Familiarity preference something something???

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Abstract

haha

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Introduction

Experiment 1

Methods

Participants

66 children completed a task modified from the adult self-paced looking time studies reported in CITE. Following our pre-registration (LINK), 2 children were excluded from the analysis because their performance in the attention-check task failed to meet the inclusion criteria. We also excluded trials with looking time that were three absolute deviations away from the median in the log-transformed space across participants. The final datasets includes 64 children in total (3YO: N = 18; 4YO: N = 26; 5YO: N = 20). All participants were recruited in a university-affiliated research preschool.

Stimuli

We used a subset of stimuli created for the adult self-paced looking time studies. In the previous study, we created a set of animated creatures using Spore (a game developed by Maxis in 2008). Half of the creatures had high perceptual complexity, and half had low perceptual complexity. We used the high perceptual complexity stimuli for the current study.

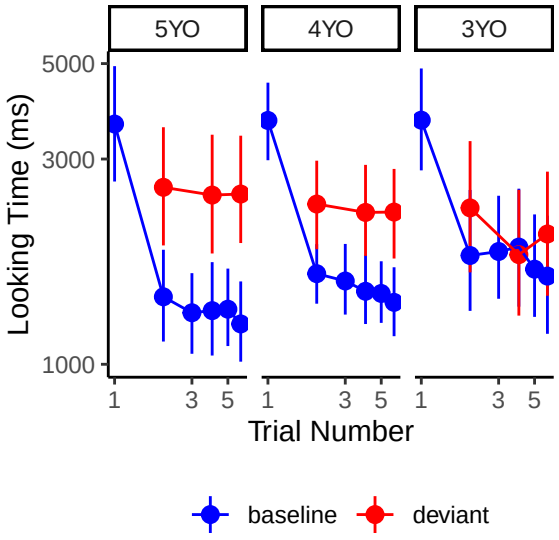
Procedures

Children were tested individually in a test room by an experimenter. The experimenter invited the child to "meet some monster friends" and then familiarized the child with the laptop computer used to present the experiment. Before the test, each child went through a practice phase where they practiced pressing the space bar to move on to the next trial. The child was instructed that they can press the key and move on to meet more monster friends whenever they want.

On each trial, the child would see an animated creature appear on the screen. The child can move on to the next trial by pressing the space bar. Each block consisted of six trials. Usually, the same creature will be shown repeatedly (the background stimulus), but each block could contain either zero or one deviant trial. Deviant trials were trials that present a different creature from the background stimulus. Deviant trials appeared on the second, the fourth, or the sixth trial of the block. Each child saw eight blocks in total.

At the offset of each block, a memory task was presented to ensure children are appropriately attending to the task. The memory task was a 2-Alternative Forced Choice (2AFC) question, asking the children to identify which of the two stimuli they have seen before. The pair of stimuli contained one stimulus used as a background stimulus in the preceding block and a novel stimulus that did not appear anywhere else in the experiment.

Results and discussion



We anticipated that the preschooler children would show patterns of habituation and dishabituation similar to adults. We also expected to see developmental changes in the shape of habituation trajectories. Our pre-registered mixed-effect mod includes a three-way interaction term between age (in months; scaled and centered), trial number, and trial type (background or deviant) to predict log-transformed looking time. The interaction between the trial number and trial type was significant, suggesting the paradigm has captured habituation and novelty preference in preschoolers ($\beta = 0.14$, $SE = 0.02$, $t = 6.22$, $p < 0.01$). However, we did not find any significant interaction with age, nor was the main effect significant (all $p > 0.1$).

We also explored the potential familiarity preference by comparing the looking time at the second background trial and the second deviant trial. Under the Hunter & Ames (1988), the second trial in each block is most likely to yield a familiarity preference, since participants receivee the least amount of familiarization with the background stimulus in a block. If there was a familiarity preference, participants should look longer at a background trial than a deviant trial. However, we did not find evidence supporting this prediction. We ran a mixed effect model predicting looking time at the second trial with trial type as the predictor. There was a significant trial type effect in the opposite direction, suggesting participants looked longer at the deviant trial than the background trial even with as little as one trial of familiarization time ($\beta = 0.41$, $SE = 0.03$, $t = 12.24$, $p < 0.01$).

In summary, this experiment captured habituation and novelty preference with in preschoolers, replicating the patterns we saw in the previous adult samples (CITE). Notably, under the current paradigm, we did not find any evidence of familiarity preference. We moved to the infant samples in the next experiment.

Experiment 2

Methods

Classical theories of attentional preferences in development posit that younger participants are more likely to exhibit familiarity preferences for a given stimulus due to their reduced encoding speed (CITE). Indeed, prior studies show a reversal from novelty to familiarity preferences when testing younger samples (CITE that grammar infant study, Cyr, H&A ?). To this end, in Experiment 2, we test the model predictions in preverbal infants, and try to evoke both familiarity and novelty preferences by interrupting familiarization to a stimulus at different time points.

To this end, we developed a new infant looking paradigm which mirrors the adult (Cao et al., 2022) and preschooler paradigm (Experiment 1). In this paradigm, infants are familiarized to multiple stimuli for different exposure durations within a single session in a blocked design. This is in contrast to the standard infant familiarization/habituation paradigm in which typically infants are familiarized to only one stimulus throughout the experiment, which makes the effect of exposure duration difficult to estimate. By presenting infants with multiple blocks with varying familiarization times, we can now measure the effect of familiarization on preference within subjects.

To get a dense estimate of exposure durations, we preregistered and ran two experiments, sequentially, with two sets of exposure durations. The first experiment showed infants blocks of 0, 4 or 8 familiarizations (Exp A; preregistered here [link]). The second experiment showed infants blocks of 1, 3 or 9 familiarizations (Exp B; preregistered here [link]).

Participants

We tested a combined sample of *nbabies* 7-10 month old infants, with X in Exp A and Y in Exp B (M_age = XX, range = XX months, Exp). A total of X were excluded due to fussiness (Exp A:, Exp B:). We also excluded a total of test trials in which 1) infants looked at the stimuli for less than a total 2 seconds, 2) there were momentary external distractions in the home of the infant or 3) the gaze classifier (see Looking time coding) had an average classification confidence of less than 50%. Data collection was performed synchronously on Zoom, and infants were recruited from Lookit and Facebook.

Stimuli

Infants saw a different stimulus set from the preschoolers. In a previous study, we showed the infants the Spore stimulus set used in preschoolers, but we were unable to elicit robust dishabituation effects, which we considered critical for the validity of the paradigm. Instead, we presented with a series of animated animals, which we created using Unity assets (`https://tinyurl.com/469xxrn7`). The animals were walking, crawling or swimming, depending on the species.

Procedure

This experiment followed a block structure, where each block was divided into two sections: 1) A familiarization period and 2) a test event. Each block was preceded by our lab-standard attention getter, a salient rotating star. During the familiarization period, the infant was familiarized to a particular animal, the background, in a series of familiarization trials. Each familiarization trial was a 5 second long presentation of the animal, during which the animated animal appears behind curtains that open for 1 second, then the animal was presented in that size for 3 seconds, and then the curtains closed again for 1 second. We refer to the number of times the curtain opened and closed as the "familiarization duration", which varied between blocks.

During the test event, the infant saw either the same background animal again, or a novel animal, the deviant. The onset of the test event was not marked by any visual markers, but a bell sound is played as the curtains open, to maximize the chance of engagement during the test trial. The test event used an infant-controlled procedure, in which the experimenter terminated the trial when the infant looked away for more than three consecutive seconds. Looking time was defined as the total time that the infant spends looking at the screen from the onset of the stimulus until the first two consecutive seconds of the infant looking away from the screen. The discrepancy between the experimenter criterion and the looking time criterion was to be conservative in stopping trials to avoid early trial terminations. If the infant did not meet the lookaway criterion after 60 seconds of being presented with the test event, the next block automatically began and infants' looking time for this test event was recorded as 60 seconds.

Each baby saw six blocks: Three different familiarization durations (0, 4 and 8 in Exp A, and 1, 3 and 9 in Exp B) ap-

peared twice each, once for each test event type (background or deviant).

Looking time coding

To code the infants' gaze we used iCatcher+, a validated tool developed for robust and automatic annotation of infants' gaze direction from video (Erel et al., 2022). To obtain trial-wise looking times, we merged iCatcher+ annotations with trial timing information, thereby fully replacing the field-standard of manual coding of looking times.

Results and discussion

To test the prediction that partial encoding elicits familiarity preferences, while complete encoding elicits novelty preferences, we pre-registered a model which allows for a non-linear interaction between exposure duration by adding a quadratic effect of familiarization duration, and its interaction with novelty.

We found that neither the main effect, nor the interaction of that quadratic term were significant (Main effect: $\beta = 0.46$; $SE = 0.88$; $t = 0.53$; $p = 0.6$; Interaction effect: $\beta = 0.4$; $SE = 1.58$; $t = 0.26$; $p = 0.8$), while the interaction of novelty with the linear term was significant ($\beta = 4.38$; $SE = 1.56$; $t = 2.8$; $p = 0.01$). This suggests that novelty preferences get stronger as a function familiarization duration, but that there is no special effect of partial encoding as posited by H&A. Furthermore, there was a significant decrease in looking times to the familiar items as a function of familiarization duration, indicating that infants habituated to familiar stimuli in our paradigm ($\beta = -2.32$; $SE = 0.87$; $t = -2.66$; $p = 0.01$).

We next tested specifically for the existence of familiarity preference in our dataset. After finding a hint of a familiarity preference after four familiarizations in the first study, which did not turn out significant in an exploratory analysis ($\beta = -0.2$; $SE = 0.19$; $t = -1.06$; $p = 0.3$), we argued that if familiarity preferences are driven by partial encoding, any condition in which there were fewer exposures should also reveal a familiarity preference. We therefore tested whether looking to the familiar stimulus was longer in all trial with four or less exposures. We did not find any evidence supporting this prediction ($\beta = 0.07$; $SE = 0.11$; $t = 0.65$; $p = 0.52$).

Novelty preferences, on the other hand, were robust after 8 ($\beta = 0.5$; $SE = 0.17$; $t = 2.9$; $p = 0.01$) and 9 familiarizations ($\beta = 0.6$; $SE = 0.14$; $t = 4.15$; $p < 0.01$), as well as in the combined dataset ($\beta = 0.54$; $SE = 0.12$; $t = 4.44$; $p < 0.01$).

General discussion

References