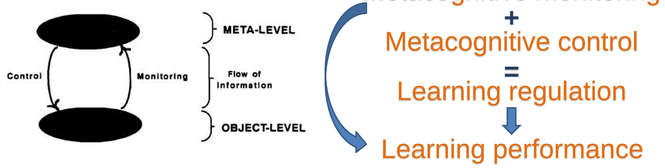
Spontaneous Retrieval-based Metacognitive Monitoring in Study Decision Making

Mengjiao Wu, and Dr. Christopher Was
Kent State University, Kent, OH

Background

Metacognition:

- Cognition and control of one's own cognitive activities, such as learning (Dunlosky & Metcalfe, 2009)
- Nelson and Narens' (1990) two-central-dimension framework
- An effective predictor of academic achievements (Ruban, 2000)



Metacognitive monitoring
+
Metacognitive control
=
Learning regulation
⇩
Learning performance

Metacognitive monitoring:

- Evaluation of the progress/state of a cognitive activity
- Typical assessments: JOL, JOK, and JOC
- Retrieval-based judgments likely to be more accurate

Retrieval

- an important metacognitive strategy in making accurate monitoring (Metcalfe & Finn, 2009).
- improves long-term retention and learning (Pyc & Rawson, 2010; Roediger & Karpicke, 2009).

Retrieval cut-off: the minimum time required to retrieve information of comparable complexity that is not highly practiced (Staszewski, 1988).

What is missing in the Literature?

Existing Procedure:
focused mostly on the effect of manipulations on learning (Karpicke, et al., 2009)

Existing Assessments:
under experimental instruction: JOK, JOL, JOC

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not appropriate to explore individuals' spontaneous behaviors and effect

Existing measurements:
Methodological weakness:

- depend on self-reporting (subjective) (Nelson & Dunlosky, 1991)
- use offline measures

Research Purposes

We attempted to capture spontaneous metacognitive monitoring with a strictly objective and online measure of studying behaviors (study decision response time).

Research questions

How do learners make study decisions in study?

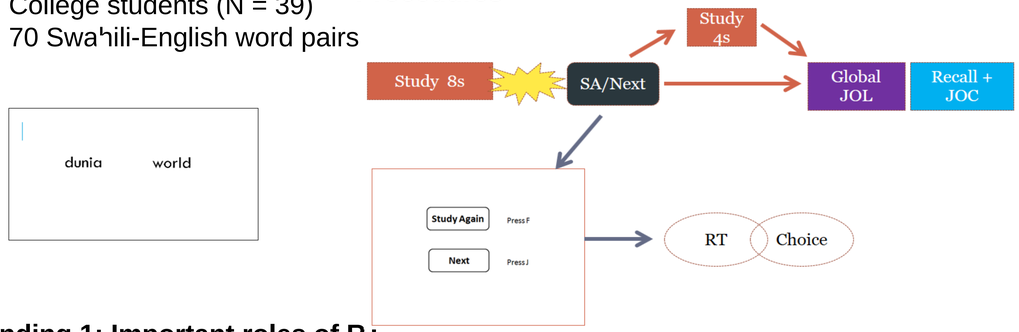
Do learners base their study decisions on retrieval results?

Experiment 1

Design

- College students (N = 39)
- 70 Swaḥili-English word pairs

Procedures



Finding 1: Important roles of RT

- Correlation: RT is significantly correlated to test accuracy and study decision.
- Mixed model: RT is a significant predictor of test accuracy.

Finding 2: Retrieval

- Retrieval is likely to be performed based on the existence of the cut-off in RT.

Experiment 2

Purposes

- Further examine if retrieval is spontaneously performed to guide study decisions.

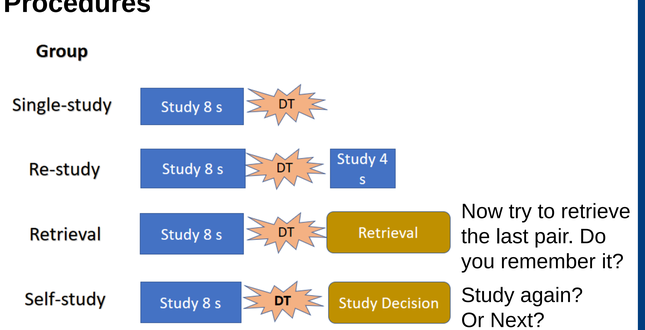
Design

- College students (N = 73)
- 50 Swahili-English word pairs

Hypotheses

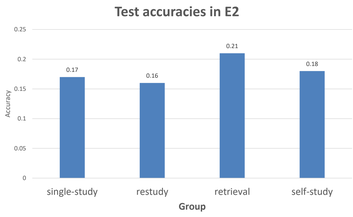
Group	Responses	Attempt to retrieve	Success of retrieval
3	Remember	+	+
	Not remember	+	-
4	Next	+	+
		-	N/A
	Study Again	+	-

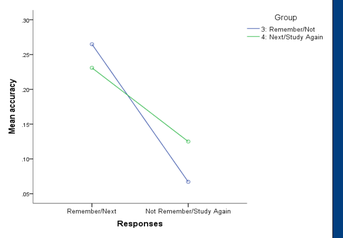
Procedures



Finding 1: Recall accuracy

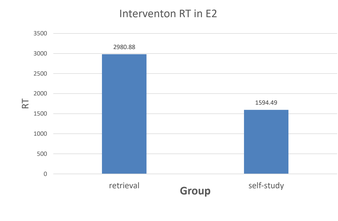
- Retrieval group had numerically highest test accuracy.
- Recall accuracy was significantly higher for the pairs reported as remembered than the pairs reported as not remembered in retrieval group, t (16) = -10.87, p<.001.
- Recall accuracy was significantly higher for the pairs asked for no restudy than the pairs requested for restudy in self-study group, t (11) = 2.396, p=.036.

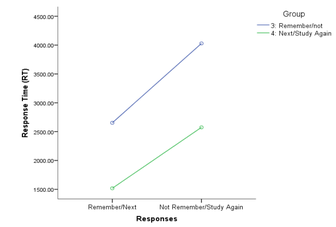




Finding 2: Intervention response time

- Retrieval group spent significantly longer time than self-study group.
- t(32) = 4.42, p = .001, CI [747.84. 2024.95]

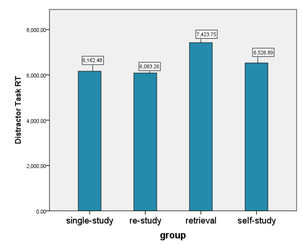




Participants in group 4 chose to restudy the pairs that were unsuccessfully retrieved, and most likely, they chose not to restudy (next) the pairs that were successfully retrieved.

Finding 3: Distractor Task RT

- The retrieval group spent numerically the longest time on solving the distractor task.



Conclusions

Participants displayed attempts of retrieval in absence of explicit prompt to make study decisions.