**When pragmatics and semantics hinder syntax:**
**how children deal with a contextually cancelled presupposition**

*Abstract*
*This study reports findings on question formation in a production task. 33 three-to-six-year-olds French children were tested. The targeted question embeds a proposition that is true or not. Results show there is a fine articulation between pragmatics, semantics and syntax. Only children who have fully acquired the semantics and pragmatics associated with long distance questions acquire their syntax. Most adult speakers can restructure the question under discussion upon experiencing contextualized presupposition cancellation and access the new question under discussion, but some children have relative difficulty. Instead of producing the targeted long-distance question, children ask yes-no questions centered on updating the QUD. We argue that pattern of errors is also attributable to ungrammatical presupposition projection. (114)*

Keywords: questions, French, presupposition, question under discussion.


# 1. Introduction

Is conversation a simple sequence of utterances produced by participants, each taking a turn? It would be a simplification to consider so. Clark and Schaefer (1989: 260) show that "there are intentions to be heard, to hear, to understand and be understood. Participants in the conversation bring their own baggage, beliefs."

The phenomena we will address are presupposition, presupposition cancelation, question under discussion, context change and the syntax of questions. At the center of this work is the ability of children to ask questions, specifically long-distance questions, which targets on the beliefs of the conversation participants. There isn't much work yet on presupposition cancellation in child language, compared to say presupposition failure for example, but the current state of affairs in experimental pragmatics is rich enough to brought into light our research questions (see Schwarz 2016, Simons 2010, Gualmini & al 2008 a.o.).

First we will present the syntactic strategies involved in spoken French; the second part develops the model of communication around Ginzburg's theory and what is intended behind the term *presupposition*. In the third and fourth parts, we detail the experiment and what expectations we have and thedifficulty the children are facing the question under discussion in experimental context. Finally, I will look at the results, part 6 and discuss them, part 7.


# 2. French Syntax

Let's underline some of the French questions properties that are relevant to the study at hand. Spoken French admit several strategies to form short and long movement questions:

*(1) C'est quoi que tu penses?*                        *Cleft*
It-is what that you think

*(2) Tu penses quoi?*                                 *In situ*
You think what

*(3) Qu'est-ce que tu penses?*                    *Wh-movement*
what-is this that you think
"What do you think?"

*(4) Tu penses que c'est quoi que ta maman a acheté?*    *Cleft Long-Distance*
you think that it-is what that your mom has bought

*(5) Tu penses que ta maman t'a acheté quoi?*         *Long-Distance In situ*
you think that your mom you-has bought what

*(6) Qu'est-ce que tu penses que ta maman a acheté?*    *Long movement*
what-is-that that your mom has bought
"What do you think your mom has bought?"

All of those strategies above were produced by the children in the experiment. I will not discuss differences in use, but the literature has been eloquent about it (see the work of Adli, Baunaz, Starke, Shlonsky and anonymous on multiple papers; contra Mathieu 1999).

It's important to acknowledge that each of the examples (4)-(6) have a LF that is equivalent to (6): the *wh*-word that is focused or that stayed in situ has indeed matrix scope. French has been a highly discussed language in the last fifty years since Kayne (1974, 1996) and Vergnaud (1974). Its main interest stands in the multiple strategies appearing in (one of) its spoken variety, and don't let anyone say otherwise: French is indeed becoming a *wh*-in situ language. There is no consensus yet, and the *French academy* still fierce and fighting isn't helping. We will keep trying and finally succeed to at least get a recognition that a diglossia is in use. *Parisian* French tends to be a register that is more formal, including long movement and subject auxiliary inversion. On the other hand, non-standard spoken French uses *wh*-in situ and clefts in embedded environments (anonymous). The number of languages that use long movement to establish long distance dependencies is less frequent than we think (Stepanov 2001, Schippers 2010). In that regard, children are the best witness of that change: their grammar tend to be highly trustworthy (aside from typical errors) because left untouched of social pressure, contrary to adult language. Note also that the children data showed no subject auxiliary inversion, contrary to the adult ones, as a low proportion (3%).


## 3. Presupposition, Common ground and a model for conversation

We will review how theories account for rules of conversation, in particular the dynamic system called *question under discussion*. We will also go over the notion of presupposition, common

ground and presupposition cancellation. As a basis, we will be using the work of Ginzburg (1996, 2011), Engdahl (2006) and Stalnaker (1970).

*3.1 Presupposition*

In *Pragmatics*, Stalnaker (1970: 279) wrote:

> "To presuppose a proposition in the pragmatic sense is to take its truth for granted, and to assume that others involved in the context do the same. This does not imply that the person need have any particular mental attitude toward the proposition, or that he need assume anything about the mental attitudes of others in the context. (…) One has presuppositions in virtue of the statements he makes, the questions he asks, the commands he issues. (…) The set of all the presuppositions made by a person in a given context determines a class of possible worlds, the ones consistent with all the presuppositions."

Heim (1990) writes that 'Definite descriptions have existence presuppositions, therefore (7) presupposes (8). A certain class of sentence embedding verbs, the so-called "factives", presuppose the truth of their complement. So (9) presupposes (10). Aspectual verbs like *start*, *stop*, and aspectual adverbs like *still*, *again* presuppose certain things concerning the truth or falsity of the embedded proposition at times before or after the reference time. E.g. As (11) presupposes (12)'(excerpt and examples from Heim 1990).

(7) John talked to his brother
(8) that John has a brother

(9) John realized that he had lost
(10) that John had lost

(11) It stopped raining (at 5 o'clock).
(12) that it had been raining (for an interval immediately preceding 5 o'clock)

Stalnaker (1970) noted it is possible to maintain a false presupposition for ease of communication (1970: 281, my own emphasis):

> "But in some cases, presuppositions may be things we are unsure about, or even propositions believed or known to be untrue. This may happen in cases of deception: the speaker presupposes things that his audience believes but that he knows to be false in order to get them to believe further false things. More innocently, a speaker may presuppose what is untrue to *facilitate communication,* as when an anthropologist adopts the presuppositions of his primitive in formant in questioning him."

What we don't know about is what it would mean for children. We will come back to this point in part 3.3 and 5 below in the context of long-distance questions

Beaver and Geurts (2011) note that "Presuppositional inferences are typically subject to cancellation by direct denial only when the presupposition trigger is embedded under some other operator. When the presupposition is not embedded, such cancelation (by the same speaker) is usually infelicitous".

The theory accounts for the case we are exploring. *Think* is the embed element that allows to cancel the presupposition under which the proposition is. We will turn now to the dynamic system of *question under discussion*. We will discuss the issue of presupposition cancellation in part 5 and 7 as well.

### 3.2 Question under discussion

The *question under discussion* is a dynamic system that gets updated as the conversation goes on. First, let's look at the definition of the Question under discussion:

(13)        Question under discussion (QUD) (adapted from Ginzburg, 1996, 2011):
      a. QUD: A partially ordered set that specifies the currently discussable issues. If a question q is maximal in QUD, it is permissible to provide any information specific to q using (optionally) a short answer.
      b. QUD update: Put any question that arises from an utterance on QUD.
      c. QUD downdate: When an answer a is uttered, remove all questions resolved by a from QUD.

When a conversation participant A asks a question, the QUD is updated to include that utterance ("QUD update"). When B answers the question, A is able to update the QUD by deleting the corresponding question ("QUD downdate"). Ginzburg describes a very interactive system, demanding but straightforward. Imagine being a child having to master it.

Engdahl (2006) defines the conversation as the information states of the involved participants, especially their mental states, i.e. their intentions and beliefs.
The following representation is draw from Ginzburg (1996, 2011), Engdahl (2006):

(14)        A dialogue participant's information state

> PRIVATE
>      BELIEFS set of propositions
>      QUD partially ordered set of questions
>
> SHARED
>      BELIEFS set of propositions
>      QUD partially ordered set of questions
>      LATEST-MOVE move

Engdahl (2006) points out that often participants approve of a received answer ('uh huh') which corresponds to adding the former question as a proposition to the set of BELIEFS. The set of propositions described as BELIEFS is part of the common ground, when it is updated, it

becomes *grounded* (Clark and Schaefer 1989). Let's look at a concrete example from Engdahl (2006).

(15)　　A: *Does Mary like Paris?*
　　　　QUD update:　　➔ QUD = <?like(m,p) >
　　B: *Yes.*
　　　　QUD downdate:　　➔ QUD = <>
　　A: *Uh huh.*　　　➔　BELIEFS = {like(m,p)}

When A asks a question, the QUD has to be updated (in the sense of *created*) with the new occurrence. Once the response is provided by hearer B, the QUD is *downdated,* meaning the question is removed from the set of questions. Finally, the proposition 'Mary likes Paris' is added to the set of proposition called BELIEFS, upon validation given by A. The information becomes part of the mutual knowledge, shared by A and B, *grounded.*

　　　3.3 Presupposition in acquisition

Most of the work on the acquisition of presupposition has logically been done on factives. One of the first studies on children and factive predicates is Harris (1975), where he used a "truth questioning" task where participants heard sentences and questions as in 0.

(16)　　Harris (1975)
　　Sentence: The teacher didn't know that Tim was absent.
　　Question: Was Tim absent?

The participants, who were children in preschool through sixth-grade, were expected to use their metalinguistic knowledge of the factivity of *know* to conclude that the truth of the complement is presupposed. The author found that even in later grade school years, children had trouble reliably answering questions like (16) in the affirmative. A similar task was used in Scoville and Gordon (1980) who tested 5-to-14-year-old children's interpretation of affirmative and negative factives, and found chance performance on negative factives until age 8. More recently, these findings were replicated in Dudley et al. (2015) and Hacquard & Lidz (2016).

Aravind and Hackl (2017: 47, my own emphasis) also wrote:

> "(…) 4-to-6-year-old children are sensitive to this restriction on the use of factive sentences with the verbs *forget* and *remember.* Children fail to access adult-like interpretations of factive sentences only when they are used incongruently in contexts that *raise a question about the status of the embedded proposition.* Because the incongruence stems from the presuppositionality of factive *forget* and *remember*, children's sensitivity to it may be taken as indirect evidence for their adult-like, presuppositional representation of these verbs. We suggest, however, that children may nonetheless display non-target behavior because they diverge from adults in how they recover from the perceived discourse incongruence."

They conclude that

> "a place where children's pragmatic abilities seem to diverge from those of adults, however, is in how they respond to breakdowns in smooth communication. Consider the scenarios in Experiment 2, where a factive sentence of the form *X forgot that p* was uttered even though the QUD raised was about *whether p?* The factive sentence cannot congruently resolve this QUD, but the incongruent QUD-response pair may be dealt with in one of two ways. One repair strategy is to change the presumed QUD to one that would make the actual response congruent. The other would be to change the response itself so that it is congruent relative to the QUD. Whereas adults opt for the first strategy, children's behavior in Experiment 2 suggests that they are opting for the second strategy, misanalzying the incongruent factive sentences as the pragmatically more appropriate implicative variant" (Aravind and Hackl 2017: 58).

Authors relate heavily on the mismatch between the QUD and the test sentence to explain how children deal with discourse incongruence.

## 4. The experiment

*4.1 Experimental design*

The main goal of the experiment was to test the acquisition of object and subject long-distance questions in French. Following Crain & Thornton (1998), we used an act-out task involving a puppet who is blindfolded, leading to an ideal context to ask a long-distance question.

(17)  a. French
Experimenter 1: dans cette première histoire, les enfants jouent à saute-mouton. On va voir si koko peut deviner qui saute. *Koko n'entend pas. Parler à voix basse à l'enfant.* Anne saute sur Pierre. On va si Koko peut deviner qui saute par-dessus Pierre, d'accord ?

Nous on sait que c'est Anne qui saute par-dessus Pierre mais on va voir si Koko peut deviner. Demande à Koko ce qu'il pense.

a'. (*Question cible sujet QUI*):
> *Qui est-ce que tu penses qui saute par-dessus Pierre?*

b. English
Experimenter: in this first story, kids are playing leap-frog. Let's see if Koko can guess who is jumping. (Koko can't hear. Talk in a low voice to the child)
Anne is jumping over Peter. Let's see if Koko can guess who is jumping over Peter, alright? We all know that it is Anne who is jumping over Peter but let's see if Koko can guess. Ask him what he thinks.

b'. (*Targeted subject question WHO*): *Who do you think is jumping over Peter?*

The reason why I won't linger on the details of the development of the experimental design is because it isn't the main focus of this paper, but it's important for the candid reader to know that non-adult strategies appeared in children's productions. Scope Marking strategies were produced consistently by a majority of children, raising questions about the experimental context providing a too good of a set-up for Scope Marking questions – this is exactly what happened in Thornton's (1990) seminal work on long distance questions (anonymous).

*(18)        Who do you think which smurf is eating the cookies?        Thornton (1990)*
*(19)        What do you think? Which smurf ate the cookies?        Sequential question*

Scope Marking has been described as having a presuppositional association to it (Herburger 1989, Dayal 1996, Lahiri 2002). By analogy, sequential questions have been described to behave the same way: I wouldn't use (19) if it hadn't been established contextually that a smurf ate the cookies; in other words, the presupposition is satisfied that *someone ate the cookies*.

In order to offer to children a context that would not be suitable for the use of a Scope Marking question, we change the experiment task (anonymous) – to add a context called "non-presuppositional", where the BELIEFS set of propositions is now different between the speaker and the hearer.

(20)        Non-presuppositional context
La maman envoie Anne, sa fille, faire les courses: "Prends le panier et va faire les courses s'il te plait. Il y a rien à manger, le frigo est vide."
*<Dans la cuisine>* Anne revient des courses et son panier est vide - « oh, le magasin était fermé et je n'ai pas pu faire les courses; j'espère que maman ne sera pas trop fâchée contre moi. Mais qu'est-ce qu'on va manger aujourd'hui? »
Mais Maman ne le sait pas.
Toi et moi (l'expérimentateur et l'enfant), on sait que le panier est vide et que Anne n'a rien acheté.
Mais la maman ne le sait pas. On sait qu'elle pense qu'Anne a acheté quelque chose. Peut-être qu'elle pense qu'elle a acheté des épinards ou un gâteau. Demande lui ce qu'elle pense.
*a. (Question cible objet QUOI)* Qu'est-ce que tu penses qu'Anne a acheté ?

(21)        Non-presuppositional context
Mom sends Anne to the store to buy food: "take a bag and go to the supermarket please. The fridge is empty and we don't have anything to eat."
*<In the kitchen>* Anne comes home and her tote is empty – "the store was closed and I couldn't buy anything. I hope Mom won't be too mad. What are we going to eat today?!"
But Mom doesn't know that.

You and me (subject and experimenter), we know her bag is empty and that Ann hasn't bought anything. We know Mom thinks Ann bought something. Maybe she thinks she bought spinach or a cake.
Ask her what she thinks.
*a. (Target object WHAT question) What do you think Ann bought?*

In the presuppositional context as exemplified in (17), it is completely acceptable to ask a matrix question (*who jumped over Peter?),* because the proposition "Someone is jumping over Peter" is established as true.

Only the non-presuppositional context in (20) urges the use of a long distance question, because it is clearly established for the speaker that Ann didn't buy anything. It is infelicitous to ask a matrix question such as 'what did she buy?', when she hasn't bought anything.

So the new experiment is divided such as:
      Session 1 provides a lead-in for 15 questions, where the contexts are in (17).
      Session 2 provides a lead-in for 5 questions, where the contexts are in (20) .

4.2 A note on Scope Marking

Herburger (1994) noted a subtle difference for German that partial movement aka scope marking behaved differently from long movement. The first leaves it open whether the speaker accepts the presupposition behind the embedded question, a *de dicto* reading as she puts it, while the latter implies that the speaker is committed to it, a *de re* reading. Dayal (2000) illustrates this with reference to English (see also von Stechow 2000; Reis 2000):

    (22)        I know no one will volunteer to help. But who does Mary think will volunteer?
    (23)        # I know no one will volunteer to help. What does Mary think? Who will volunteer?

Lahiri (2002) compares the German scope marking structure (25) with the corresponding extraction structure (24) (the observation goes back to Herburger, 1994). He notes that the proposition presupposed by the embedded clause, *Rosa kissed someone*, is interpreted as the speaker's belief, not as the agent George's in (24). This is not the case in (25):

    *(24)*       *Was glaubt der Georg, wen die Rosa geküsst hat?*
               what believe  G         who Rosa     kissed
               'What does George believe, who did Rosa kiss?'
    *(25)*       *Wen glaubt der Georg, dass die Rosa geküsst hat?*
               who believe   G       that Rosa     kissed
               'Who does Georg believe that Rosa kissed?'

That is the mere reason why acquisition studies have seen scope marking appear in elicited production, as in Thornton (1990): in the experimental context, the design makes it available to ask a question such as (24), the speaker believes the presupposition that *Rosa kissed someone* to be true. For more details, see Dayal (2016) and Dayal & Alok (2017).

In the next part, I will describe what the theory can help us explain regarding the experimental context and what is at stake for children.

## 5. The QUD in context

Let's now turn to a closer description of the context children are exposed to. In a sentence like (26) below, the child has to know that the truth conditions of (26) are met without the need for the subordinate clause to be true. The reason is that *think* is a non-factive verb, so doesn't denote the truth of its complement, contrary to *know* or *be happy*.

(26)    *Peter thinks that his Mom bought him a miniature helicopter*

What is reported in (26) are Peter's beliefs, and they don't have to hold truth in the real world. The subordinate clause doesn't have to be true for all of (26) to have a truth-value. It means that the presupposition doesn't project up to the matrix clause.

Karttunen (1973) outlined the presupposition projection problem: some elements behave differently regarding the projection of presuppositions from an embedded clause. Verbs like *think* can be seen as *plugs*, just like *believe*.

(27)    *Mary believes that John's children are at home.*

To quote Partee (2009): "the speaker of sentence ((27)) does not have to be committed believing that John has children, or that such a belief is part of the common ground. The speaker may be presupposing that, but need not be. It may be just "Mary's presupposition". That is, in order for Mary to have such a belief, she must also believe that John has children. But the speaker of the sentence need not."

On the other hand, depending on the context, a proposition can be holding a presupposition of truth. Imagine a context where it's Peter birthday and his Mom bought him a gift. We don't need to know what the gift is for the presupposition to be true. When we ask the participant to guess what Mom bought or to ask what Peter thinks his Mom bought, the *question under discussion* is "what did Mom buy?", presupposing that *Mom bought something*. In that context, the target long-distance question "what do you think Mom bought?" is carrying the presupposition that Mom bought something, even though *think* is not denoting the truth of its complement. In that case, the presupposition is inherited by the context or the discourse.

(28)    *What do you think Mom bought?*

Imagine now a context where Peter's Mom failed to pick him up a gift and comes home empty handed because let's say Mom finished work late and found the store closed on her way back home (it would have to be a country where stores close at a reasonable hour to be credible, it was the case in France in the early 2000 not so much in the States, ever).
We let Peter be ignorant of that fact, for it to be reasonable for the speaker to ask what he thinks she bought him. The Condition of Plausible Dissent proposed by Crain et al. (1996) requires the presentation of a possible, alternative outcome to a story in addition to the actual outcome, and we will see that we presented such an outcome below.

The targeted long-distance question remains the same as (28), but it is probably obvious to the reader that the *question under discussion* is NOT "what did Mom buy?" anymore, and the context is NOT presupposing that *Mom bought something* any longer. We cancelled the

presupposition contextually and the long-distance question is not carrying the presupposition that *Mom bought something*. The *question under discussion* becomes something closer to "what are your beliefs?".

For children, the switch between a context where the presupposition is true (also a much more common and everyday life context) and another where the presupposition is not *is* a challenge. Let's represent what is part of the common ground in the first case and in the second case using the same conversational model as before.

(29) The dialogue participant's information state (after Engdahl)
    a. Context 1: Mom bought a gift

PRIVATE
    BELIEFS set of propositions {Mom bough something}
    QUD partially ordered set of questions {What did she buy?}

SHARED
    BELIEFS set of propositions {she could have bought a helicopter, she could have bought a book…}
    QUD partially ordered set of questions {What did she buy?}…
    LATEST-MOVE move

    b. Context 2: Mom didn't buy anything

PRIVATE
    BELIEFS set of propositions {she didn't buy anything}
    QUD partially ordered set of questions {What do you think she could have bought?}

SHARED
    BELIEFS set of propositions {Mom intended to buy a gift}
    QUD partially ordered set of questions {…}
    LATEST-MOVE move

If we consider the "private" side to be the participant / child being tested and the "shared" to be the hearer (Mom or Peter) and the child, we notice how much information the hearer is missing in the second context. You can tell how the difference between the two contexts can affect the representation of the mental states of the participants in the conversation.

In the first context, called presuppositional, the participants in the conversation share the common ground as described by Ginzburg (1996, 2011). Both know that "Mom bought something", the presupposition has been established as true, and the QUD is "what did she buy?".

In the second context, called non-presuppositional, the participants do not share the common ground any longer, as the experimenter hides an essential truth to the hearer: *Mom didn't buy anything*. In that situation, we make it plausible to wonder what Peter's thoughts are on the type of gifts his Mom could have bought. Only the speaker knows the existence of a discrepancy between what *he/she* knows and what *the hearer* knows. Only a long-distance question is suitable in that context, not a matrix or scope marking ones.

The issue that has to be resolved is two-fold: children have to learn that long-distance questions involving a non-factive verb does not denote the truth of its complement, and can embed a cancelled presupposition. Indeed, (30) doesn't presuppose that Mom bought anything (she could or could not have).

> *(30)*     *What do you think Mom bought?*

Let's now turn to the results of the experiment.


## 6. Results

### 6.1 General results

Looking at the results from 33 French-speaking children (2;11 to 6;03), a strong contrast is displayed between the youngest group and the three other groups (tables 1 and 2). Right below the tables are exemplified the main questions produced by the children.

Let's look at the numbers. I divided the tables into two main results, question formation in the first line, including the target question (LD: Long distance), Scope marking strategies, matrix and LD yes-no questions. In the second line are grouped the non-question answers, children failing the task.

Table 1: results by age group in the first context (%)

| Presuppositional context (context 1) | 3-yr-old (n=5) | 4-yr-old (n= 9) | 5-yr-old (n=12) | 6-yr-old (n=7) |
|---|---|---|---|---|
| *Target LD question* | 0 | 3 | 30.3 | 41.7 |
| Scope marking | 4 | 13 | 12 | 13.4 |
| Matrix question | 21 | 24 | 27 | 14.4 |
| LD yes-no | 0 | 15 | 2.6 | 3.1 |
| Answer | 0 | 3.1 | 8 | 0 |
| Not responding | 16[*] | 0 | 0 | 2.1 |

[*]The numbers don't equal 100% because I am not presenting all the strategies put in place by the children, some irrelevant to the present study, including matrix questions such as 'what do you think?'.

> (31)    Type of responses
>      *a*.  LD
>      *Quel smarties tu penses que le pirate mange?*
>    which smarties you think that the pirate eats

*b*.  Scope marking
*Tu penses que quoi il mange le pirate?*
you think that what he eats the pirate

*c.*  Matrix question
*Qu'est-ce qu'il mange, le pirate?*
 what is he eating

*d*.  LD yes-no
*Est-ce que tu penses que c'est Pierre ou Margot qui a sauté par dessus?*
Do you think it is Peter or Margot who jumped over?

*e*.  'Answers' category from 3 and 4 year-olds to the non-experimental context
'*Rien*'. 'Nothing.'
'*Il y a rien dedans*.' 'There is nothing in there.'

The general results match our expectations: Long distance questions are produced at a rather low level in the first context, but their proportions raise slowly but steadily across age groups. Matrix questions are the favorite strategy of the first two groups but are also highly produced by 5 and 6 year-olds. Scope marking as well is a highly produced strategy. Both questions were produced more than LDs by 3- and 4-year-olds.

The second context confirms as well our expectations: Scope Marking questions aren't produced anymore, and apart from the group of 3-year-olds, all groups produced more LDs. QUDs only appears in this context (exemplified in (33) below).

Table 2: results by age group in the second context (%)

| Non-presuppositional context | 3-yr-old | 4-yr-old | 5-yr-old | 6-yr-old |
|---|---|---|---|---|
| *Target LD question* | 0 | 22 | 36.2 | 46.6[*] |
| Scope marking | 0 | 0 | 0 | 0 |
| Root 2 | 0 | 8 | 0 | 0 |
| QUD (21) | 12 | 5 | 13.6 | 3.3 |
| LD yes-no | 4 | 10 | 2.2 | 6.6 |
| Answer | 6 | 7.8 | 6.8 | 0 |
| Not responding | 12 | 0 | 0 | 6 |

[*]The numbers don't equal 100% because I am not presenting all the strategies put in place by the children, some irrelevant to the present study, including matrix questions such as 'what do you think?' (see anonymous for complete results).

Results show that the children who produced LDs produced them everywhere: they have acquired their syntax, semantics and pragmatics.

This is the context where QUDs appear. Children who produce those are in the number of 6, they belong to group 2 and 3, when we classify then according to their primary strategy.

A confounding factor is the high range of disparity across ages: it would be a mistake to see those results as 'one age fits all': among the five and six-year-olds they are children behaving like 4-year-olds. It is more revealing to classify them by their preferred strategy:

1. Group 1, 10 children, aged 5 and 6, long movement: they produce LDs everywhere.
2. Group 2, 10 children, aged 4, 5 and 6: short movement to establish long distance dependency. They produced matrix, scope marking, indirect questions, and QUDs.
3. Group 3, 13 children, all ages: (almost) no long distance dependency. They only answer, ask matrix questions such as 'what do you think?' or a few scope marking questions.

*6.2 Adult controls*

Let's turn to adult controls right now. 18 adult controls filled a shorter pen and paper version of the experiment. The complete results of the study have been developed in other papers by the author, so the reader should feel free to check out the different work (anonymous). What is the most surprising is the non-prevalence of LD questions in the adult productions. They are actually doing a little worse than children: they produce less LD questions than the group 1 of children in the first context, the context where root questions are completely suitable, because the presupposition *someone jumped over someone else* has been established as true.

Table 3: Adult controls (n=18, m.a.= 23)

| % | LD | Avoidance | Root | Indirect | QUD | others |
|---|---|---|---|---|---|---|
| **Presuppositional context** | 27 | 21 | 37 | 12 | 2 | 1 |
| **Non-presuppositional context** | 58 | 17 | 4 | 8 | 11 | 2 |

One thing to keep in mind is most adult grammars don't have LD questions (Stepanov 2001, Schippers 2010). It has been shown that the way to establish long distance dependencies is through the use of short movement, exactly what adults are doing here.

In the second context, adults produce more LD compared to the first, as expected, and matrix questions disappeared.

Here are some examples of the adult data.

(32)  Adult productions
      a.  LD
      *Qu'est-ce que tu penses qu'il y a dans le puits ?*
      'What do you think is in the well?'

      b.  Avoidance
      *A ton avis, qu'est-ce qu'il y a dans l'arrosoir ?*
      'According to you, what's in the watering can?'

c. Root question
*Qu'est-ce qu'il y a dans la malle ?*
'What is in the trunk?'

d. Indirect question
*'Do you know who jumped over Peter?'*

e. QUD
*Est-ce que tu penses qu'il y a quelque chose dans la malle ?*
'Do you think there is something in the trunk?'

What must be striking to the reader is the existence of QUD in the adult productions too. It is quite interesting to see emerge those strategies because it does raise the question that it might not have to do at all with competence. If it was the case than only children were producing QUD, you would be easily concluding that it has to do with elements not being acquired properly. But because some adults are behaving the same way is giving us a very big clue on what is at stake, or is telling us that more of one explanation is necessary.

*6.3 Question(s) under discussion*

The questions below are produced by different profiles of subjects. They are equally produced by a few adults, young and older children.

(33)  a. *Tu    penses qu'elle   lui   a    acheté  quelque chose  ou pas*
      you think    that-she him has buy.PP some      things or not
*acheté   quelque chose?*
buy.PP some   thing
'Do you think that she bought him something or not?'

b. *Peut-être que tu   penses qu'il  y     a    un fantôme dans la   malle?*
     May-be   that you think   that-it there has a   ghost     in    the trunk
   'Maybe you think that there is a ghost in the trunk?'

c. *Tu   penses  qu'il   a    fait   les   courses ou tu   penses qu'il    a*
   you  think    that-he has do.PP the groceries or you think    that-he has
   *pas   fait   les    courses?*
   not done the groceries
   'Do you think that he did the shopping or he didn't?'

d. *Tu penses qu'il y a quelque chose ou tu penses qu'il n'y a rien?*
'Do you think there is something or you think there is nothing in there?'

e. *Tu penses qu'il y a un monstre dans la malle ou y'a pas de monstre?*
'Do you think there is a monster in the trunk or not?'

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f. *Tu penses qu'elle t'a acheté un cadeau?*
'Do you think the bought you a gift?'

QUD questions are yes-no questions questioning the beliefs of the hearer. We only used one introductory verb (*think*) and many of the QUD question an object because it's harder to negate the existence of a subject than an object. Among the experimental items, only one was a subject question, such as 'who do you think will invite you?' when it is make clear that *no one will invite Peter* but Peter *doesn't* know that.


# 7. Discussion

Here are the facts we have to cover: instead of producing a LD question in a context where it is the only option available, some children and adults ask questions centered on the hearer's beliefs.

Several potential explanations are possible, options which don't necessarily exclude one another. Children and adults:
1. haven't acquired the syntax of LDs
2. have trouble updating the QUD
3. are projecting the cancelled presupposition up to the matrix.
4. are being as informative as possible.

Adults are not concerned by 1, 2 and 3, but possibly by 4.
Children, on the other hand, could potentially be affected by all four cases.

## *7.1 Being Cooperative*

Even though Stalnaker (1970:281) himself described the possibility for "a speaker (to) presuppose what is untrue to *facilitate communication*", it looks like is not so natural for children and adults to do so.

I will underline that we are facing a confounding factor: I don't believe it is for the same reason that adults and older children are behaving the same way than the children who haven't acquired LDs.

If they are producing QUDs when they have acquired the syntax of LDs, we must explain it with a different reason than the one who haven't. The idea is that their intention is to prevent the hearer to draw an incorrect inference. The rationale behind this is that speaker and hearer don't share the same Common Ground: it is only true for the hearer that Mom bought something.

By addressing a belief question, the speaker is making sure the hearer doesn't draw the incorrect inference that Mom bought something: he is signaling that the presupposition is not necessarily satisfied that Mom bought something, and maximally that he may believe Mom bought something, but might be wrong.

If the hearer thinks they're in a context where the main QUD is 'what did Mom buy?', they will also draw the inference that the speaker assumes the presupposition that Mom bought something. Participants in the conversation try to be as informative as possible, in other words, they are being cooperative.

## 7.2    *Updating the QUD*

Prior acquisition literature has been shown that children tend to have trouble updating the QUD or tend to refute or not accept sentences that don't fit the salient QUD or an answer that is not congruent with it (Gualmini & al 2008, Dudley et al. 2015, Hackl & al 2016, Sugawara 2016, Di Bacco & al 2017).

Children seem to be failing the Ginzburg system where the QUD has to be updated during conversation by adding a question that has been raised and getting rid of an answered question.

(34)      QUD update: Put any question that arises from an utterance on QUD.

(35)      QUD downdate:
          When an answer a is uttered, remove all questions resolved by a from QUD.

In the experimental context we presented, the context is a bit more complex that everyday conversation: the change resides in moving from a QUD like "What did Mom buy?" where the presupposition *Mom bought something* is satisfied, to canceling the presupposition that Mom bought something, turning the new QUD into something like "what are your beliefs?"

We adopt the term Principle of Charity (Grice 1975; Davidson 1984a, 1984b). The Principle of Charity says that the speaker is speaking truthfully and choose an interpretation that makes the target sentence true, if there is such an interpretation.

> Charity in interpreting the words and thoughts of others is unavoidable in another direction as well: just as we must maximize agreement, or risk not making sense of what the alien is talking about, so we must maximize the self-consistency we attribute to him, on pain of not understanding *him*. (Davidson 1984a, p.27)

> We want a theory that satisfies the formal constraints of truth, and that maximizes agreement, in the sense of making [aliens] right, as far as we can tell, as often as possible (Davidson 1984b, p.136)

If we consider children adhere to the Principle of Charity, it would mean that they haven't acquired LD questions and are unable to use it in the non-presuppositional context: those questions are indeed the only suitable in that context. For children who only have acquired matrix or scope marking questions, they find themselves stuck with no questions to ask. They then ask yes-no questions questioning the beliefs of the hearer, aka QUD.

During the first part of the experiment, things looked good for kids who haven't acquired LD questions. The QUD were all of the form 'who is jumping over who?', 'what lollipop is he eating?', etc. the form of questions they could ask. They could easily address and answer the QUD with the form of questions they have acquired (matrix or scope marking questions), such as

(36)      *What do you think? Who is jumping?*
(37)      *Who is jumping?*

In the second context, the task makes it much harder for the same kids who haven't acquired LD questions: we cancelled the presupposition in context and the target question is mismatched with a simpler QUD, and with the type of questions they are able to produce. Children are not able to accommodate the QUD and they are not able to produce what would fit the new QUD either.

| | | |
|---|---|---|
| *(38)* | *She didn't buy anything but Peter thinks that she did* | *Lead-in* |
| *(39)* | *# What did she buy?* | *wrong QUD* |
| *(40)* | *What are your beliefs Peter?* | *QUD* |
| *(41)* | *What do you think she bought?* | *Target LD* |

On the positive side, it does mean they *know* the questions they are able to produce are not felicitous in the new context: it means then they have acquired the syntax and semantics of matrix and scope marking questions, which can't be use in a context where the presupposition has been cancelled.
What they have acquired syntactically is short *wh*-movement and forms questions such as (42) and (43). It doesn't mean they can express long-distance dependencies, only that they are established via short movement, not long movement.

*(42)*    *Qu$_i$'est-ce qu'il mange le pirate t$_i$?*
          what is-it that-he eats the pirate
          'What is the pirate eating?'

*(43)*    *Tu penses quoi, Koko? Qui$_i$ t$_i$ saute par-dessus qui?*
          You think what K.        who *t* jump by-up    who
          Sequential question: 'What do you think? Who is jumping over who?'

It is crucial to understand that the results suggest that because the pragmatics is not established, the syntax can't be established. Children do show being sensitive to the pragmatics in contact, by asking those QUD questions, even though they try but fail to accommodate the new QUD. The syntax is not there, rest to know what exactly is missing: they do have some kind of subordination, but they are missing long movement (Syntax or LF).

What is interesting in the study is that only kids who have acquired LD questions are *able* to produce them in *both* contexts: it means syntax goes hand in hand with semantics and pragmatics. It also underlines the importance to consider that the acquisition happens at the latest stage of completion, when *all* the modules are in place.

*7.3 Presupposition projection*

In part 5 above, I outlined that, following Karttunen (1973), *believe* and *think* are plugs that block the presupposition of the embedded proposition.
In a context where we cancelled the presupposition that *Mom bought something*, it is relevant to ask a long distance such as (44) without the content of the embedded to be presupposed or even true:

*(44)*    *What do you think Mom bought?*

> (45)    #*What did she buy?*
> (46)    *Do you think she bought something?*

Instead of (44), children produce (46), showing they let project the cancelled presupposition up to the matrix. Hence, they won't be producing something like (44) for the reason that they are projecting the cancelled presupposition to the matrix, and render (44) without a true answer.

This would mean that children haven't acquired the syntax and semantic of long distance questions, explaining why they can't use them in the context we provided during the experiment. If they did, they would see no issue asking as (44) in the absence of a true answer for the embedded clause, they would know the presupposition does not project to the matrix because *think* is a *plug*.

# 8.  Conclusion

The conclusion is twofold: children do indeed have difficulty to update the QUD in a new context. In the first context, children have no difficulty producing an utterance corresponding to the QUD "what did Mom buy?", especially when they only have acquired short *wh*-movement. In the second context, the child is exposed to a lead-in telling 'she didn't buy anything but Peter thinks she did', the QUD presents itself as 'What are your beliefs Peter?' and only the children who have acquired LD questions can produce the targeted question 'What do you think she bought?' Children who haven't reach that stage don't answer, answer or ask a QUD-related question, showing they have trouble accommodating the QUD and lack the syntax of LD questions because the proper semantics and pragmatics are not yet in place.

Children potentially could have trouble with the discrepancies between speaker and hearer beliefs: making explicit the knowledge that the common ground is not shared, blocks their utterance of a question. It would mean children need both participants to be on the same level of knowledge or hold the same beliefs to continue the conversation. It also confirms that they haven't acquired LD, because they would know that they are the only suitable questions in that context.

Finally, we acknowledge that children responsible for the questions described here fail to not project the content of the embedded up to the matrix, showing they haven't acquired the semantics of *think*.

The question remains open as to know the reason that children had to interact with a person which held a different belief is what caused the appearance of belief-questions. Remember for example, that Scope Marking questions are only suitable when the presupposition has been established as true contextually, but it would also be fine to ask such a question if a third person (non-directly addressed) was holding a belief which has been disproved to be true by the main participants in the conversation. This remains to be tested in future research.

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