Novel Noun Generalization And Stimulus Comparisons In Children: Manipulating The Number And Structure Of Learning Stimuli.

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Abstract

Studies in novel word learning show that comparison settings (i.e., several stimuli introduced simultaneously) favor taxonomically-based generalization. Most comparison studies have been done with forced-choice designs. Here, we investigated, in a free-choice comparison design the type of stimuli four and five-year-old children chose in a novel noun generalization task, either from the same basic level category, or a near superordinate category, or a distant superordinate category, but also perceptual, thematic, and unrelated lures. Same basic level category items were more chosen than other taxonomically related items. Perceptual lures and near superordinate items did not differ, suggesting that children did not arbitrate between perception and taxonomy. Results are discussed in terms of different theoretical perspectives on stimulus generalization, lexical constraints, stimulus comparison and finally Bayesian approaches. They suggest that children integrate the results of their comparison rather than sampling probabilistic regularities.

Keywords: Lexical learning ; generalization ; free-choice; generalization distance ; item familiarity.

Introduction

Comparisons and novel word generalization

Young children's ability to quickly and efficiently associate novel words onto novel objects is amazing (Bloom & Markson, 1998; Carey, 2010; Carey & Bartlett, 1978; Diesendruck & Bloom, 2003; Jones & Smith, 1993; Landau et al., 1988b; Markman, 1989a; Woodward et al., 1994). One aspect of lexical learning is the capacity to generalize novel words to new entities and is our central question. It requires the capacity to focus on conceptually relevant dimensions (Bloom, 2002; Jones & Smith, 1993; Markman, 1989b).

We briefly review the vast literature on lexical generalization, from three points of view, that is single object design, comparison studies, and Bayesian perspective. Indeed, evidence suggests that the way a novel noun is introduced with a novel object, either single or several objects, *shapes* its generalization (Gentner & Namy, 1999; Markman, 1989a; Smith et al., 2002; Thom & Sandhofer, 2009; Xu & Tenenbaum, 2007a).

First, when one single learning object is introduced with its name, children could select any dimension or set of dimensions as a basis for later generalization. What they do, rather, is to follow so-called lexical biases (Diesendruck & Bloom, 2003; Jones & Smith, 1993; Landau et al., 1988b; Markman, 1989b, 1990). For example, the shape bias says that children tend to generalize novel object nouns along shape, rather than other dimensions such as color or size or texture (Kucker et al., 2019; Landau et al., 1988a; Markman, 1990). Another bias is the basic level bias which refers to children's spontaneous generalizations of novel nouns to same basic-level category objects (e.g., "apple" to any new apple, but not other fruits) (Imai et al., 1994; Tek et al., 2012; Waxman et al., 1991; Waxman & Hatch, 1992). Studies often rely on the forced-choice single object paradigm. One stimulus is introduced (e.g., a pumpkin) with a pseudoword: "See? It's a *dax*". Next, test stimuli are introduced, for example a taxonomic associate (another fruit) and a perceptually related stimulus (e.g. a balloon). The child is asked to choose the one that is also "dax".

Second, other studies have revealed that introducing several learning instances, rather than one, can give more weight to less salient dimensions, which might even suppress the above biases (Lagarrigue & Thibaut, 2025a; Namy & Gentner, 2002). Two (or more) stimuli are introduced and a noun (e.g., a pumpkin and a potato, as "daxes"). Comparing multiple learning examples would prompt children to test various "alignments" and to consider less salient dimensions than the one selected in a single design (Augier & Thibaut, 2013; Hammer, 2015, 2015; Hammer et al., 2009; Lagarrigue & Thibaut, 2025b; Namy & Gentner, 2002) and select a perceptually different taxonomic choice (e.g., a carrot) rather than a same shape choice (e.g., a basketball balloon) (Gentner & Namy, 1999). Both designs are forced-choice.

Third, the Bayesian view is a also a comparison perspective. It shows that, depending on the set of learning stimuli (e.g., three green apples, or three different apples, or an apple and a peach and a banana), children generalize to different levels of categorization, subordinate, basic, or superordinate, respectively, rather than to the basic level of categorization they usually prefer in single learning object designs (Jenkins et al., 2015; Spencer et al., 2011; Xu & Tenenbaum, 2007a, 2007b). The main idea is that depending on the *level of variation* displayed by the learning exemplars, the breadth of extension of a word will change accordingly in both adults and children. Here, the learning items encompassed different levels of the taxonomy. Xu & Tenenbaum (2007a,b) used a *free-choice* rather than a *forced-choice* design. Learners could select as many images as they desire. In the learning phase, participants saw either three subordinate level items (e.g., three Dalmatians), three images from the same basic level category (e.g., three dogs of different breeds), or three images belonging to the same

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superordinate level category (e.g., three different mammals), or, as a control condition, one stimulus (a dalmatian). The stimuli were associated with a pseudo-word ("You see? these are *daxes*"). Then, a generalization set of images was introduced, which entertained various taxonomic relations with the learning items (new Dalmatians, Dogs, and mammals), plus unrelated distractors (vehicles or food). The presentation of three learning subordinate items elicited generalization of the novel noun at the subordinate level (here, Dalmatians) rather than to other types of dogs. Introducing three different breeds of dogs elicited generalization to all types of dogs (including new breeds). Introducing a dog with other types of mammals (e.g., cow and cat) led to "any mammal" generalizations. The authors described these results as the "suspicious coincidence effect". Indeed, three dalmatians under the same name make it likely that the noun refers to dalmatians only. The same logic holds for the two other learning situations. As the authors put it, sensitivity to these types of suspicious coincidences is a fundamental ability facilitating word learning (Xu & Tenenbaum, 2007b), as participants assume that the examples are representative of the sampled category. These results have been replicated several times (Lewis & Frank, 2018), even though the effect is sensitive to how learning and generalization are introduced (Spencer & Smith, 2011; Wang & Trueswell, 2019).

In Xu & Tenenbaum, note, first, that the stimuli were familiar to both adults and children, who, thus, could use their existing knowledge to associate the stimuli with the novel word and to generalize it to novel (but familiar) instances. Second, the distractors in the generalization phase were all unrelated to the learning exemplars, so no shape bias could be expected (Kucker et al., 2019; Golinkoff & al, 1995; Landau et al., 1988a; Markman, 1990).

Goals Of The Present Experiments

Here we want to combine the results obtained with the forced-choice designs in both the single- and the comparison-learning formats and results obtained in the free-choice format as in the Bayesian approach. We focus on the basic and the superordinate level of categorization. Like Xu and Tennenbaum (2007b), we used a free-choice format in which we introduced learning items from the same basic level of categorization and from the same superordinate level of categorization, and generalization items at the same basic level, or the same near taxonomic level. We also introduced more distant taxonomic generalization choices, see below, (Thibaut & Witt, 2023). However, following former comparison studies showing that perceptually-related choices remain frequent even in comparison designs (see Gentner & Namy, 1999; Thibaut & Witt, 2023) we introduced perceptually-related items, but also thematically-related or unrelated lures. Note that a free-choice paradigm allows participants to choose any stimulus (or combination of) and that former free-choice contributions such as Xu and Tennenbaum (2007) did not consider perceptually- or thematically-related lures. We wanted to assess whether the lexical biases identified with single learning paradigms, or with forced-choice comparison studies also appear in a free-choice comparison paradigm. Finally, compared to previous Bayesian studies in which only immediate superordinate category members were considered (e.g., other fruits like bananas, when rhubarb or apple were the learning items), we also introduced more distant taxonomic choices (e.g., meat) like in Thibaut and Witt (2023). This condition was meant to test the taxonomic range of generalization.

We compared three learning conditions: a single stimulus learning design (which is optimal for detecting children's lexical biases). For the generalization options, we focus on three main taxonomic generalization cases: generalization items belonging to (i) the same basic level of categorization as the learning stimuli (e.g., a new type of pumpkin), (ii) the same immediate superordinate level of categorization (e.g., new fruits), and (iii) a more distant superordinate category choice (e.g., meat when the learning item are veggies).

Predictions. The Bayesian view predicts that in the three-basic-level learning comparison conditions, basic-level generalization items will be chosen more than any other stimulus type; that in the three-superordinate learning condition, same-superordinate level options (e.g., another veggie) should be selected as often as the basic level stimuli. The Bayesian view also predicts no selection of the most distant taxonomic choices in both learning (basic and superordinate) conditions, since they are beyond the taxonomic range of the learning conditions. This view does not predict selections of the thematically or perceptually related lures as they do not belong to any learning category, in the three learning condition, including the single one. In contrast, the lexical bias literature predicts a high selection rate of the perceptually-similar option in the "single" learning situation because children might also find "same shape" stimuli appealing. Children might also select this latter option in the comparison condition as in previous forced-choice studies (see Thibaut & Witt, 2023).

Experiment 2 manipulated stimulus familiarity. Our goal is to test whether these previous findings remain when children are not able to rely on their prior knowledge. Former Bayesian studies were based on familiar categories. However, the principle they describe is supposed to be a general lexical learning, thus should mainly apply for unfamiliar stimuli in children. Thus, we compared a familiar (e.g., three pumpkins) with an unfamiliar (e.g., three Buddha's hand) condition. The predictions are that children might be more sensitive to distractors in unfamiliar stimuli. The Bayesian does not predict perceptual distractors. Either it is unclear how the suspicious coincidence effect should exist, since the scope of variability is more difficult to establish for unknown stimuli and thus where the categories stop. Differences between adults and children might be more important in the unfamiliar case, especially for superordinate level items, since children might have more difficulties to identify the corresponding superordinate categories than for familiar ones (adults recognize the superordinate level

categories). Studying children is important since most studies have featured adults.

Experiment 1
Methods

Participants

One hundred and seventy-two children 4-5-year-old children (mean age, 56.9 months; range, 47.8 – 75) were individually tested in a quiet room at their school. They were from the Dijon area (France). Children were randomly assigned to one of the three experimental conditions ("single" = 46, "basic-level comparison" = 53 and "superordinate comparison" = 57). Informed consent was obtained from children's school and their parents. Sixty-one psychology students from the Université of Bourgogne (mean age = 20.24 years; range 19-37 years) participated in this experiment They were randomized to these three conditions ("single" = 20, "basic-level comparison" = 21, "superordinate comparison" = 20) and tested individually. The Ethics and Research Committee of our University reviewed and approved the procedure (CERUBFC-2023-03-15-016).

Materials

Stimuli were photos depicting real objects. There were two blocks of six trials (block A and block B), which were fully counterbalanced. They were presented on a 15-inch touchscreen laptop. Each trial (experimental set) was composed of twelve stimuli, each depicting a semantic category (e.g. foods, clothing, tools, etc.). For each trial (set), there were three learning stimuli and twelve generalization stimuli. The twelve trials were divided into two taxonomic level conditions. For the "same basic level" learning condition, the three learning pictures of objects came from the same basic level category (e.g., three different pumpkins, see figure 1). In the case of the "same superordinate level" learning condition, the three learning items came from the same superordinate category (e.g.,a pumpkin, a tomato and a melon, see Figure 1). We had a total of 60 learning items and 144 generalization pictures. Much of our materials comes from Thibaut and Witt (2023). Independent similarity ratings by fifty-three students confirmed that learning objects in the same basic level conditions were conceptually closer to each other than the objects from the "same superordinate category", $t(26) = 3.98$, $p < .001$. Basic-level learning items were more conceptually related to the standard learning items than superordinate learning items (average ratings: M_{Super} = 4,76, M_{Basic} =6.63, p <.001).

The twelve generalization items were distributed across six types of items, two items per generalization types (see Figure 1), either taxonomically-related stimuli (3 types) or not (3 types). The taxonomically-related items were two items from the same basic level category as a learning item (TaB, e.g., two different pumpkins), two stimuli from the same immediate superordinate categorization level as the learning items (TaN; e.g., vegetables such as a salad and a cucumber) and two stimuli from a more distant superordinate category (TaD; e.g., food category, such as meat and cheese). The three types of distractors were perceptually similar but taxonomically unrelated items (2 perceptual distractors, P, e.g., a ball and a round candle). Two distractor items were thematically related but taxonomically and perceptually unrelated to learning items (2 thematically related, Th, e.g., a pressure cooker and a fruit knife). Finally, two unrelated distractors were taxonomically, semantically and perceptually unrelated to the learning items (Non related distractors, NR, e.g., a toy and a phone). These latter two items are should never be selected as generalization items.

We used 12 distinct bisyllabic labels (pseudo-words) such as daxo, zatu, etc.. Indeed, Gathercole and Baddeley (1993) showed that bisyllabic words are more easily memorized than monosyllabic ones.

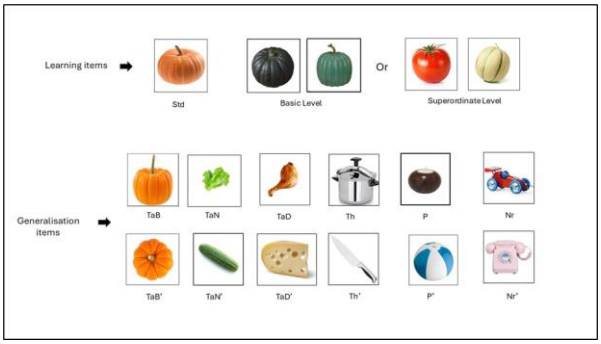

Figure 1: The pumpkin category trial (basic-level condition). TaB: same basic taxonomic category, TaN: near superordinate category, TaD: distant superordinate, Th: thematically related, P: perceptually related, NR : Non related generalization items.

Ratings for generalization items. Our generalization items come from previous experiments with children (Stansbury et al., 2022, 2023; Thibaut & Witt, 2023). Twenty-eight students rated them. Thematically and perceptually related items were judged to be less taxonomically related to the learning items than the taxonomically related items (Means: M_{TaN} = 6.8, M_{TaD} = 4.09, M_{Th} = 4.5, M_{P} = 2.1, M_{NR} = 1.5, p between TaN-Th $p < .05$). Twenty-four students rated distant taxonomically related generalization items to be taxonomically further to the standard item compared to near taxonomically related items. Thirty-six students rated the perceptual similarity of items. Perceptual matches were perceptually more similar to the learning items than all the other generalization item types (average ratings: M_{TaN} = 3.03, M_{TaD} = 2.52, M_{Th} = 2.2, M_{P} = 6.3, M_{NR} = 1.7, average p between P-Ta $p < .001$). Finally, twenty-one students rated the thematic distractors as being thematically further to the learning items than the other generalization items (average ratings: M_{TaN} = 6.28, M_{TaD} = 4.09, M_{Th} = 7.5, M_{P} = 2.2, M_{NR} = 1.8, average p between Th-Ta $p < .05$). In all the ratings,

the unrelated distractors scored significantly lower than all other generalization items ($p < .01$).

Procedure

We conducted the experiment in a quiet room, in children's school. Children were seated in front of a laptop which was on a small table, next to the experimenter. Each child was assigned to either Block A or Block B. Then, they were randomly assigned to one of the three learning conditions: single, basic-level comparison and superordinate comparison. Depending on the learning condition, children saw either the three "close" learning stimuli (same basic level) or the three far learning stimuli (same superordinate). In both conditions, children were introduced to a puppet, Yoshi "This is Yoshi, we are going to play with him. He lives far from here and speaks a different language. In the game we are going to learn his language." The procedure started with two training trials. The twelve experimental trials were then shown. In all three learning conditions, the experimenter gave the names as the learning appeared one at a time at the top of the screen: "Yoshi's mummy says that this is a *buxi*, and this one is also a *buxi*; Yoshi must find other *buxis* for his mummy". Then, the generalization items were displayed in the lower part of the screen. Then, each generalization item was displayed one by one at the center of the screen. The experimenter then asked "Is this a *buxi*?" for each of the 12 generalization items, regardless of experimental condition. Children were asked to wait until Yoshi appeared on the screen before giving their response "Take your time, don't give me your answer before Yoshi appears on the screen". The procedure was the same for adults, but was run in our laboratory.

Results

We computed the proportion of items which was chosen by participants for each category of generalization item (i.e., basic category, near superordinate, distant superordinate, perceptual, thematical, unrelated) as a function of the learning condition (out of a total number of 24 items, 12 x2.)

Unrelated items selections were used as a control measure, since they should never be selected. So, we discarded children who selected more than 50% of unrelated items from further analysis. Most likely, this high rate of selection of unrelated items reflected their lack of comprehension of the "foreign language learning". Twenty-two 4-year-old children out of ninety-five and three 5-year-old children out of sixty children and no adult were excluded.

We ran a three-way ANOVA with Learning distance (single, basic-level, superordinate) and Age (children vs adult) as between-factors and Item Type (Basic-level, near superordinate, far superordinate, thematically-related, perceptual match, unrelated) as a within-factor. Here, we focus on interactions involving Item type.

The analysis revealed an interaction between learning level and generalization items, $F(10,1050) = 8.34$, $p < .001$, $\eta_p^2 = 0.074$ (see Figure 2) which indicates that participants selected more near superordinate items than thematically-related lures, unrelated lures and distant superordinate items (TaD) in the superordinate comparison condition (*MTaN* = 0.3852, *MTaD* = 0.17, *MTh* = 0.12; *MNr* = 0.088; $p < .001$). Interestingly, perceptual items were significantly more selected than thematic and unrelated items in the superordinate comparison case (*Mth* = 0.12, *MP* = 0.2014; $p < .001$). Also, the proportion of TaN in the "superordinate condition" (*MTaN* = 0.38) was significantly higher ($p < .001$) than in the "single" (*MTaN* = 0.12) and the "basic-level comparison" (*MTaN* = 0.09), which is predicted by the Bayesian approach, but its level is much lower than TaB.

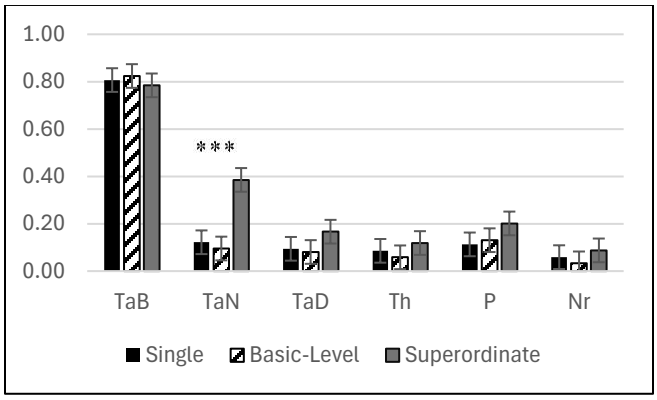

Figure 2 : Average selection rate according to item type (TaB basic, TaN near, TaD distant superordinate, Th thematic, P perceptual and Nr unrelated) and learning condition ("Single", "three basic level" and "three superordinate level").

There was an also Age x generalization items interaction, $F(5,1050) = 35.08$, $p < .001$, $\eta_p^2 = .143$ (see Figure 3). The "Age x Generalization item" interaction (see Figure 3) indicates that adults select more near basic level category item than children (*MTaB* = 0.9 2; *MTaB* = 0.68; $p < .001$, Bonferroni correction). Adults chose fewer perceptual lures than children (*Madults* = 0.06; *Mchildren* = 0.22; $p < .05$) and fewer unrelated items (*M adults* = 0.002; *Mchildren* = 0.11; $p < .05$) than children.

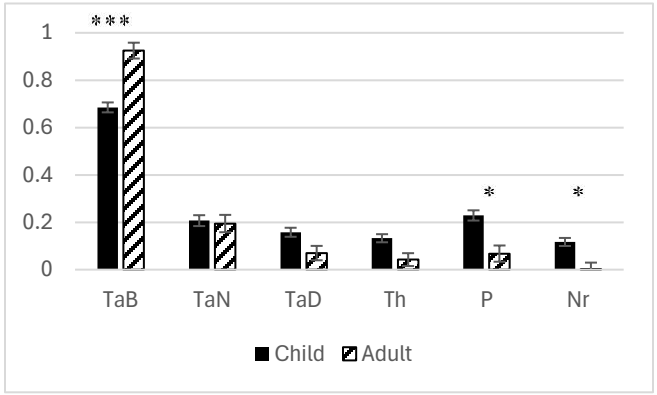

Figure 3: Average selection rate according to item type (basic, taxonomically distant, thematic, perceptual and unrelated) by age of participant (child or adult)

Discussion

This experiment assessed the role of learning format (either single or multiple same basic or same superordinate level) on the type of generalization items participants would select. The main results are (1) regardless of the learning condition, both adults and children selected more items from the same basic-level category than any other generalization type. Second, the superordinate level learning increased the number of corresponding TaN by both adults and children. Although we have reproduced some of the Xu & Tenenbaum (2007) results (a large number of TaB in the basic level learning condition), in the superordinate learning condition participants selected fewer close superordinate items TaN than in their experiments (33 % vs 62-87 %) and much lower than basic level items. Furthermore, children also selected perceptual distractors even when their most frequent choices were taxonomic items. In contrast, they did not select thematic choices significantly more than from unrelated items. Finally, adults and children seemed to have adopted a similar strategy for generalizing. However, adults were less sensitive than children to different distractors, and selected more basic-level taxonomy items.

Last, both adults and children were familiar with the learning and generalization items (see also Spencer & al, 2011; Xu & Tenenbaum, 2007). Thus, their prior knowledge might have helped them to identify which familiar category the learning images belonged to, such as “all pumpkins” or “all fruits” or “all foods”. To achieve a more realistic condition of novel word learning, we designed an experiment. in which we contrasted an “unfamiliar condition” (e.g., three Buddha’s hands or three unfamiliar fruits) with a “familiar” condition (as in Experiment 1) in the learning phase.

Experiment 2

Participants

Fifty-nine French-speaking children were tested individually in a quiet room at their school. They were between 4 and 5 years old (mean age: 56.39 months; range: 51 – 65). Children were randomly assigned to one of the three learning conditions (“basic-level comparison” = 22, “superordinate comparison” 18 and “single” = 19). For Ethics standards see Experiment 1. Additionally, the experiment was conducted with a sample of 60 young adults (“basic-level comparison” = 21, “superordinate comparison” 19 and “single” = 20) on Prolific©.

Materials

The paradigm was the same as in Experiment 1, except that we added an unfamiliar condition (see Figure 4). In the familiar condition, the stimuli came from Experiment 1. In the unfamiliar condition, the children were presented with three unfamiliar learning items, either three items from the same “basic-level” category (e.g., three different buddha's hands) or three learning items from the same “superordinate” category (buddha's hand, prickly pear and carambola). Each of the unfamiliar items was first presented to a group of 4- to 5-year-old preschoolers. This was done to ensure that they were unable to identify the stimuli. However, we made sure that they were able to relate them to the appropriate superordinate category (e.g., fruit for Buddha's hand).

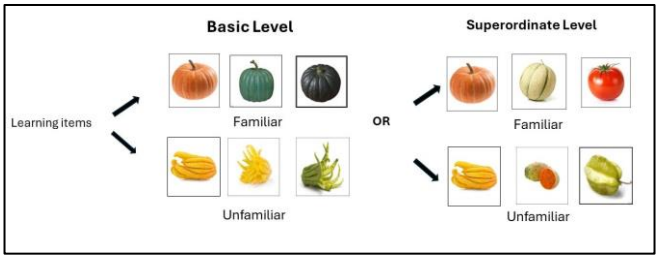

Figure 4: Example of the three learning items from a fruit category in the “basic-level” and the “superordinate level" in the familiar and unfamiliar learning items condition.

Procedure

The procedure was the same as in Experiment 1.

Results

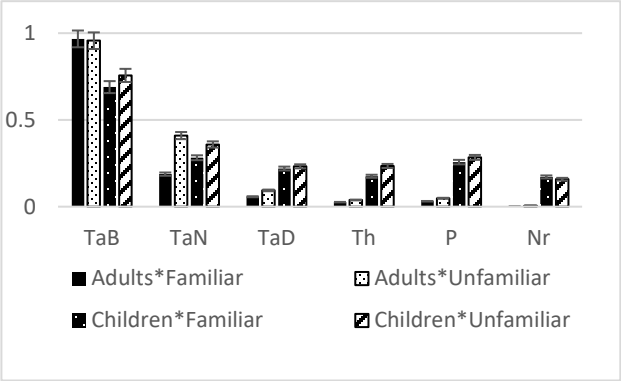

Figure 5: Average selection rate according to item type (basic, taxonomically distant, thematic, perceptual and unrelated) by age (adults or children) and familiarity (“familiar” “unfamiliar”).

We ran a four-way repeated measure ANOVA with Familiarity (unfamiliar, familiar) and Items type (basic-level, near superordinate, far superordinate, theme related, perceptual match, unrelated) as within-factors and Learning (single, basic level comparison and superordinate comparison) and Age (children or adult) as between factors. The analysis revealed a main effect of generalization items $F(5, 565) = 448.666$, $p < .001$, $= 0.799$, and a significant interaction between Items type and learning, $F(10, 565) = 8.499$, $p < .001$, $= 0.131$. However, the most interesting results were interactions involving familiarity. The interaction between Familiarity, Age and Item type was

significant, $F(5, 985) = 6.376$, $p < .001$, $\eta_p^2 = 0.031$ (see Figure 5). Indeed, the selection rate of near superordinate was higher in the unfamiliar condition (*MTaNAdults*= 0.41) than in the familiar condition (*MTaNAdults* = 0.19), ($p < .001$, with Bonferroni correction). Furthermore, in the unfamiliar condition, adults selected significantly more near superordinate items than thematically related items, perceptual distractors, and unrelated items (*MP* = 0.04*; MTh* =0.03 *; MNr* = 0.005; $p < .001$, with Bonferroni correction). This was also the case in familiar condition (*MP* = 0.03*; MTh* =0.02*; MNr* = 0.0001; $p < .001$, with Bonferroni correction). Finally, in the unfamiliar case, children selected fewer basic-level items and more distractors (thematic, perceptive and unrelated) than adults ($p < .001$, with Bonferroni correction). Overall the pattern of results was similar to the one obtained in the familiar condition except the proportion of TaN, higher in the unfamiliar case than in the familiar case in adults. This was not the case in children, who generally chose more lures and less taxonomic choices. This probably results from their lack of knowledge of then unfamiliar, which led to a more even "spread" of choices.

General discussion

The aim of the study was to investigate the proportion of taxonomically related options as a function of learning item type (basic level, or immediate taxonomic or distant taxonomic category) and the proportion of lure choices. The Bayesian approach (Xu & Tenenbaum, 2007b) predicted that selections would be consistent with the taxonomic level of the learning items, and would follow the suspicious coincidence effect. It did not predict any selection of lures, or of distant (TaD) superordinate items. In contrast, the standard comparison studies (e.g., Gentner & Namy, 1999) was consistent with distractor choices, since previous studies had shown that children were choosing distractors even when they did not unify the stimuli in forced choice paradigm even distant superordinate items (e.g., Gentner & Namy, 1999; Thibaut & Witt, 2023).

Experiment 1 showed that children preferred basic level options to other taxonomically related items, regardless of the learning condition. This finding is consistent with previous studies lexical bias (Markman, 1989b; Waxman et al., 1991), studies on comparisons (Thibaut & Witt, 2023) or the Bayesian approach (Spencer et al., 2011; Xu & Tenenbaum, 2007a) single and comparison designs, forced- or free-choice. Children also selected less immediate superordinate than basic level category items with basic level learning items.

However, in the superordinate learning condition, in contrast to previous Bayesian studies, children selected much more basic level options than same superordinate level category options (38% here (Figure 2) versus 62% in Xu and Tenenbaum, 2007b). This result is consistent with forced choice comparison paradigms (Thibaut & Witt, 2023) in which superordinate level choices were lower than basic level choices. There were even fewer selections of the distant taxonomic items (meat for basic level categories of fruits) which is consistent with Thibaut and Witt (2023) and can be explained either by the semantic distance or by the difficulty to find common ground between the learning and the transfer items. Not so surprisingly, children selected very few unrelated items and thematically related items.

There were more perceptual choices than unrelated choices in the single condition, which is consistent with previous studies on biases (shape bias), but this was also the case in the superordinate learning comparison. This was not predicted by a Bayesian perspective (see also the fact that the distant taxonomic choices were less often chosen than the perceptual choice, confirming the availability of these perceptual similarities in contrast with the difficulty of finding superordinated common grounds. According to the Bayesian approach, only taxonomically related items (either basic level or taxonomic level options) should have been selected. In contrast, this result is consistent with the lexical bias literature, as children tend to prefer same shape items. The Bayesian approach would have predicted a decrease with several training items.

Finally, the second experiment confirmed the results with familiar items. We observed a generalization strategy that was similar to the one used with familiar items, but which differed in two respects. First, adults selected more near items of the superordinate taxonomy when unfamiliar items were presented. The Bayesian model did not predict these results as their experiments involved familiar learning items. This suggests that, in the absence of prior knowledge of the learning items, we tend to generalize to a larger category (such as food rather than fruit). Second, regardless of the familiarity (familiar or unfamiliar) of the items presented, the children used a similar strategy. This result shows that children continue to follow a strategy similar to the one observed in the familiar condition, but in a more realistic learning context (with unfamiliar items) These results indicate that children are sensitive to factors other than variations in taxonomic levels, and the necessity to include a wider set of distractors (thematic, perceptual, etc.) in order to capture subtle variations in the generalization pattern.

Finally, the use of unfamiliar materials are an important methodological addition to previous contributions which only presented very unrelated items (see above).

Concluding remarks.

Our experiments showed that children could select different types of taxonomically related items in the same set of options, but the proportions of these choices could vary as a function of distance. These taxonomic choices were paralleled by perceptual lures choices, a result which would have remained hidden in a classical forced choice. This suggests that the extension of the nouns is backed up by different types of information, particularly in young children.

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