Semantic Learning Creates Semantic Networks and Visual Long-term Representations

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Introduction

- Learning is a process in which information is encoded into long-term memory [1,2], so that they can be accessed for later use as needed.
- Vast majority of studies dealing with memory, focus on narrow learning based on memorization and repetition [3-5]. However, long-term knowledge is organized in long-term memory as semantic networks [6,7].
- The aim of my research is to introduce and investigate semantic learning, a learning type that ecologically reflects the way we naturally learn and internalize new information in everyday life.

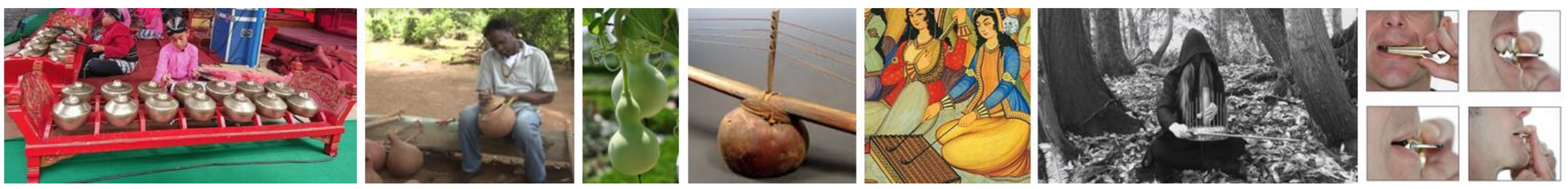
Methods

20 participants

- First session – Different measures of existing long-term representations and semantic networks.
- Sessions 2-5 – Semantic Learning - Exposure to diverse information to create branched semantic networks for novel stimuli.
- Sixth session – A repetition of the first session.

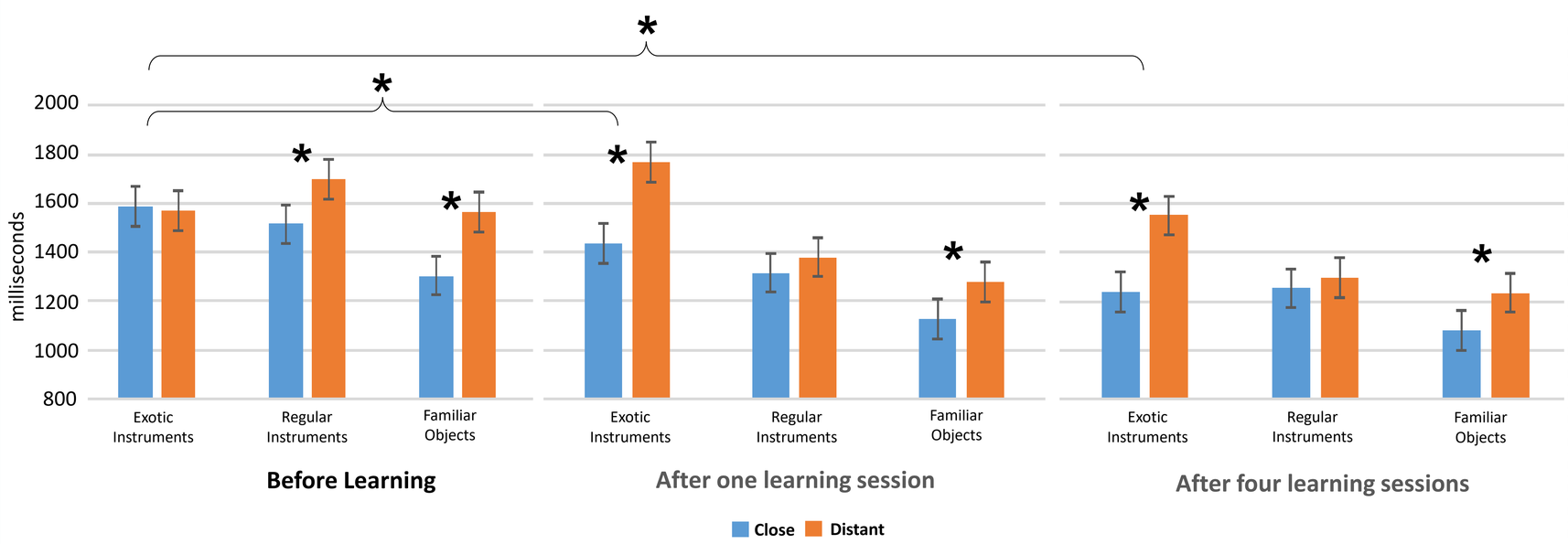
Semantic Learning includes

- Exposure to diverse information such as history and origin, structure and raw materials, modern uses versus traditional uses, etc.
- Exposure to many examples of the studied object through pictures and videos.
- Encouragement to create personal associations regarding each of the studied objects.



Results

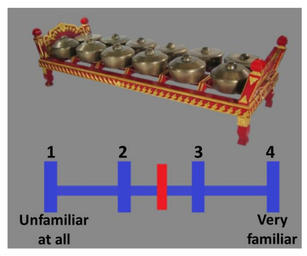
Semantic network formation



Exotic Instruments: Ocarina is related to sweet potato **vs.** Ocarina is related to sound
Regular Instruments: A guitar has strings **vs.** A guitar has parts
Familiar Objects: Watermelon is sweet **vs.** A Watermelon is a plant

F(2,76) = 12.7
p < 0.0001
η^2_p = 0.4

New long-term representations



	Rating	Naming	Name Recognition
First Session	1.135	0.05	0.2
Last Session	3.85	9.45	9.9
Significance	$t(19) = 35.0$ $p < .001$	$t(19) = 33.0$ $p < .001$	$t(19) = 75.9$ $p < .001$

In addition, visual working memory performance was measured for the exotic and the regular musical instruments, as a measure of activated long-term memory. The results obtained were not significant.

Conclusions

- Semantic learning creates semantic networks in long-term memory.
- Semantic learning creates effective learning without memorization and thus reflects natural and everyday learning.
- Semantic learning allows the generalization of visual learning on unlearned exemplars.

References

1. Atkinson, R. C., & Shiffrin, R. M. (1971). The control of short-term memory. Scientific american, 225(2), 82-91.
2. Baddeley, A. (1992). Working memory. Science, 255(5044), 556-559.
3. Melton, A. W. (1970). The situation with respect to the spacing of repetitions and memory. Journal of Verbal Learning and Verbal Behavior, 9(5), 596-606.
4. Craik, F. I., & Watkins, M. J. (1973). The role of rehearsal in short-term memory. Journal of verbal learning and verbal behavior, 12(6), 599-607.
5. Cepeda, N. J., Vul, E., Rohrer, D., Wixted, J. T., & Pashler, H. (2008). Spacing effects in learning: A temporal ridgeline of optimal retention. Psychological science, 19(11), 1095-1102.
6. Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. Psychological review, 82(6), 407..
7. Collins, A. M., & Quillian, M. R. (1969). Retrieval time from semantic memory. Journal of verbal learning and verbal behavior, 8(2), 240-247.

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The Visual Working Memory Lab website:
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