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Language Acquisition

Class 4
Early Syntax

Components of a linguistic system

- **Primitive elements** (listemes, grammatical formatives)

- **A system of rules and procedures** that puts primitive elements together to form larger units (e.g. Merge) = **narrow syntax**

- **Interface systems** that interpret the output(s) of the recursive procedure:

  - A phonological system, which relates the output of the recursive procedure to the articulatory/perceptual systems

  - A semantic/logical system, which relates an output of the recursive procedure to conceptual/thought system

Last class

- syntactic knowledge might be useful for things like extracting meanings of content words => bootstrapping

- + a bit of syntax skepticism: how much syntax can a 2-year-old know anyway?

Today and the next few classes

- How much syntax can a 2-year-old know anyway?
- How does syntax acquisition proceed?
  - How much variation is there? How do learners navigate the space of possible variation?
  - What is the evidence that learners make use of? How do learners extract the relevant information from the available evidence?
  - Are there primitives that are there from the get-go? Is there grammatical maturation?

Properties of the system

- Structure-dependence
- Proprietary elements, rules and operations

Properties of the system

- Structure-dependence
  - Rules that are operative in natural language syntax cannot be defined over strings
  - Proprietary elements, rules and operations
  - agreement, case
- Do child grammars show these properties?

Early sentential structure

- Around 2-yrs children start to combine words.
- At first sight, the syntax seems rudimentary at best ("telegraphic "), e.g. no functional elements
- However, even their telegraphic productions reveal a surprising amount of target language properties
  - Head-directionality: VP, IP/TP, CP, DP
  - Negation
  - Post-verbal subjects
  - …

Accurate productions

- Head-Directionality: VO vs. OV
  - English acquiring children produce (1a) but never (1b)

(1) Her have a big mouth (Nina 2;6)
*Her a big mouth have

- In contrast, Japanese acquire children never produce a sentence of the form in (1a)

Accurate productions

- Position of subjects
  - French acquiring children produce sentences like (2), where the subject appears post-verbally.
    - Post-verbal subjects are licit in French.

(2) Dormir petit bébé. (Daniel 1;11)
Sleep-INF little baby
`The little baby is sleeping'

  - English acquiring children never produce analogous forms

Accurate productions

- Position of negation relative to main/auxiliary verbs

(1) Kann **ikke** see (Anne, 2;0)
can not see

(2) Hij doet ’t **niet** (Hein, 2;4)
he makes it not

(3) I can’t see you (Eve, 1;10)

(4) Unobserved: *I see not you

Déprez and Pierce (1993), Harris and Wexler (1996

Very Early Parameter Setting

- Many of these properties vary across languages, i.e. they have to be learned (they can be thought of as language-specific "parameters")

- Since kids seem to set these parameters correctly ***before*** they produce utterances which can be corrected, learning here cannot be supervised learning, i.e. no negative evidence (Wexler and Hamburger 1973)

  - Negative evidence - being told that sentence is ungrammatical

  - NB: Parents and others don't correct kids for grammatical errors to begin with (Brown and Hanlon 1970)

Omission of functional categories ("Telegraphic style")

- **At the same time, children's early productions are non-adult in specific ways**
  - Inflectional morphemes: 3rd singular *–s*, past tense *–ed*, ...

(1) a. Papa have it. (Eve 1;6)
b. Cromer wear glasses. (Eve 2;0)
c. Marie go. (Sarah 2;3)
d. Mumma ride horsie. (Sarah 2;6)

- Auxiliaries: perfective *have*, progressive *be*

(2) a. Eve [has] gone. (Eve 1;6)
b. Eve [is] cracking nut. (Eve 1;7)
c. Mike [has] gone. (Sarah 2;3)
d. Kitty [is] hiding. (Sarah 2;10)

Omission of functional categories ("Telegraphic style")

- **At the same time, children's early productions are non-adult in specific ways**

  - Copular *be*

    (3) a. That [is] my briefcase. (Eve 1;9)
    b. You [are] nice. (Sarah 2;7)

  - Dummy *do*

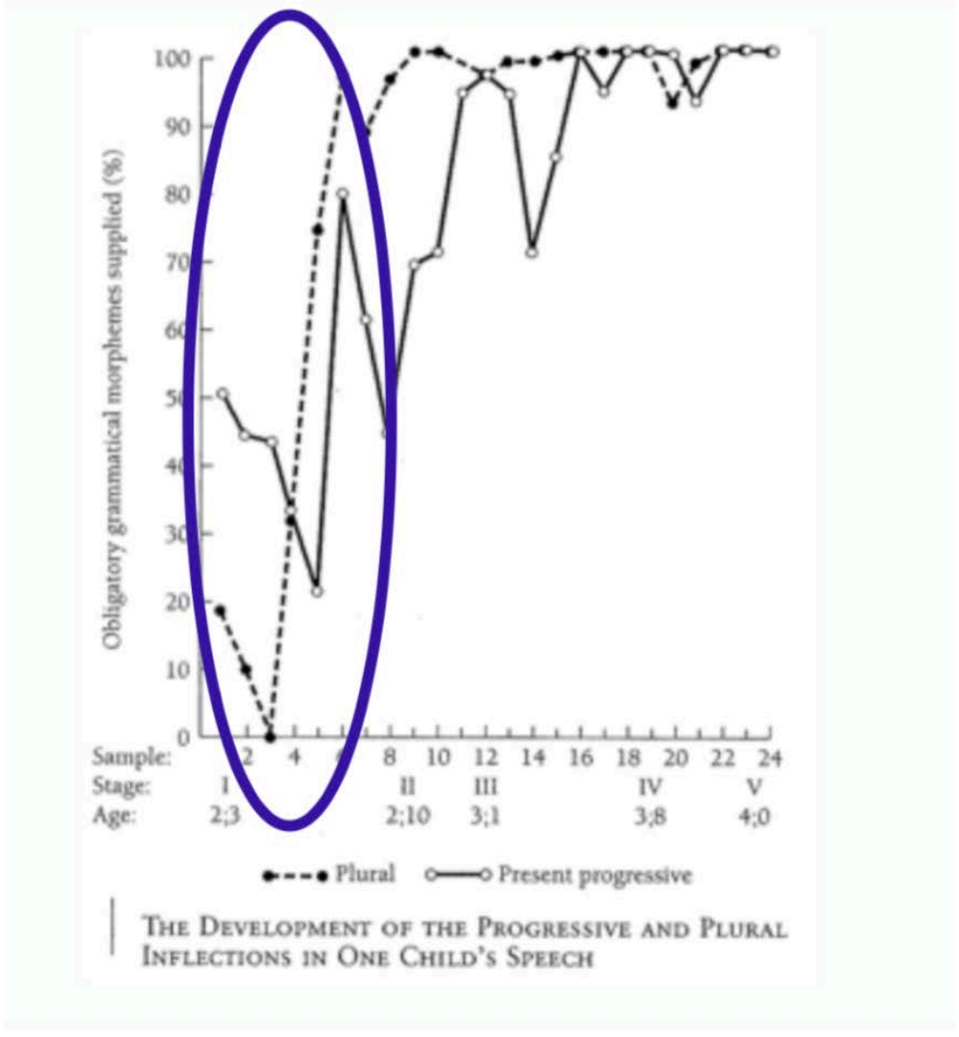
    (4) a. Fraser [does] not see him. (Eve 2;0)
    b. He [does] no[t] bite ya. (Sarah 3;0)

  - Articles: *the*

    (5) Where [did] [the] ball go? (Adam 2;3)

Developmental trend

- English acquiring kids start adding functional elements, esp. bound morphemes, to their speech between 2-3yo



How much syntax?

- What characterizes this early stage of syntactic development?

- Do these child productions have the same functional architecture as clauses in the adult grammar? How can we tell?

Content elements > Functional elements

- Interpreted for a long time as showing that English-acquiring children don’t have command of the inflection for verbs and of functional morphology more generally.

But…

- Omission is selective/purposeful
  - Gerken, Landau & Remez 1990: in an imitation task 2-year-olds omitted functors (e.g. -es in Pete bounces the ball), but not prosodically matched nonsense functors (e.g., -a in Pete pusha ko truck)

Another variant of the idea

- Perhaps kids know (some) functional morphology after all, but…
- Given that you can communicate quite well without the more “grammatical” categories and utterance planning and production might be costly for the young speaker, they choose to skip some of these
- If so, comprehension should reveal competence

Comprehension of inflection

- Soderstrom et al. 2007: do 16-mos show sensitivity to inflection-driven ungrammaticality in comprehension?
- Head-turn preference paradigm
  - Exp 1: 54 infants; 18 per condition
  - Exp 2: 44 infants; 22 per condition
  - Exp 3/4: 18 infants per exp.

Soderstrom et al. 2007

- Exp 1 Conditions (between-subjects)

  - **Good vs. Bad word-order** (“Content-word mismatch”)
    (a) They used to **sing** in these **chairs** on the porch
    (b) They used to **chair** in these **sings** on the porch.

  - **Good vs. Bad inflection**
    (a) They used **to sing** in **these chairs** on the porch
    (b) They used **to sings** in **these chair** on the porch.

  - **Wrong both**
    (a) They used **to sing** in **these chairs** on the porch
    (b) They used **to chairs** in **these sing** on the porch.

Soderstrom et al. 2007

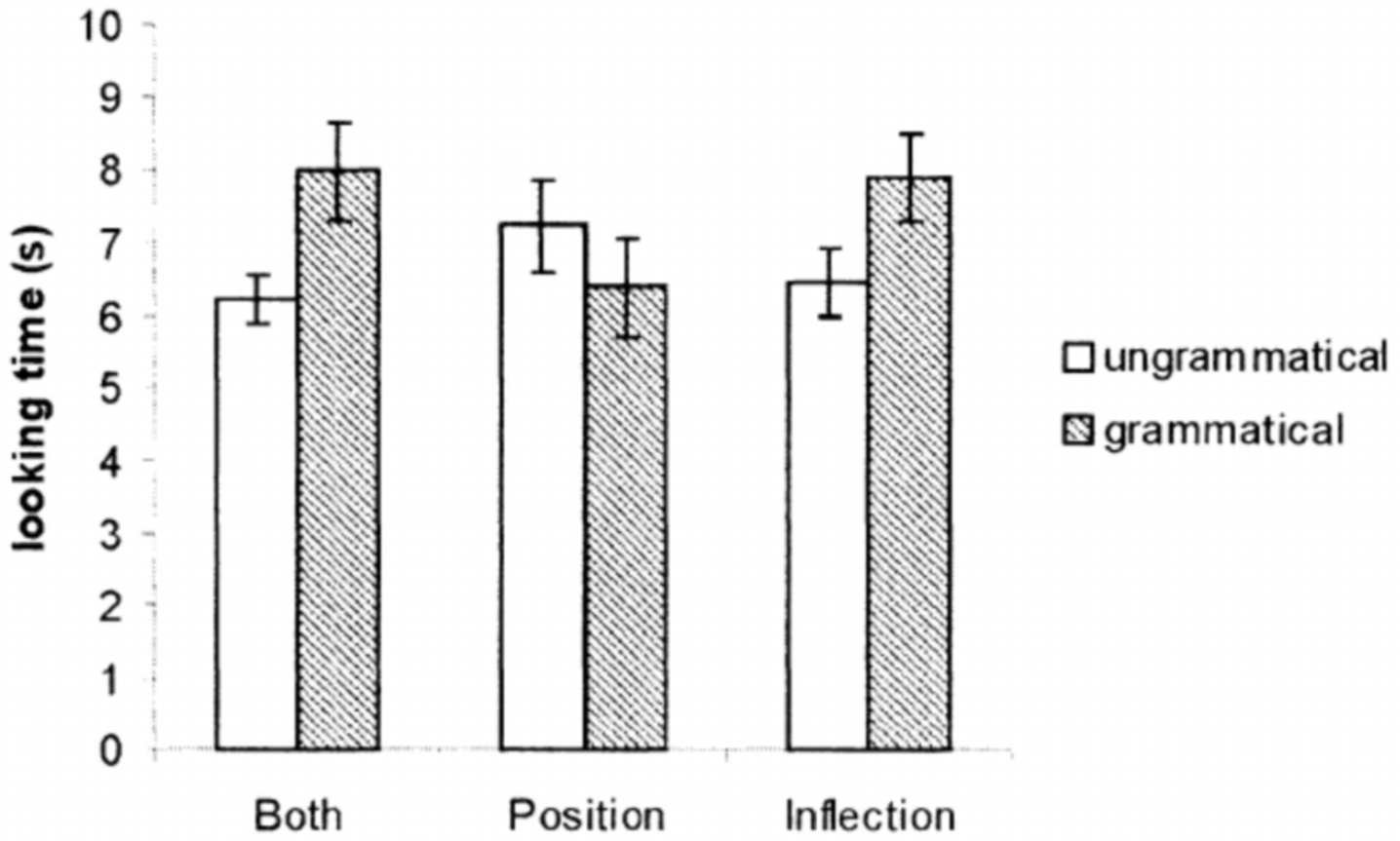


FIGURE 1 Mean looking time to grammatical and ungrammatical passages in Experiment 1. Error bars reflect standard error.

Soderstrom et al. 2007

- Interpretation of Exp1 results:
  - 16-month-olds detect violations involving the mis-placement of inflection, but are not sensitive to the distributional properties of various content words
  - consistent with the flexibility of content words and their ability to be coerced

Soderstrom et al. 2007

- Indeed, canonical syntactic properties associated with listens can be systematically overridden by syntax.

(1) a. I windowed the north wall.
b. I lamped the room.

- In contrast, no such flexibility is attested for closed-class functional items/grammatical formatives.
  - *three cats* cannot be made mass or singular
  - *every cat* cannot be made plural or mass;
  - *permissible* cannot be made a verb;
  - *walked* cannot be made a noun or a present tense verb.

discussion based on Borer (2005)

Soderstrom et al. 2007

- But is this study a good demonstration of this?

  (1) They used **to sings** in **these chair** on the porch.

  (2) I used to **min[s]** garlic

  (3) These **deer-∅** are adorable

- Results are finicky: not robust to non-adjacency (Exp.2), or novelty of content words (Exp.3)

A clearer demonstration

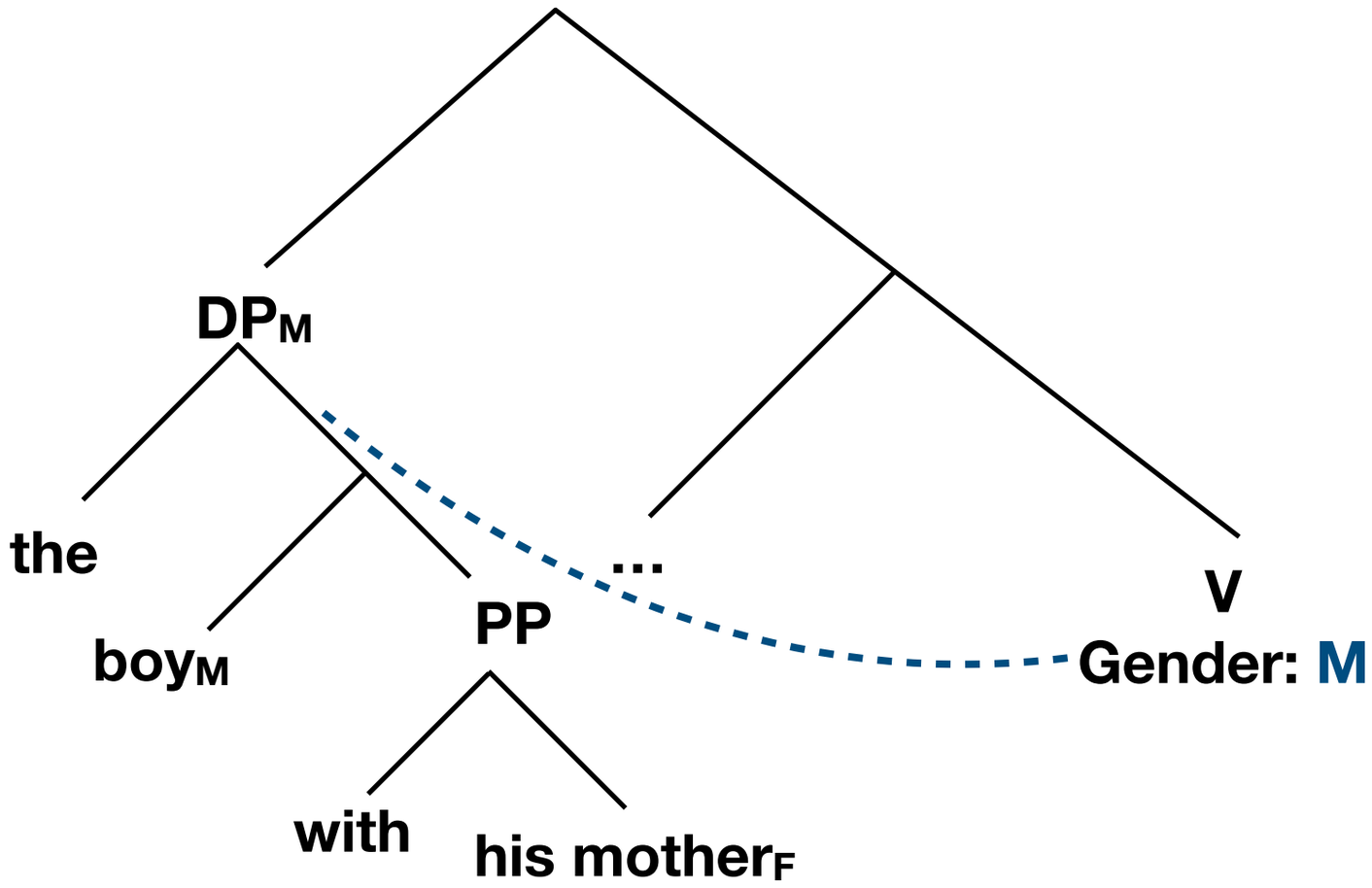
- Sensitivity to gender-agreement in French toddlers and infants

  - Shi, Legrand and Brandenberger (2020) for 30mos

  - Shi, Emond and Badri (2020) for 17mos

Gender agreement in complex noun phrases

- Verb agrees with the head noun



Gender agreement in coordinated noun phrases

- The gender-matched conjuncts, the conjoined DP bears the gender of the individual conjuncts

- If gender-mismatched conjuncts, a default form is inserted; in French, this is homophonous with Masc

(1) [la garçon$_{M}$ et sa soeur$_{F}$]$_{\varnothing}$ sont compétents$_{M}$/*compétentes$_{F}$
[the boy and his sister] are competent

Sensitivity to agreement w/ complex NPs

- Subject-doubling constructions with 2 kinds of complex NPs:

(i) NP1 in NP2

La banane$_F$ dans le chapeau$_M$, **elle$_F$** VP
the banana in the hat, it VP

(ii) NP1 and NP2

La banane$_F$ et le chapeau$_M$, ils$_{M/Def}$ VP
the banana and the hat, they VP

Procedure

- Visual fixation

  - Neutral visual stimuli on screen (a talking puppet) paired with audio

  - Measure is looking time ≈ listening time

Design

GROUP 1

Grammatical: NP1 in NP2

La banane$_F$ dans le chapeau$_M$, **elle$_F$** VP
the banana in the hat, it VP

Ungrammatical: NP1 and NP2

La banane$_F$ et le chapeau$_M$, **elles$_F$** VP
the banana and the hat, they VP

GROUP 2

Ungrammatical: NP1 in NP2

La banane$_F$ dans le chapeau$_M$, **il$_M$** VP
the banana in the hat, it VP

Grammatical: NP1 and NP2

La banane$_F$ et le chapeau$_M$, **ils$_{M/Def}$** VP
the banana and the hat, they VP

Table 1. Test sentences and design.

Structure 1 (Correct agreement) [*La banane*$_{F}$ *dans le chapeau*$_{M}$]$_{\mathbf{F}}$ *elle*$_{\mathbf{F}}$ … (The banana in the hat, it …)	Structure 2 (Incorrect agreement) *[*La banane*$_{F}$ *et le chapeau*$_{M}$]$_{\mathbf{M}}$ *elles*$_{\mathbf{F}}$ … (The banana and the hat, they …)
Group 1	
La banane dans le chapeau, elle pèse les graminées.	*La banane et le chapeau, elles pèsent les graminées.*
La banane dans le chapeau, elle demeure au fleuve.	*La banane et le chapeau, elles demeurent au fleuve.*
La banane dans le chapeau, elle grasseye ardemment.	*La banane et le chapeau, elles grasseyent ardemment.*
La banane dans le chapeau, elle fuie les tentatives.	*La banane et le chapeau, elles fuient les tentatives.*
La banane dans le chapeau, elle tente leur pécule.	*La banane et le chapeau, elles tentent leur pécule.*
La banane dans le chapeau, elle résonne au couvent.	*La banane et le chapeau, elles résonnent au couvent.*
Group 2	
Structure 2 (Correct agreement) [*La banane*$_{F}$ *et le chapeau*$_{M}$]$_{\mathbf{M}}$ *ils*$_{\mathbf{M}}$ … (The banana and the hat, they …)	Structure 1 (Incorrect agreement) *[*La banane*$_{F}$ *dans le chapeau*$_{M}$]$_{\mathbf{F}}$ *il*$_{\mathbf{M}}$ … (The banana in the hat, it …)
La banane et le chapeau, ils pèsent les graminées.	*La banane dans le chapeau, il pèse les graminées.*
La banane et le chapeau, ils demeurent au fleuve.	*La banane dans le chapeau, il demeure au fleuve.*
La banane et le chapeau, ils grasseyent ardemment.	*La banane dans le chapeau, il grasseye ardemment.*
La banane et le chapeau, ils fuient les tentatives.	*La banane dans le chapeau, il fuie les tentatives.*
La banane et le chapeau, ils tentent leur pécule.	*La banane dans le chapeau, il tente leur pécule.*
La banane et le chapeau, ils résonnent au couvent.	*La banane dans le chapeau, il résonne au couvent.*

Note. The strings in contrasting structures for each group only differ in Word 3 (*dans* in Structure 1; *et* in Structure 2), with the remaining words being homophonous despite some orthographic differences. For example, the subject pronoun clitics (i.e., verb prefixes) *il* and *ils* are pronounced the same, so are the verbs *pèse* and *pèsent*. The content words (verbs, nouns, adverbs) following the subject pronoun are all infrequent words, unlikely known by toddlers.

Predictions

GROUP 1

Grammatical: NP1 in NP2

La banane$_F$ dans le chapeau$_M$, **elle$_F$** VP
the banana in the hat, it VP

Ungrammatical: NP1 and NP2

La banane$_F$ et le chapeau$_M$, elles$_F$ VP
the banana and the hat, they VP

GROUP 2

Ungrammatical: NP1 in NP2

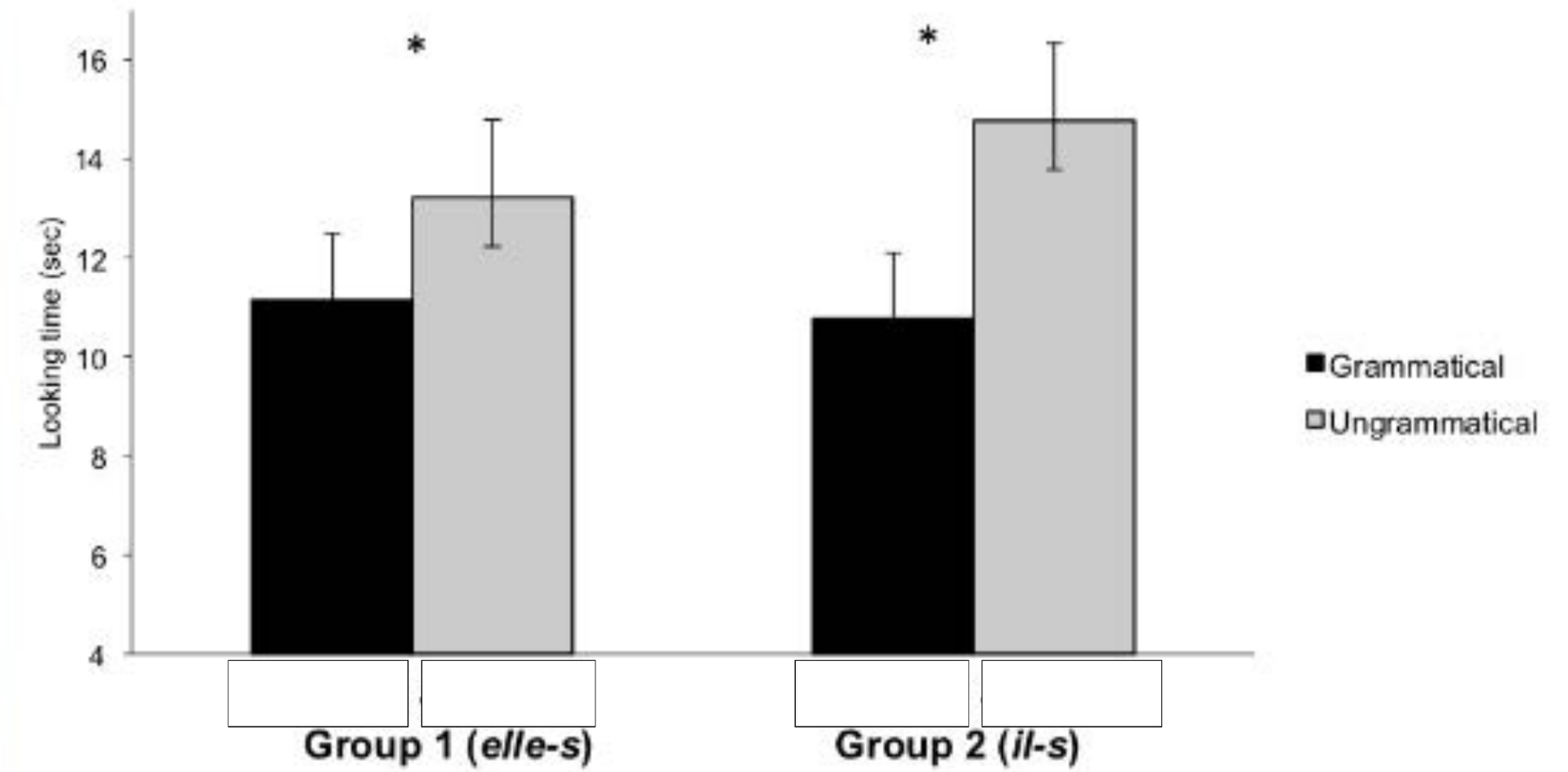
La banane$_F$ dans le chapeau$_M$, **il$_M$** VP
the banana in the hat, it VP

Grammatical: NP1 and NP2

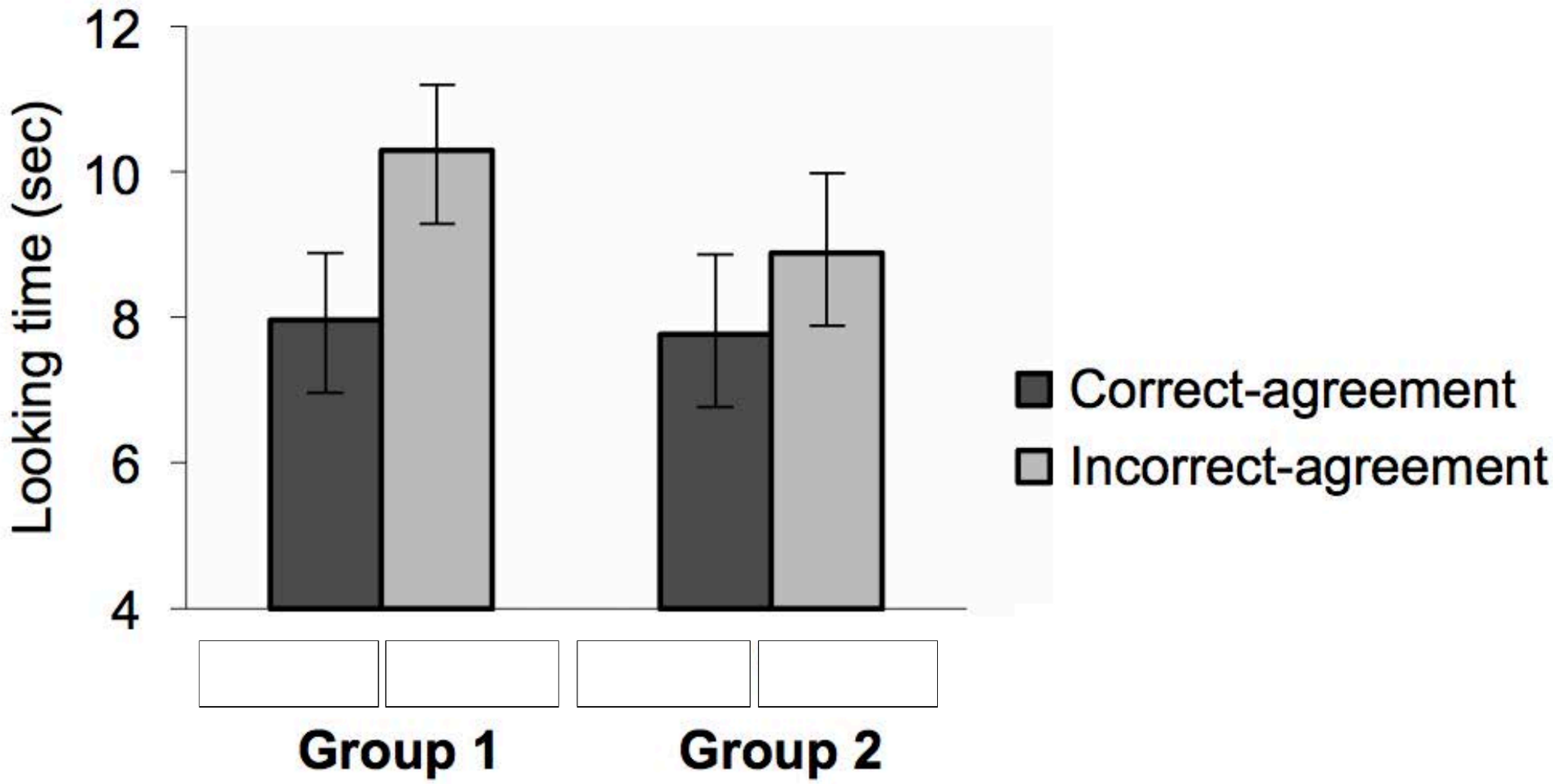
La banane$_F$ et le chapeau$_M$, ils$_{SM/Def}$ VP
the banana and the hat, they VP

- Linear rule based on closeness
  - Discrimination across groups, but not within
- Linear rule based on first NP
  - Discrimination across groups, but not within
- Structure-dependent rule
  - Discrimination within groups
  - Uniform direction of preference based on grammaticality across groups

Results, 30mos



Results, 17mos



Upshot

- Children who are omitting functional elements in their production are nevertheless sensitive to remarkably sophisticated aspects of syntax that these elements partake in.

Still, Eve talk funny

i. Papa have it (Eve 1;6)

ii. Marie go. (Sarah 2;3)

iii. Doggy bite (Adam 2;4)

iv. Baby doll ride truck (Allison 1;10)

v. Pig say oink (Claire 2;1)

Root infinitives

- Recognizably English, even comprehensible, but it's not the way adults talk.
  - 3sg *-s* often missing.
  - Past tense *-ed* often missing.
  - Auxiliaries *have*, *do*, and *be* often missing.
- Generally speaking, what is missing are those elements that mark a verb as *finite*

Eve talk funny

- Recall the long-standing view: kids are bad at inflection, or omit inflectional elements for communicative ease
- Radford (1990):
  - similarities between these early child productions and adult small clause structures
  - children's early clauses don't extend beyond the lexical-thematic layers. Child sentential representations are VPs/vPs.

Not quite…

Optionality

- Same transcript, Eve 2;1

i. Papa go put my jammies on
   Noel wears jammies when he take a nap

ii. It a lady
   That's a man

iii. Someone’s in the kitchen with Dinah
   This one better

The cross-linguistic picture

i. **German**
   *Du das hab-en. (Andreas, 2;1)
    you that have-infin
ii. **French**
   *Dorm-ir petit bébé. (Daniel, 1;11)
   Sleep-infin little baby
iii. **Danish**
   *Hun sove (Jens, 2;0)
   She sleeps.infin
iv. **Dutch**
   *Earst kleine boekje lez-en (Hein, 2;6)
    First little book read-infin

The cross-linguistic picture

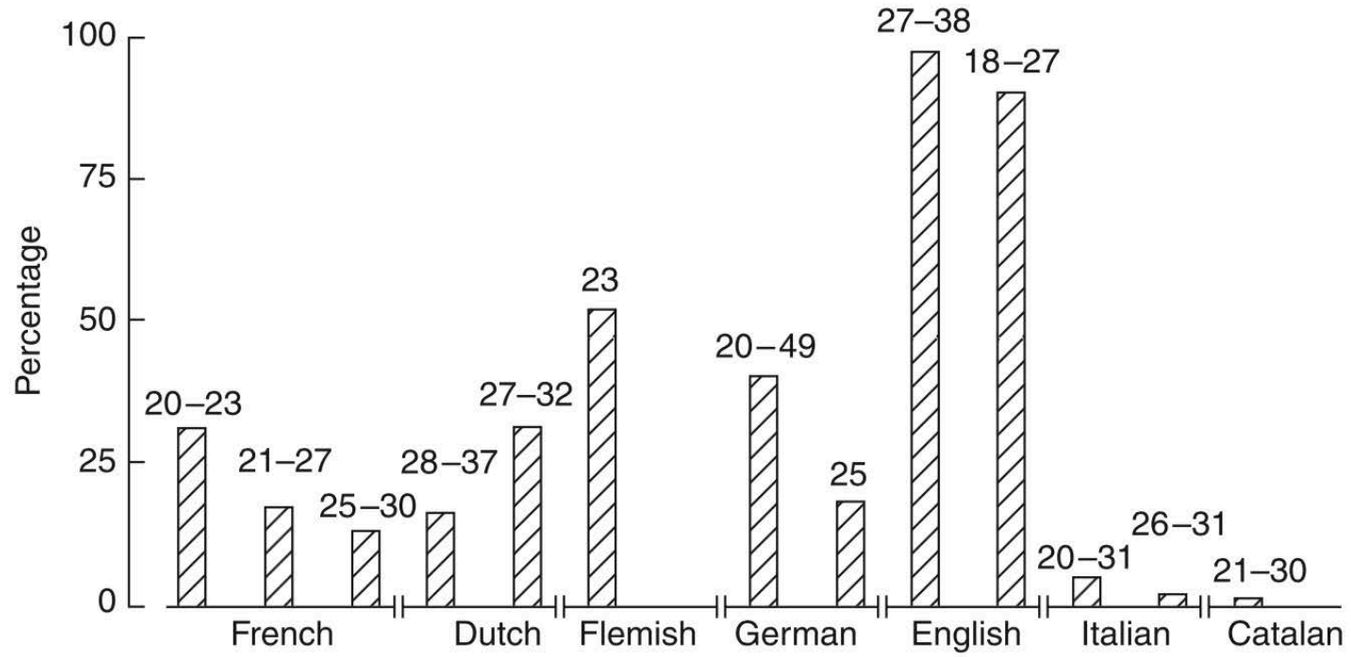


Figure 4.1
Percentage of root infinitives (RI) in early languages. Each bar shows the overall percentage of RIs produced by a single child in the age range (given in months) indicated above the bar. Data taken from Rasetti 2000 (French: Daniel, Nathalie, Philippe); Haegeman 1995b (Dutch: Hein); Phillips 1995, crediting Krämer 1993 (Dutch: Thomas; Flemish: Maarten); Phillips 1995, crediting Beherens 1993 (German: Simone); Poeppel and Wexler 1993 (German: Andreas; English: Eve, Sarah); Guasti 1993/1994 (Italian: Martina, Guglielmo); Torrens 1995 (Catalan: Guillem).

Root Infinitive Stage

- Although ungrammatical in the target language, main clause infinitives are common in child speech cross-linguistically

- Co-occur with inflected forms

- Children get out of this stage by ~age 3, after which point they consistently produce inflected forms

The puzzle

- The errors are unmotivated
- Children fail at making certain generalizations even when their input is rife with the necessary evidence [abundance of evidence argument]

The puzzle deepens

- Experience-independent, to a degree
  - widespread across unrelated languages
  - inconsistent in fundamental ways w/ input
    - reliably over by ~3 despite no marked change in input

- Experience-dependent, to a degree
  - not all languages
  - some property of the target language must trigger/ preclude the possibility of root infinitives

Maturation

- The idea that root infinitives develop on a **maturational schedule** is a widely held view
  - i.e. it might have something to do with the biological course of acquisition as opposed to learning (cf. baby teeth, puberty, walking)
- The goal in an explanation of (a) why root infinitives occur, and (b) why they only occur in certain languages, is to pinpoint the exact thing that is maturing, such that the difference only has an effect in the languages that show root infinitives.

RI vs. non-RI languages

- Empirical observation: languages like Italian, Spanish, Polish etc. do not exhibit an RI stage.

(1) **The Null-Subject/Root-Infinitive Correlation** (Wexler 1998)
A language displays an RI-Stage if and only if that language is not a language in which null-subjects are licensed by inflection.

Sophistication in the errors

Verb placement in French

Table 4.2
Finiteness versus verb placement with respect to the negation in the speech of three French learners. Data from Philippe, Nathalie, and Daniel (age range 1;8–2;3).

	+Finite	−Finite
Verb-Neg	173	2
Neg-Verb	9	122

Source: Based on Pierce 1992b
$\chi^2 = 263.02$, $p < .001$

- Replicated in French (Rasetti 2003), German and Dutch (Weissenborn 1990, Poeppel and Wexler 1993)

Sophistication in the errors

Verb placement in V2 languages

- In adult Dutch and German matrix clauses, finite verbs appear in second position in the clause, whereas infinitival verbs appear clause-finally

(1) a. Simone braucht das.
Simone needs that
‘Simone needs that.’
b. Simone wird das lesen.
Simone will that read-inf
‘Simone will read that.’

Sophistication in the errors

Verb placement in V2 languages

- Child learners of these languages who are in the RI stage reserve second position for finite verbs and final position for infinitives

Table 4.3
Finiteness versus verb placement in the speech of a German learner. Data from Andreas (age 2;1).

	+Finite	−Finite
V2	197	6
Verb-final	11	37

Source: Based on Poeppel and Wexler 1993
$\chi^2 = 150.25$, $p < .001$

Summary of properties of RIs

. . . i.e. properties that any theory of RIs need to account for.

- RIs occur in many, but not all, languages.
  - We need to understand what characterizes the two classes
- Children who produce RIs distinguish their finite vs. non-finite productions (e.g. in terms of V-to-T movement, V2, etc.), and their finite clauses are not obviously distinct from those of adults
  - We need to understand what characterizes the grammar-pairs (e.g. adult vs. child English) such that infinitives is blocked in one as root clauses and licensed in the other.

Truncation model (Rizzi 1993/1994)

- **Starting point:** similar to the small clause hypothesis of Radford (1990). Sentences in which the verb is not tensed might be sentences where TP is missing in the child's structure.

- **Difference:** children know about TP but that their structures sometimes don't include it.

  - Children's structures can be as complex as adult structures, but children sometimes just stop early as they're building it up.
  - Adults build their trees all the way to CP, children might "truncate" the structure at the VP. Or at TP. Or at CP.

Truncation model (Rizzi 1993/1994)

- **The missing axiom:**

(1) All root clauses must be CPs.

Explaining the properties of RI

- Monotonic: no omission of TP while projecting CP.
- Consequences:
  - Verb movement: If TP is missing in root infinitives, this explains why the children’s nonfinite verbs do not move to T — there is no place for them to move to.
  - V2-related facts: If a root infinitive is necessarily missing CP, the “first position" landing site is gone, forcing everything to stay in its base order.

Further predictions

- No RIs in wh-questions.
  - Borne out for Dutch (Haegeman 1995) and French (Crisma 1992)
  - Not borne out for English

	Finite	Non-finite
Declaratives	3768	721
Wh-questions	80	2

Haegeman 1995

Further predictions

- Subject placement relative to negation
  - Déprez and Pierce (1993): children in RI languages go through a stage of systematic error in subject-placement relative to negation

(1) a. No dog stay in the room. Don’t dog stay in the room. (Nina, 2;1)
b. Pas la poupée dormir (Natalie [French] 1;9)
Not the doll sleep
c. Nein ich putt mache (Simon [German] 2;2)
No I break

Explaining RI vs. non-RI languages

- In non-RI languages, both finite and non-finite verbs are such that they must move to T.

- The result is that there is no way to create a grammatical structure that lacks a TP, even in child grammar where root clauses need not be CPs.

- Formal implementation a bit involved and anachronistic, but it amounts to a distinction in the featural make-up of non-finite T.

Pros and cons

- Parsimonious (esp. in comparison to other theories)

- Empirically adequate?

Next week

- Two models:
  - Comparing Truncation to Agr-Tense Omission
    - Read: Schutze & Wexler 1996 (optional: Poeppel & Weiler 1993, Schutze 1997, Ch. 5)
- Connections to parts of adult grammar
  - Read: Fitzpatrick 2006 (optional: Déchaine 1991, Hoekstra and Hyams 1998)