The Acquisition of Projective Content:
An investigation of the presupposition trigger *too* in English

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1 Introduction

An utterance often conveys two types of information. First, the information that constitutes the main message of the utterance, often referred to as the AT-ISSUE or asserted content. Second, the information that is simply presupposed or a side commentary to the main message. Let's call this the non-at-issue content. Suppose I see my friend Al and he tells me that he is going to the Saturday party. I say "Bart, who is dating Felicia by the way, is going to the Saturday party **too**." In my utterance, the main message is that "Bart is going to the Saturday party". This is the at-issue content. The fact that "Bart is dating Felicia" is a side commentary and "too" simply indicates that we both know someone other than Bart (Al in this context) is going to the party. Therefore the non-restrictive relative clause (NRRC) and the additive particle "too" provide non-at-issue content to my utterance.

An important difference between at-issue and non-at-issue content is that non-at-issue content is PROJECTIVE while at-issue content is not. Projective content is not targeted by operators, such as negation and question, that normally cancel the entailments of ordinary lexical items (Langendoen and Savin 1971; Karttunen 1974; Tonhauser et al. 2013 among others). Consider my conversation with Al. If Al asks "Really?" right after my utterance, we would normally understand him questioning whether Bart is coming to the party (the at-issue content of my utterance), and not whether Bart is dating Felicia (the content of the NRRC) or whether someone other than Bart is going to the party (the content contributed by the additive particle "too"). We can summarize this observation by saying that the

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question operator targets the at-issue content but the non-at-issue content projects past the question operator unaffected.

Similar to "too" and the NRRC in the example above, many other words and constructions in world languages provide projective content and contribute to the non-at-issue dimension of meaning. They are often referred to as TRIGGERS of projective content because they set off non-at-issue implications. This paper is concerned with the form-meaning mapping problem in child language acquisition (Clark 1993, p.43) with respect to such triggers. I will argue that triggers of projective content raise several important issues regarding children's acquisition of the lexicon. Below, I provide a short summary of the theoretical work on the semantics of triggers before moving to the issues they raise for acquisition.

Triggers of Projective Content Projective content consists of a class of implications, commonly identified as presuppositions or conventional implicatures. These stand in contrast to at-issue meaning, also known as "ordinary entailment" or "what-is-said". The main property of projective content is PROJECTION: such implications survive the linguistic environments that normally cancel implications in their scope. In (1), for example, adopted from Chierchia and McConnell-Ginet (1990), (1a) has two main implications: (i) that someone lives in Ithaca and (ii) that there is a unique queen of France . In (1b)-(1e) where the sentence S in (1a) is embedded under various entailment canceling operators ($\neg$, ?, $\diamond$, $\rightarrow$), we do not get the first implication that "someone lives in Ithaca" anymore. This implication is targeted and cancelled by the operators mentioned. Therefore, (i) is classified as an at-issue implication. However, (1b)-(1e) still imply that "there is a unique queen of France". The second implication was not cancelled by the mentioned operators so (ii) is classified as projective.

(1) [From Chierchia and McConnell-Ginet (1990)]
   a. The present queen of France lives in Ithaca. (S)
   b. It is not the case that the present queen of France lives in Ithaca. ($\neg S$)
   c. Does the present queen of France live in Ithaca? (?S)
   d. Maybe the present queen of France lives in Ithaca. ($\diamond S$)
   e. If the present queen of France lives in Ithaca, she has probably met Nelly. ($S \rightarrow q$)

Projective content is associated with a class of words or constructions called TRIGGERS. For example, in (1) the implication that there is a unique queen of France is associated with the English definite determiner *the*. Replacing *the* with the indefinite determiner *a* changes the status of (ii) to at-issue and consequently, none of the sentences imply (ii) anymore. Beaver and Geurts (2013) provide a list of (presupposition) triggers that includes factive verbs (e.g. *know*, *realise*, etc.), definite determiners and demonstratives (e.g. *the*, *this*, etc.), pronouns, proper names, quantifiers (e.g. *both*, *all*, etc.), additive particles (e.g. *too*, *also*, etc.),

aspectual verbs (e.g. *stop*, *continue*, etc.), manner adverbs (e.g. *quickly*), and temporal clauses headed by *before*, *after*, *since*, etc. Potts (2014) adds some (conventional implicature) triggers to this list such as some connectives (e.g. *but*, *so*, *therefore*, *nevertheless*, etc.), subordinating conjunctions (e.g. *although*, *even though*, *despite*), implicative verbs (e.g. *manage*, *fail*, etc.), swears, parentheticals (e.g. nonrestrictive relative clauses, nominal appositives), etc. This is already a notable list of lexical items conventionally associated with projective meaning. In focus here is how children learn the meaning of such triggers, and more specifically how they associate their content with the property of projection.

The Acquisition of Triggers Triggers raise several important issues with respect to children's language acquisition that I list below.

1. Knowledge about Projection: How do children know about projection in the first place?
2. Input Status: How often do children encounter triggers; especially in entailment cancelling environments?
3. Isolating the Meanings: How do children isolate the conventional meaning of triggers in the context?
4. **Projection Status**: How do children decide whether the isolated meaning of a lexical item is projective or not? Do they ever make errors resulting in a trigger with at-issue meaning or an ordinary lexical item with projective meaning?

This paper mainly focuses on the last problem, the acquisition of the projection status. However, in this section I briefly comment on the other problems before moving to the problem of projection status. For the first question, it is possible that the answer lies in the notion of at-issue-ness. At-issue-ness in the linguistic sense is tightly connected to the notion of goal-directed behavior in the psychological sense. In other words, at-issue-ness in conversation is what lies at the center of the speaker's conversational goals. Understanding communicative goals and goal-directed behavior appears early in development; even before infants reach their first year of life (see Premack and Premack (1997); Csibra et al. (2003)). Therefore, children are coming to the task of form-meaning mapping equipped with the understanding that some information will be directly relevant to the conversational goals of the speaker and some other will not; the latter may be presupposed or simply a commentary on the main point. Therefore, it is the children's awareness of at-issue-ness that gives rise to their understanding of projection and successful mapping of triggers. This is indeed Simons et al. (2011)'s approach in giving a pragmatic explanation of projection. For the second question, on the input status, we need to do a corpus study; something that I hope to come back to in future research.

For the third question, we can see that it is the good old "gavagai problem" (Quine, 1960) pertinent to any lexical item including triggers. Here I could think

of two facts about triggers that can help the learner isolate their meanings. First, trigger meaning is always a full proposition. This rules out a lot of other possible hypotheses about their meanings. Second, the syntactic distribution of triggers may also give clues about their meanings. Hacquard (2014) and Harrigan et al. (2016) suggest that syntactic bootstrapping may help children in isolating the meaning of attitude verbs such as "think", "want", and "hope".

However, the main focus of this paper is on the last question: how do children sort out triggers from non-triggers? How do children know which words should be associated with projection and which ones not? Do they make errors resulting in triggers with at-issue meaning or ordinary lexical items with projective meaning? Let me expand on using the presupposition trigger "too" used as the trigger in my experimental study. According to the standard view (e.g. Karttunen and Peters (1979)), a sentence such as "Mary lives in London too" (2) has the at-issue content "Mary lives in London" (2a) and the presuppositional content "someone else lives in London" (2b). In (2c), I show both implications together and mark the presuppositional content with Beaver (1992)'s partial function $\partial()$ to get a logical form that matches our intuition about what "Mary lives in London too" means. The presupposition in (2b) is contributed by the trigger *too*.

(2) [Mary]$_f$ lives in London *too*.

a. lives-in-london (Mary)

b. $\exists x$ [x $\neq$ Mary $\wedge$ lives-in-london (x)]

c. ∂($\exists x$ [x $\neq$ Mary $\wedge$ lives-in-london (x)]) $\wedge$ lives-in-london (Mary)

d. $\exists x$ [x $\neq$ Mary $\wedge$ lives-in-london (x)] $\wedge$ lives-in-london (Mary)

Now let's assume that the child correctly isolates the meaning of *too* - something close to (2b) - and maps the phonological form *too* to this meaning. Let us also assume that the child, following compositionality, assumes that the meaning of *too* should be conjoined to the proposition expressed by the VP it modifies, namely "Mary lives in London" in (2a). This would result in a logical form like the one presented in (2d). However, the resulting logical form is not exactly what (2) means as represented in (2c). The child also needs to assign a projective status (in this case also presuppositional) to the meaning that *too* contributes. Otherwise, the mapping will result in an at-issue version of *too* that amounts to a simple conjunction and can be targeted by entailment-canceling operators. This issue is not specific to "too". It is easy to imagine an at-issue version for many triggers and possibly projective meanings for many at-issue lexical items. The questions is: how do children know which version is the right one?

This raises another question: how often we can find pairs of words with the same semantic content but different in their projection status crosslinguistically. It is pretty hard to find them in English and if this holds across languages, we might start to wonder why[1] It might be that it is the nature of the semantic content that

[1]Pairs such as $\langle know, think \rangle$, $\langle both, two \rangle$ and $\langle again, twice \rangle$ in English are close but there are valid

makes a projective mapping more likely. It is possible that for *too*, this is simply high context-dependency[2]. The content of *too* is something close to "in addition to a given (discourse) alternative". The meaning also depends heavily on the common knowledge of the discourse participants on what the relevant alternatives are. These could be pragmatic cues to assigning a projective status to the content of *too*.

I propose two mechanisms that children could apply to the classification of lexical items as projective or not: one based on a learning constraint or default assumption (Markman (1990)) that maps the meaning of all lexical items as at-issue initially and another based on a pragmatic principle. First, children can use a default assumption to map all lexical items as non-projective and only revise this mapping for triggers when there is substantial evidence to do so. Since most of the lexicon of a language consists of non-triggers, a non-projective (at-issue) default mapping would get most of the mappings right. However, it would result in systematic mapping errors for triggers. It predicts that there will be a period of "mis-mapping" in which a trigger is treated as an at-issue lexical item, before its status is revised. For example in comprehension, the child may interpret someone pointing at an apple and asking "the apple?" (with a rising intonation) as a question on whether the object is an apple or not. Notice that in normal usage, such an interpretation is possible if the speaker says "an apple?" but not "the apple?". A question like "the apple" could be about whether someone wants the apple or not but it cannot be about whether some entity is an apple or not. That is simply presupposed. In production, the child may start conversations with lexical triggers. For example, in the context that there are apples and bananas on the table, the child may say "I want an apple too" (when it is not established that he wants a banana) to communicate "I want an apple and a banana". This is again a marked usage of "too" in adult conversation.

Alternatively, children can use a principle to classify lexical items as projective vs. non-projective. This principle could be something close to the awareness of discourse participants' conversational goals. Lexical items that address these goals are mapped as at-issue. Lexical items that provide background assumptions or parallel commentary are mapped as at-issue. This classification based on a pragmatic principle predicts that mapping projective content is done quite accurately with almost no errors. Therefore, the existence of systematic mapping errors is crucial to the two approaches sketched here. The at-issue default assumption should result in systematic mapping errors (projective as at-issue) in the acquisition of triggers while the pragmatic principle approach predicts no such errors but assumes a principle that helps children in the classification of triggers. In the next section, I propose an experiment for the presupposition trigger *too* that aims at detecting mapping errors where the content of *too* is assumed to be non-projective. If we find a robust mis-mapping effect as children learn the meaning

objections to their content being truly identical.

[2]I thank Cleo Condoravdi for this suggestion.

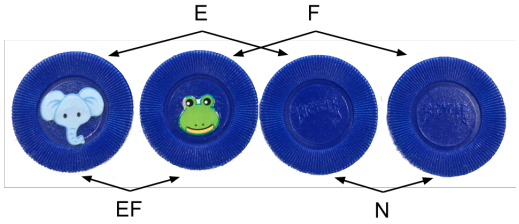

Figure 1: The elephant, frog, and blank chips. EF represents the outcome of the frog and the elephant; E only elephant, F only frog, and N the outcome of two blank chips.

of *too*, then we can conclude that the non-projective default account is on the right track. Otherwise, the absence of projection errors would be consistent with the use of a pragmatic principle.

2 The Experimental Study

2.1 Method

Choice of a trigger For my experiment, I chose the additive adverb *too*. There are several properties of *too* that make it a good candidate for the study of triggers and projective content. First, its meaning is proposed to be completely projective (Karttunen and Peters, 1979; **?**). Some triggers contribute both projective and at-issue meaning. Second, the implication of *too* seems to be stronger than many other triggers. Tonhauser et al. (2013), for example, argue that *too* sets strong constraints on the context of the utterance while a factive verb like *know* does not. Finally the age of acquisition for this trigger seems to be relatively low.

Participants 36 children (age range =3;4 - 5;7, mean age = 4;7, 20 girls) completed the trials while 4 failed to do so and were therefore excluded from the final analysis. Participants were recruited from a local nursery school. They were native speakers of English and largely from middle class families.

Materials There were four round blue plastic chips (Figure 1): One with an elephant sticker on one side, one with a frog sticker, and the other two blank. The backs of the chips were all identical and blank. One could not see what was on the other side by looking at the back of the chips.

Design and procedure The current study was designed as a guessing game. The experimenter first laid the four chips face up on the table and asked the child what was on each chip he pointed at. The goal here was to see which labels the child was most comfortable with for the chips. The responses were almost

always “elephant”, “frog”, and “nothing”. If the child was not sure how to label the blank chips, the experimenter helped them with the label “nothing”. Then the experimenter explained to the child that he was going to put the chips face-down and mix them up. As he did this, he made sure that it was impossible to track the chips. Then he chose two chips and put them between himself and the child but slightly closer to the child. The other two chips were at the corner of the table further away to the right.

Considering the two chips in front of the experimenter and the child, there are four possible outcomes shown with the arrows on figure 1: elephant and frog (EF), elephant and blank (E), frog and blank (F), or two blank chips (N). At this stage, the experimenter asked: “What do you think we have here? Can you guess what these are?”. The experimenter looked and pointed at the chips to make the referents of “here” and “these” clear in the context. When the child made his/her guess, the experimenter flipped the chips to show the actual outcome. He also flipped the chips at the corner of the table to help the child see the full state of the game (see section 2.2 for details).

The experiment had four within-subject conditions: 1.Baseline 2.Without-trigger 3.With-trigger and 4.At-issue. The baseline condition always appeared first but trials related to conditions 2-4 were randomized. There were 2 trials in the baseline condition, 7 in the without-trigger condition, 3 in the with-trigger condition, and 3 in the At-issue condition, resulting in a total number of 15 trials. The uneven number of trials per condition were the result of balancing three factors: first, how long children are willing to play such a game. Second, the outcome frequency truly representing the probability of random selection of chips; and third, collecting enough data for each condition. The randomization code along with the detailed explanation of the procedure can be accessed via the author’s website.

The Baseline Block was designed to assess any biases that children may have for particular outcomes as well as familiarizing them with the game. The baseline condition had two trials and always appeared as the first block of the experiment.

The Experimental Block contained conditions 2-4. The experimenter told the child that he is going to take a peek at the chips before the child makes his/her guess. Then he peeked at the chip on his right. Peeking was done in a way that the child could not see what was on the other side of the chips. Then he uttered a question as if it was something he was wondering about and he was curious to know the answer. The list below shows the questions raised by the experimenter in each experimental condition:

- Without-trigger: “Do we have an elephant?”
- With-trigger: “Do we have an elephant *too*?”
- At-issue: “Do we have an elephant and a frog?”

Then the experimenter peeked at the second chip and said "Yes" or "No" to indicate that he found the answer to his own question based on what he saw. Then he asked the child: "What do you think we have here? Can you guess?" In the without-trigger and the with-trigger conditions, the appearance of the word "frog" or "elephant" in the experimenter's question was randomized and counterbalanced. In the at-issue condition, the first argument of the conjunct matched the first chip the experimenter looked at. For example, if the first chip was a frog the experimenter asked "Do we have a frog and an elephant?" and not the other way round. The with-trigger and at-issue conditions did not contain any trial in which the experimenter saw a blank chip first. In the without-trigger condition, the first chip was blank half of the times. When asking the question in the with-trigger condition, the experimenter stressed the word *too* while in the at-issue condition, the whole phrase "an elephant and a frog" was stressed.

2.2 More on the Design

Figure 2 below shows the following for each condition: the questions asked after peeking at the first chip, the answers given after peeking at the second one, and any viable guesses after the participants updated their knowledge state with the content of the question-answer pair. I have abstracted over the choice of frog or elephant with X and Y: X is the one mentioned explicitly by the experimenter and Y is the salient alternative. In the at-issue condition, since both elephant and frog were mentioned in the question, X and Y simply indicate the order.

Condition	Question	Answer	Guesses	Error
Without-trigger	"Do we have an X?"	"Yes"	XY or X	XY or X
Without-trigger	"Do we have an X?"	"No"	Y or N	Y or N
With-trigger	"Do we have an X *too*?"	"Yes"	XY	XY
With-trigger	"Do we have an X *too*?"	"No"	Y	X, Y ,N
At-issue	"Do we have an X and a Y?	"Yes"	XY	XY
At-issue	"Do we have an X and a Y?	"No"	X, Y ,N	X, Y ,N

Figure 2: Question-answer pairs and the corresponding viable guesses for each experimental condition. The "error" column shows the expected answers if a child has an at-issue version of "too". The boxed guesses show the crucial condition where at-issue vs. projective mapping make different predictions.

In the without-trigger condition, the experimenter's answer helps the participant narrow down the possible outcomes to two options with certainty. Nevertheless, none of the two remaining outcomes (e.g. Y or N) could be ruled out based on what the experimenter said. However, in the with-trigger condition, the experimenter's question and the corresponding answer remove uncertainty with respect to the outcome. The implication that there is a frog is a commitment to

what the experimenter explicitly said. The presupposition trigger *too* implies that the alternative, namely the frog, is (also) present. Finally, in the at-issue condition, a "yes" answer removes all uncertainty and makes it clear that EF is the correct guess. But, a "no" answer leaves the participant with three possible outcomes: E, F, and N.

Now with respect to the mapping problem sketched in section 1, let's investigate what a non-projective (at-issue) variant of *too* would look like in the experimental setting presented above. Let's first assume that what *too* contributes semantically is basically the presupposition that the predicate (e.g. having something) is true with respect to some salient alternative (e.g. frog) not mentioned explicitly.

(3) a. $?[\partial(\exists x[x \neq \text{FROG} \wedge \text{HAVE}(\text{SP}, x)]) \wedge \text{HAVE}(\text{SP}, \text{FROG})]$
b. $?[\exists x[x \neq \text{FROG} \wedge \text{HAVE}(\text{SP}, x) \wedge \text{HAVE}(\text{SP}, \text{FROG})]$
c. $?[\text{HAVE}(\text{SP}, \text{ELEPHANT}) \wedge \text{HAVE}(\text{SP}, \text{FROG})]$

(3a) is the logical form for "Do we have a frog too?" (SP stands for the speaker). The property of projection assigned to the contribution of *too* (marked with ∂) guarantees that the content of *too* is not targeted by the question operator, ?, but simply presupposed. (3c) shows an at-issue variant where the content of *too* is targeted by the question. Notice that in the context of the experimental setting, having something that is not a frog amounts to having an elephant. Therefore, (3b) and (3c) are logically equivalent in the context of this experiment. Now if some children fail to map the conventional meaning of *too* as projective, we expect to see the results in the with-trigger condition to look similar to the at-issue condition. In other words, "too" is interpreted similar to "and Y". In the next section I discuss the results of the experiment sketched above.

2.3 Results

Using the median age, the participants were divided into two age groups: Group 1 = 3;4 - 4;9 (n=18) and Group 2 = 4;9 -5;7 (n=18). For my statistical analysis I used mixed effects multinomial logistic regression using the {mlogit} package (Croissant, 2013) in R (R Core Team, 2015).

Baseline Condition There were a total of 74 guesses (two per participant and one participant provided two extra guesses). Figure 3 shows the distribution of guesses among the two age groups. In Group 1, there was a significant preference for "EF" over "E" ($t = -2.05$, $p < 0.05$) but not over "F" or "N". There was no significant preference for any of the outcomes in Group 2. Overall, the baseline condition showed an approximately uniform distribution for the guesses. This suggests that there are no prior biases affecting children's guesses in a significant manner.

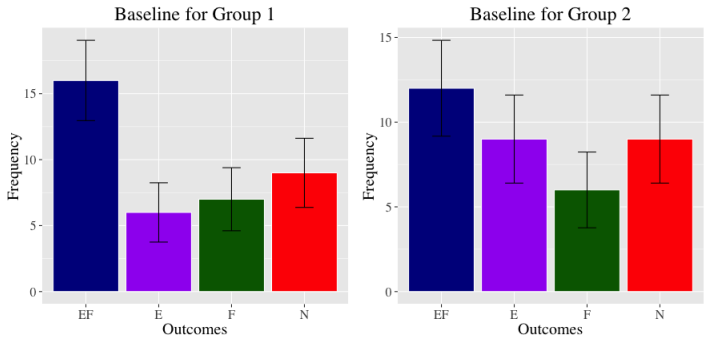

Figure 3: Baseline distribution of guesses among the younger (group 1) and older (group 2) participants. EF represents the guess elephant and frog, E only elephant, F only frog, and N two blank chips.

Condition	Question	Answer	Short Form	# trials
−Trigger	"Do we have an X?"	"Yes"	X? Yes!	71
−Trigger	"Do we have an X?"	"No"	X? No!	180
+Trigger	"Do we have an X *too*?"	"Yes"	X,too? Yes!	35
+Trigger	"Do we have an X *too*?"	"No"	X,too? No!	72
At-issue	"Do we have an X and a Y?	"Yes"	X&Y? Yes!	36
At-issue	"Do we have an X and a Y?	"No"	X&Y? No!	72

Figure 4: The short forms for the six experimental subconditions and the number of trials in each subcondition

Experimental Condtions Figure 4 below shows the short forms that I will use in this section to refer to the experimental subconditions and the number of trials in each. Figures 5 and 6 show the distribution of the guesses in the six subconditions for Groups 1 and 2 respectively.

In the figures for both age groups, there is a sharp distinction between the results of the at-issue condition (X&Y?) and the other two conditions. In both age groups, children unanimously guessed EF in the "X&Y? Yes!" trials. In the "X&Y? No!" trials, participants succeeded in removing the EF outcome with certainty in both age groups but there was no significant preference for any particular outcome. Children showed a surprisingly high number of N guesses in the "X&Y? No!" trials.

In the without-trigger (X?) and the with-trigger (X,too?) conditions, both age groups display similar guessing patterns except for a strong interaction of age group with the "X,too? Yes!" trials. The younger participants were at chance between XY and X. This parallels their responses in the "X? Yes!" trials in which the trigger *too* was absent. They showed no significant preference for XY or X

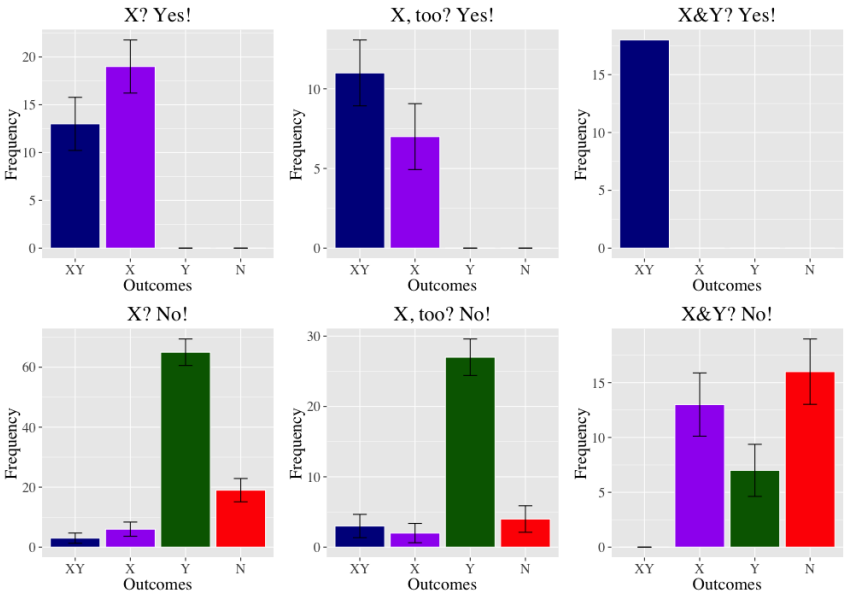

Figure 5: Distribution of guesses among the younger participants (Group 1) for the six subconditions.

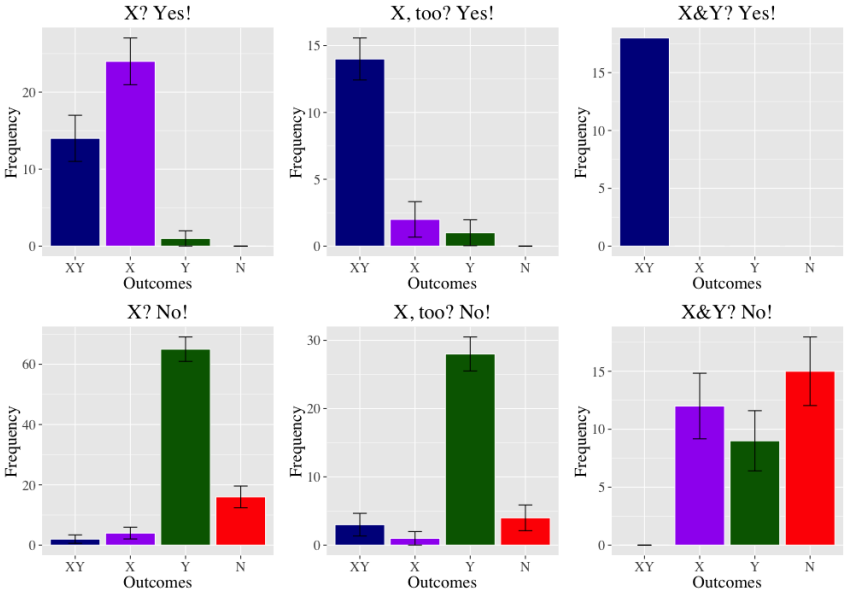

Figure 6: Distribution of guesses among the older participants (Group 2) for the six subconditions.

there either. However, the older group showed a significant preference for XY over X in "X, too? Yes!" trials ($t = 2.5742, p < 0.05$), but no such preference in "X? Yes!" trials where the trigger was absent. The responses in the "X? No!" trials and the "X, too? No!" trials were almost identical for both age groups. The younger children showed a highly significant preference for Y over N in both the "X? No!" trials ($t = 4.72, p < 0.001$) and the "X, too? No!" trials ($t = 3.56, p < 0.001$). The situation was the same for the older age group ($t = 5.0230, p < 0.001$ and $t = 3.64, p < 0.001$ respectively). There was no significant difference between the number of N guesses in "X? No!" and "X, too? No!" trials for either age group.

2.4 Summary

There are three main patterns present in the results reported in this study: first, a difference between the at-issue condition and the with/without-trigger conditions; second, a developmental pattern with respect to the interpretation of the trigger *too*: the older children take the semantic contribution of "too" into account while playing the game but the younger participants do not. Third, a pragmatic enrichment by most children such that the answer to the question "X?" is interpreted under the assumption "X or Y". This pragmatic reasoning is most salient when the researcher said "No".

First, the distribution of children's guesses showed a clear difference between the with/without-trigger conditions and the at-issue condition. This difference is most evident in the negative trials. A negative response to an "X&Y?" question was evaluated very differently from a negative response to an "X?" question or an "X?too" question. In the latter, a negative response to X was evaluated as implying that the salient alternative Y is present. But, a negative response to "X&Y?" is met with uncertainty when choosing among alternatives to XY. The high number of N guesses in the "X&Y? No!" trials is particularly surprising since the experimenter asked the question after peeking at the first chip. If the first chip was blank, it must have been already obvious to the experimenter that the outcome cannot be EF! Children appeared not to follow this line of reasoning.

Children also showed a clear developmental pattern with respect to taking the contribution of *too* into account while guessing the outcome of the game. Many children between 3;4 and 4;9 did not use the meaning of *too* to pick the correct outcome in the "X, too? Yes!" trials systematically while children between 4;9 and 5;7 were almost always right in those trials. It is important to note that the younger group's failure in these trials does not necessarily mean that they do not understand the meaning of *too*. It is quite possible that the younger children knew the meaning of *too* but did not follow one of the necessary pragmatic steps in the experimental game. If you remember, I discussed that in the context of the experimental setting, having something that is not a frog amounts to having an elephant. As pointed out to me by Valentine Hacquard, some children may not follow this reasoning and assume that a blank chip also counts as something that

is not an elephant. Under such an interpretation, "too" becomes uninformative and the results of the with-trigger condition resemble those of the without-trigger condition. Therefore, it is quite possible that some younger children differed from their peers with respect to their interpretation of what counts as the salient alternative that "too" targets.

The third significant finding here is that children used some sort of pragmatic strengthening when answering the questions without the trigger, especially when the response was "No" ("X? No!"). While in such trials both the salient alternative Y and the blank chips N are viable answers, children systematically chose Y over N. Children may have arrived at their guesses via the following reasoning: "*The experimenter asked whether there was an X. He could have asked whether there was a Y. Probably he chose X over Y because he has already seen a Y on the first chip.*" Further examination of the data suggests that some children chose Y over XY in the positive trials ("X? Yes") as well, while both are viable options in those trials. This pattern of guessing is expected if the children interpreted the question "X?" under the assumption "X or Y", leaving out XY and N. As to why children would do such reasoning I have no good answer here. These results suggest that we need more research on children's pragmatic strategies and how they differ from adult strategies for interpreting utterances.

3 General Discussion

This experiment was designed to test the acquisition of the presupposition trigger *too* in two respects: 1. its semantic/pragmatic contribution to the utterance, 2. the property of projection. In taking the meaning of *too* into account, the younger children did not differentiate between the trials where *too* was present and trials where it was not, while the older children used the meaning of *too* to arrive at the correct outcomes in trials with *too*.

With respect to projection, this study found no evidence of a period of systematic mapping errors in the acquisition of the presupposition trigger *too*. All the children differentiated trials where the trigger was present and trials where the semantic contribution of *too* was at-issue. This is consistent with the hypothesis that children use a pragmatic principle to map projective content. However, it is also possible that this study did not find any period of systematic mapping errors due to one of the following two reasons:

First, while there may be some mis-mapping in the acquisition of projective content, the period between initial mis-mapping and later correction could be very short and hard to detect. It is possible to remedy this in two ways in future research. First, we could run a more comprehensive study of several triggers to see if we can find a robust stage of mis-mapping for any of them. Second, we could increase the number of participants and improve the odds of finding children going through a mis-mapping period.

Second, mis-mapping of projective content may occur in children younger

than 3.5 years old. Children in this study were between 3;4 and 5;7 and at this stage, they may have already identified projection as a relevant property in mapping *too*. In future studies, we will also recruit younger children to test the possibility of mis-mapping for triggers.

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