What Underlies Negative Priming? Contributions of Memory to the Negative Priming Effect

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We report here results on negative priming in children over a wide age range and in adults. We included a condition to better determine whether differences in the degree of negative priming are due to inhibition or memory.

Negative priming is defined as slower reaction time (RT) when responding to a previously inhibited item, location, or aspect of an item. Say you are to respond on the basis of color, & ignore shape, & when the orientations of the stimuli start to vary, that is your cue to switch the basis of your responding. Your RT would be longer if you had to switch to responding based on shape (which was previously present & inhibited) then if you had to switch to responding based on orientation.

When the basis of responding is the location of a target stimulus, your attention will be selectively drawn to the target's location & selectively inhibited at a distractor's location. If the target appears next where the distractor had been, you will be slower to respond to that location (because you must overcome inhibition of that location) than you would be to respond to any other location (Houghton & Tipper, 1994).

If you have weaker inhibitory control, you should inhibit the distractor's location less well & so you should have an easier time responding quickly to that location when it is occupied by the target. Thus, you should show **less negative priming** (less increase in RT at the previously inhibited location), & hence **should perform better on the task**. Your RT should be faster on Ignored Repetition Trials relative to Control Trials than that of persons with better inhibitory control, & differences in negative priming have been used to infer differences in inhibitory control (Tipper *et al.*, 1989).

Note, however, that **if you have poor memory**, you might forget where the distractor had been, making inhibition of that location unnecessary. Again, you should have an easier time responding quickly to that location when it is next occupied by the target. **You should show less negative priming** (i.e. **you should perform better**). To allow us to control for this, we modified Tipper *et al.*'s (1991) spatial-selection paradigm to include a measure of memory for the distractor's location.

Participants were: 56 children, ages 6-12 years
11 adults, ages 22-40 years

A practice block & 3 test blocks were administered (38 trials per block). Each trial consisted of 2 presentations, a prime & a probe.

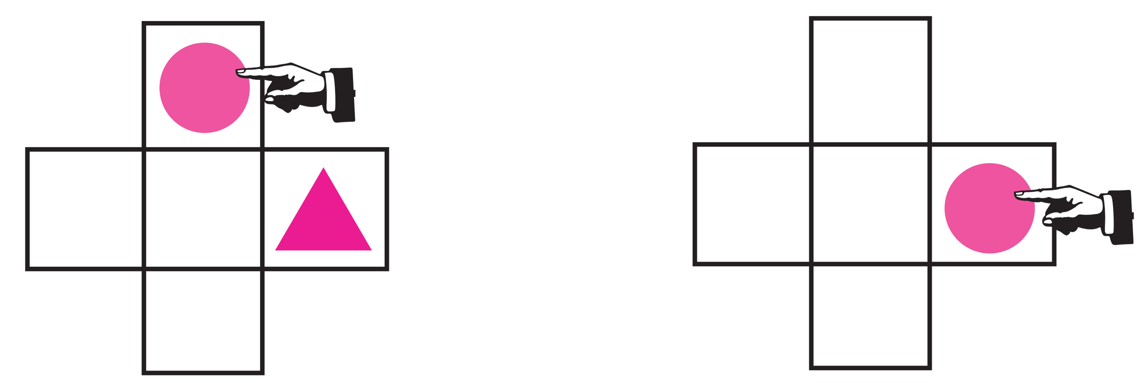
The participant's task was to touch the target circle during both the prime & probe presentations. The participant's hand began on a mouse pad in front of the screen. After touching the target in the prime & probe, the participant returned his/her hand to the mouse pad in anticipation of the next trial. The intertrial interval was 2 sec. The task was presented on a Macintosh computer, using a 21" Microtouch Touch Screen monitor.

Three types of trials were presented: **Ignored Repetition Trials, Control Trials, and Memory Trials.**

In **Ignored Repetition Trials**, where the distractor (triangle) had been during the prime was where the target (circle) was located during the probe.

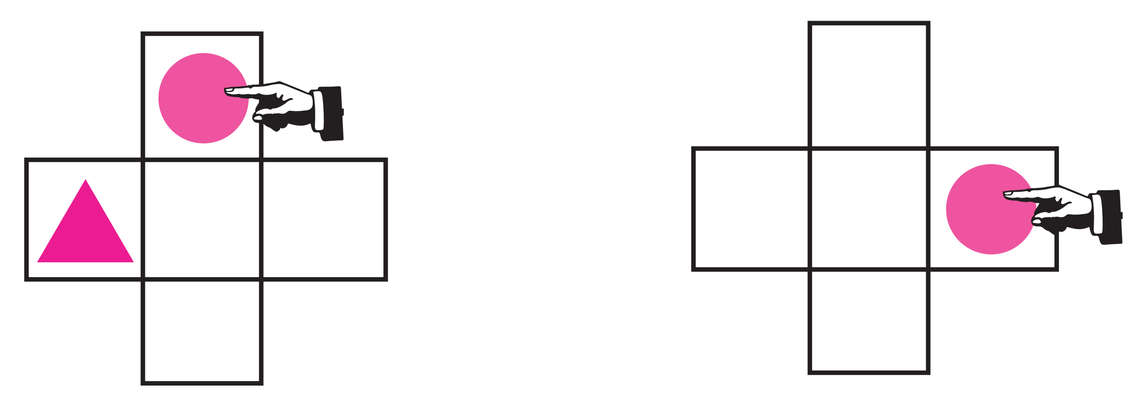
PRIME
First Part of the Trial:
Participant is to touch the target & ignore the distractor

PROBE
Second Part of Trial:
Participant is again to touch the target



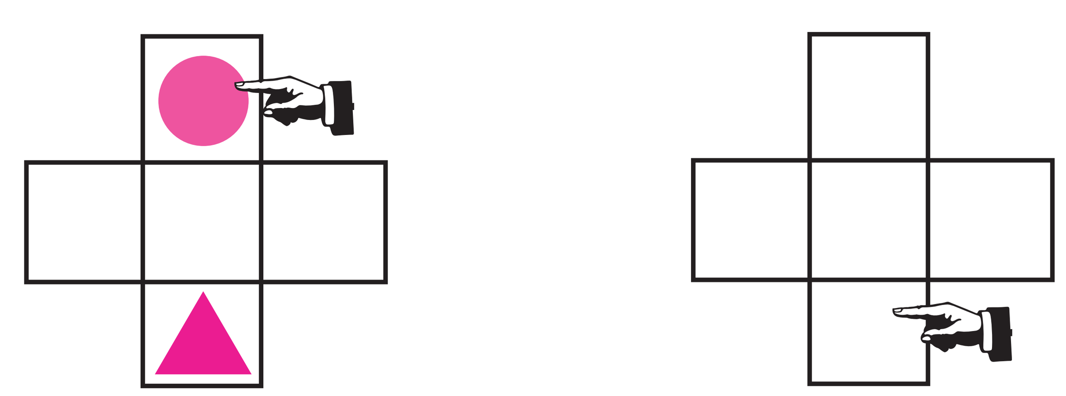
During **Control Trials**, the target's location during the probe was NOT where the distractor had been during the prime.

PRIME **PROBE**

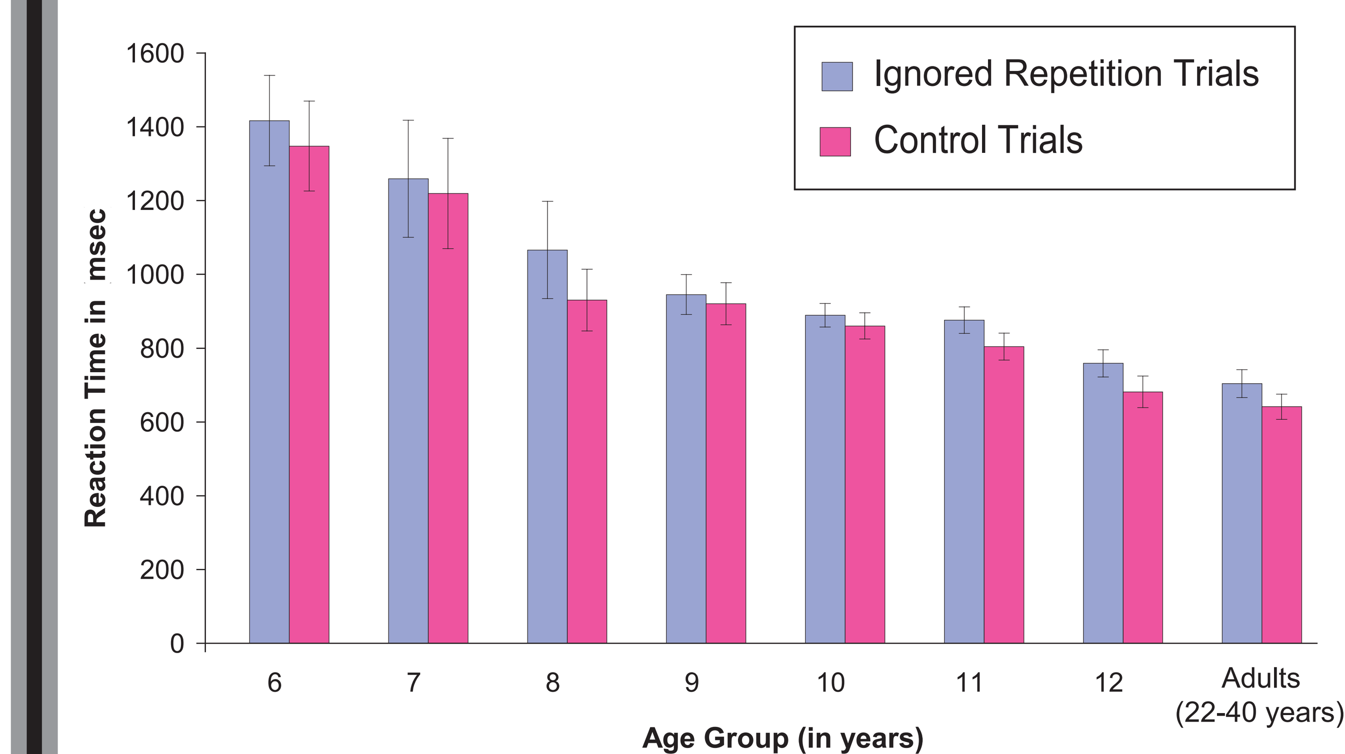


On **Memory Trials**, the prime presentation was identical to that on the other 2 types of trials. During the probe, however, an empty cross was displayed & a computer-generated voice instructed the participant to touch the location that the distractor (triangle) had occupied during the prime.

PRIME **PROBE**



The Negative Priming Effect: Reaction Time on Ignored Repetition Trials vs. Control Trials Over Age

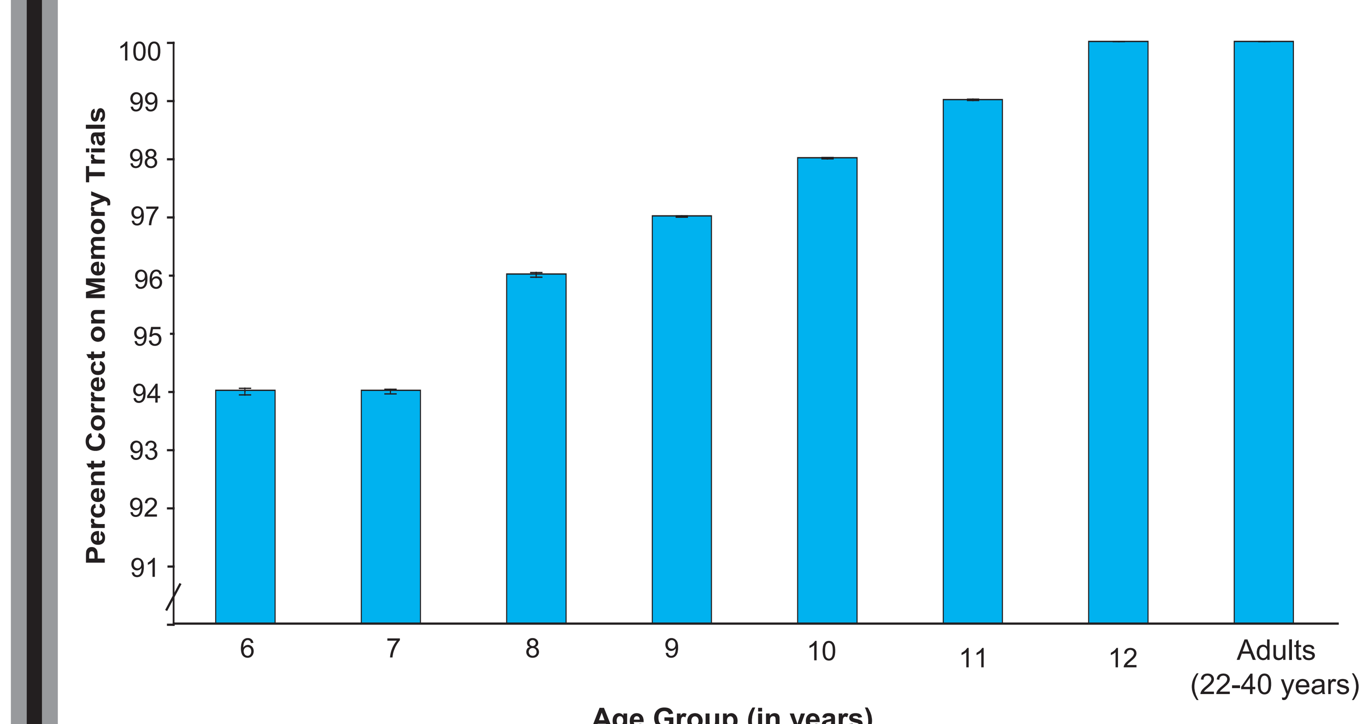


It took participants significantly longer to respond to the target on Ignored Repetition Trials than on Control Trials (children: F[1,55] = 13.804, p < .001; adults: t[10] = 5.218, p < .001).

The RT difference between Ignored Repetition and Control Trials (i.e., the degree of negative priming) did not differ significantly over age (F[7,59] = 1.066, ns).

RT on both types of trials decreased continuously over age.

Memory for the Distractor's Location

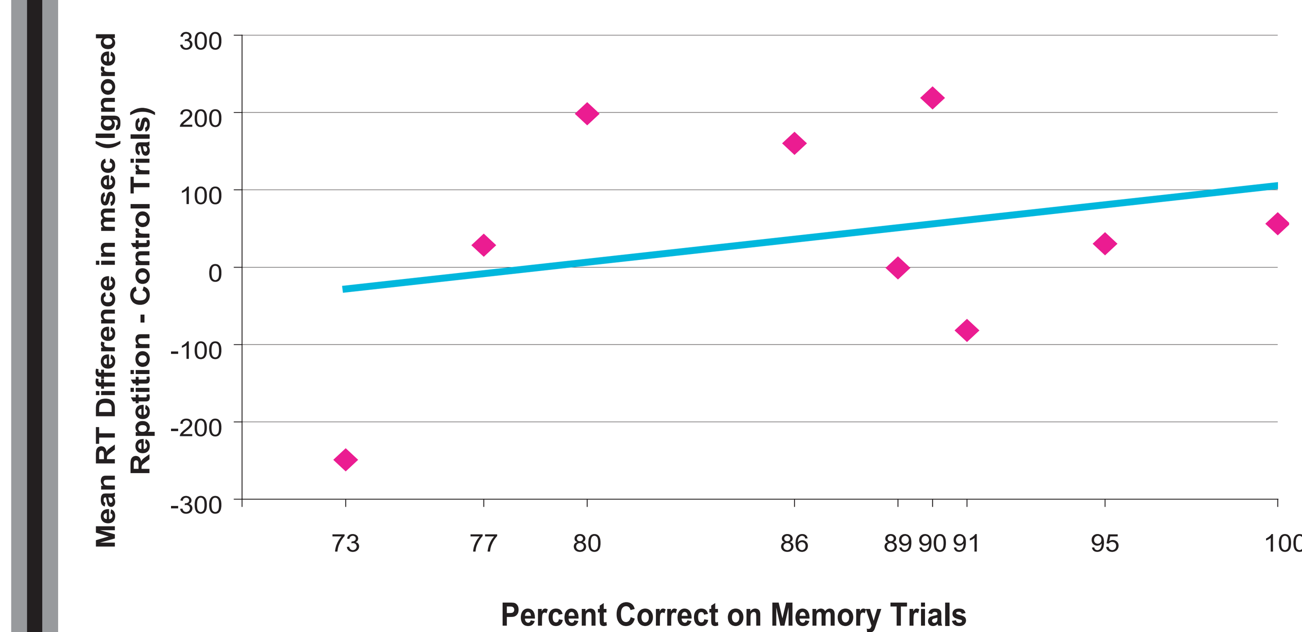


There was a steady improvement in accuracy for the distractor's location over age with virtually no variability in memory performance at any age (F[6,52] = 0.699, ns).

The Memory Effect

We were able to covary accuracy for the distractor's location in this task for children because they made errors when asked to recall where the triangle (distractor) had been. Adults, however, performed consistently at 100% accuracy; hence, we could not covary memory accuracy for them.

Once the variance associated with memory was removed, the negative priming effect was no longer evident in children (F[1,54] = 1.105, ns). The graph below presents the best fitting line of the difference in RT between Ignored Repetition and Control Trials as a function of memorial accuracy. The better recall was for the distractor's location, the larger the difference in RT.



Given the number of memory trials, only certain % Correct values were possible. Those values are displayed here.

Conclusions

We found negative priming in children as well as adults.

The size of the negative priming effect in children as young as 6 years was comparable to that in adults & did not change over age.

Once the memory for distractor location was controlled for, the negative priming effect was no longer evident in children.

References Cited

Houghton, G., & Tipper, S.P. (1994). A model of inhibitory mechanisms in selective attention. In A. Dagenbach & T. Carr (Eds.), *Inhibitory mechanisms in attention, memory, and language (pp. 53-111)*. San Diego, CA: Academic Press.

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