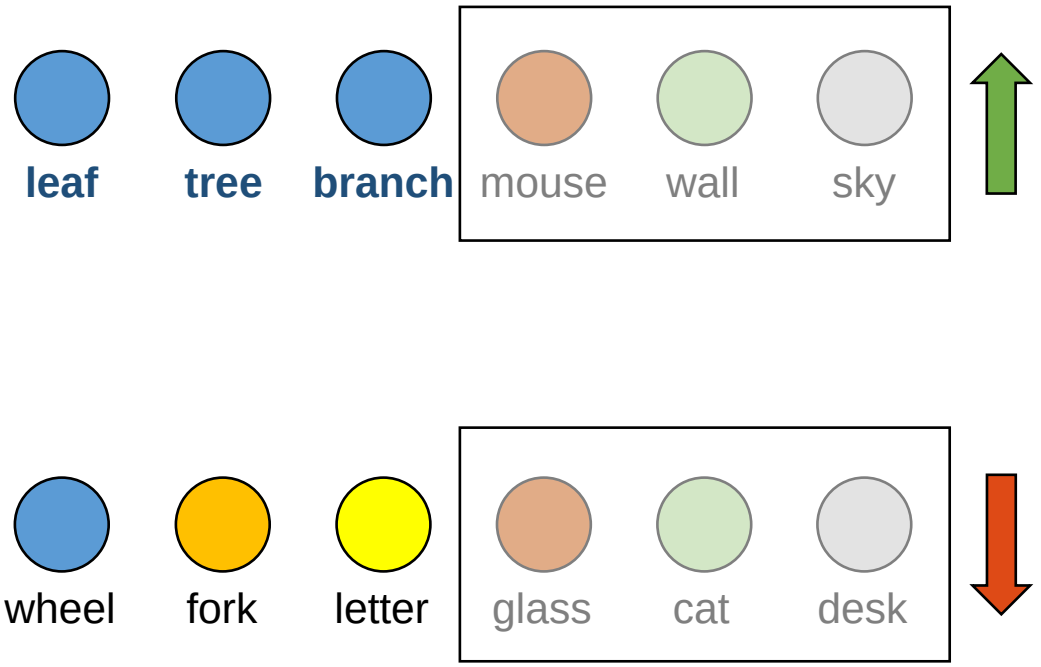
Methods



The attentional resources should be **reallocated** toward these items.



Methods


leaf
tree
branch
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letter
glass
cat
desk

Methods

How does the system “know” when attentional resources should be **reallocated**?

This is determined by the **refreshing schedule**.

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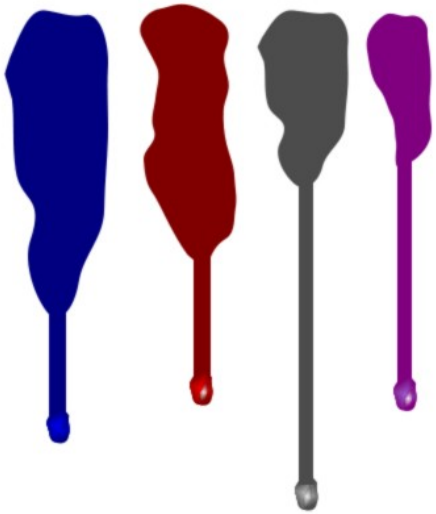
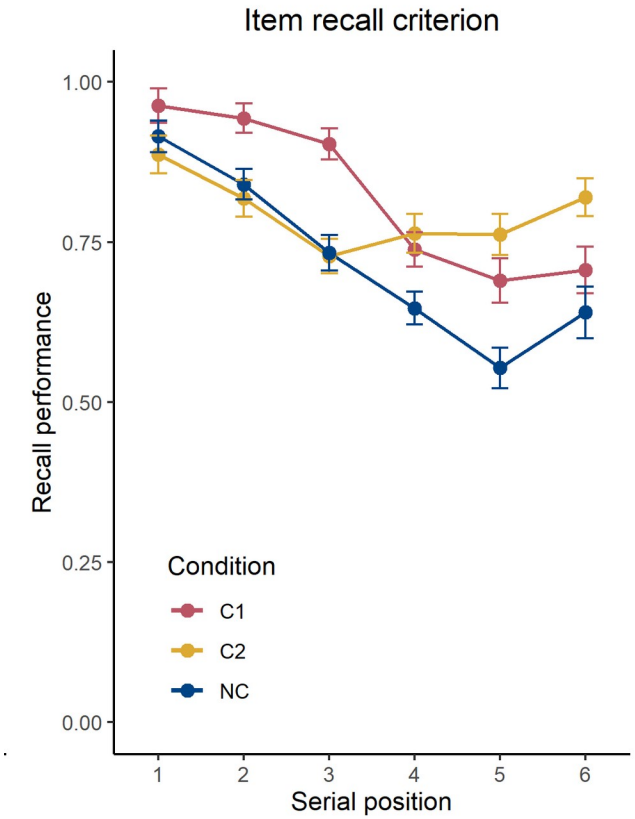


Least Activated First refreshing schedule
Lemaire, Pageot, Plancher & Portrat (2018)

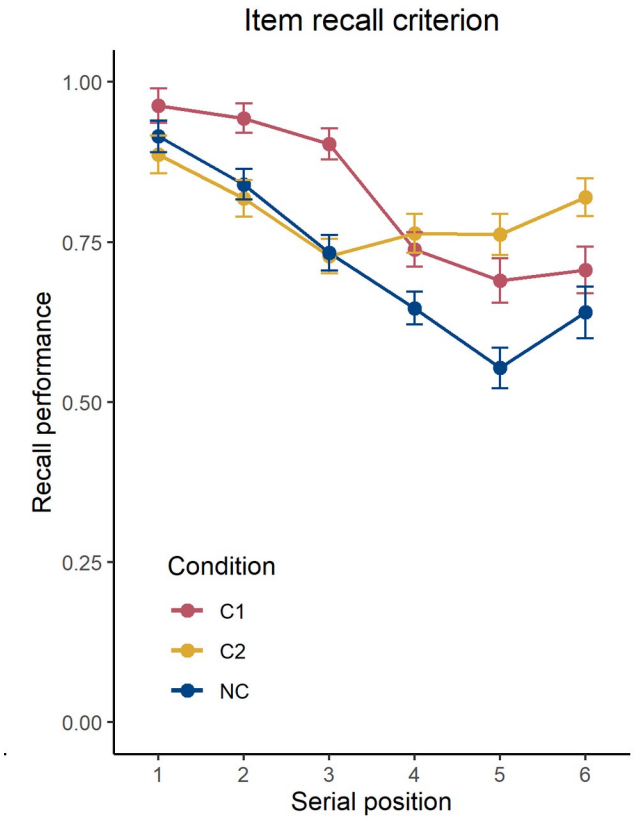
Results

Empirical data

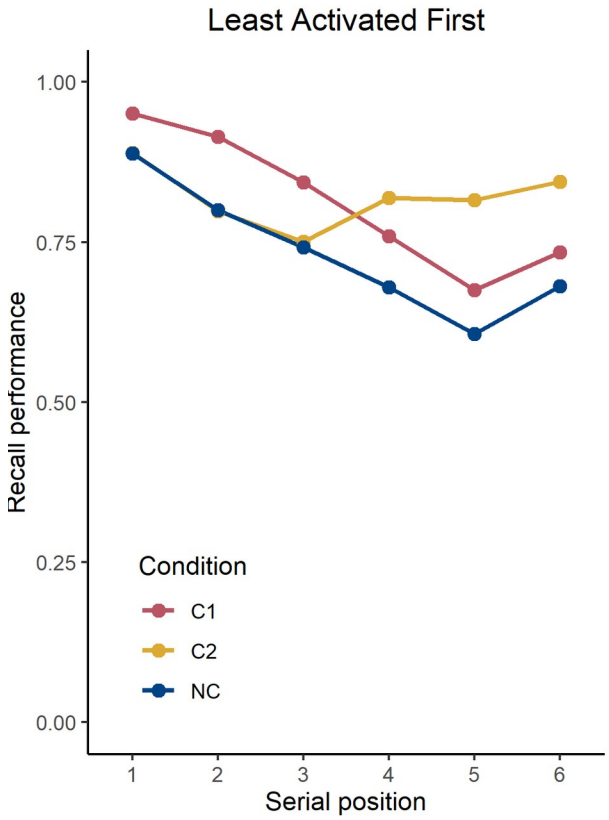


Results

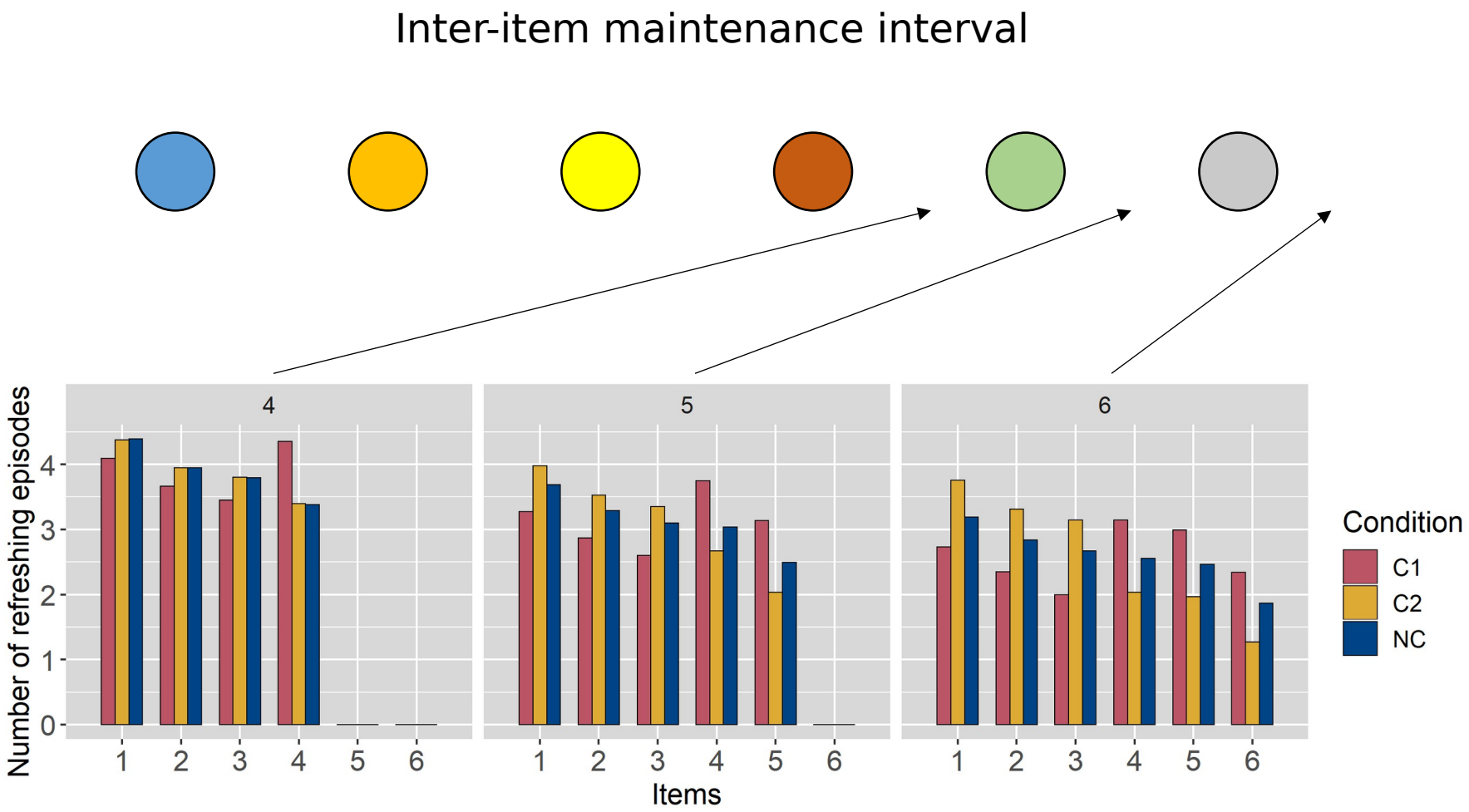
Empirical data



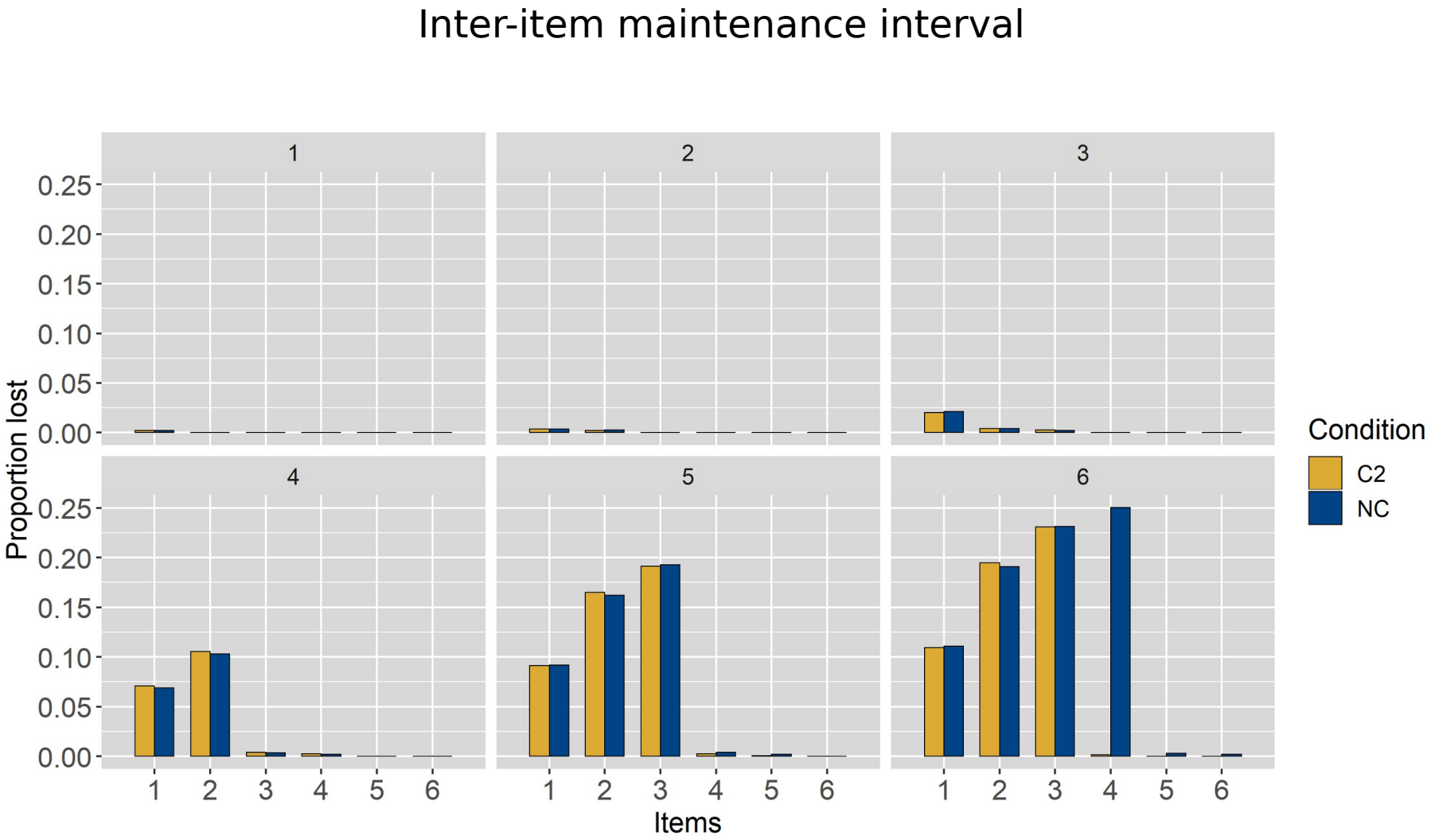
Model



Results


Inter-item maintenance interval
4
5
6
Number of refreshing episodes
0
1
2
3
4
1
2
3
4
5
6
Items
Condition
C1
C2
NC

Results


Inter-item maintenance interval
1
2
3
4
5
6
Proportion lost
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6
Items
Condition
C2
NC

Results

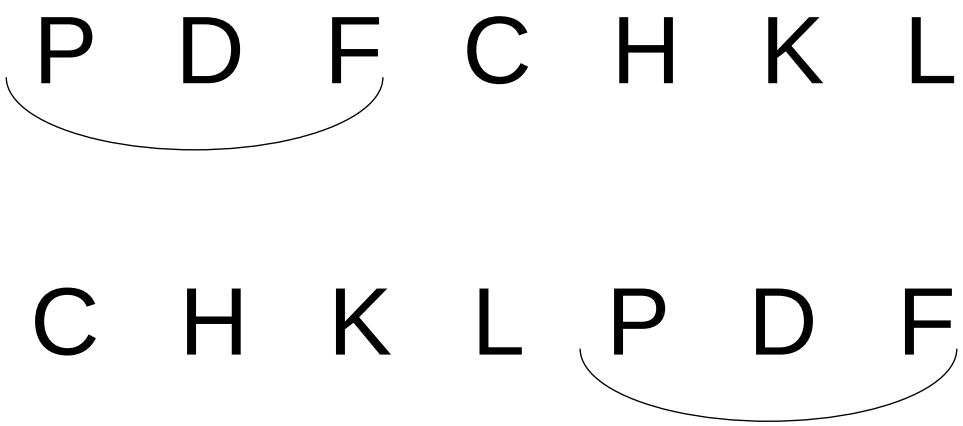
There was **no retroactive impact**, because the attentional reallocation benefited to those items that were **strongly activated enough to survive this far**.

Discussion

Semantic knowledge can free up attentional WM resources.

These attentional WM resources can be reallocated for maintenance purpose.

Discussion



Thalmann, Souza & Oberauer (2019)

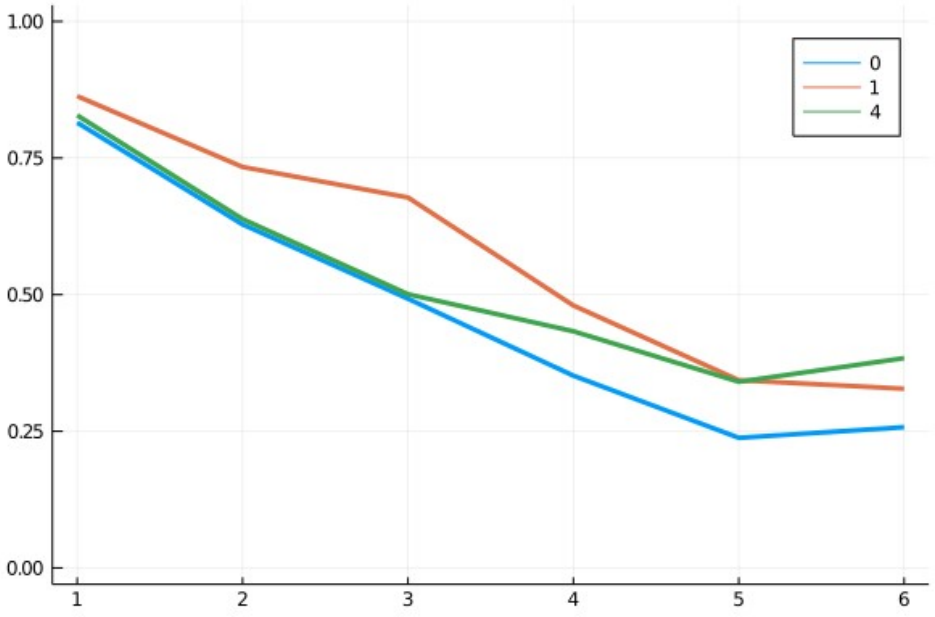
Discussion

It has been argued that decay and refreshing models predict a retroactive impact

Thalmann, Souza & Oberauer (2019)

Discussion

TBRS*-C (C = Chunking)

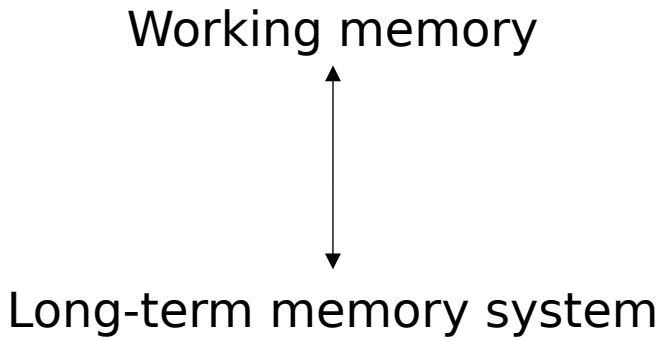


Portrat, Guida, Phénix & Lemaire (2016)

Discussion

What about an interference-based perspective?

Conclusion



The long-term memory systems also constrains how information is maintained in WM.

The way long-term memory knowledge impacts WM performance may also inform us about the core properties of WM itself.

Thank you for your attention