Origins of Homophily In Infants: A Replication and Extension Study

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Abstract

Previous research has documented that infants as young as six months have intuitions about affiliations regarding shared preferences as well as an understanding of homophily. Homophily ultimately influences friendships, marriages, hiring decisions — the interactions of everyday life. Moreover, understanding shared preferences is relevant to predicting human behavior, as well as guiding child development and socialization.The present study aims to (1) replicate earlier work proving the infants' understanding of homophily and (2) extend our understanding of infant homophily in regards to characterizing the differences in homophily by sex. Both the replication and extension support the original study by proving the original theory that infants can recognize homophilic attractions. The extension, however, explores the roles that sex and test trial type play in homophily, which the original researchers did not observe. Ultimately, the extension provides preliminary evidence that there is a preference to affiliate with the same sex.

Keywords: homophily, infants, sex, shared preferences, affiliation trials, disengagement trials, attention, linear mixed model

Introduction

Creating social partnerships and groupings are crucial decisions made in various settings, from the home, workplace, academia, online communities and other environments involving shared interactions. Human social networks revolve around the idea of homophily, or the "love of sameness," which describes the behavior of gravitating towards others who share preferences, values, appearances, identities, etc. Affiliation, a cultural union outside of assumed material advantages, can be shown through social behaviors such as proximity, joint attention, and gesturing to each other to signal agreement (Liberman et al., 2021). Previous studies examining adult relationships and shared preferences consistently reveal attraction toward likeness: users with shared interests were more likely to be friends on social media (Aiello et al., 2012), workers with similar levels of job-satisfaction were more likely to socialize together (Chancellor et al., 2018), similar personalities and attractiveness predicted higher satisfaction in roommate relationships (Carli et al., 1991), and sexual attitudes positively correlated between heterosexual romantic partners with a higher degree of similarity (Cupach & Metts, 1995). Additionally, a deeper study of shared preferences concludes that individuals with rare similar preferences are more likely to interact than individuals with more recurring similar preferences; the tendency to interact with other people increased with relative rarity or exclusivity of said preferences (Vélez et al., 2019). Affiliation ultimately influences friendships, marriages, hiring decisions–the interactions of everyday life. Moreover, understanding shared preferences is relevant to predicting human behavior, as well as guiding child development and socialization.

Recent research on homophily has shifted its focus towards early development because of its integral role in human social organization. Expectations of homophily are contingent on similar preferences as an essential part of social cognition and can be detected in infants as

young as fourteen months old (Liberman et al., 2021). A previous study revealed increased interaction between infants with shared toy, food, and sticker preferences (Fawcett & Markson, 2010; Gerson et al., 2017; Mahajan & Wynn, 2012). From third party perspectives, infants were also found to expect people with shared interests to affiliate with each other compared to a person with opposing preferences, but the experiments' methodologies failed to clarify if shared preferences specifically drove infants' expectations about social relationships (Liberman et al., 2014). Coinciding with adult study results, their findings suggested that the infants stare longer when the situation was inconsistent because they had made their own inferences about patterns of affiliation, therefore infants most likely can form their own analysis on affiliations. But data of shared preferences is often confounded with social behaviors (i.e. proximity, facial expression, and joint attention) that indicate affiliation, often adding extraneous variables (Liberman et al., 2014). Therefore, creating a context that can isolate shared preference from social behaviors that signal affiliation is crucial for future research.

Our study aims to determine whether infants' sex impacted their ability to use information about individuals' shared preferences in order to deduce their relationships by reproducing and extending the results published by Liberman, Kinzler, and Woodword in "Origins of homophily" (2021). The experiment used data from testing a young sample group of five to six month old infants who have little to no experience with a necessary human activity like eating, thus isolating their inferences as separate from previous personal experiences with the choice of food. We focused on Study 1 of the original research where infants watched two actors express either their food preferences, resulting in infants in the shared preferences condition expecting affiliation and infants in the opposed preferences condition expected disengagement with quicker looking times for both.

Methods

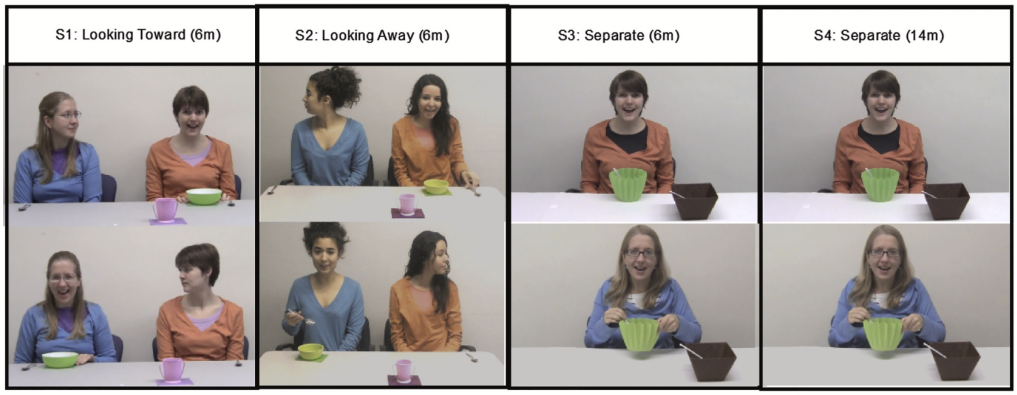

Fig. 1. Figure 1 illustrates the methods used in the studies. For Study 1, the actors actively watched one another express their preferences. For Study 2, the actors sat together but looked away when one of them expressed their preference. For Study 3 and Study 4, the actors were not presented together.

All studies in the experiment consist of 32 participants: either five to six month old infants in Studies 1, 2, and 3, or fourteen month old infants in the final assessment, Study 4. Of the participants in each study, half were randomly assigned to the condition: shared preferences, and the other half were randomly assigned to the condition: opposing preferences. In each study the participants were observed through two phases: familiarization and test. During the familiarization stage, infants watched a video four times about two actors expressing opinions about food together, eliciting either positive or negative reactions. Actors in the shared preferences condition agreed using positive reactions such as “Oh, I like that” in a rising intonation pattern, and those in the opposing preferences condition disagreed using negative reactions such as “Ew, I don’t like that” in a falling intonation pattern. The test phase took place after infants had viewed alternating trials of actors interacting by affiliating or by disengaging, and

measured the infant's attention to the screen after they had looked away for two consecutive seconds. Study 3 and 4 provided a different setup where each actor was presented in separate videos to provide information about infant affiliation inferences based on similar or opposing preferences while controlling other social behavioral cues that indicate affiliation, such as active communication or eating from the same bowl. In order to replicate these studies, the data provided from the original paper underwent a pivot and log transformation using the lme4 package in the statistical computing language, R. In R regression models were created using this log transformed data to examine participant attention across many variables such as preference condition, test pair number, and trial type; These models support the significance of the condition and trial type variables. To visually understand the findings of the studies, boxplots were created using the ggplot and facet_wrap functions to illustrate the data in each study concerning preference condition and trial type variables.

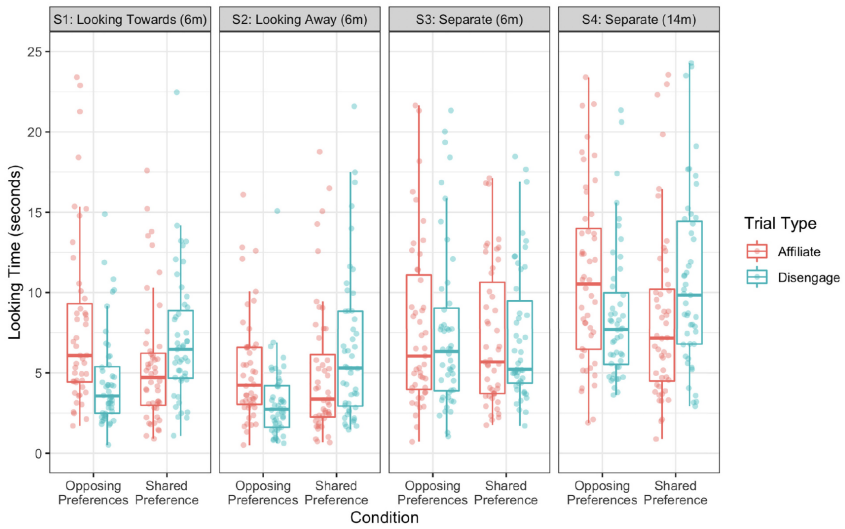

Fig. 2. Figure 2 shows looking times at test trials for all 4 studies. Each boxplot depicts the median and interquartile range and each dot represents one trial. With the exception of Study 3, there was a significant

difference in looking across trial types for all studies. To reproduce Fig. 2 in the original study, the ggplot() function as well as facet_wrap was used to graph the data by study.

Results

Fig. 3 depicts the replication of the original visual present in *Fig. 2.* which was created using the ggplot function. The visuals presented in these figures describe the results of Study 1 and 2 which found that infants viewing actors in the opposing preferences condition had a longer looking time at affiliation trials compared to disengagement trials. Respectively, those in a shared preference condition had a longer looking time at disengagement trials than affiliation trials, implying that infants expected the actors in opposing preferences condition to be more likely to disengage and expected the actors in similar preferences condition to be more likely to affiliate. The significance of the condition variable is marked by the low probability value ($p = 0.015$; $B = -0.187$, linear mixed-effect model), as is the significance of the test trial type variable ($p < 0.001$; $B = -0.248$). The findings begin to shift in Study 3 where actors were presented in separate videos, thereby limiting the effects of visual affiliation clues. The results of this study conclude that infants have no significant reaction to a certain condition or trial type; the difference in looking time between the conditions did not differ from chance. A similar experimental setup but with older participants, as depicted in Study 4, concluded similar results to Study 1 and 2 where the children came about expectations regarding affiliation

between actors in the absence of social information such as body language and intonation of voice.

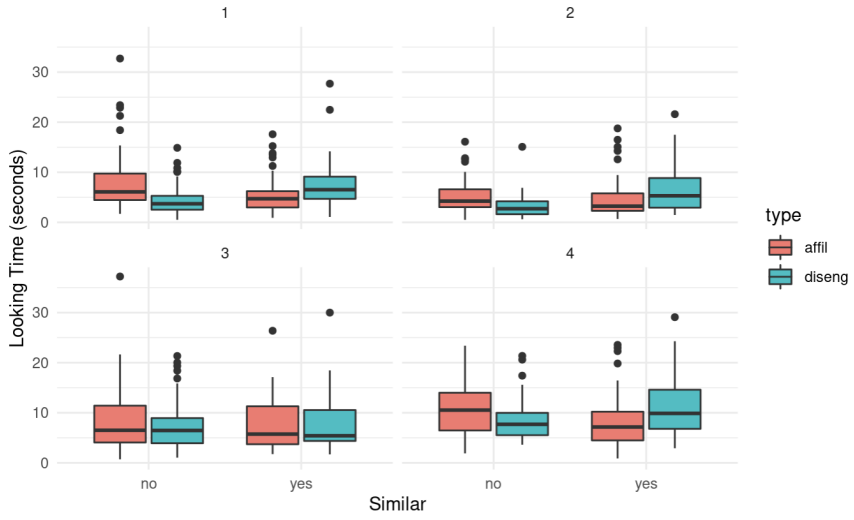

Fig. 3. Box and whisker plot of looking times based on similar preferences and test trial type. The infants' attention as indicated by looking time differed across test trials. Infants in the Shared Preferences condition looked at disengagement trials longer than at affiliation trials. In comparison, infants in the Opposing Preferences condition looked at affiliation trials longer than at disengagement trials.

Extension

Methods

First, we created a linear model and density plot of the looking time data to see if the looking time data was normally distributed. Since it was not normally distributed, we log-transformed the data using the log() function and graphed the resulting curve using the plot() function. We then used variables such as sex and pair to predict log-transformed looking times using a linear mixed effects model.

In order to manipulate the linear models, we used the lmer() function to examine looking times and variables such as pair and sex. Next, we used the subset() function to define which

study we wanted to focus on for each linear model, as well as to define whether we were looking at the similar preferences condition or not.

To create the box and whisker plot in Fig. 4, we used the ggplot() function and facet_wrap again to graph the data according to its study.

To create the bar charts in Fig. 5 and Fig. 6, we used the ggplot() function once more and introduced geom_bar this time to stack the data into bars.

In order to uncover any new findings between variables in the replication data table, one of such studies relied on the use of the data software R to create a linear model of looking time data. Upon finding that this data was not normally distributed, a logarithmic transform function was applied to the data. The looking time data was then paired with other variables already collected in our database, such as sex and pair using box and whisker plots.

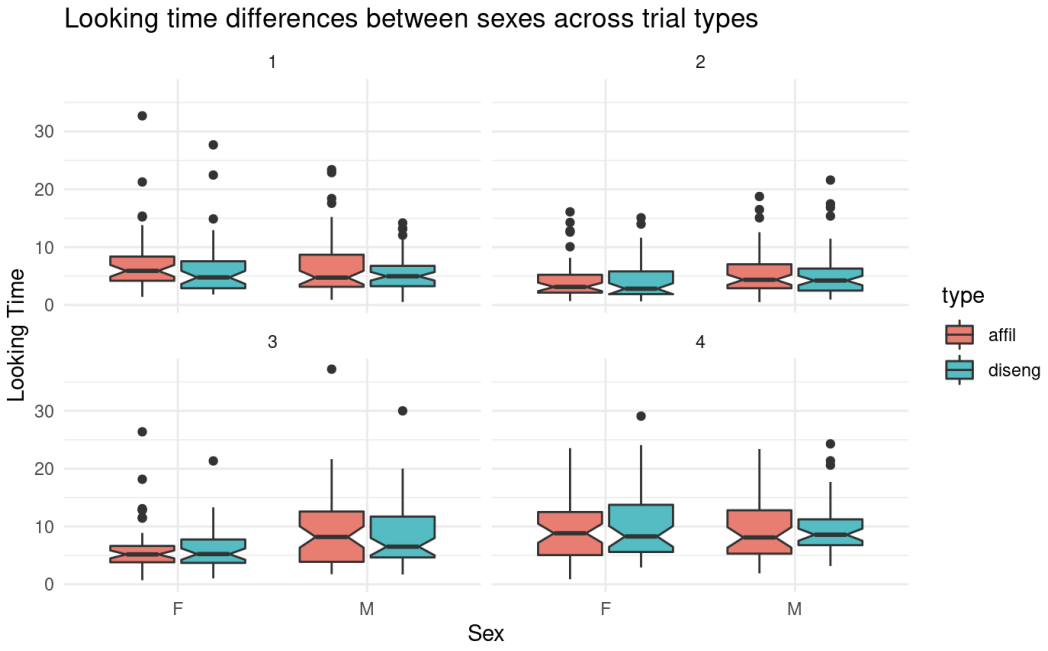

Fig. 4. Box and whisker plot of looking times between sexes across test trial types. The infants' attention as indicated by looking time differed across test trials, however, there was no significant difference between male and female infants.

Results:

In Figure 4, we can see that the infants' looking times in response to affiliation and disengagement trials varied to some degree, but no significant difference was observed between the sexes.

The left bar chart in Figure 5 shows that in the first test condition, male infants were recorded as having greater looking times at disengagement trials than their female counterparts. Conversely, female infants were found to have greater looking times at affiliation trials than male infants. The right bar chart illustrates how male infants had longer looking times in both the similar and opposing preferences condition compared to female infants.

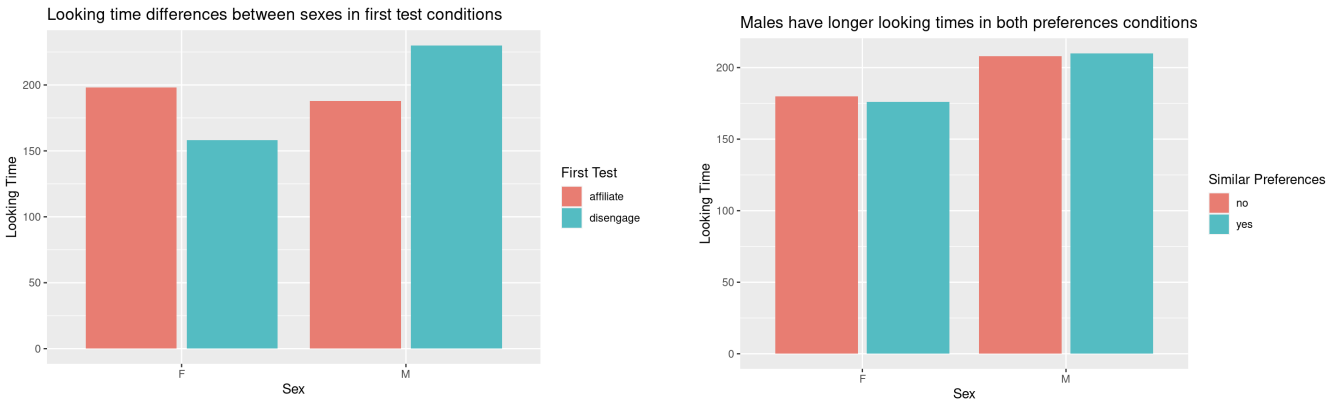

Fig. 5. (Left) Bar chart depicting looking time differences between sexes across first test trial type. (Right) Bar chart depicting looking time differences between sexes in similar/opposing preferences conditions.

Fig. 6. Bar chart depicting trial count per sex sorted by pair. The number of trials across each pair were approximately equal for both male and female infants.

Discussion

The results of Study 1 showed main effects of test pair and test trial types, as well as an interaction between condition and test trial type. The trials conducted with the 5-6 month old infants revealed that infants in the shared preference condition expected that the actors in the experiment were more likely to affiliate than disengage compared to actors in the opposing preferences condition. This reveals that at a young age– already by 6 months– infants expect people who share food preferences to be more likely to affiliate than people who have opposite food preferences. The implications of these observed behaviors are far reaching, for they can provide insight into biases children develop as a result of being conditioned by their environment. Children who are immersed in a particular environment with a certain culture, therefore may develop a skewed understanding of which types of individuals and communities

affiliate and which communities do not. It is important therefore, to understand when and how children develop an understanding of when groups affiliate based on their shared preferences or other social behaviors.

Future studies should track the effects of the actor's race on the behavior of infants in the study, for this was not a factor considered by the initial researchers. This extension was limited by the data we obtained by the experimenters, where the race of the actors in the experiment was not a factor taken into account. It is therefore encouraged that future studies investigate whether or not the race of the actor in relation to the children has an impact on children's looking times, and expectation for certain individuals to affiliate.

The data collected by the experimenters did give us the opportunity, however, to add the children's sex as a variable to the analysis and linear model. In the other analyses carried out, there was no significant differences of trial count per sex sorted by first test trial type or similar preferences, and the number of trials across each pair were approximately equal for both male and female infants. When checking for correlations with the variable of test trial type, however, this extension found that infants' attention differed across test trials. Male infants looked at affiliation trials longer than at disengagement trials, while female infants looked at affiliation trials longer than at disengagement trials in all studies except for Study 4. Study 4 was the only case in which there were no differences in the characterization of the differences in the homophily of sex. There weren't any substantiallly differnces in terms of differences of the homophily of sex, however it is notable that the infants in this study were substantially older. Even though the study was carried out with an absence of social cues, the infants were still able to recognize the shared preference to affiliate even in the absence of social cues. This ultimately

shows us that as infants grow older, they can make inferences about homophily with less information.

In future replication/extension experiments, it is encouraged that researchers further investigate if sex has any impact on the infant's engagement and disengagement in affiliation trials. Understanding this can provide insight into when developmentally, females and males tend to subconsciously group individuals together.

Conclusion

Our research into an extension study was able to be completed because the variables we chose to analyze were applicable to the linear model. By conducting an extension study using two variables: sex and test trial type, we were able to observe that infants have the ability to recognize homophily in multiple ways such as shared food preferences or even similar sex. By reiterating this idea from the replication in the extension, we saw opportunities to explore other areas of research such as the role of race and affiliation preferences. This study provides substantial evidence for the development of homophily understanding in infants as young as 6 months old. Future investigators are encouraged to expand on this finding to determine how this effect might be moderated by sex, race, socioeconomic status, amongst others.

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