



## How the Emergence of Propositions Separates Strict Interfaces from General Inference\*

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**Abstract.** How does a child utilize inferences in acquisition and ultimately separate inferences from implicatures from semantic composition? How exactly does a child recognize a truth-functional proposition? It is argued that the child begins with rich, free inferences that are systematically replaced by syntax/semantics compositional rules. Strict syntax/semantics interfaces are discussed and linked to the syntax of subject auxiliary inversion and acquisition evidence of copying (*Is Bill is busy?*) and long-distance movement in opaque contexts (*What did she say she bought?*). A connection between Tense, propositions, and Phase boundaries is argued to be a critical syntax/semantics interface.

### 1 Acquisition Goals: the Syntax/Semantics Interface

While acquisition has been conceived of largely in syntactic terms, it is intuitively obvious that semantics and pragmatics motivates a child to unlock mysterious adult utterances, not just their unusual syntactic character. But what, actually, are the steps a child takes if syntax, semantics, and pragmatics converge upon her? Where does she begin and how can she simplify the process? The original notion of the *autonomy of syntax* offered an illusory image that the child could see through every linguistic situation to see the syntactic skeleton within. It cannot be so simple.

Our account will be deliberately intuitive, dwelling upon imprecise notions of propositionality and presupposition, but it parallels in spirit the idea of compositionality: each syntactic step has a semantic and pragmatic consequence. The hope is that an intuitive discussion helps us see just where more rigorous formalization is appropriate and where it may not be.

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### 1.1 Learnability

If an interaction with semantics and pragmatics is assumed to be relevant, then in classic terms, the set of possible grammars should go up exponentially and the learnability problem is then dramatically increased. The child must identify the optimal grammar not only in terms of syntactic derivation, but in terms of the set of meanings she map onto it as well. If structure X defines a set of possible *meanings* within the grammar, then each member of the set must be evaluated for presence in a particular grammar, not just the syntactic structure. It should be obvious that we must reverse that logic: the presence of semantic and pragmatic factors should serve to *constrain* the set of possible grammars, not expand them. How could that work? What prevents a child from making articles recursive: *the the hat*. One answer could be that syntax does not prevent this possibility, but that no semantics can be attached to a recursive article that would make sense: an object cannot be specific in two ways. In fact, a pragmatic meaning is not that far off: *the the hat I like* could mean *the hat of the hats that I like*. So we would want the exact semantics of the syntax – the semantics of recursion in fact – to be incompatible with this option.

If one takes the literature in formal semantics as a starting point, it is far from obvious how to make it work for the child. First we must see that there is a significant division between the inherent logic of cognition, and the special logic of a syntactic semantics. The difference is important if we wish to see exactly which acquisition hooks are actually used by the child. Formal semantics has not, to my knowledge, explicitly sought to articulate such a distinction.<sup>1</sup>

### 1.2 Interface Hypothesis

Let us begin then, with an interface hypothesis which serves as a motivating desideratum:

- (1) **Strong Interface Hypothesis:** Every step in acquisition must satisfy syntactic, semantic, and pragmatic criteria.<sup>2</sup>

An acquisition pragmatic principle is a natural consequence:

- (2) **Pragmatic Principle:** Connect to Context as quickly as possible.

From an acquisition perspective, we need an hypothesis of this kind to explain, for instance, the fact that small children can project and interpret single words.

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<sup>1</sup> This article is written from an acquisition perspective and there well may be appropriate literature of which I am unaware.

<sup>2</sup> The hypothesis is surely too strong because there may be morphological or movement (scrambling) operations which fail to constitute a shift for each criterion.

Let us elaborate a simple example to see how pragmatics and semantics can participate in syntactic triggering. In an early approach to the interface question, Lebeaux (2000) argued that semantics served to *confirm* syntactic hypotheses which are derived from context. How does a child acquire the passive? If he can *independently* determine meaning from context, and then generate a syntax to match the meaning, then semantics/pragmatics confirms the syntax (as in Roeper (1982)). Suppose the child hears:

- (3) The cheese was eaten by the mouse.

If the child knows semantically and pragmatically that *it must be the mouse who ate the cheese*, therefore *cheese* must be restored to a position after *eat* where that meaning is available. If UG syntax can find an operation – reverse object to subject movement – which restores *cheese* to the object position, then the meaning will be consistent with common sense. Once acquired, but only then, the syntax can become autonomous and can generate a meaning inconsistent with pragmatics (plausible real-world knowledge) such as:

- (4) The mouse was eaten by the cheese.

The emergence of propositional representations can, as we shall see, be represented from this interface perspective. In broad terms, children first:

- (5) Represent propositions as events.

In general, the emergence of propositional interpretations can be profoundly clouded by *general inference capacities*. For adults, strictly speaking, the inference is not warranted but often occurs. Ultimately, the child must separate *logical implicatures* from insecure situational inferences. That is, she must create an autonomous semantic space – constrained by syntax – which blocks the inappropriate use of general inference.

- (6) Move from rich inference to constrained compositional readings.

The differences between inference, implicature, and syntactic compositional semantics are part of the acquisition challenge. The immediate relevance of inference is obvious to any parent whose child's first word is "no". It is often not clear exactly to what the "no" applies. When a child resists socks, does "no" mean:

- (7) Don't put *any socks* on me or don't put *those socks* on me.

And the child is confronted with the same conundrum when the parent says “no!”. We assume a situational salience of something in a “Common Ground”, but it is not only unwarranted, but the failure of inference is a reasonable motivation for a child to acquire an articulated grammar.

## 2 How Do Propositions Emerge?

Propositions, as well as logical inferences and systematic implicatures, have a long history in philosophy and they are the subject of many definitions in Propositional Logic. At the same time, there are those (Hinzen 2007; Chomsky 2007) who have suggested that the notion *proposition* needs to be delicately introduced into linguistics and may not have a single logical definition. Our discussion will follow this tradition. Nonetheless one goal must ultimately be to say how a child arrives at a notion of proposition that is useful in traditional syllogistic reasoning:

(8) John is a man. All men are mortal.  $\Rightarrow$  Therefore John is mortal.

All indications are that this kind of explicit reasoning is far from nursery school children. At the same time, many implicit logical relations are undoubtedly present and a prerequisite for every stage of acquisition.

We should note that our approach is orthogonal to formal semantics. Many of the rich and detailed distinctions found in formal semantics are natural fodder for experimentation in the future. We aim to look at the “moving parts” in acquisition. This may leave the reader unsatisfied because we will avoid a rigorous treatment which may be found in philosophical discussions. Many interesting questions arise, for instance, whether and when children grasp upward and downward entailments for which there are ongoing experiments.

Nonetheless, the most primitive first stage kinds of initial entailments in language seem to refer to how thinking of any kind operates. What belongs to presuppositions or entailments about thought in general, and what calls for a special mapping onto linguistic structure? To trace the acquisition path wisely, we need to draw this line correctly. Our account builds from the point where a proposition is a syntactic projection that is distinct from a semantic primitive. Ultimately, it must all be embedded in a realistic version of children’s pragmatic experience.

### 2.1 Syntactic Propositions and Deniability

Where should we begin to look for “moving parts”? One prominent feature of propositions is the notion of *deniability* which happens to be elicited precisely by syntactic movement, inversion:

- (9) John is playing baseball  $\Rightarrow$  is John playing baseball

The movement of the Tensed element cancels the property of assertion and automatically introduces *deniability* via a yes/no question construction. Therefore our definition of propositions is:

- (10) Propositions are deniable: True or False.

We argue, consistent with classic syntactic claims, that this property results from a *strict interface* between syntax and semantics which pivots upon this UG claim (Klein 2006; Schulz 2003):

- (11) Universal Grammar: Tense projects a proposition.

This has led to concepts like “Propositional-Island Constraint” for tensed clauses. A child should, if UG is innate, grasp this notion of proposition, not immediately, but very early, as a UG *reflex* of the acquisition of Tense.

Yes/no questions via inversion give overt manifestation of this:

- (12) John is singing  $\Rightarrow$  is John singing

Most of the meaning of yes/no questions, we claim, emerges automatically via a Strict Interface, and therefore predictably, emerges before other properties of propositions, clouded by inference, but after entailments that are direct reflections of cognitive organization. First we look at the child’s semantic and pragmatic environment and the kinds of propositional distinctions, hanging in a world of inferences, that a child must ultimately master.

## 2.2 Non-Assertion Propositions

Other forms of meaning that are stateable as propositions include:

- (13) Entailments      Implicatures      Presuppositions

Each of these properties is close to situational pragmatic reasoning that does not depend upon language (at least in my estimation). Entailments are not subject to deniability (unless elevated to an overt assertion) – and they are prerequisite to the composition of any kind of meaning, linguistic or non-linguistic. Therefore I claim, that propositions are obscure, but in some measure they are part of any form of knowledge, as when we presuppose the existence of an object when we speak of it.

- (14) **Hypothesis:** The capacity for “proposition” is innate and immediate, but not necessarily available to conscious deduction.

Presuppositions and their triggers are notoriously difficult to pin down, but they emerge as intuitively critical in what follows.<sup>3</sup>

### 2.3 Entailments

Such a notion of proposition is present in much of our thought, but not automatically subject to any other linguistic operation like: *denial*, *contrast*, or deductive *consequence*.

For example if:

- (15) John has a blue car.

It entails the proposition: *John has a car*. A sentence like:

- (16) John likes the car.

has the existential presupposition that:

- (17) A car exists.

But we do not expect that children – nor probably animals – lack this mental capacity. It underlies not only language but many actions. It is plausible to argue that more sophisticated structures partake of this connection. For instance, understanding:

- (18) John was sad that the Bruins lost.

involves *sad [clause]* where the truth of the complement is assumed (“Speaker-factivity”). It could, therefore, share a presuppositional basis with *blue car*. We predict therefore that adjective complements should be easier for cognitive reasons than attitude verbs that create opaque contexts. Thus:

- (19) a. John was unaware that the Bruins lost.  
b. John did not think that the Bruins lost.

(19a, b) might seem pragmatically close in content, but the grammar delivers the meaning of the complement in different ways, where (a) has speaker or Common Ground factivity, but (b) is marked without a fixed truth value. Legere (2008) has shown that this is true in acquisition. With sentences roughly like in a carefully controlled experiment, 92% of 5yr olds understood (20a), but only 62% understood (20b)

- (20) a. She is happy she has a hat.

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<sup>3</sup> See Beaver & Geurts (2010) for an overview.

- b. She knows she has a hat.

This kind of data is consistent with diverse contexts under which presuppositions are triggered as the literature attests.

## 2.4 Implicatures

Linguistically-based *implicatures* involve derived propositions usually by contrast.

- (21) a. John has some of the marbles.  
b.  $\Rightarrow$  John does not have all of the marbles.

Linguistically-based *implicatures* involve derived propositions usually by contrast.

- (22) a. John has *some* of the marbles.  
b.  $\Rightarrow$  John does *not* have *all* of the marbles.

Nevertheless implicatures, at least some of those relating to quantification, appear to involve an extra semantic operation that takes more time and shows up later in acquisition (see work by Snedeker and colleagues (e.g. Panizza, Chierchia, Huang & Snedeker (in press) for recent discussion)). They occupy a different propositional corner.

## 2.5 Entwined Inferences

What stands in contrast to all of these forms of logical reasoning are rather similar *situational inferences*, which form a backdrop to all language and mingle in subtle ways with grammatical properties. Such inferences are ever-present but less constrained and not subject to logical verification. For instance, for (22), while *some*  $\Rightarrow$  *not all* is fixed, I might infer that someone other than John has a few marbles. But such an inference is insecure: some of the marbles could be under the couch, not in someone else's possession. In general we make what should be a virtually self-evident claim:

- (23) Acquisition shifts, systematically, from an over-reliance upon inference to a reliance upon systematic semantics.

This view leads to the natural question: What is the system whereby the shift occurs: Does a child know when a situational interpretation corresponds to the grammar or when it is an inference that exceeds the meaning grammar carries? This is a significant acquisition problem whose solution will engage many dimensions of linguistic theory.

## 2.6 Inferences and Grammar

Before we proceed, we would like to demonstrate how intimately woven unsubstantiated inferences can compromise systematic semantics in the eyes of a child. They are immediately available to children and confound the acquisition path. One can easily conclude the truth of both (24b, c) from the observation of (24a).

- (24) a. Situation: John observes Bill drinking beer.
- b. John saw Bill drink beer. = Event
- c. John saw that Bill drinks beer. = Proposition

The event seems to entail the proposition and the proposition seems to entail the event, although neither conclusion withstands careful scrutiny (Higginbotham 1983). But it is a part of how we commonly understand things, and court cases will show it. Imagine this scene:

- (25) Mary said “Bill saw John drink beer.”  
       Now if someone were asked in court:  
       “Did Mary say that John drank beer?”  
       Most people would in fact say “yes”.

But linguists know that if you saw John drinking, but did not know what it was, someone might say: “You saw John drink beer – you just did not realize it was beer.” And if you only saw empty bottles afterwards, you might say: “you saw that John drank beer” without entailing that you saw him drink beer.

Some constructions are ambiguous:

- (26) She saw the boys drink beer. = Event perception  
       or Proposition = She saw (that) the boys drink beer.

If a child at first depends upon these inferences in the initial state (as do adults understanding children), they can be legitimately confused as to whether the construction they heard was the representation of an event in a small clause or a proposition.

This reasoning extends to False Belief environments that surround opaque utterances as well. We commonly allow inferences to overrule opacity in our understanding as well. Consider this scene:

- (27) Grandma asks Dad: “What did Mom buy at the store?”  
       and he answers: “Plastic toys.”  
       “How do you know?”  
       Dad: “I heard a friend talking to Mom on a cell phone at the store and



I asked the friend: “What did Mom say she bought at the store?” and the friend said she had said “Plastic toys.”

Although under two recursive verbs of “saying” the complement is opaque and technically Dad does not necessarily know what she bought, this inference is commonly accepted in normal communication as a basis of “knowing”. Therefore it is something a child easily hears and must, ultimately, learn to qualify or discount in his construction of the sentence:

(28) What did Mom say that she bought \_\_

Acquisition experiments aim very precisely at creating situations where adults will apply a notion of opacity to the complement of say, but in real life we are often entitled to make this inference.

Suppose again this were a court case, one could imagine a defense lawyer seizing upon the distinction and asking a witness, who is under oath:

- (29) A: “Do you know what she bought at the tobacco store?”  
 B: “Yes, I know she bought drug paraphernalia.”  
 A: “How do you know?”  
 B: “She told me she bought drug paraphernalia.”  
 A: “Has she ever lied to you?”  
 B: “Yes.”  
 A: “Then she could have been lying?”  
 B: “She could have.”  
 A: “Then in fact you do not know that she bought drug paraphernalia, because you never saw it and she might have been lying.”

In a court, reasoning of this kind, pivoting on the illegitimacy of common inferences is a standard technique to downgrade the value of testimony. Here is a putative adult caught in the fact that his statements, under oath, depended upon an inference and not actual knowledge. What he actually knew was that she said she bought drug paraphernalia but this was allowed to shift to: *Know that she bought drug paraphernalia*. No one would be indicted for perjury for such an assertion: *He said he knew what she bought, but he didn't, therefore he lied*. Moreover, the information would not be disallowed as evidence. The fact that she said she bought drug paraphernalia could be legitimately relevant to the judgement, in a juror's mind, that she did buy drug paraphernalia.

If adults are easily uncertain about the boundaries of semantic meaning, then it must be a challenge for a child as well because his experience has inconsistent

information. Sometimes “saying that” can be relied upon to introduce a truth, and sometimes not. It is no wonder that children must learn to disentangle the meaning from the inferences when such inferences are a part of normal life. There is subtle naturalistic evidence that children may take the verb *say* to carry a factive complement. In the adult language factive complements for verbs like *know* are deletable (b) as opposed to non-factive verbs like *think* (c) with which we generate the opaque complement via verbphrase-prominalization with the word *so* (d):

- (30) a. A: John went outside.  
       b. B: I know.  
       c. B: \*I think.  
       d. B: I think so.

Children are known to do the same in conversation but with the non-factive *say* being treated like a factive, although adults do not do this:

- (31) “Can we have cookies?”  
       “Yeah, Mom said.”

In fact, the Childes database has examples with exclamations that feel non-adult, as if a factive complement has been deleted, which suggests that a child might first understand the word that way.

- (32) “You said!”

We turn now to an examination of acquisition data. Much of this data can be regarded as experimental hints – in a way like “??” grammatical judgments – that need to be subject to more careful scrutiny, as do many grammaticality judgments, but which nonetheless carve out the terrain that needs exploration.

### 3 The Emergence of Tense and Propositionality

Where does a child begin? One-word utterances like

- (33) “uh-oh”, “no”, “dat”, “fish”, “milk”, “juice”

have the same variety of interpretations, expanded by intricate inferences that they do for adults who say:

- (34) “John!”, “No way!”, “Beer!”

and leave it to speaker/hearer inferences to fill in the communication. Parent and child must both exercise inferential capacities, which often run awry, pre-

sumably providing the child with motivation to acquire more grammar in order to be clear. Nonetheless, the efficiency of such inferences must be present early on to make the utility of one-word utterances a good starting place for children. The child who says “milk” is, often but not always, trying to express an imperative like “please give me some milk”. Early work in acquisition claimed that children had full sentences here, but there is no more reason to believe that than the notion that adult exclamatives should be expanded as full sentences. Potts & Roeper (2005) argue that the same analysis holds for two-word utterances, which are like *expressives* for adults:

(35)     **Exclamations:** You fool! You idiot! You jerk!

These utterances are not equivalent to a tensed sentence:

(36)     You are an idiot.

The latter has a profoundly different force, just as a parent who screams at a child “You idiot!” is not dealing with the same meaning as a psychologist who solemnly pronounces:

(37)     Your son is an idiot.

Where the tensed element implies reference to evidence like intelligence test scores.

Expressive exclamations cannot be cancelled or tagged or take articles:

(38)     \*You idiot, but it does not look that way.

          \*You idiot, aren’t you.

          ?\*You an idiot.

### 3.1 The Pre-Propositional Stage

A child utterances often seem to carry exclamative force:

(39)     “it big” or “dat here” or “Mommy sock”

They are therefore plausibly using the syntax of expressives, though his communicative intent might be closer to an assertion, the notion that it is an assertion is then an inference.

Therefore we argue that they are *pre-propositional*. They show no indications of a proposition, like tense-marking, tag-questions or even proto-tag questions (as far as we know):

(40)     \*It big, isn’t it?

\*It big, huh?

What drives us – in particular children – to abandon these rich inferences in favor of grammar? We are left with many uncertainties in a world of pure indeterminate inference. We seek the precision and reliability of assertions that have an evidential relation to context.

### 3.2 The Semantic Side of Root Infinitives

What exactly happens when the child moves from (a) to (b):

- (41) a. he big  $\Rightarrow$  b. he is big

He is taking both a big semantic and a big syntactic step. There is evidence very early that precisely its deniable propositional character is quickly recognized, when a child uses Verum Focus in a context where someone claims that something is *not* working:

- (42) “it IS working!” (Danilo Azcarate 3,4yrs)

Thus we have early evidence that a putatively UG-mediated and innate connection falls into place easily and quickly, much like children once standing up quickly learn to walk.

A large literature on Root Infinitives argues specifically that children initially lack Tense (see Wexler (to app.) for a summary). What the literature fails to address is the fact that propositions are carried by tense. Therefore until the child can project a proposition – which we define as carrying deniability – the semantics as well as the syntax can be inhibiting the move from expressions like:

- (43) a. Hände waschen [hands to wash]  
b. wäscht die Hände [washes the hands]

The child who moves from (43a) to (43b), not only raises the verb and adds a tense-marking, but adds a deniable proposition as well. It is notable that an important form of language disorder is the failure to express tense. We take that to be not only a syntactic, but a semantic failure, and the step toward tense recognition to engage the strict interface between syntax and semantics.

A close look at a child's departures from the adult language indicate that the notion of proposition is psychologically present.<sup>4</sup> Why do we ask a yes/no

<sup>4</sup> We have undertaken no analysis of languages that lack Tense marking. It is perfectly possible that UG has a few innate avenues where propositionality is linked to syntactic markers or constructions.

question with inversion?<sup>5</sup> Why don't we just add a word that carries that meaning, like *whether*:

- (44) a. Is John here?  
b. \*Whether John is here?<sup>6</sup>

It is really a strange fact that we can signal that a whole proposition is questionable by just moving an auxiliary. We argue that something deeper is at work: an operation on the notion proposition.

We argue that the interpretation arises from what we call a syntax/semantics *Strict Interface*. An application of this principle leads to Chomsky's Strong Minimalist Thesis:

- (45) **Strong Minimalist Thesis (SMT):**  
Each syntactic Phase undergoes semantic interpretation.  
(Chomsky 2005, 2008)

It now becomes plausible that if something is removed from the Phase – like tense-marking – then it cannot be interpreted, which I call Vacate Phase. Thus if a clause is a Phase, then moving something out of it, blocks an interpretation. Movement is motivated to create new discourse meaning, like questions, but also to *avoid* meaning.

Consider the contrast between (46a) and (46b), two questions around the same proposition:

- (46) a. Can you t play baseball?  
b. You can play baseball, can't you?

In (46b) the proposition is advanced and then the tag asks for confirmation or disconfirmation. In (46a) the proposition is never assumed, although reconstruction allows the system to know what the proposition would be.

In other words, by movement out of the Phase, the pragmatic projection to a presupposition of a question, as in (b), does not occur. The *trace* of Aux-movement allows reconstruction of thematic meaning, but the proposition carried by tense is not projected if the tense is not pronounced in the Phase. This requires technical expression that differentiates Phase Head and Phase-

<sup>5</sup> See Roeper (2011) and deVilliers & Roeper (to appear) where a detailed minimalist syntactic account is provided.

<sup>6</sup> Note that it can be said in German (M. Zimmerman pc),  
i. Ob er da ist [whether he here is]  
but with some presupposition difference, as if the proposition is in the Common Ground, which is hard to pin down.

complement, limited reconstruction, and a relation between pronunciation and presupposition which we will not articulate here, but which Strict Interfaces allow (see Roeper (2011)):

- (47)        [CP can            [IP you trace play baseball]  
              Phase-Head    Phase-complement

Only the Phase Complement is initially transferred to interpretation (Boeckx 2008). UG and a Strict Interface delivers, by movement out of the complement, a block on the propositional presupposition. By hypothesis:

- (48)        Strict Interfaces are a part of UG and therefore immediately available to a child.

Now the odd fact that inversion undoes a presupposition follows directly from Strict Interfaces and the seemingly natural *whether*-question option is automatically rendered superfluous.

If indeed, this is UG-derived, hence innate, then it should be available for children very early. In fact, Van Valin (2002), advocating a similar view of the role of Tense, shows that precisely overtly tensed elements invert first: “*Is, are, was, do, does, did, have, has* and *had* occur in inverted questions at the initial stage 67% of the time, while *can, could, may, might, shall, shoul, will* occur only 14%.”

Moreover, further operations become quickly possible. As mentioned, young 3yr olds say things like:

- (49)        “it IS working” (Danilo Azcarate 3.4 years)

showing an awareness of Verum Focus, requiring Contrastive stress on the tensed element, presupposing the Tense-Proposition connection. In fact, we have explicit dialogues that reveal the presence of the presupposition when, via *copying*, the tense continues to be present in the clause for children:

- (50)        Father: Do you want to go outside?  
              Child: No.  
              Child (to friend): Do you don’t want to go outside ?

The *copying*, by maintaining the auxiliary inside the Phase, preserves the presupposition and asks a question about it, while the inverted case not only lacks the presupposition, but acquires a suggestion reading:

- (51)        Don’t you want to go outside?

Other examples include:

- (52) a. “Where are we ARE?” (Danilo Azcarate 3.8 yrs)  
 b. = Where is it that we are?

which is uttered in a strange forest, with the meaning like a cleft (52) where the fact that we are somewhere is presupposed.

Now let us ask more carefully what the copying implies. It has been noted and debated for 40 years in the acquisition.<sup>7</sup> It occurs for a brief period of time, before tag-questions are available (Jesney 2007):<sup>8</sup>

- (53)
- |                              |                                  |
|------------------------------|----------------------------------|
| “Is Bill is busy”            | “Can you can do that”            |
| “Is it’s Stan’s radio”       | “Is this is the powder”          |
| “Is that’s a belt”           | “why do you’re going outside”    |
| “why do you’re giving juice” | “why do you’re cutting the meat” |
| “what’s he’s doing”          | “what’s the mouse is doing”      |
| “why is there’s big tears”   | “what is the woman is doing”     |
| “why do deze don’t unrase”   | “why did you didn’t want to go”  |

Under our hypothesis, the yes/no questions should have the meanings of tag-questions, not open yes/no questions, although the claim is hard to prove, and the *wh*-questions are like clefts with presupposed relatives (*why is it you’re cutting meat*).

Under the Strict Interface, syntax and semantics converge. One reason that a child would use copying is precisely to preserve the presupposition. A second reason is that copying transformations can be first learned at phonetic operations with Total Reconstruction, thus the interpretation would involve treating both the copy and the trace as if it were the full tensed element.

This notion of Total Reconstruction has been articulated by Sauerland & Elbourne (2002) and Miyagawa (2005). If the child first does Total Reconstruction, then we predict that even non-copied inverted SAI questions initially are like tag questions. Here is a pilot experiment that goes in that direction. Consider the contrast between:

- (54) a. anyone can lift a ball → exhaustive = *everyone*  
 b. can anyone lift a ball → Qp-neg → *anyone* = Free Choice  
 (or exhaustive reading)

<sup>7</sup> See Guasti (2006); deVilliers, deVilliers & Roeper (2010) for some references.

<sup>8</sup> Fitzpatrick (2005) shows inversion changes presupposition in *wh*-questions too. Note the contrast: *why don’t you go outside* (no required presupposition) and *how come you don’t go outside* (necessary presupposition). Conroy (2006) shows that variation in inversion in *wh*-questions in children patterns with this distinction.

This Scene was given to a child and the child was asked:

- (55) [insect, dog, fish, child]  
 Can anybody play with a ball?  
 → adult: *yes*, the child or dog (yes-bias chooses)

An adult if asked, would give “no, not a insect or a fish” to a tag-question:

- (56) Anybody can play with a ball, is that right?

If the child has a yes-bias (and because *anybody* has a person or personlike bias), we would expect “yes” for “Can anybody play with a ball” instead the 4yr old child gave a tag-like response:

- (57) “no, not the fish or the insect”

Even for an adult, the copied version seems to prefer this Free Choice, not universal reading :

- (58) → *Can* anybody *can* play with a ball?

To sum up, the experiment supports both the notion of Total Reconstruction and the presupposed proposition reading.

What can we conclude from the early evidence:

- (59) a. early use of inversion  
 b. verum focus  
 c. copying to create tag-questions  
 d. disorder linked to Tense

We take this to reflect a mechanical and strict interface between syntax and semantics.

What is astonishing and critical is that this evolution happens very early with children in the 2-3 yr range, while the block of a presupposition under attitude verbs like *say*, *think*, *tell* which are not inherently more complex, is not worked out until several years later, to which we now turn.

We argue below that the presence of easy pragmatic inferences that overrule what strict syntactic/semantic connections require, like those courtroom confusions outlined above, are an important part of why some realizations of Strict Interfaces seem not strict to children and delay acquisition.



#### 4 The Inference toward Default Tenselessness

Later stages, nonetheless, show an application of inferences to what may be a default Tenseless representation. Children show:

- (60) Event interpreted as proposition.  
 Proposition interpreted as event.

In a pilot experiment conducted by Mary Wilson and associates at Laureate Learning Corporation, 6 children were given scenes and sentences like this:



5/6 answered “Amy” (or comparable for other stories) for “who heard that Jack played the trumpet in his room.” None of the children did the reverse: took *heard Jack play the trumpet* to be “grandma”. Therefore a tensed clause was taken to be, or entail, an untensed small clause event, but not the reverse. While the primary direction is: Proposition  $\Rightarrow$  Event, there is some evidence of the opposite as well.

While adults know when an inference from a proposition to an event is warranted, a child may not.

##### 4.1 Inferences that Overrule Grammar

Inference, however, hangs in the air over many situations and is the motive for many statements. Thus the statement above:

- (61) “Don’t you want to go outside?”

is usually expressed as a *suggestion* not a request for a propositional judgement of truth or falsity equivalent to: ‘Is it the case that you don’t want to go outside.’ Because such pragmatic goals as *suggestion* are the purpose of the speech act, there is an understandable inclination to build this into the grammar directly. However, we believe it is of apiece with inferences that *overrule* the overt meaning of the grammar.

Schulz (2003) explored the contrast in a series of experiments with numerous similar stories like this one:

- (62) Kermit went shopping and he was supposed to buy eggs.  
 Then in the evening, he got really hungry, but he said “I have nothing to eat in the house.” He didn’t remember the eggs.  
 Did he forget to buy eggs?  $\Rightarrow$  no  
 Did he forget that he bought eggs?  $\Rightarrow$  yes (Schulz 2003)

A group of 38 children 4-6 yrs made errors on both types. 82% of the children made errors on these sentences and Schulz states that “younger children treat factive verbs as non-factive.” Consider the younger children who were most prone to take the non-factive and interpret it as factive: “Did he forget to buy eggs” to mean “did he forget that he bought eggs” and answer “yes”.

Unlike the Strict Interface discussed above, verbs like *forget* are *negative implicatives* which means they do not carry a fixed truth, but rather an implication. The fact that he *forget to buy eggs* does not entail that he did not buy eggs strictly, just that he forgot the obligation at some point. Inference must be applied to know which implication to apply. Consider these more elaborate scenarios.

A boy is supposed to buy eggs to make omelettes. He forgets and brings no money to the store. When he comes home, his mother says, “Did you forget to buy eggs?”. He says yes and quickly runs back to the store to get some eggs. His father comes home and says:

- (63) “Did you forget to buy eggs?”

The natural, pertinent answer is “no” because he did eventually buy eggs, but he also had forgotten as well. Most adults would answer such a question with the most recent and relevant answer: No. Now consider an altered context: Suppose the father comes home, and says “Johnny is always forgetting things – I bet he forgot to buy eggs.” “Did you forget to buy eggs?” Now the answer might be “Yes, even though he got them eventually.” This answer would, in a

way, respond to both interpretations.

The conclusion is that the child must decide by a *broader situational inference* – which should not be collapsed with Conventional implicatures – to decide which event should be the basis of an answer. So we see that direct syntactic projections, implications, and inferences are all pertinent. It is possible, at early stages, that a child arrives at a neutral reading, which gives free rein to inferences? Suppose she deleted any tense marking and instead generated a gerund:

(64) Did he forget about buying eggs?

This could allow both meanings: *forget to buy* or *forget that he bought*. We consider this a plausible syntactic move. It is plausible in part because the act of deletion would signal (unconsciously) the fact that the grammar was incomplete. It is exactly what the children did in the *hear him play the trumpet* scenario.

#### 4.2 False Belief

A great deal of work has surrounded the fact that children make errors in False Belief contexts. In deVilliers et al. (2010); Roeper (2011); deVilliers & Roeper (to appear) we have developed an approach that parallels our discussion of inversion at the syntactic level. Children allow Total Reconstruction to occur with respect to a syntactic chain which enables them to obey the Strong Minimalist Thesis. Children are known to give the wrong answer in this scenario (“birthday cake” instead of “paper towels”):

(65) This mother snuck out one night when her little girl was asleep and bought a surprise birthday cake. The next day the little girl saw the bag from the store and asked, “What did you buy?” The mom wanted to keep the surprise until later so she said, “Just some paper towels.”  
– What did the mom *say* she *bought*? ⇒ “a birthday cake”

We argue that when the *wh*-word is interpreted in the lower clause, the SMT demands interpretation there, and then they give a factive answer. Thus they put the what back into the second *trace* position:

(66) What did she say [ (what) she bought *trace*.]

That position is inside the first Phase and therefore is interpreted there. The interpretation for the adult is ultimately altered by the impact of the higher verb allowing the lower CP to inherit a feature in syntax. The Total Reconstruction is exactly like what we saw with auxiliary inversion. In fact several other branches

of adult behavior coincide with this analysis to enhance its plausibility. First in French it has been argued that *wh*-in-situ, unlike the fronted case, entails a presupposed proposition:

- (67) Il va où. vs. Où va-t'il.  
*he goes where where goes he*

The first entails that one went somewhere, while the second might be answered with “nowhere”. In addition, in German, it has been claimed that (substandard) partial movement where the *wh*-word is repeated requires factivity for some speakers (Herberger 2001):

- (68) Was hat sie gesagt, was sie gekauft hat.  
*what has she said what she bought had*

Although this is regarded as substandard and obscure, the effect is exactly what we find with children, who are also known, in a variety of languages, to spontaneously repeat (see deVilliers & Roeper (to appear)):

- (69) “What did she say what she wanted for her birthday.”

And finally when a *wh*-word is in-situ in English the “correct” reading emerges, as this contrast reveals:

- (70) What did he guess t the number was t. [=what was his guess]  
 Did he guess what the number was. [=guess correctly or just make a guess]

Thus, looked at carefully, the child’s decision falls within the options of UG and is shown in parallel adult behavior.

But why do children persist in this reconstruction so much longer than for yes/no questions? In our initial court cases, we discussed how we develop beliefs from imperfect verbal evidence. In these experiments, a story with two prongs is developed, both of which in the larger world of inferences is roughly plausible. The experiment, in effect, seeks to see when children are able to use a precise interpretation of grammar to see which is appropriate. Adults must likewise sense that this discrimination is called for. If adults also allow inferences to exceed what grammar allows, then why should children not do the same? If *say* often takes factive complements and if they are allowed to infer a proposition from a small clause with an event (see *John drink*), then the manner in which the child uses inference to expand, and overinterpret, then their maneuver is within the larger comprehension strategies available to human beings.

Ultimately, the child must grasp that the momentum of the story is precisely a call for the hearer to contrast *what was bought* with *what was said to have been bought*, and therefore the factive assumption must not be made.

## 5 Conclusions

The reasons, then, that children pass through the misanalysis of SAI years before they reliably handle such False Belief environments involves both the fact that UG favors an SMT analysis of clauses and that they must grasp the role of contrast in the story narrative.

We have allowed several ideas to circle around the Strict Interface that: Tense entails a proposition. We have argued that

1. it motivates the first major step to a transformation in the Root infinitive stage.
2. it promotes Total Reconstruction in order to maintain a tag-question meaning in early yes/no questions and in later long-distance questions, and
3. it allows deletion in some tensed clauses to fulfill pragmatically invited inferences.

This article seeks primarily to embed these syntactic options within a larger semantic and pragmatic context by showing that what children do largely remains in the repertoire of adult response to language as well.

What must the child do to become an adult? She must recognize certain contexts, particularly those where contrast is part of the rhetoric of a narrative, that calls for, in effect, blocking our usual broad inferences about the possible meanings of human utterances.

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