



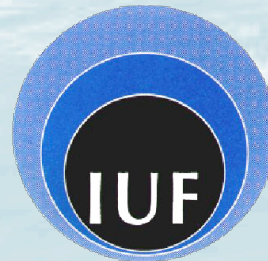
An investigation of maintenance mechanisms in working memory through phonological similarity and word length effects

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de France



3 University of Geneva



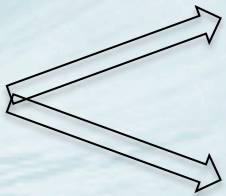
**UNIVERSITÉ
DE GENÈVE**



What is working memory?

- Time limited

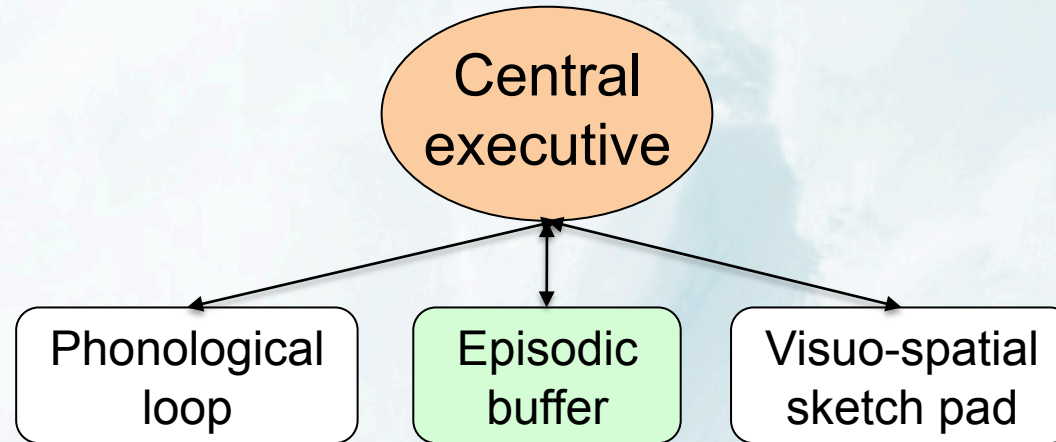
- Capacity limited

- Responsible of  processing
storage



Phonological Loop model

(Baddeley, 1986, 2000)



- Phonological code
- Articulatory rehearsal

Evidences from:

Phonological Similarity Effect (PSE) = better recall for dissimilar than similar words

cow day bar mad man cat

Word Length Effect (WLE) = better recall for short than for long words

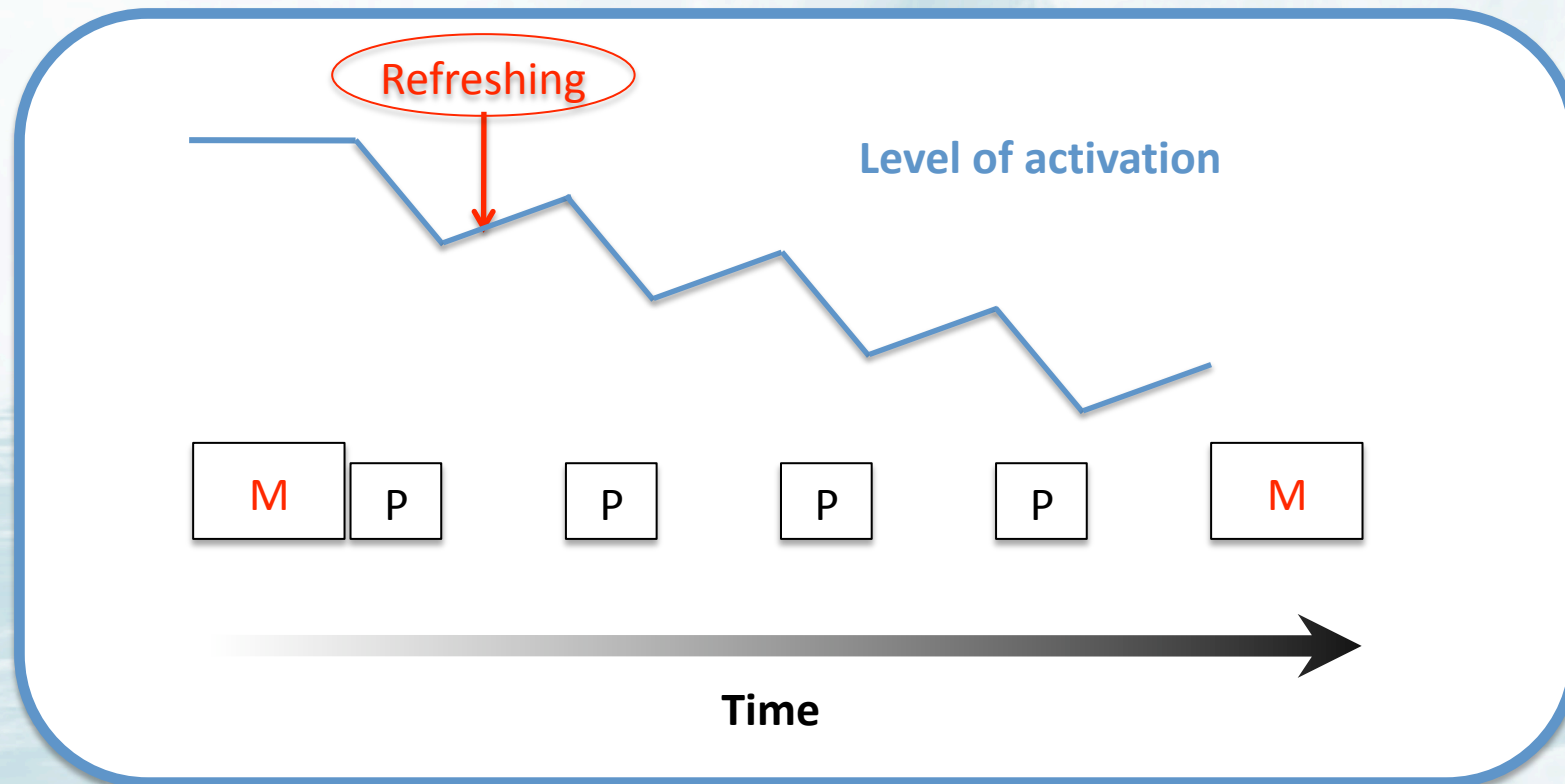
sum hate harm friday humane cyclone



Time-Based Resources-Sharing model

(Barrouillet et al., 2007)

- Time-related trace decay
- Traces are refreshed by attentional focusing
- Switching of attention between Processing and Maintenance





Time-Based Resources-Sharing model

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(Barrouillet et al., 2007)

Evidences of attentional refreshing come from:

Attentional demand effect = better recall with low than with high demanding processing



Maintenance of verbal information

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Rehearsal

Refreshing

How the two mechanisms interplay?



Camos, Lagner, & Barrouillet (in press)

- 2 independent mechanisms
- Jointly used

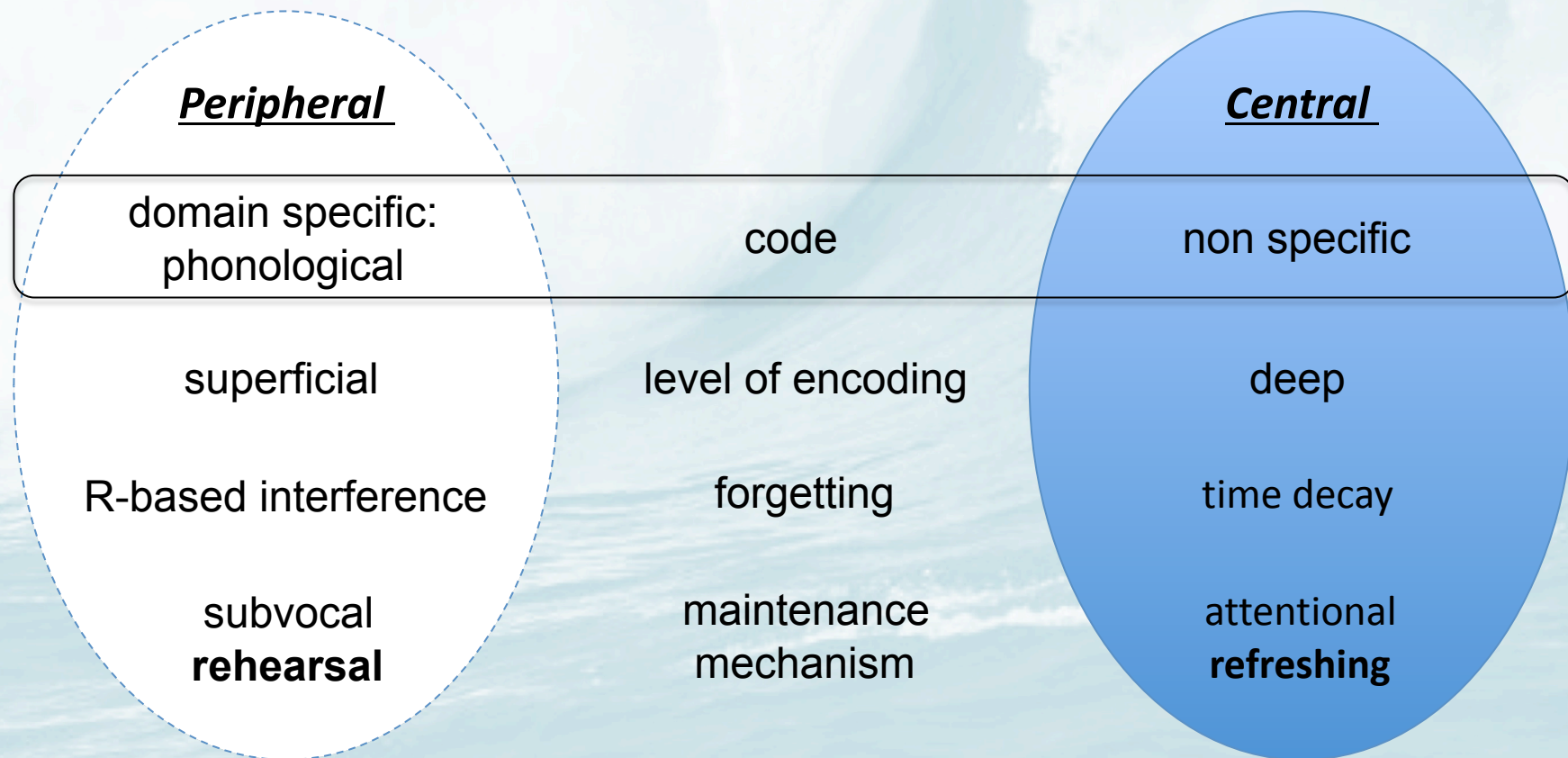


An extended version of the Time-Based Resource-Sharing model

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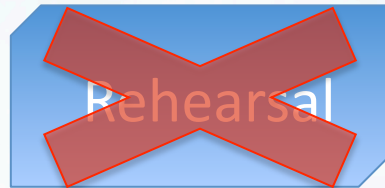
(Camos, Lagner, & Barrouillet, in press)

Two levels for maintenance of verbal information in WM





The present study



articulatory suppression

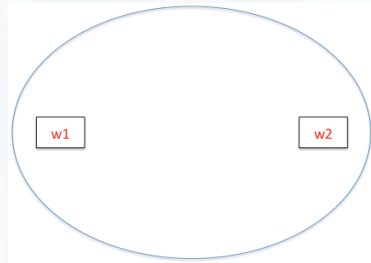


attention demanding processing

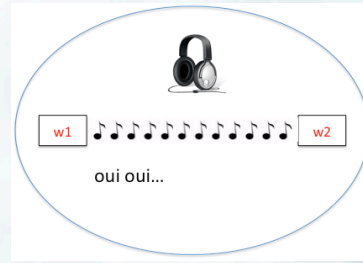
Predictions

Rehearsal	Refreshing	PSE	WLE
✓	✓	Yes	Yes
✗	✓	No	No
✓	✗	Yes	Yes
✗	✗	No	No

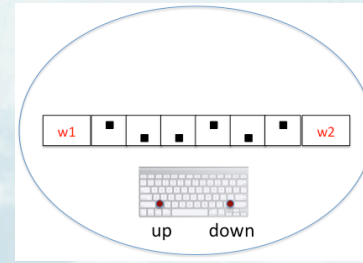
General procedure



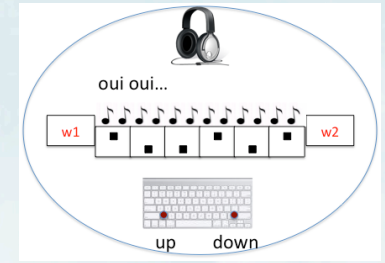
Both Rehearsal and Refreshing available



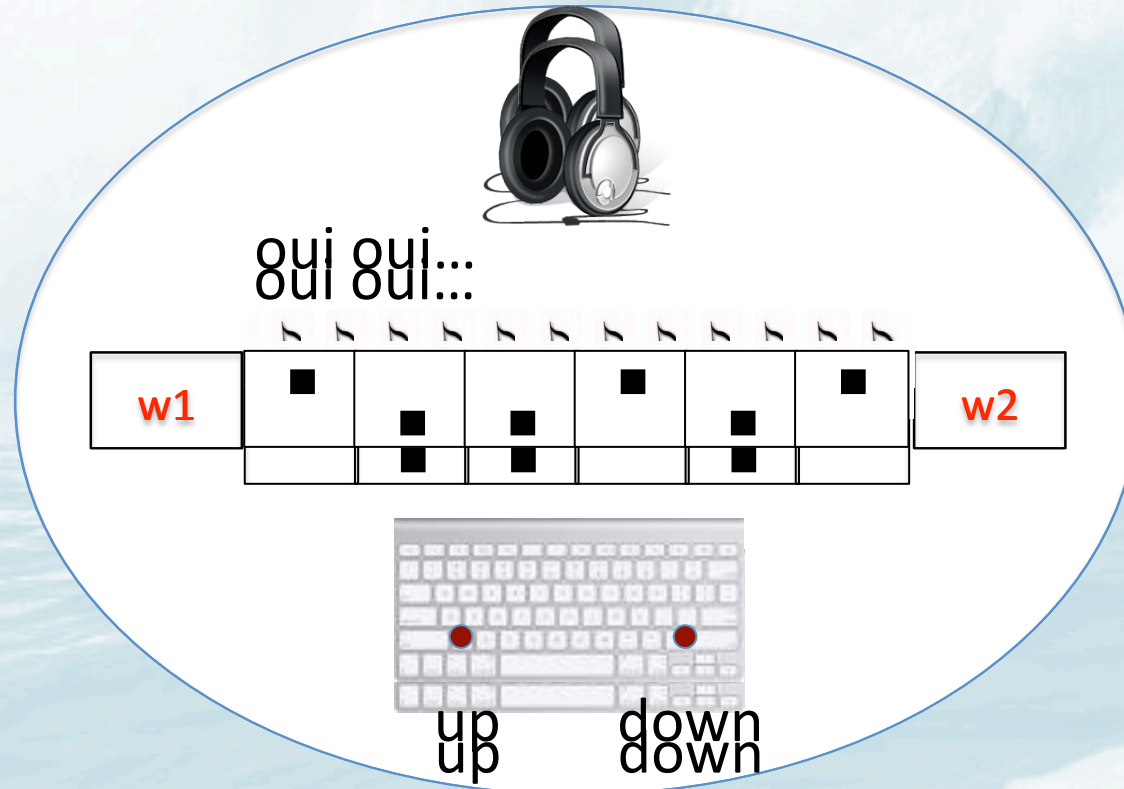
Rehearsal impeded



Refreshing impeded



Both refreshing and Rehearsal impeded





Material Exp. 1

Words to remember:

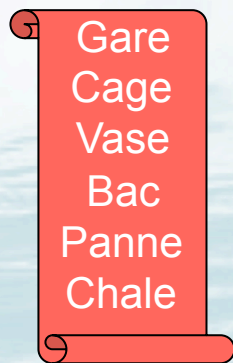
2 pools of 96 monosyllabic French nouns

CVC phonological structure

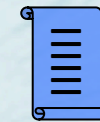
Lists of 6 words

Similar lists

Same central phoneme



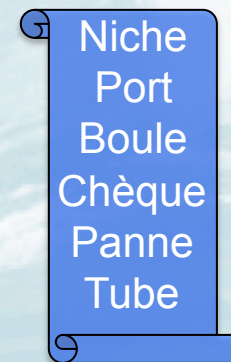
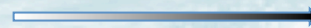
Gare
Cage
Vase
Bac
Panne
Chale



Dissimilar lists

No common phoneme

Same words arranged
in a different way



Niche
Port
Boule
Chèque
Panne
Tube



Results Exp. 1

1s

w1

6s

w2

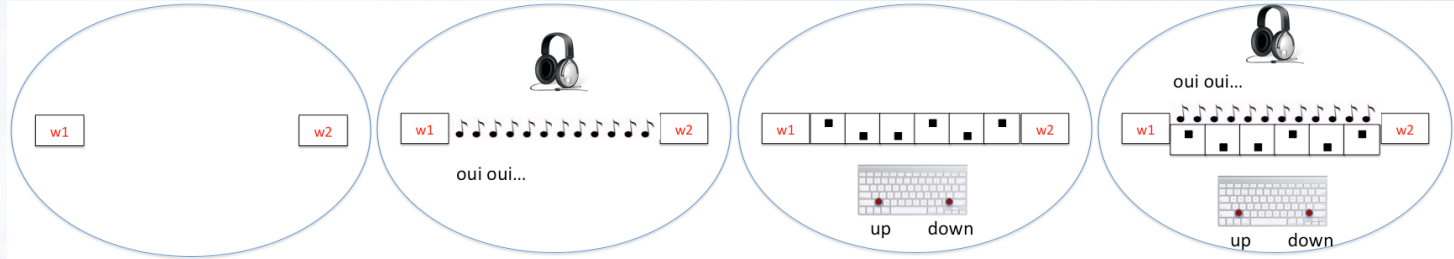
w3

w4

w5

w6

Recall



PSE $\rightarrow F(1,20) = 15,96;p<.001$

Attention demand effect $\rightarrow F(1,20) = 71,05;p<.001$

No interaction Similarity*Attention $\rightarrow F<1$



Results Exp. 1

1s
6s

w1

w2

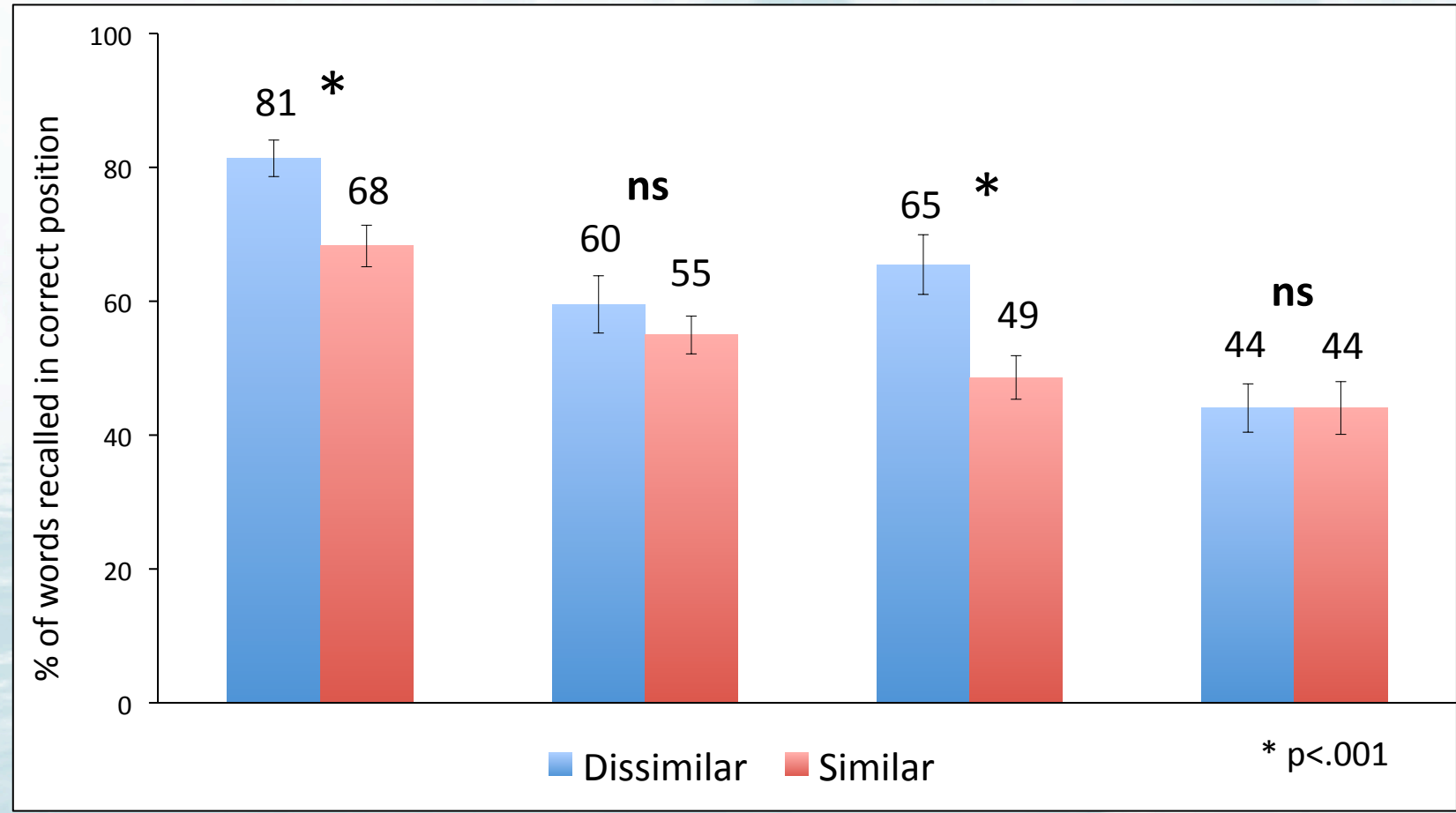
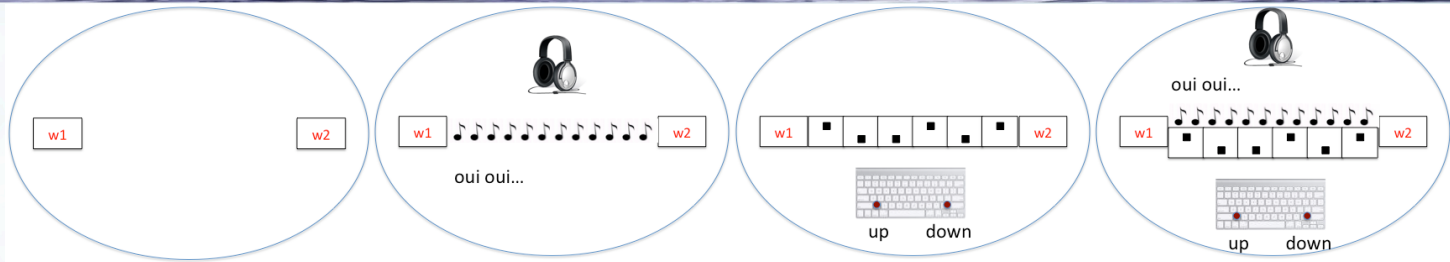
w3

w4

w5

w6

Recall





Conclusion Exp. 1

12

1

When rehearsal is impeded refreshing is used
When refreshing is impeded rehearsal is used

2

Recall is better when rehearsal and refreshing are both available

3

No PSE when only refreshing is available
→ Refreshing is independent of similarity of phonemes



Material Exp. 2

Words to remember:

2 pools of 96 French nouns

Short words

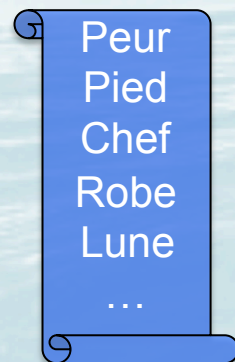
- 3 phonemes
- 1 syllable
- 4 letters
- frequency $10 < < 355$

Long words

- 5 phonemes
- 2 syllables
- 6 letters
- frequency $8 < < 368$

Lists of 6 words randomly selected from:

Pool of **short** words



Peur
Pied
Chef
Robe
Lune
...

Pool of **long** words

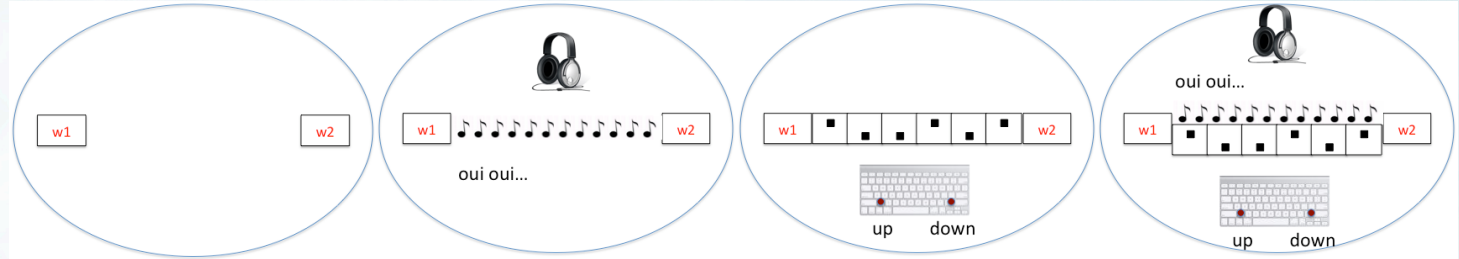


Soleil
Jardin
Papier
Destin
Valise
...



Results Exp. 1

- 1s w1
- 6s w2
- w3
- w4
- w5
- w6
- Recall



WLE $\rightarrow F(1,26) = 8,57;p<.001$

Attention demand effect $\rightarrow F(1,26) = 25,99;p<.001$

No interaction Length*Attention $\rightarrow F<1$



Results Exp. 2

1s
6s

w1

w2

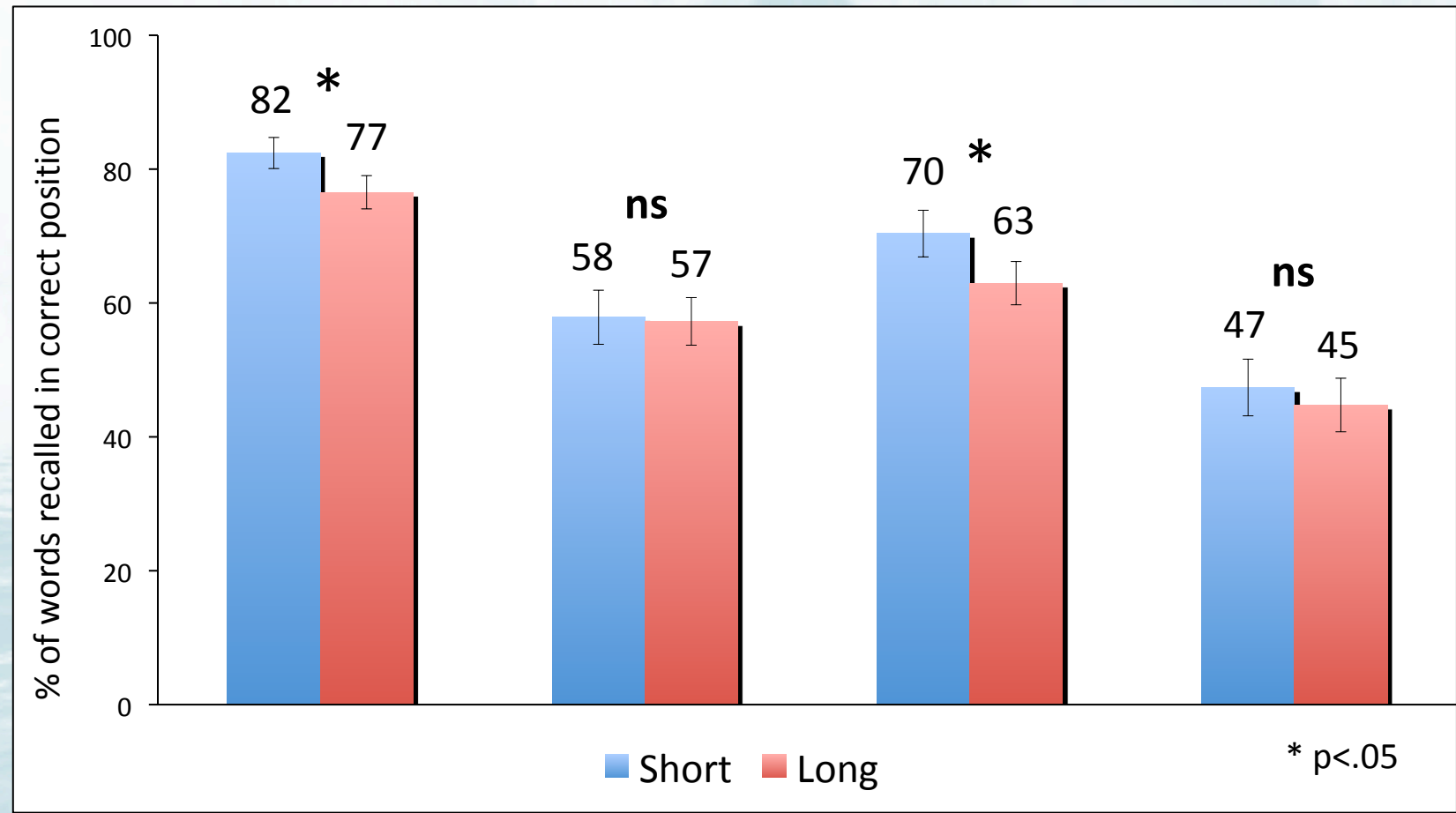
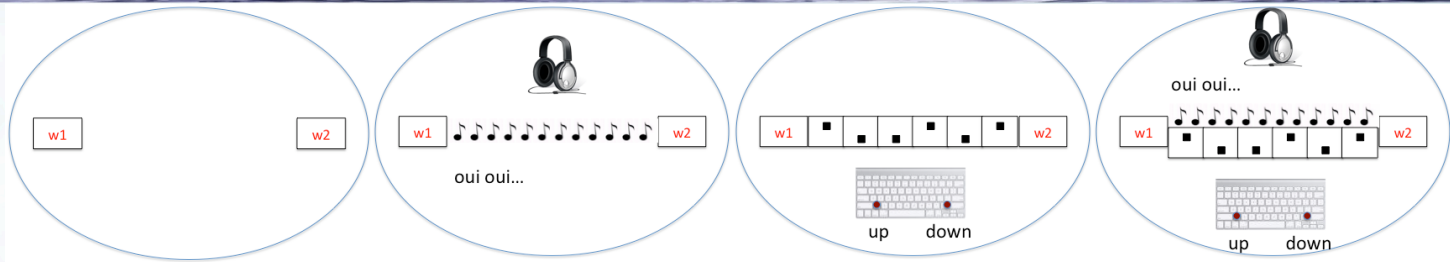
w3

w4

w5

w6

Recall





Conclusion Exp. 2

16

1

When rehearsal is impeded refreshing is used
When refreshing is impeded rehearsal is used

2

Recall is better when rehearsal and refreshing are both available

3

No WLE when only refreshing is available
→ Refreshing is independent of number of phonemes



Conclusion

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1

As previously observed (Camos et al., in press)

Rehearsal and Refreshing

- 2 independent levels of maintenance
- Can work jointly

2

**Rehearsal Is dependant of phonological code
whereas ...**

**Refreshing is independent of phonological
characteristics**

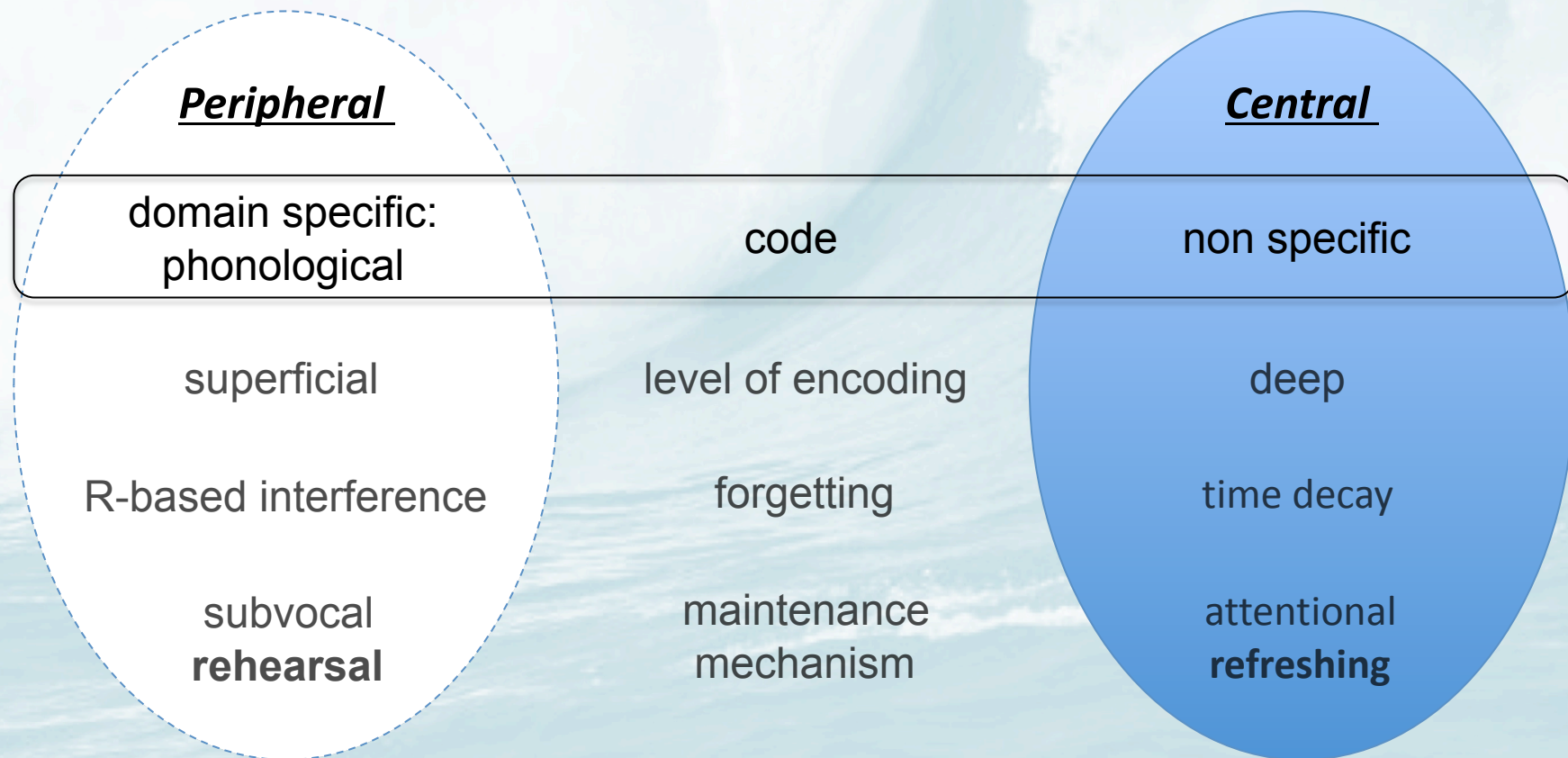


An extended version of the Time-Based Resource-Sharing model

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(Camos, Lagner, & Barrouillet, in press)

Two levels for maintenance of verbal information in WM





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Marie-Aude Bardier*

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*ANR
MEN*

LEAD
Laboratoire d'Etude de l'Apprentissage et du Développement

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