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The Boundaries and Ontogeny of Myside Bias

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When we believe something, we favor information supporting that belief, a myside bias. Despite decades of research showing its influence on reasoning, we lack a clear understanding of how context and age influence this bias. We examined how the presence versus absence of an argumentative context shifts information seeking in 484 participants aged 5–55. After making a prediction, participants were tasked with *learning* whether their prediction was correct or told that they would need to *convince* another person that their prediction was correct at the end of the experiment. Half were told that another person made a conflicting prediction; half received no information about the other person's beliefs. Participants selected envelopes as information samples, containing information supporting or undermining their predictions. Having to convince someone in the future biased information seeking. This bias increased and changed across the lifespan: 5-year-olds selected positive information supporting their predictions. From age 11, participants selected a more balanced set of self-favoring evidence: positive information supporting their prediction and counterevidence undermining the alternative. The impact of a conflicting perspective depended on the goal. When the goal was convincing, conflict increased information seeking and slightly reduced the bias. When the goal was learning, conflict reduced information seeking and slightly increased the bias. In sum, we showed that myside bias is influenced by the presence of an argumentative context, that is, primarily by the aim of convincing someone in the future and to some extent by the presence of a conflicting perspective, and increases with age.

Public Significance Statement

Myside bias is a tendency to favor information that aligns with our initial beliefs while discounting information that opposes them. This bias is very common in human reasoning and is linked with polarization. Our study is the first to show that, across the lifespan, participants exhibit this bias in information seeking after being explicitly told that they will have to convince someone in the future—but not when they are simply told to check whether they are correct. Critically, this bias increases and changes with age. Having to convince someone in the future led 5-year-olds to focus their search on positive information supporting their predictions. From 11 years old, participants selected positive information supporting their prediction and negative information undermining the alternative prediction. Across the lifespan, the kind of information we seek depends on our information-seeking goals and our age.

Keywords: myside bias, confirmation bias, information seeking, lifespan development, reasoning

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This study's hypotheses, methods, and analysis plan were preregistered on the Open Science Framework at https://osf.io/vb5jm/overview?view_only=fb36d0d0250f456580d0208b24a4494a. The data set and the scripts for the statistical analyses are available at https://osf.io/6g8u9/overview?view_only=3372381f84f6409284dcacc1e8937883. Some of the results presented in this article were presented as talks in two conferences prior to publication (Society for Philosophy and Psychology, 2025 Annual Meeting; Society for Research in Child Development, 2025 Biennial Meeting).

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To develop an accurate understanding of the world, update false beliefs, and grasp different perspectives on issues, we need to be exposed to information that challenges our beliefs. However, humans tend to seek, evaluate, and share information supporting rather than contradicting what they already believe. This tendency to favor information that supports our existing beliefs and to discount information that contradicts them has been termed as a "myside/confirmation bias"[1] (Baron et al., 1993; Klayman, 1995; Klayman & Ha, 1987; Mercier, 2016, 2022; Mercier & Sperber, 2011; Nickerson, 1998; Stanovich, 2021; Stanovich et al., 2013; Wason, 1960; Zimmerman & Klahr, 2018; see also Hahn & Harris, 2014). Despite decades of research showing its influence on human reasoning and its association with polarization, we do not have a strong understanding of the factors that influence it, its boundaries, or its developmental trajectory. Theoretically, understanding the boundaries and origins of the bias is critical for understanding its function in human reasoning. Practically, it is crucial for identifying when and how to intervene to reduce its negative consequences, such as polarization.

According to the argumentative theory of reasoning (ATR: Mercier & Sperber, 2011), the myside bias is not a flaw of reasoning but an adaptive manifestation of its function: argumentation. ATR argues that reasoning evolved to exchange arguments with others: to evaluate the reasons of others and to convince others by producing reasons. When producing reasons, the theory predicts a strong myside bias (or confirmation bias): We produce arguments that support our perspective and undermine alternative perspectives (Mercier, 2016, 2022; Mercier & Sperber, 2011). It can be understood as a form of *division of labor*. When we are exchanging arguments with someone, our individual biases generate a balanced view with strong reasons from both sides, which allows us to make the best possible decision (Mercier & Sperber, 2011). However, when reasoning alone, the bias leads to poor outcomes because the lack of competing reasons leads to overconfidence in one's own opinions (Mercier, 2016).

The ATR does not outline how different contexts might change the presence and degree of the myside bias. In the present study, we examined whether and to what extent the *presence of an argumentative context* shifts how we seek information. We also examined what makes an argumentative context: the need to *justify* oneself, the *presence of a conflicting opinion*, or the co-occurrence of these aspects—having to justify one's beliefs to someone who disagrees with us.

Past work shows that adults are more likely to select data that support rather than contradict their beliefs (Hart et al., 2009; Jonas et al., 2001; Scherer et al., 2013) and to evaluate that information as more reliable (Vedejová & Čavojová, 2022; Stanovich & West, 2008). The more limited developmental literature shows that children are more likely to seek evidence for a hypothesis by reproducing a desired result rather than by seeking to falsify that hypothesis (Tschirgi, 1980; see also Klahr & Chen, 2003; Lapidow & Walker, 2020; see Over et al., 2018, for a bias in the group level). However, we do not know whether and to what extent the presence of an argumentative goal might influence these information-seeking patterns.

How might knowing that we need to convince someone later on—an argumentative information-seeking goal—influence the type of information we choose to seek? One possibility (Possibility 1) is that an argumentative information-seeking goal makes us biased when we gather evidence: We might primarily look for information supporting our belief in order to use that information to convince others. Although this possibility might align with ATR, it would also extend its scope by showing that the bias starts *before* producing reasons, whereas ATR suggests that the bias is mostly linked to offering reasons. On the other hand, it is also possible (Possibility 2) that an argumentative information-seeking goal makes us unbiased or relatively less biased: We might gather evidence supporting *and* discounting our beliefs in order to know the strengths and weaknesses of our perspective and, thus, anticipate possible arguments from our opponent in order to prepare counterarguments that will help us win the argument. This strategy would make us better prepared for convincing others relative to Possibility 1. This alternative hypothesis would also clarify the scope of the ATR by suggesting that evidence gathering and reason production have different functions: obtaining an accurate understanding by seeking balanced evidence versus using a subset of the gathered information to convince others. Critically, any effect of knowing that we need to convince someone later on the information we seek may depend on whether we know whether this person disagrees with us—the presence of a conflicting perspective. Knowing that someone disagrees with us could amplify Possibility 2 by increasing one's uncertainty and triggering more exploration, both in terms of the amount of information selected and the type of information selected (Langenhoff et al., 2024), or it could amplify Possibility 1 by increasing the motivation to win the argument and increasing biased information seeking.

In addition to examining whether participants display a myside bias when they do and do not have an argumentative information-seeking goal (effect of context), we also examined the developmental trajectory of the myside bias and whether it differs as a function of the presence of an argumentative information-seeking goal. Past research has shown that young children's information seeking is more exploratory compared to adults (Gopnik, 2020; Meder et al., 2021; Ruggeri et al., 2016); thus, young children might not show or show less bias overall than adults.

However, past work on argument generation showed that children are biased to select self-serving evidence when generating arguments and that this bias increases in competitive contexts (Baron et al., 1993; Domberg et al., 2018; see also Kuhn & Crowell, 2011; see also Mercier et al., 2016). Thus, a myside bias in information seeking might be present early in ontogeny, especially in an argumentative context.

Two additional factors might shape information seeking in childhood across contexts. Past research shows that young children demonstrate a positivity bias when reasoning about themselves and other people (Boseovski, 2010; Boseovski et al., 2017; Marble & Boseovski, 2020). Thus, young children may select more positive information than older children and adults, regardless of whether their goal is to learn or to convince. This positivity bias would lead younger participants to prioritize information valence, selecting positive content irrespective of its alignment with their initial choice. We also know that producing counterarguments, that is, evidence undermining a conflicting position, develops relatively late and improves

[1] Confirmation bias and myside bias are sometimes used interchangeably in the literature. However, they are sometimes distinguished based on whether people are testing a focal or external logical hypothesis (confirmation bias/positive test strategy) rather than seeking to confirm their own hypothesis/beliefs/side (myside bias; see Berthet et al., 2024; Mercier et al., 2016; Peters, 2022; Stanovich et al., 2013). Also, some accounts attribute a "motivated" feature to myside bias but not to confirmation bias (Stanovich et al., 2013), whereas some argue confirmation bias can be motivated as well (Klayman, 1995). In this article, we use "myside bias" because we are testing bias based on participants' own predictions and because participants are given specific goals under argumentative and nonargumentative contexts.

with explicit instruction (Crowell & Kuhn, 2014; Domberg et al., 2018; Kuhn, 2001; Kuhn & Crowell, 2011). Thus, it is possible that young children might select less counterevidence overall.

In summary, the present study aims to explore (a) whether and how the myside bias shifts depending on the presence of an argumentative context and (b) whether and how this effect of context interacts with age. To answer these questions, we manipulated the aim (to learn vs. to justify) and the presence of a conflicting opinion (conflict vs. no conflict) across four conditions (*learn*, *learn + conflict*, *justify*, *justify + conflict*) with participants ranging from 5 to 55 years old. In all conditions, participants predicted which path (out of two) a character took to go to a city—an arbitrary prediction. Using an arbitrary prediction experimentally controls for prior knowledge (see also Scherer et al., 2013), thereby facilitating age comparisons.

In the learn conditions, participants' task was to seek information to see if they selected the correct path. In the justify conditions, we told them that, after playing the game, they would need to convince another player that they selected the correct path. Following their aim, half of the participants were told that the other player selected the opposite path (conflict) and the other half were given no conflicting opinion. Participants were then given the opportunity to select evidence supporting and undermining their predictions. We examined participants' myside scores: the number of selections favoring their chosen path plus the number of selections discounting the other path divided by the total number of selections. We also examined these two components of the myside bias separately to examine developmental change in participants' tendency to select different types of self-serving information. Finally, we examined the amount of information participants selected across conditions and age groups to understand how these factors influence the total amount of information selected.

Method

Participants

Our sample included 484 participants. We tested six age groups: 5- to 6-year-olds (M = 5.48 [in years], range = 5.02–5.97; according to parent reports, 39 were assigned female at birth and 41 were assigned male at birth), 8- to 9-year-olds (M = 8.53, range = 8.02–9.02; 46 assigned female and 35 male), 11- to 12-year-olds (M = 11.51, range = 11.02–12.02; 39 assigned female and 42 male), 14- to 15-year-olds (M = 14.43, range = 13.90–15.07; 42 assigned female and 40 male), 18- to 24-year-olds (younger adults: M = 21.83, range = 18–24; 40 identified their sex as female and 40 as male), and 25- to 55-year-olds (older adults: M = 35.55, range = 25–55; 39 identified their sex as female and 41 as male). The participants were based in Canada. Among the child participants whose parents indicated their ethnicity (n = 317 out of 324), 35.96% were Caucasian/White, 29.34% were Asian, 22.71% identified themselves with more than one ethnicity, 2.84% were Black/African American, 2.21% were Middle Eastern/Arab, 2.21% were Latin American, 0.32% were Indigenous/Inuit/Metis, and 4.42% of them indicated "other." Among the adult participants who indicated their ethnicity (79 out of 80), 46.91% identified themselves as White, 30.86% as Asian, 6.79% as Black, 6.79% of them indicated "mixed," and 8.64% indicated "other." Children were recruited through the university database and social media advertisements, and adults were recruited via Prolific. We determined the sample size to be 480 based on a simulation-based power analysis prior to data collection (see the preregistration for the details). An additional 20 children were excluded due to parental interference (n = 9) and/or connection issues and technical difficulties (n = 11). An additional 17 adult participants were excluded due to answering the attention check question incorrectly. The exclusions were replaced. We removed one trial's data from five children due to connection issues or the child's accidentally clicking on an unintended option on the screen.

This study was approved by the University of Toronto's Research Ethics Board, and it conforms to recognized ethical standards. For all studies, adult participants and parents of children provided written informed consent. Children provided verbal assent.

Materials

The experiment was designed on PsychoPy (Peirce et al., 2019), and the participants were shown the stimuli via Pavlovia (https://pavlovia.org) so they could click on the items on their screen. They used either a mouse or a trackpad on their laptops/PCs to click on the items. The stimuli included video clips and static images. Each trial featured a unique character, paths, and envelopes in different colors, matching the colors of the paths.

Procedure

We tested the child participants on Zoom. After the screen adjustments, the parents clicked on the study link and shared their screen with the experimenter so that the child and the experimenter could see the stimuli synchronously. The adult participants completed the study on their own. The instructions were prerecorded in both versions.

Warm-Up

The study started with a warm-up to familiarize the participants with choosing items on the screen with a limit, that is, one up to four items among five. They were shown two doors and told to click on one of the doors, behind which they would see some boxes. After their selection, they were shown five toy boxes and instructed to select one to four boxes to see what was inside them. They were told that this meant they could choose one, two, three, or four boxes. Each time they clicked on an item, that item became semitransparent to indicate that it had been selected. After their first choice, participants could stop by pressing a (previously demonstrated) key. When they clicked the fourth item, they were automatically directed to the next page. They were shown the different toys inside the boxes. Then, they proceeded to the experimental trials.

Experimental Trials

Participants watched a video clip explaining that the story character went to the city by taking one of two paths varying in color. They were told that this character had to decide which path to take and that the character read the letters in the envelopes shown on the screen to make that decision, that is, eight envelopes: four for each path, half containing positive information and half containing negative information about the paths (see Figure 1). The envelopes were color-coded to match each path and had either a thumb up or a thumb down to indicate the valence of the information, which was explained to the participants. Participants were told that after reading the letters, the character decided to take one of the paths. The participants could not see what was inside the envelopes. Then, the participants were asked, “Which path do you think [the character’s name] took?” The participants clicked on the path of their choice. After being reminded of the path they chose, the experimenter told the participants that they would select 1–7 envelopes. The purpose of the envelope selections varied across these four between-subjects conditions.

In the *learn* condition, the participants were told to select envelopes to see whether they selected the correct path. In the *learn* + *conflict* condition, although the aim was the same, they were told that another player selected the other path. In the *justify* condition, the participants were told that the other player, depicted as a silhouette on the screen, had not played the game before and that after playing the game, they would need to convince that participant that they selected the correct path. In the *justify* + *conflict* condition, the participants were told that the other player selected the other path and that after playing the game, they would need to convince them that they (the participant) had picked the correct path.

On the next screen, the participants saw eight envelopes (the locations of the envelopes were randomized across trials and participants; see Figure 1) and were told to select 1–7 envelopes. The procedure was similar to the warm-up. The participants could stop at any point after their first selection, and when they selected the seventh envelope, they automatically proceeded to the next trial. Each participant went through three trials. The trials were identical except for the characters and colors of the paths and envelopes (i.e., blue–brown, pink–yellow, orange–purple). At the end of the third and final trial, the participants were shown what was inside the envelopes, that is, visual depictions of good and bad characteristics of the paths. This demonstration was only for the completion of the story of the experiment. We calculated our scores for the dependent variables (DVs) according to the participants’ envelope selections in each trial.

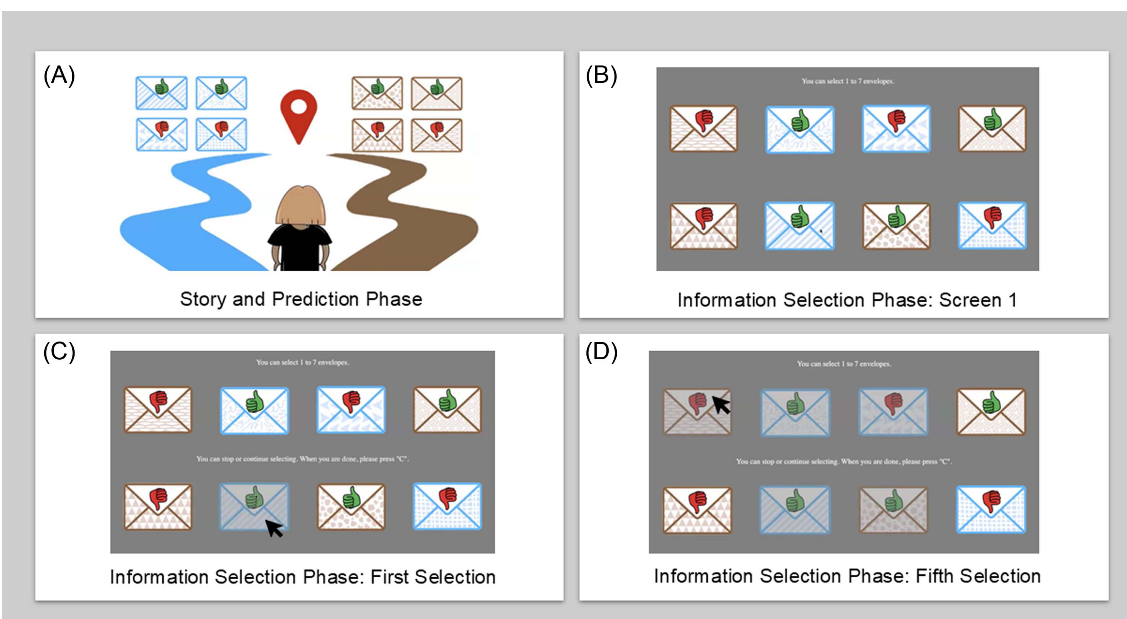
Measures/DVs

Participants’ scores were automatically calculated for each trial using a code we created on PsychoPy. Their myside scores in each trial were computed as the total number of own-positive selections (positive information about the path they chose) and other-negative selections (negative information about the path they did not choose) divided by the total number of selections. This created a proportion score ranging from 0 to 1, with a score of greater than 0.5 indicating a myside bias.

We also calculated the two components of the myside bias. The *own-positive scores*, that is, the proportion of own-positive selections, and *other-negative* scores, the proportion of other-negative selections. For these, a score of greater than 0.25 indicates a bias, as there are four categories of evidence in total with the same frequency (i.e., own-positive, own-negative, other-positive, and other-negative).

Figure 1

Summary Flow of the Prediction and Information Selection Tasks in the Experimental Trials



Note. This figure shows the summary depiction of the story and prediction phase (A) and the information selection phases (B–D). In each trial, there was a different character. The color of the paths and the envelopes also varied across the trials, for example, yellow–pink and orange–purple. The locations of the envelopes were randomized for each trial and participant in the information selection phase. The screenshots reflect a random participant’s selections. The envelopes selected turned semitransparent after each selection. (B) The participant was told that they can select 1–7 envelopes. (C) The participant’s first envelope selection is shown. After the participant selected their first envelope, they were told that they could stop or continue selecting. (D) The participant’s fifth envelope selection is shown. This participant stopped after their fifth selection. If a participant selected seven envelopes, they automatically proceeded to the next trial. See the online article for the color version of this figure.

We also coded the total number of selections. Other preregistered DVs (the category of the first item selected; the bias after each selection, e.g., first, second, third, … seventh; the positivity scores, e.g., the proportion of positive selections [own and other combined]; the self-related scores, e.g., the proportion of own-positive and own-negative; the proportion of own-negative selections; and the proportion of other-positive selections) can be found in the Supplemental Materials. In the current article, we report analyses focused on the development of the myside bias.

Transparency and Openness

This study's hypotheses, methods, and analysis plan were preregistered at https://osf.io/vb5jm/overview?view_only=fb36d0d0250f456580d0208b24a4494a. We report the deviations from our preregistered plan in Supplemental Table S1. Our data set and the scripts for the statistical analyses are available at https://osf.io/6g8u9/overview?view_only=3372381f84f6409284dcacc1e8937883. We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study, and the study follows the Journal Article Reporting Standards (Appelbaum et al., 2018). For all statistical analyses, we used R (Version: 2023, 4.3.0, R Core Team, 2023). We also explain our analytic strategy in the Analytic Plan and Results sections.

Analytic Plan

As our bias scores were bounded between 0 and 1 and reflected a proportion score based on information selected in each trial, we used generalized linear mixed models (GLMMs) with a beta distribution[2] for the myside bias score and its components. As the beta models do not allow exact 0 and 1 values and our data have exact 0s and 1s, we transformed the scores to lie strictly within (0, 1) following Smithson and Verkuilen (2006).[3] For the analyses regarding the total number of selections, we used a Poisson GLMM. In these analyses, the unit of analysis was each trial. For these analyses, we compared the full models with the null models. Our null models only included the control predictors of participants' sex and trial number (scaled) and the random factor of the participant ID. All of the full models reported in the Results section demonstrated improved fit relative to null models (ps < .001). For the model comparisons, we used the "drop1" function in R, which allows us to assess the significance of each term by assessing the effect of removing each item from the model.

We report additional models for the myside bias scores in the Supplemental Materials (linear mixed models, a logistic model [GLMM] that treated values higher than 0.5 as 1 and otherwise 0, and two other models that treated age as continuous; see Supplemental Material, Additional Models).

We treated age as a categorical variable in our final models as preregistered because we recruited specific age groups rather than a sample with continuous variations in age. Using age as a categorical variable also allowed us to make no assumptions about the shape of development, for instance, that it unfolded linearly.

Results

Total Amount of Information Selected

The two most popular strategies were to select seven (36.7%) or four (29.4%) envelopes. A total of 6.6% of the participants selected only one envelope, 5.2% selected two envelopes, 2.6% selected three envelopes, 5.5% selected five envelopes, and 14% selected six envelopes. As the total number of envelopes selected was a count variable ranging between 1 and 7, we fitted a Poisson GLMM[4] by using the "glmmTMB" package (Brooks et al., 2017). The full model included the three-way interaction between aim, context, and age, along with the control variables of sex and trial number (scaled) and the random intercept of participant ID. Model diagnostics indicated no evidence of overdispersion (dispersion ratio = 0.38). This model yielded a significant three-way interaction between aim, context, and age, $\chi^2(5) = 13.26$, $p = .02$ (see Figure 2; see also the Supplemental Material). The interaction effect of age was mainly due to the different pattern 8-year-olds showed relative to all other age groups (see Figures 2 and 3). An additional model excluding the 8-year-olds yielded a significant interaction between aim and context ($p < .001$) and a main effect of age ($p < .001$; see Figure 3). Tukey-adjusted post hoc comparisons showed that in the justify condition, participants sought more information when they did versus did not know that someone disagreed with them ($b = 0.10$, $SE = 0.04$, 95% CI [0.02, 0.19], $z = 2.40$, $p = .02$). In contrast, in the learn condition, participants sought less information when they did versus did not know that someone disagreed with them ($b = -0.16$, $SE = 0.04$, 95% CI [−0.24, −0.08], $z = -3.95$, $p < .001$). Tukey-adjusted age comparisons showed that adults selected more information compared to 5-year-olds (ps < .001) and 11-year-olds (ps ≤ .03). Younger adults selected more information compared to 14-year-olds ($p = .045$).

In sum, the majority of the participants selected the most amount of information in the learn condition when there was no conflict and the least amount of information in the justify condition when there was no conflict, and the amount of information selected increased with age.

Myside Bias and Its Components

Myside Bias

We examined condition and age differences by fitting a beta GLMM using the "glmmTMB" package (Brooks et al., 2017). The full model included the interaction of aim (learn vs. justify), context (conflict vs. no conflict), and age (5-year-olds, 8-year-olds, 11-year-olds, 14-year-olds, younger adults, and older adults), along with the control predictors of sex and trial number and the random factor of the participant ID. The response variable was the myside bias score. The three-way interaction was not significant. The reduced model with the full set of two-way interactions yielded significant interaction effects of aim and context, $\chi^2(1) = 4.22$, $p = .04$ (see Figure 4), and aim and age, $\chi^2(5) = 14.92$, $p = .01$ (see Figure 5). Thus, in the final model, we kept these two interactions along with the control predictors and the random factor (see Supplemental Tables 3a–3b and 4a–4b). Although the interaction between aim and context was

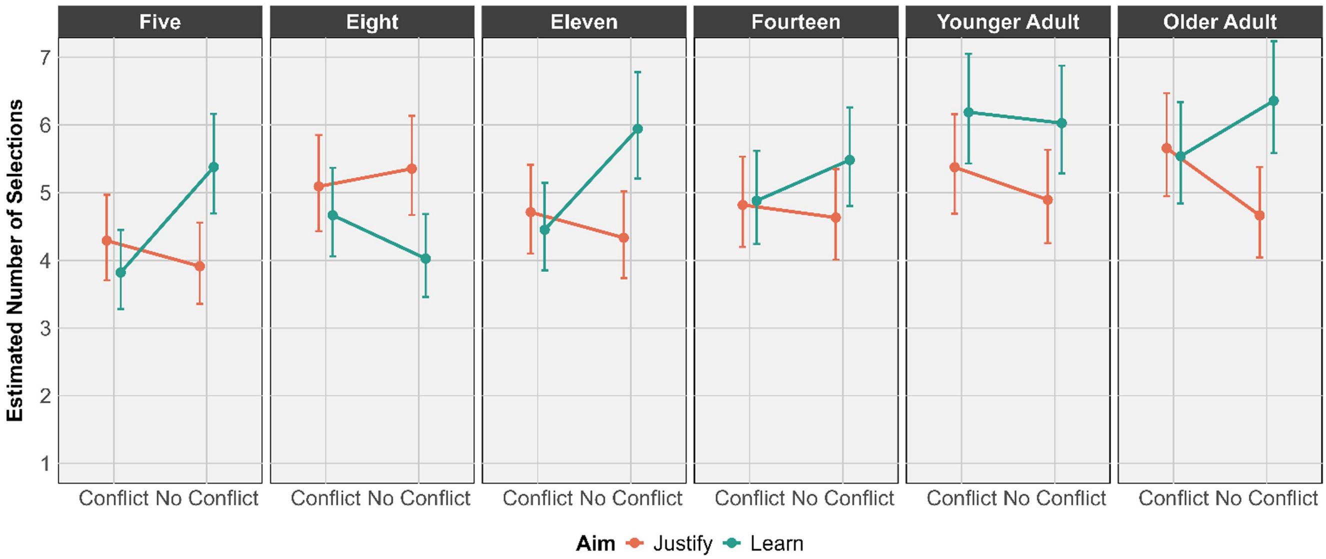
[2] Although we had preregistered using linear mixed models, due to the bounded nature of our DVs, we used beta GLMMs. We report the results of the preregistered models in the Supplemental Materials.

[3] For the transformation, we used the following formula: (variable * (length(variable) − 1) + 0.5)/length(variable).

[4] Our preregistered full model (a linear mixed model) yielded a significant three-way interaction between aim, context, and age ($p = .03$) as well; see Supplemental Table 2a–2b for the model comparisons and the results.

Figure 2

Estimated Marginal Means of the Number of Selections Across All Age Groups and Conditions

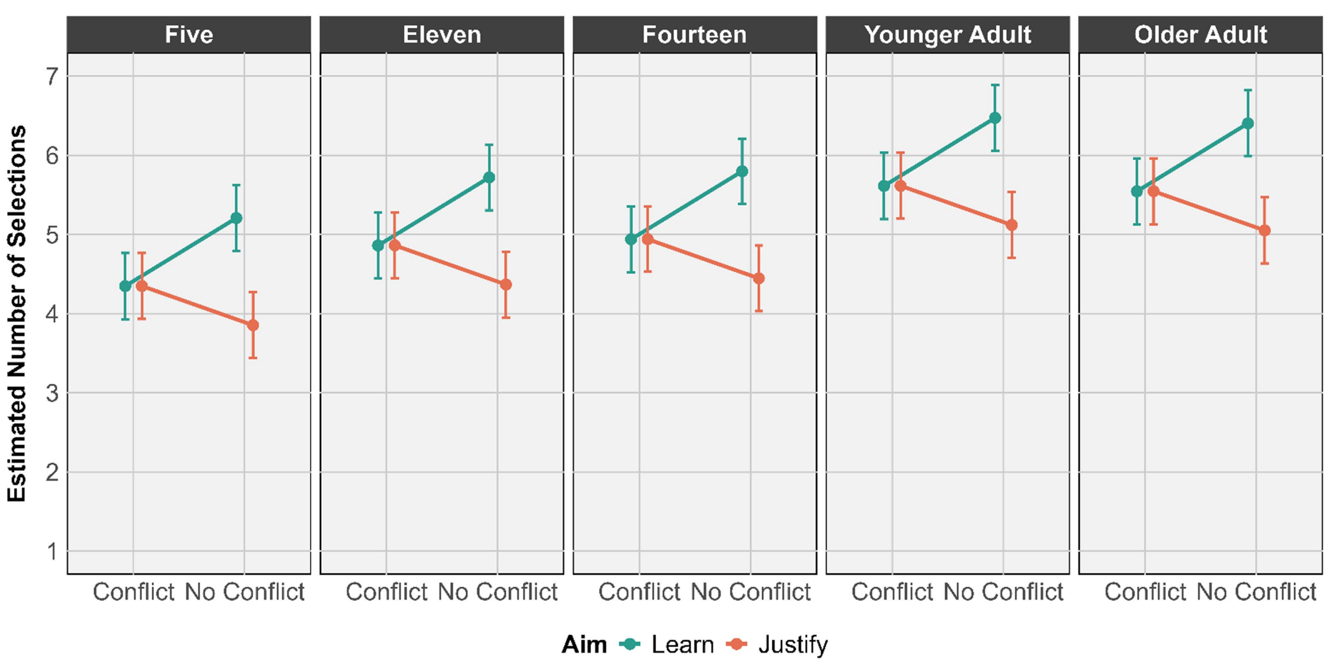


Note. The estimations belong to the model that includes all age groups (three-way interaction between aim, context, and age). The error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

significant in our final model, the Tukey-adjusted pairwise comparisons did not yield a significant difference between any of the comparisons (*ps* > .07; see Figure 4). In the learn conditions, myside bias scores were slightly higher when there was conflict compared to no conflict ($b = 0.14$, $SE = 0.12$, 95% CI [−0.10, 0.38], $z = 1.12$, $p = .26$). In the justify conditions, myside bias scores were slightly lower when there was conflict than no conflict ($b = -0.22$, $SE = 0.12$, 95% CI [−0.46, 0.02], $z = -1.78$, $p = .075$). When it comes

Figure 3

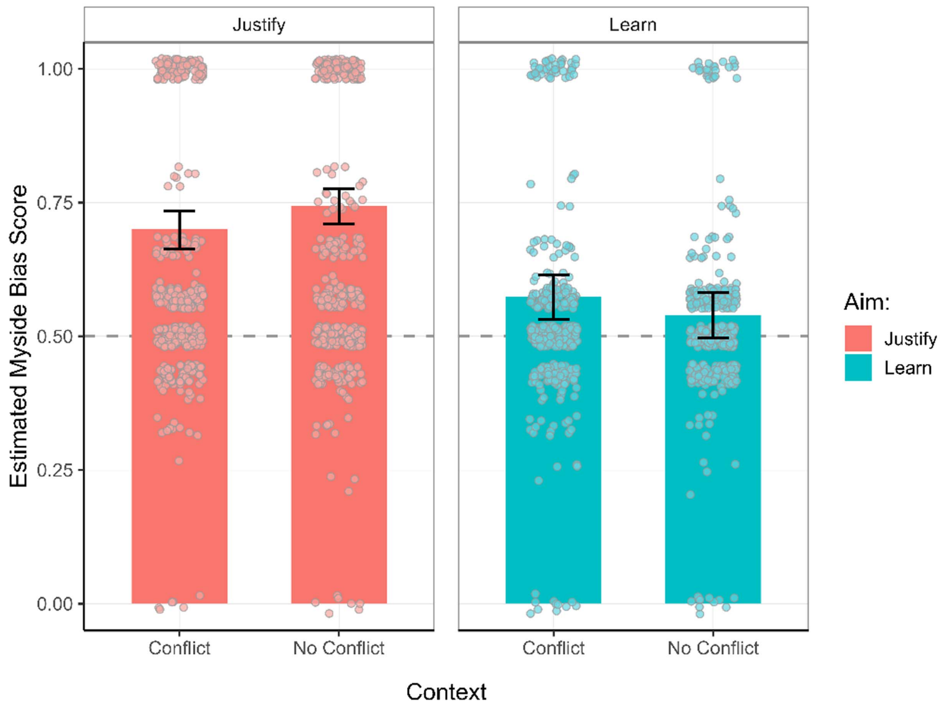
Estimated Marginal Means of the Number of Selections Across Conditions and Age Groups Excluding 8-Year-Olds



Note. The estimations belong to the model excluding 8-year-olds (interaction between aim and context, and the main effect of age). The error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

Figure 4

Estimated Marginal Means of Myside Bias Scores Across Aim and Context



Note. Bars represent the estimated marginal means from the final model. Individual data points reflect the trial-based scores (random jitter added to enhance visibility). The dashed line at 0.5 corresponds to the chance level. Error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

to the interaction between aim and age, all age groups, except the 8-year-olds, had significantly higher myside bias scores when the aim was to justify compared to learn (see Figure 5). Tukey-adjusted pairwise comparisons showed that 5-year-olds had higher myside bias scores in the justify conditions compared to the learn conditions ($b = 0.54$, $SE = 0.22$, 95% CI [0.12, 0.96], $z = 2.50$, $p = .01$). The difference between the myside scores in the justify and learn conditions was not significant in 8-year-olds ($b = 0.22$, $SE = 0.21$, CI [−0.20, 0.64], $z = 1.03$, $p = .30$). Eleven-year-olds had higher scores in the justify conditions compared to the learn conditions ($b = 0.47$, $SE = 0.21$, 95% CI [0.06, 0.89], $z = 2.22$, $p = .03$). Fourteen-year-olds also showed higher myside bias in the justify conditions compared to the learn conditions ($b = 1.05$, $SE = 0.21$, 95% CI [0.64, 1.47], $z = 4.95$, $p < .001$). Similarly, the myside scores in the justify conditions were higher than in the learn conditions in younger adults ($b = 1.09$, $SE = 0.22$, 95% CI [0.67, 1.51], $z = 5.07$, $p < .001$) and in older adults ($b = 1.01$, $SE = 0.22$, 95% CI [0.59, 1.43], $z = 4.69$, $p < .001$). We also examined the effect of age based on the aim, for example, learn versus justify. The age effect was not significant in the learn conditions. In contrast, we found a significant age effect in the justify conditions, $p = .003$. This age effect was mainly due to the difference between the lower scores of 8-year-olds compared to the scores of older age groups (see Figure 5). In addition, female participants had higher myside scores when the aim was to justify compared to the male participants ($p = .01$). The participants' myside bias scores were higher in the later trials in the justify conditions ($p = .04$).

Thus, our results showed that all age groups showed greater myside bias when their information-seeking aim was to convince someone later compared to having to learn whether their prediction was correct. This difference did not reach significance in 8-year-olds. The myside bias scores were around the chance levels in the learn conditions and were relatively stable across age groups, whereas myside bias scores increased with age (especially after 8 years) in the justify conditions. While the presence of a conflicting perspective slightly decreased the bias in the justify conditions and slightly increased it in the learn conditions, these differences were not significant.

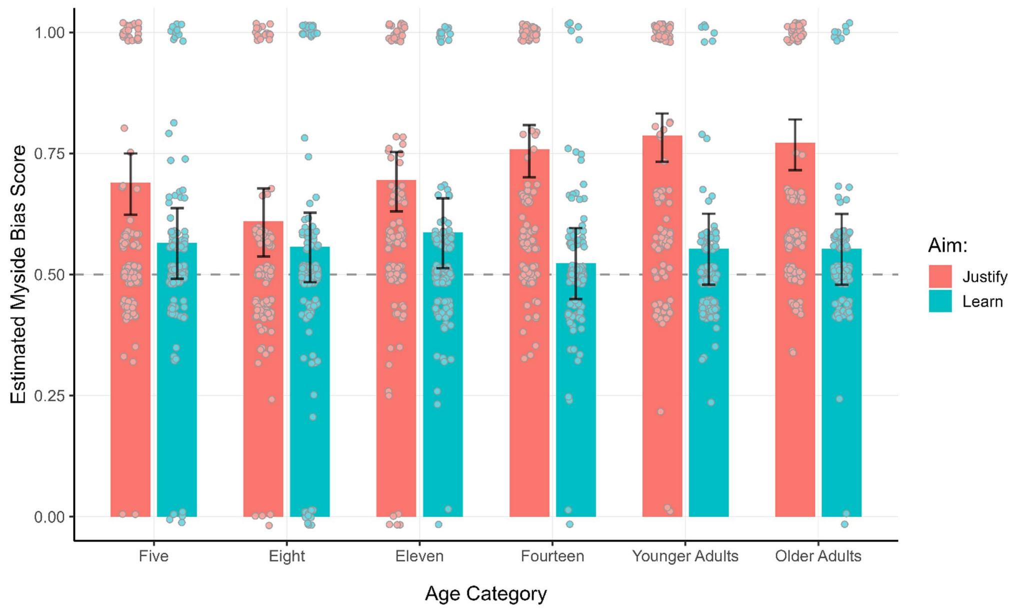
Next, we analyzed the two components of the myside bias scores separately: the proportion of positive selections about the chosen path and the proportion of negative selections about the other path.

Positive Information About the Chosen Path: Own-Positive Selections

We examined the condition and age differences by fitting a beta GLMM. The full model included the interaction of aim, context, and age along with the control predictors of sex and trial number, as well as the random factor of the participant ID. The response variable was the proportion of the own-positive selections. The three-way interaction was not significant. The reduced model with the full set of two-way interactions did not yield any significant interaction effects. Our final model including only the main effects yielded significant main effects of aim, $\chi^2(1) = 22.38$, $p < .001$, and age, $\chi^2(5) = 13.64$, $p = .02$ (see Supplemental Table 7a–7b and Figure 6),

Figure 5

Estimated Marginal Means of Myside Bias Scores Across Aim and Age Groups



Note. Bars represent the estimated marginal means from the final model. Individual data points reflect the trial-based scores (random jitter added to enhance visibility). The dashed line at 0.5 corresponds to the chance level. Error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

along with a significant main effect of trial number, $\chi^2(1) = 5.96$, $p = .01$. Participants selected more own-positive information when their aim was to justify than to learn ($b = 0.40$, $SE = 0.08$, 95% CI [0.24, 0.56], $z = 4.77$, $p < .001$). The age effect was mainly due to the higher scores of 5-year-olds compared to the 11-year-olds ($b = 0.49$, $SE = 0.14$, 95% CI [0.08, 0.90], $z = 3.43$, $p = .01$, Tukey-adjusted pairwise comparisons). The participants selected more own-positive information in the earlier trials ($b = -0.07$, $SE = 0.03$, 95% CI [−0.13, −0.01], $z = -2.44$, $p = .015$).

Next, we examined the second component of the myside bias: the proportion of other-negative selections, which serve to discount the alternate path—the path the participant did not choose.

Negative Information About the Unchosen Path: Other-Negative Selections

We examined the condition and age differences by fitting a beta GLMM. The predictors included in the full model were identical to the ones in the previous section. The three-way interaction was not significant. The reduced model with the full set of two-way interactions did not yield any significant interaction effects. Our final model with the main effects yielded significant main effects of age, $\chi^2(5) = 83.92$, $p < .001$, and trial number, $\chi^2(1) = 5.90$, $p = .02$ (see Figure 7 and Supplemental Tables 9a–9b). Tukey-adjusted pairwise comparisons showed that 5-year-olds' and 8-year-olds' other-negative scores were significantly lower than the older age groups, *p*s < .005. Five-year-olds' other-negative scores were also significantly lower than 8-year-olds' ($p = .04$). Overall, participants selected more other-negative information in the later trials ($b = 0.07$, $SE = 0.03$, 95% CI [0.01, 0.12], $z = 2.43$, $p = .015$).

Summary of the Developmental Trend in Myside Bias Results

In Figure 8, we plot the developmental trend in myside score and its two components: searching for positive information about the path the participant selected (own-positive scores) and searching for negative information about the path the participant did not select (other-negative scores). While the myside scores were around chance level and relatively stable across ages when the aim was to learn, we found an increase by age when the aim was to justify. After a decrease from 5 years to 8 years, the myside scores increased with age (see the Discussion section). The participants' own-positive selections decreased, and other-negative selections increased with age.

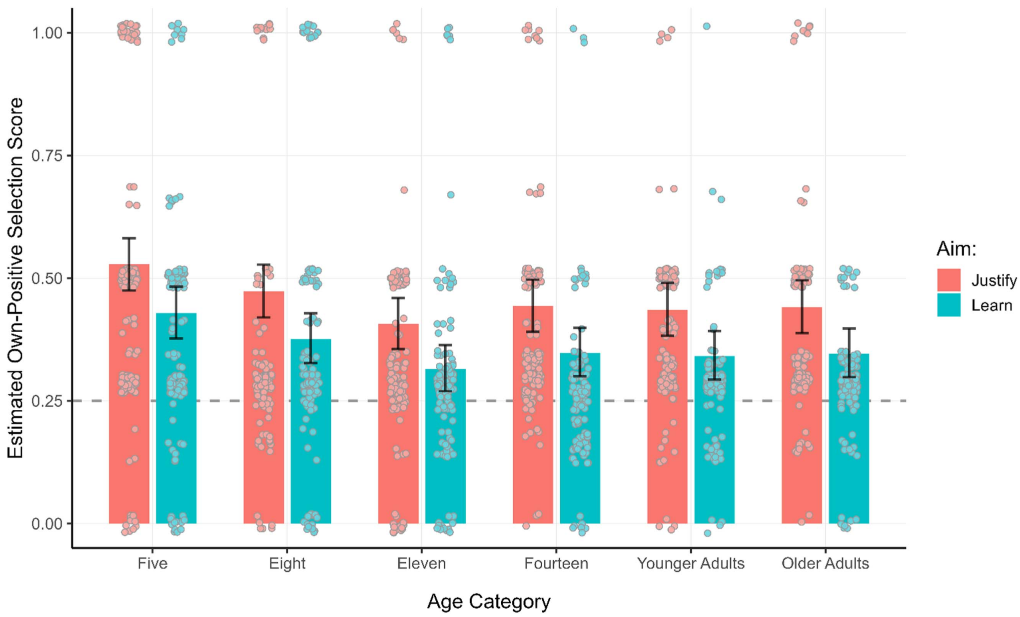
Discussion

We examined how people search for evidence after making a prediction in argumentative and nonargumentative contexts across the lifespan. Specifically, whether they demonstrate a myside bias by favoring information that supports their initial guess and discounting information that goes against it. We explored two possibilities: (a) The presence of an argumentative context biases information seeking—we gather evidence to support our side, a myside bias; (b) the presence of an argumentative context leads to balanced information seeking—we gather evidence to understand both sides of an argument in order to better defend our own perspective. We tested these predictions with participants ranging from 5 to 55 years old.

We discovered that (a) knowing that you will need to convince someone in the future that your arbitrary prediction is correct biases information seeking from 5 to 55 years old, (b) this bias increases

Figure 6

Estimated Marginal Means of Own-Positive Selection Scores Across Aim and Age Groups



Note. Bars represent the estimated marginal means from the final model. Individual data points reflect the trial-based scores (random jitter added to enhance visibility). The dashed line at 0.25 corresponds to the chance level. Error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

with age, (c) seeking supporting evidence for a prediction is present at 5 years old, (d) seeking undermining evidence about a competing prediction develops later, (e) being prompted to check the accuracy of one's predictions leads participants 11 years and older to seek a more balanced set of evidence for and against their predictions, and (f) while the presence of a conflicting opinion slightly decreases the bias in the justify conditions, it slightly increases the bias in the learn conditions. These data extend the scope of the ATR by showing that the bias does not just affect how we defend our views. It is also present when we seek information prior to producing arguments. Our data also show that we are not always biased. Our information-seeking goals shape the kind of information we seek. Below, we unpack these results and connect them to prior work. We begin by discussing what our results reveal about the components that make up an argumentative context.

Components of an Argumentative Context

In exploring what creates an argumentative context, we manipulated two factors: being asked to justify a prediction in the future and knowing that someone made a competing prediction. We examined the effect of these two components on two measures: the total amount of information participants sought and the kind of information that participants sought. We found that the effect of a conflicting perspective slightly differed across goals. When the goal was learning, conflict reduced the amount of information selected and slightly increased the myside bias compared to the no conflict scenario. On the other hand, when the goal was to convince someone later on, knowing that someone made a conflicting prediction increased the number of information selected (except for 8-year-old children; see Figure 3) and slightly decreased the myside bias.

Compared to the learning scenario when there was no conflicting perspective (where we would expect more exploration), conflict might have triggered a slightly more argumentative context, which reduced exploration and slightly increased the bias. In contrast, when selecting information to convince someone, knowing that the person had a different belief might have led to seeking a bit more information supporting the alternative to understand the other perspective better and to prepare for the later discussion, for example, challenging the opponent's arguments. It is also possible that the presence of a conflicting perspective slightly reduced the participants' confidence when the aim was to convince, leading to more exploration (see Langenhoff et al., 2024). However, it should be noted that the effect of conflict on the myside bias scores was subtle (see Figure 4).

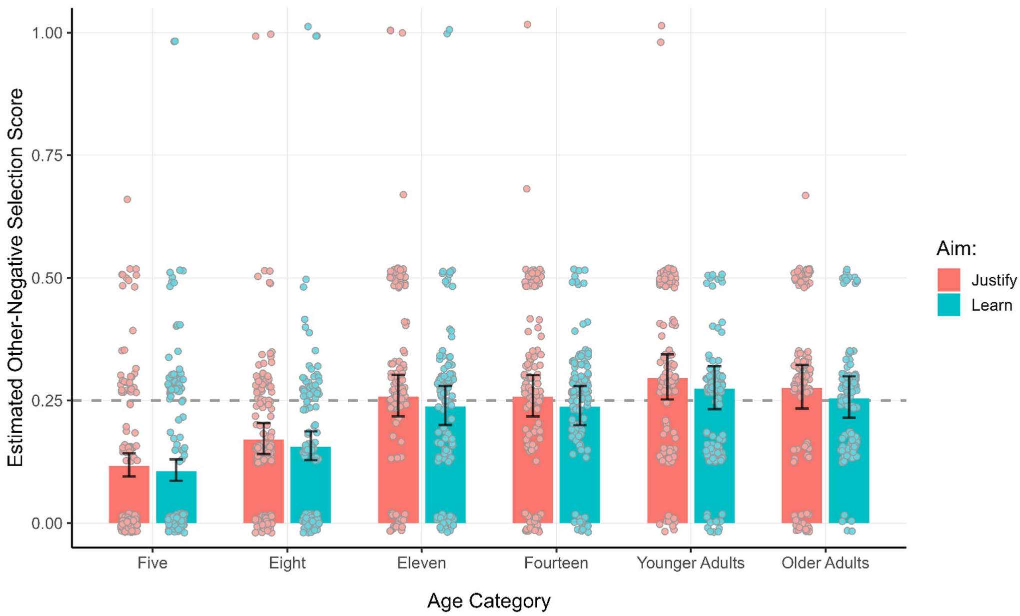
The most significant influence on participants' biased information seeking was knowing that they would need to convince someone that their prediction was correct. This manipulation had a strong effect on the kind of information participants sought across the lifespan, making them choose information supporting their perspective and undermining the other perspective and ignore information supporting the other perspective and undermining their perspective, resulting in myside bias.

The Developmental Trajectory of the Myside Bias Across Contexts

We discovered that the nature and strength of the myside bias change across the lifespan. When told they would need to convince someone in the future that their predictions were right, 5-year-olds mainly selected positive information supporting their predictions—a finding consistent with prior research on the positive test strategy

Figure 7

Estimated Marginal Means of Other-Negative Selection Scores Across Aim and Age Groups



Note. Bars represent the estimated marginal means from the final model. Individual data points reflect the trial-based scores (random jitter added to enhance visibility). The dashed line at 0.25 corresponds to the chance level. Error bars indicate the 95% confidence intervals. See the online article for the color version of this figure.

in children's hypothesis testing (see Klahr & Chen, 2003; Tschirgi, 1980; Zimmerman & Glaser, 2001). By 11 years old, participants selected a more balanced set of evidence: positive information supporting their prediction and negative information about the alternative. Thus, the two components of the myside bias for information seeking when the goal is to convince someone develop at different rates. Favoring information that supports our beliefs develops before the tendency to seek negative evidence about competing predictions. Critically, we found that the strength of the bias increased with age and reached adult-like levels of bias around age 14 (Figures 5 and 8).

When the aim was to learn, we also observed a shift from a focus on learning positive information about one's belief to also seeking negative information about a competing belief. These changes led participants 11 years old and above to become more balanced in their information selection when learning whether their beliefs were correct. Therefore, our results reveal two developmental trajectories: one for learning, which involves seeking more balanced information, and one for persuasion, which focuses on weakening the opposing view.

Our results extend past work on how children learn from evidence and how they teach and deceive others (Bonawitz et al., 2012; Gopnik et al., 2001; Gweon, 2021; Kimura & Gopnik, 2019; Rhodes et al., 2015; see Butler, 2020; see also Köymen & Tomasello, 2020) by showing age-related developments in the kinds of evidence gathered to convince someone. Young children think that they need information showing why their own perspective is correct, while older children and adults think that they need information supporting their own perspective *and* evidence undermining alternative perspectives.

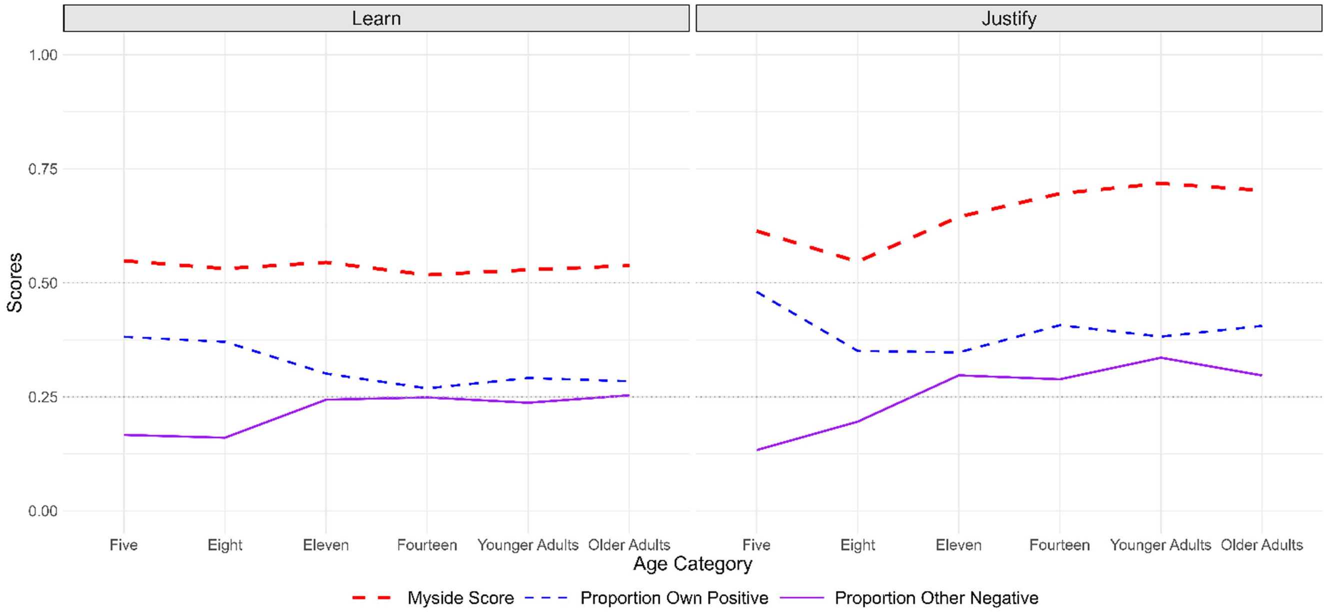
From ages 5–8, when the aim was to justify, the drop in own-positive selections was larger than the rise in other-negative selections, leading to slightly lower myside bias scores in 8-year-olds compared to other age groups (see Figure 8). This difference may indicate a developmental shift between ages 5 and 11, from favoring own-positive information to a more balanced approach, as shown in both the learn and justify conditions (Figure 8). What might cause this transition?

It is possible that with more exposure to formal and informal argumentation in their social environment, and explicit instruction about argumentation in the school context, children might be starting to employ a more explicit strategy to support their perspective and undermine the alternative perspective. That is, between ages 5 and 11, children may be learning how argumentation works and what makes a good argument. Consistent with this interpretation, children's counterargumentation skills develop substantially between early childhood and adolescence. While younger children (5-year-olds) provide reasons supporting their beliefs, for example, own-positive information, even 11-year-old children struggle to spontaneously generate reasons undermining the alternative perspective, for example, other-negative information (Baron et al., 1993; Crowell & Kuhn, 2014; Domberg et al., 2018; Kuhn & Crowell, 2011; Kuhn et al., 2013). This skill can be learned and improves with instruction (see Crowell & Kuhn, 2014; Kuhn & Udell, 2003; Kuhn et al., 2013).

An increase in children's ability to coordinate hypotheses and evidence (Kuhn, 2002) and in their understanding of the recursive nature of mental states, rToM (Astington et al., 2002; Osterhaus & Koerber, 2023), are other potential contributors to this development. Past work showed that scientific reasoning abilities are linked with rToM abilities, which develop around age 7 (see Osterhaus & Koerber, 2023). The relationship between the two has been argued to be the mechanism that allows one to represent beliefs about beliefs

Figure 8

Mean Myside, Own-Positive, and Other-Negative Selection Scores Across Aim and Age Groups



Note. The mean scores reflect the untransformed raw scores, 0.25 represents the chance level for the own-positive and other-negative selections, and 0.5 represents the chance level for the myside bias. See the online article for the color version of this figure.

(e.g., reasons) and to use them to justify other beliefs (e.g., hypotheses). In our study, this mechanism might be linked to how children select information to later use as reasons to convince someone.

Another potential contributor to this developmental change is metacognitive development. For example, children under 5 overestimate their knowledge and tend to mistake guessing with knowing, a tendency that decreases with increasing age (Kloo et al., 2017; Rohwer et al., 2012). Younger children's overreliance on information supporting their perspective and their avoidance of counterevidence undermining the opposite perspective in our study might be linked with their overreliance on their initial guesses due to overconfidence (Hagá & Olson, 2017). It is possible that greater metacognitive abilities, combined with greater knowledge of what makes a good argument, could be making participants' information selection more balanced in supporting their side and undermining the other side with increasing age. On the other hand, the decrease in selecting own-positive information might be partly affected by a decrease in children's general preference for positively valenced information (Boseovski, 2010; Marble & Boseovski, 2020); however, it should be noted that children did not show a preference for *any* positive information. They selected positive information consistent with their prediction rather than positive information against it and did more so when their aim was to convince than to learn (see Figure 6 and Supplemental Figure 14).

Constraints on Generality

Our results provided important theoretical and practical information about a well-known and prevalent bias in human reasoning. Although our sample includes a broad age range of participants with diverse backgrounds, future research should explore whether our findings hold beyond North America. Such work will be particularly important to determine whether the age-related increase in the myside bias, as well as the more specific increase in selecting evidence undermining an opposite prediction, is culturally dependent and associated with exposure to formal schooling.

In our paradigm, we asked participants to make an arbitrary prediction. This approach contrasts with past work with adults, which predominantly used people's positions on controversial issues or their in-group status as their prior beliefs (e.g., gun control, the death penalty, nationality; Vedejová & Čavojová, 2022; Frost et al., 2015; see also Stanovich, 2021). Our methodological decision to control for participants' priors may be why adults did not show any bias in the learn condition (see Taber & Lodge, 2006). On the other hand, the lack of bias in the learn condition could also be due to the prompt we used, which may have caused adults to take on an *accuracy motive* and debiased their search (see Kunda, 1990; see also Friedrich, 1993; Van Bavel & Pereira, 2018; see also Johnston, 1996). Further research might explore whether the need to convince someone increases the bias or the need to check the accuracy of one's prediction decreases the bias, or both.

In our design, seeking information was free, yet participants still varied in the amount of information they sought. Moreover, because participants were given balanced evidence about both paths, their biased selections in the justify conditions might not only reflect a preference for self-serving evidence, but they might also reflect a tendency to *ignore* non-self-serving evidence.

The participants tended to start by selecting information supporting their side, especially when their aim was to convince someone they were correct (see Supplemental Figures 1–3 and 7–8). The participants were free to choose up to seven envelopes containing information without being able to see the information hidden in the envelopes. In some contexts, the order in which we receive supporting or opposing information matters in belief updating (see Pilgrim et al., 2024). Further research might investigate this effect of biased initiation on revising beliefs in argumentative and non-argumentative contexts. Biased initiation toward belief-supporting information may compound, particularly in an argumentative context, and lead to even greater bias than we observed when participants are able to immediately incorporate that information into their beliefs (see Hahn et al., 2018).

Conclusion

Our results showed that knowing that you will need to convince someone in the future that your arbitrary prediction is correct biases information seeking across the lifespan. Participants did not show a myside bias when trying to simply learn if their prediction was accurate. By implication, these results suggest that (a) the presence and the degree of myside bias are dependent on the presence of an argumentative goal—we are *not* always biased—and (b) myside bias does not just affect how we defend our views. We are biased *before* we produce reasons, and this bias is present even for arbitrarily made predictions. These results contribute to understanding the scope and function of myside bias in human reasoning. By providing data across the lifespan, we clarify the developmental trajectory of the myside bias. We show that it emerges early and increases and changes with age. Practically, our results suggest that the myside bias could be ameliorated by introducing a learning goal to focus participants' attention on data that undermine their predictions.

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