Is working memory resource depletion effect observable with a dictation task?

Aurélie Huret, Alina Petri, Elisabeth Fonteneau, Maélys Aquilina,
Maeva Dada, Isil Aykin, Killian Krossbery, André Tricot
Epsylon Lab., University Paul Valéry Montpellier, France

The Time-Based Resources Sharing model

- Attention is the main resource in WM
- It can only be focused on one task at any time, processing a task and maintaining chunks actively requires multitasking
- Multitasking can occur due to a rapid switching between processes
- Time is considered as the main source of forgetting and chunks held active in working memory have to be refreshed periodically to prevent forgetting

- In sum: performing a double task => high load, mainly when time pressure on one of them

Questions and hypotheses

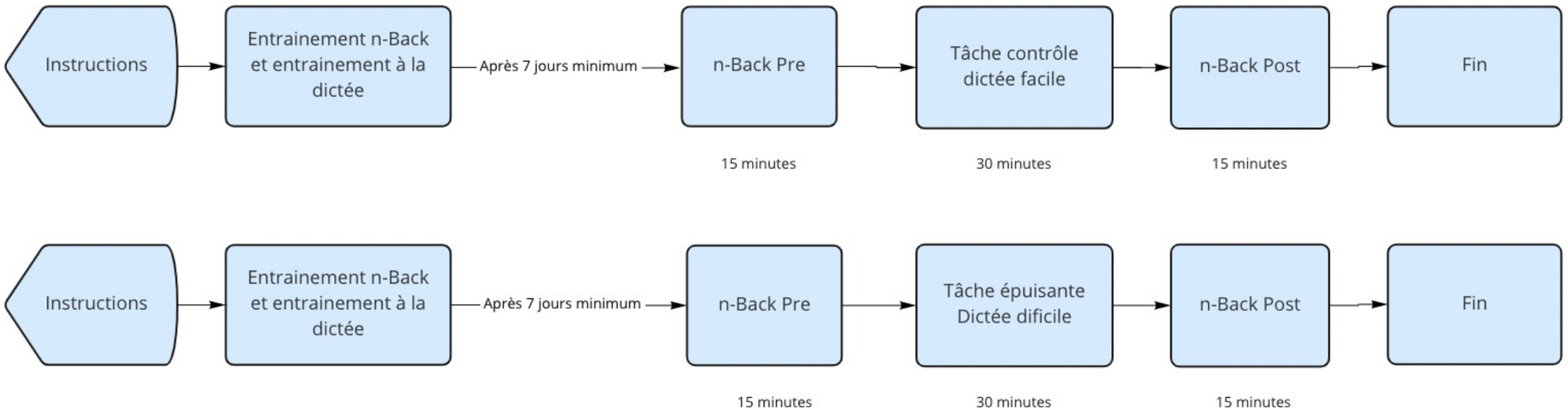
- Is time having an effect on spelling performance?
- Does a better temporal management of the attentional resources :
  - reduce cognitive load?
  - increase performance?

- Hypotheses
  - Increasing the rest time between words increases performance by reducing cognitive load.
  - This effect is greater for novices than for experts.

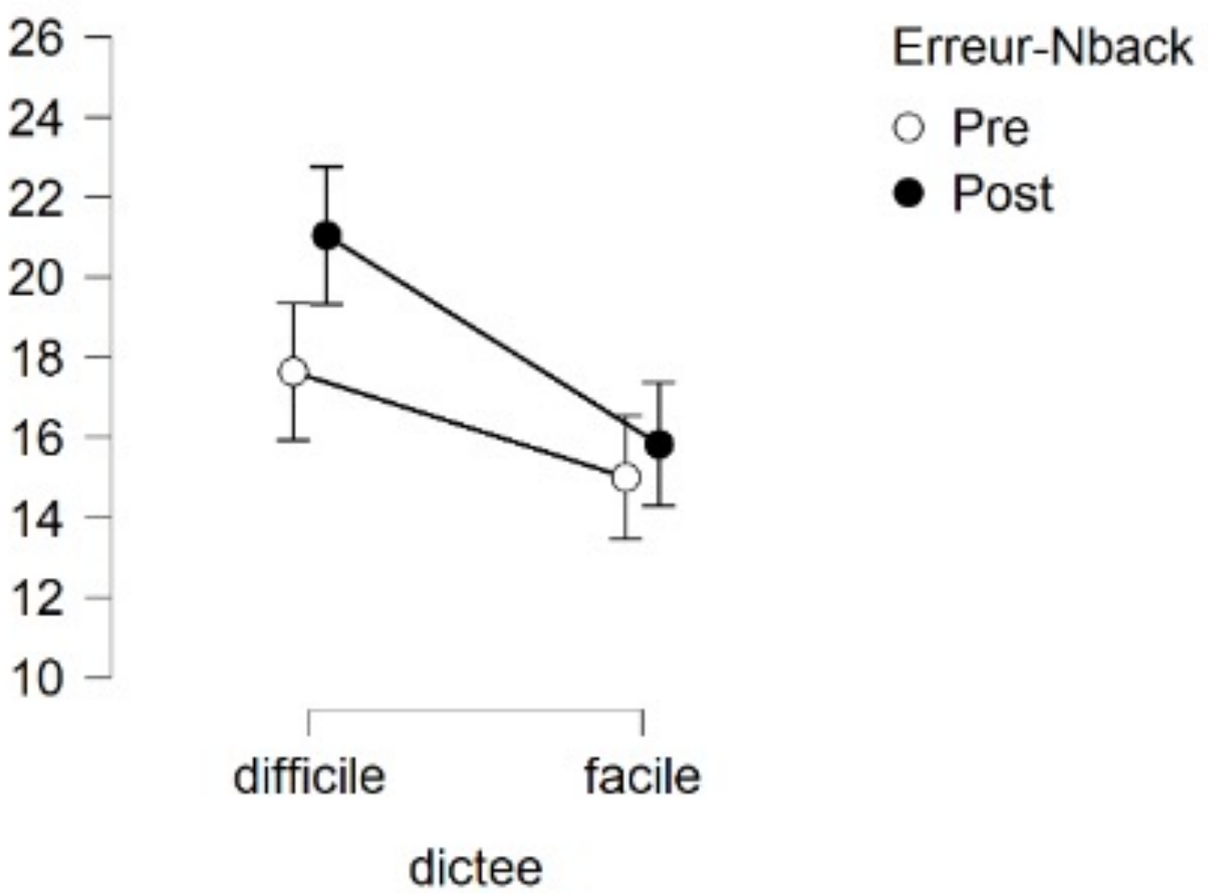
Méthode

- Participants: 45 University students (1st and 2nd year); 2 experimental groups; random assignment
- Task: dictation for 30’.
- Independant Variable: type of task (dictation)
  - easy dictation (le chat mange): 23 participants
  - difficult dictation (les superstars monnaieront): 22 participants
- Dependant Variable
  - Performance on the dictation task (error and speed)
  - Percentage correct on the memory task (2-Back)
- Controlled Variable: French fluency

Procedure

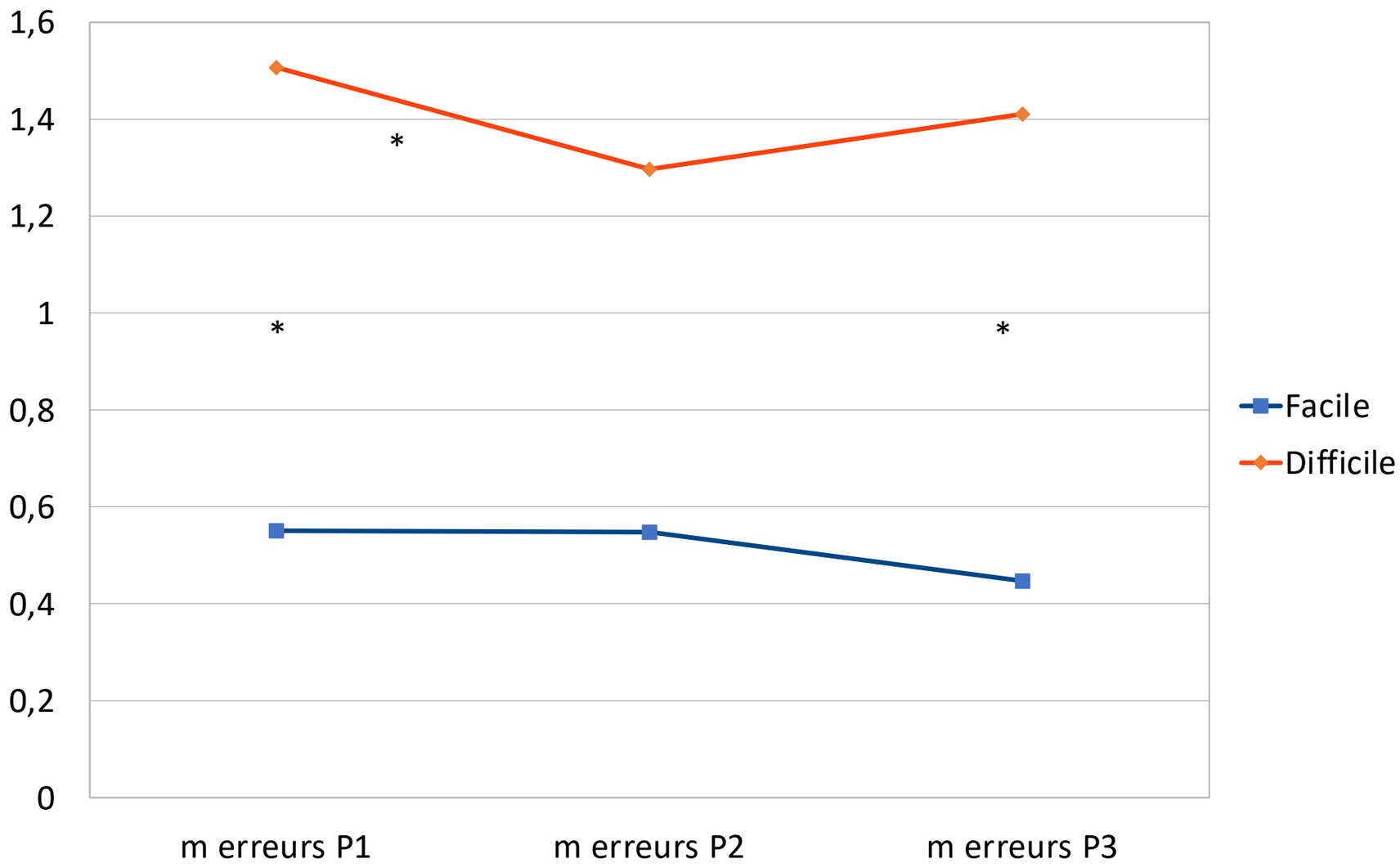

Instructions
Entrainement n-Back et entrainement à la dictée
Après 7 jours minimum
n-Back Pre
Tâche contrôle dictée facile
n-Back Post
Fin
15 minutes
30 minutes
15 minutes
Instructions
Entrainement n-Back et entrainement à la dictée
Après 7 jours minimum
n-Back Pre
Tâche épuisante Dictée dificile
n-Back Post
Fin
15 minutes
30 minutes
15 minutes

Results N-back : NOTHING!



No effect on number of Errors

Dictation errors, by third parties



No significant effect of the difficulty of the dictation, except on dictation performance and perceived difficulty

Anova(Welch)		
	F	p.
Nback Diff pre-post	0.4136	0.525
1st third dictation	48.5924	< .001
2nd third dictation	17.5918	< .001
3rd third dictation	27.6793	< .001
average dictation	31.2333	< .001
Nback error_pre	0.5387	0.469
Nback Total e_pre	0.4942	0.487
Nback error_post	0.0846	0.773
Nback Total e_post	0.7923	0.379
Boredom dictation	1.9648	0.169
Perceived dictation	11.6618	0.002
Motivation pre Nback	0.1576	0.695
Motivtation post Nback	0.1209	0.730
Fatigue pre experiment	0.2610	0.612
Fatigue post dictation	0.0116	0.915
Fatigue post exp	0.0476	0.828

Discussion

- After we failed to replicate working memory resource depletion effect
  - In transcription task with adults (Vié et al., 2021)
  - In dictation task with children (Brellier & Tricot, 2021).
- We now failed to replicate
  - In dictation task with adults
- It is difficult to explain, because our dictations are very long and demanding
- Maybe resource depletion effect should be obtained in more complex tasks / double tasks

Thank you!

Andre.Tricot@univ-montp3.fr