First Language Acquisition

Course script
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1. Introduction

Types of knowledge

(1) Peter knows what Sally had for dinner tonight.
(2) Peter knows how to drive.

- Specific knowledge vs. general knowledge
- Declarative knowledge (knowing what) vs. procedural knowledge (knowing how)
- Conscious knowledge vs. subconscious knowledge

Table 1. Lexical and grammatical knowledge

Lexicon	Grammar
Specific	General
Declarative	Procedural
Conscious	Subconscious

Knowledge sources:
- Knowledge based on experience/practice
- Knowledge based on instruction
- Knowledge based on generalizations/abstractions

Two theories of language acquisition

Learning theory. According to this theory, language is learned from experience alone. Children acquire language based on general learning mechanisms that are also involved in learning many other phenomena. These general learning mechanisms are crucially driven by the 'input'.

Nativism. According to this theory, language cannot be learned from experience alone. Specifically, the proponents of this approach argue that children do not receive enough information in the input to learn the intricate rules of grammar. Children are only able to acquire grammar because of innate grammatical knowledge.

2. Methods for studying language acquisition

Karmiloff, Kyra and Annette Karmiloff-Smith. 2001. Pathways to Language. From Fetus to Adolescent, chap 2. Cambridge: Harvard University Press.

2.1 Observational studies

Two types of observational data:
(1) Longitudinal data (i.e. data from one or more children collected over an extended period of time).
(2) Cross-sectional data (i.e. data collected from different children at different ages).

The CHILDES database

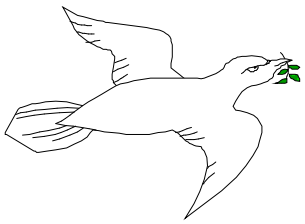
MacWhinney, Brain 1995, *The CHILDES Project. Tools for Analyzing Talk*, Hillsdale NJ: Lawrence Erlbaum, [second edition].
MacWhinney, Brain 2000, *The CHILDES Project. Tools for Analyzing Talk*, Vol. II, *The Database,* Hillsdale NJ: Lawrence Erlbaum, [third edition].

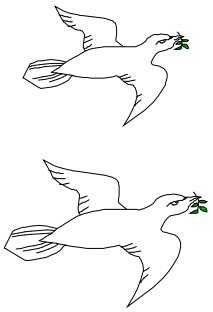
http://childes.psy.cmu.edu

2.2 Experimental studies

Experimental studies are used to examine both the development of language production and the development of language comprehension.

Elicited production using nonce words





This is a wug.
Now there are two of them.
There are two … (rising intonation)?

Elicited imitation

Example 1

ADULT: I've got two foots.
CHILD: I've got two … foots/feet.

ADULT: This is my blue big tractor.
CHILD: This is my … blue big / big blue … tractor.

Example 2

(1) The boy the girl kicked went home.
(2) The girl kicked the boy very badly and then he went straight home.

Example 3

(1)	There is the boy who played in the garden yesterday.	SUBJ
(2)	This is the girl who the boy teased at school this morning.	DO
(3)	There is the girl who Peter borrowed a football from.	IO
(4)	This is the dog that the cat ran away from this morning.	OBL
(5)	There is the woman whose horse Peter heard on the farm.	GEN

Elicited transformations

a. Example: tag questions

ADULT: He's going home…
CHILD: Isn't he?

ADULT: They'll take a long time…
CHILD: Won't they?

ADULT: She can't stay with us …
CHILD: Can she?

b. Example: passives

ADULT: The man cleaned the bath.
CHILD: The bath was cleaned by the man

ADULT: The boy kissed the girl.
CHILD: The boy was kissed by the girl.

Act-out

Example 1: passives

(1) The dog pushes the cow.
(2) The cow is pushed by the dog.

Example 2: complex sentences

(1) The duck pushed the chicken after it had kissed the dog.
(2) The duck pushed the chicken before it had kissed the dog.

Picture-pointing

Sample sentence: The cow is pushed by the dog.

1. Picture showing a cow feeding a dog.
2. Picture showing a cow pushing a dog.
3. Picture showing the described scene.

Reaction-time studies

Task: Child has to press a button as soon as it recognizes a target word.

(1) The boy was out on a walk and he watched a dog passing by.
(2) * The boy was out on a walk and he watched to a dog passing by.

High-amplitude sucking technique

Head-turn-preference procedure

Preferential looking technique

Questionnaire studies

Brain Imaging techniques

3. Prelinguistic development

Karmiloff, Kyra and Annette Karmiloff-Smith. 2001. Chapter 3. Speech perception in and out of the womb, 43-55. Cambridge: Cambridge University Press.

Developmental stages

- 1;0 preverbal stage
- 1;0 – 1;6 one-word stage
- 1;7 – 2;0 two-word stage
- 2;0 – 3;0 multi-word utterances

3.1 Early speech recognition

Speech perception before and right after birth

2-month-old infants are able:

- to differentiate speech sounds from noises
- to recognize their mothers' voice
- to distinguish different types of languages

Language types:

- Stressed-timed languages (i.e. languages in which words consist of alternating stressed and unstressed syllables)
- Syllable-timed languages (i.e. languages in which all syllables are stressed equally)
- Mora-timed languages (i.e. languages in which words consist of alternating patterns of heavy and light syllables)

Categorical perception

Young infants are able to perceive allophonic differences that adult speakers are unable to hear (e.g. the contrast between aspirated and unaspirated stops in English). At around 7-month children tune into the phonological system of the language they learn losing the ability to recognize phonetic contrasts that are not phonemic in their native language.

Segmentation of the speech stream

1. Intonation and pauses

2. Stress patterns

ADULT: What's that?
CHILD: That's a 'nana'.
That's a 'raffe'.

ADUL: Behave!
CHILD: I'm heyv.

3. Phonotactic constraints

CCCV
VCCC

big dog

4. Allophonic variation

5. Distributional regularities

Saffran et al. (1996):
tupiro
golabu
bidaku
padoti

tupiro-bidaku-padoti-bidaku-golabu

Condition1: tupiro-bidaku-…
Condition 2: da-pi-ku-ro-tu-…

6. Function words

3.2 Early speech production

> 0;2 *Reflexive vocalization*: crying, sneezing, coughing etc.

0;2-0;6 *Vocal play*: first vowels and consonants.

0;6-0;10 *Babbling*: consonant-vowel syllables
Reduplicated babbling: dadadada
Variegated babbling: dabagidi

0;10 > *Jargon (conversational babbling)*. babbling and the production of the first words overlap. The child seems to have a full grasp of the social nature of conversation.

Canonical forms

(1)	[majos] or [mEjan]	monster	[CVjCV]
	[tajak] or [tajaN]	tiger	
(2)	[ɲaɲa]	Randall	[ɲVɲV]
	[ɲeːeː]	window	
	[ɲeːeː] or [ɲiːɲɪ]	finger	
	[ɲaɲa]	another	
(3)	[ɪʃ]	fish	[(C)VS]
	[dɪʃ]	dish	
	[uʃ]	vest	
	[byʃ]	brush	
	[ɪʃ]	fetch	

Assimilations

(1)	[dæs]	glass
	[bɛd]	bread
	[sek]	snake
	[hæn]	hand
	[da]	star
(2)	[bæn]	van
	[dæt]	that
	[nɛr]	there
	[dæk]	Jack
	[dæb]	jam

	[dɛk]	check
(3)	[bɔt]	pot
	[do]	toe
	[dɪ]	kiss
(4)	[dat]	duck
	[det]	gate
	[fʌm]	thumb
	[zus]	shoes
	[mæts]	match
	[tæbədz]	cabbage
(5)	[nɔp]	knob
	[bæt]	bad
	[dɔt]	dog
	[duf]	stove

(1)	[bump]	bump
	[dawn]	down
	[gɔn]	gone
(2)	[baɪp]	pipe
	[dod]	toad
	[gar]	car
(3)	[gʌg]	bug
	[gɪg]	big
	[gʊk]	book
	[gaɪk]	bike
	[gɪg]	pig
(4)	[gʌg]	dog
	[gʌg]	Doug
	[gʌk]	duck
	[gɪk]	stick
(5)	[bʌb]	tub
	[bɔp]	top
	[bɛp]	step
	[bɔp]	stop

Motherese

O'Grady, William. 1997. Syntactic development, chap 12. Chicago: The University of Chicago Press.

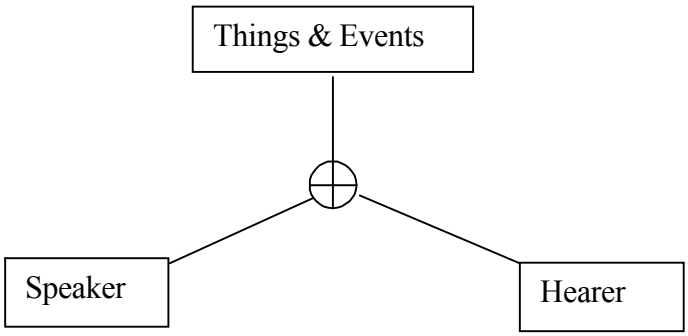
- Special prosodic features: exaggerated stress patterns, exaggerated intonation
- Many repetitions
- Many vocatives/attention getters
- Many questions (often in place of an evaluative statement)
- Simple sentences and simple grammatical constructions
- Basic vocabulary

4. Early words

Clark, Eve. 2003. Early words. In Eve Clark. 2003. First language acquisition, 79-92. Cambridge: Cambridge University Press.

Tomasello, Michael. 1999. The cultural origins of human cognition. Cambridge: Harvard University Press.

4.1 Joint attention and the nine-month revolution



The Organon-Model of language (Bühler 1934)

Children's early interactions are dyadic:

1 Either the infant grasps or manipulates an object,
2 or the infant interacts with another person.

The 9-month revolution:

The situation changes at around 9 months: at that time infants first engage in triadic situations (Tomasello 1999).

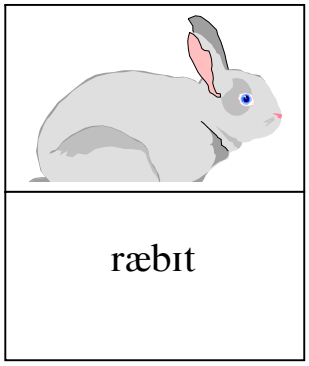
4.2 Early words

1;3	first words appear in the child's speech
2;0	100 to 600 words
6;0	14,000
18;0	50,000

Table 1. Early words in children's speech

1;0	daddy, mommy
1;1	bye
1;2	dog, hi, uh oh
1;3	baby, ball, no
1;4	eye, nose, banana, juice, shoe, kitty, bird, duck, car, book, balloon, bottle, night-night, woof, moo, ouch, baa baa, yum yum
1;5	apple, cheese, ear, cracker, keys, bath, peekaboo, vroom, up, down, that
1;6	grandpa, grandma, sock, hat, cat, fish, truck, boat, thank you, cup, spoon, back

The symbolic nature of words



Saussure: the combination of form and function is *arbitrary* and *conventionalized*.

Onomatopoeic words: buzz, murmur, hiss
cock-a-doodle-doo

see
1. I saw Peter.
2. I see what you mean.

run
1. She is running down the stairs.
2. She ran into Peter.

car
1. vehicle
2. toy

have
1. She has a dog.
2. I have finished my work.

HEAD

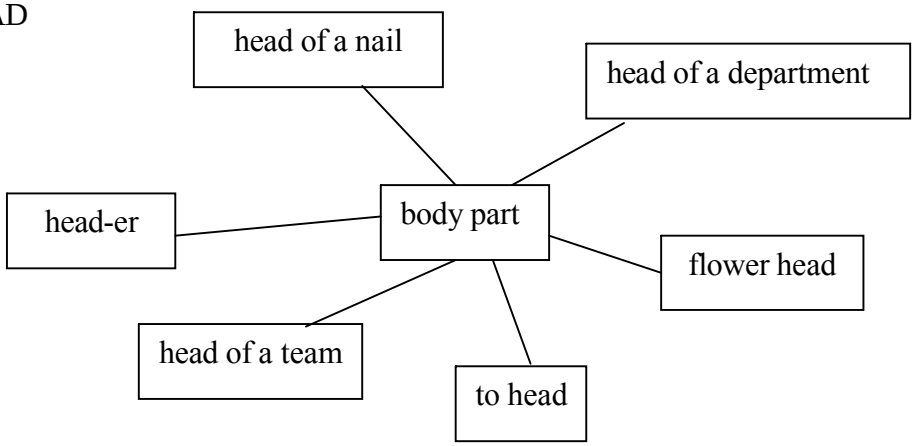
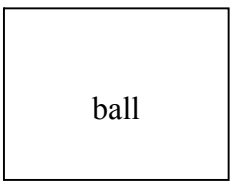


Table 2. Overextensions of early words

Word	First referent	overextensions
dog	dog	cat, horse, rabbit, lion, tiger, all four-legged animals
mooi	moon	cakes, round marks on window, round shapes in books, round postmarks, letter O
ticktock	watch	clock, gas meter, fire hose on spool, bath scale with round dial
baw	ball	apples, grapes, eggs, squash, bell clapper, anything round
mum	horse	cow, calf, pig, moose, all 4-legged animals
fly	fly	specks of dirt, dust, all small insects, child's own toes, crumbs of bread, toad
em	worm	flies, ants, all small insects, heads of timothy grass
wau-wau	sound of train	all animals, toy dog, soft house, slippers, picture of old man in furs
sch (Germ)	dog	all moving machines



ball	balloon
apple	moon
orange	circle

The acquisition of nouns and verbs

Gentner (1982) divides words into four basic semantic classes:

- Nominal terms, which have the function of object reference. They are most commonly expressed by nouns in adult language.
- Predicate terms, which refer to actions, change of state, or other predicate notions. They are most commonly expressed by verbs, prepositions and certain modifiers in adult language.
- Expressive terms, which function either directly to express a feeling (e.g. ouch) or as part of a ritual (e.g. bye-bye).
- Indeterminate terms, which have ambiguous or multiple uses.

Table 1. The earliest words of one English-speaking child

Age	Nominal	Predicate	Indeterminate	Expressive
11 months	dog			
12 months	duck			
13 months	daddy, mommy	yuk		
	the (teddy)			
	car			
14 months	dipe (diaper)		toot toot (horn)	
15 months	keys			
	cheese			
16 months	eye			
18 months	cow	hot	bath	
	cup			
	truck			
19 months	kitty	happy	pee pee	oops
	juice	down	TV	boo
	bottle	up		hi
	spoon			bye
	bowl			uh oh
	towel			
	apple			
	teeth			
	cheek			
	knee			
	elbow			
	map			
	ball			
	block			
	bus			
	jeep			

Possible language-based explanations

1. Frequency

Table 4. Occurrence of parts-of-speech in telephone conversations

Parts-of-speech	Tokens	Types	Token-type ration
Nouns	11,660	1,029	11,33
Verbs	12,550	456	27,52
Adjectives + adverbs	9,880	634	15,58
Auxiliaries	9,450	37	255,41
Preps + conjs	12,400	36	344,44
Pronouns	17,900	45	397,78
Articles	5,550	3	1850,00

2. Word order

3. Morphological transparency

What makes the acquisition of verbs more difficult?

1. Semantic frames

1. David bought an old shirt from John for ten pounds.
2. John sold an old shirt to David for ten pounds.
3. John charged David ten pounds for an old shirt.
4. David paid ten pounds to John for an old shirt.
5. David spent ten pounds on an old shirt.
6. The old shirt cost David ten pounds.

Verb-framed vs. satellite-framed structures

1. He entered the room.
2. He came into the room.
3. He left the room.
4. He went out of the room.

Transitive vs. intansitive verbs

1. He opened the door.
2. The door opened.

3. He dropped the glass.
4. The glass fell down.

5. Don't fall that on me.
6. The horse is feeding. [= the horse is eating]

5. Principles of word learning

Karmiloff, Kyra and Annette Karmiloff-Smith. 2001. Pathways to Language. From Fetus to Adolescent, Chap. 4, 68-75. Cambridge: Harvard University Press.

Markman, Ellen M. 1996. Constraints children place on word meanings. In Paul Bloom (ed.) Language Acquisition. Core readings, 154-173. Cambridge: MIT Press.

Tomasello, Michael. 2001. Perceiving intentions and learning words in the second year of life. In Michael Tomasello and Elizabeth Bates (eds.), Language development. The essential readings, 111-128, Malden: Blackwell

Cognitive constraints on word learning

1. The whole object constraint

Quine (1960): Children tend to associate a new word with a whole object (rather than its parts, coler, size, or other attributes).

2. The mutual exlusivity constraint

Experiment 1 — Carey 1978

(1) Don't take the red tray, take the chromium tray.

Experiment 2 — Markman 1996

Table 1. Materials (Markman — mutual exclusivity constraint)

Familiar		Unfamiliar	
Object	Novel N (for part)	Object	Novel N (for part)
Fish	Dorsal fan	Current detector	Detector
Fire truck	Boom	Pipe tool	Damper
Hammer	Claw	Ritual implement	Crescent
Camera	Focusing grip	Pagoda	Finial
Telephone	Receiver	Microscope	Platform
Race car	Air foil	Lung	Trachea

3. The taxonomic constraint

Taxonomic relationship	Thematic relationship
pig	pig — mud
horse	horse — stable
cow	cow — milk

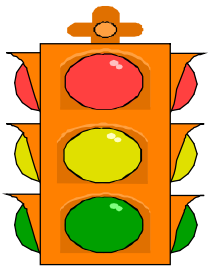
Experiment — Markman 1996

Table 2. Materials (Markman — taxonomic constraint)

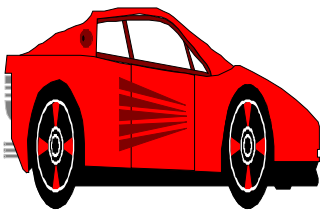
Target	Choice picture 1 Taxonomic	Choice picture 2 Thematic
Cow	Pig	Milk
Ring	Necklace	Hand
Door	Window	Key
Crib	Adult bed	Baby
Bee	Ant	Flower
Cup	Glass	Kettle
Car	Bike	Car tire
Sprinkler	Watering can	Grass
Paintbrush	Crayons	Easel
Train	Bus	Tracks
Dog	Cat	bone



Target



Taxonomic choice



Thematic choice

a. No Word Condition

ADULT: I am going to show you something. Then I want you to think carefully and find another one.

ADULT: See this? (showing the child the target picture)

ADULT: Can you find another one? (showing the child the two choice pictures)

b. Novel Word Condition

ADULT: I am going to show you a dax. Then I want you to think carefully and find another dax.

ADULT: See this? (showing the child the target picture)

ADULT: Can you find another dax? (showing the child the two choice pictures)

Table 3. Results (Markman — taxonomic constraint)

	Percentage of correct responses	
	Taxonomic choice	Thematic choice
No word condition	25%	75%
Novel word condition	65%	35%

Linguistic cues

Grammatical morphemes of verbs and nouns

X-ing	the X
X-ed	a X
X-s	that X
has X-ed	those X-s
want to X	big X

Experiment — Katz, Baker, and Macnamara 1974

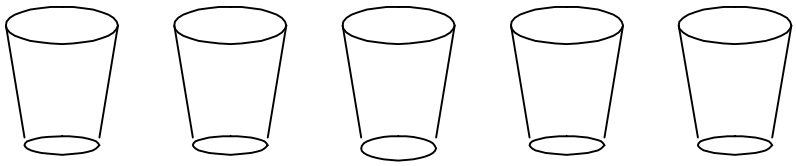
(1) That's Zav.
(2) That's a Zav.

(1) Can you pick up Zav?
(2) Can you pick up a Zav?

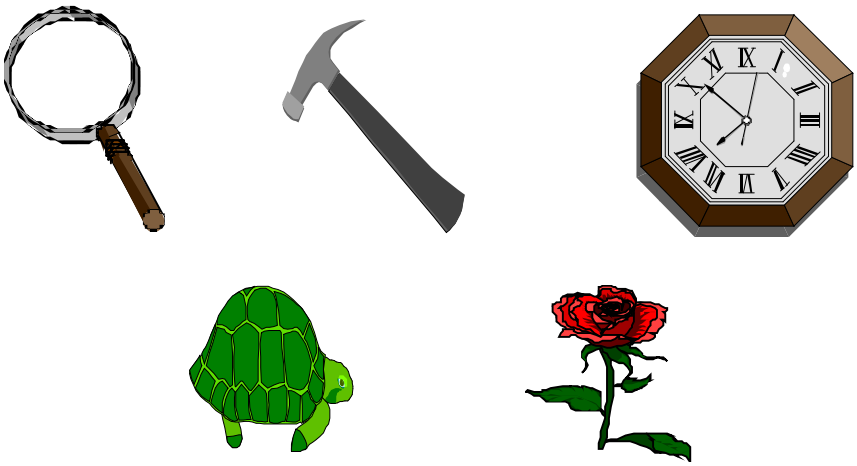
Social-pragmatic cues

Experiment 1 — Tomasello and Barton 1994

Let's go find the toma.

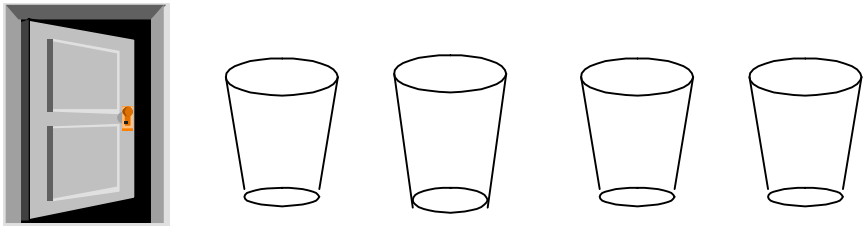


- The without search condition
- The search condition

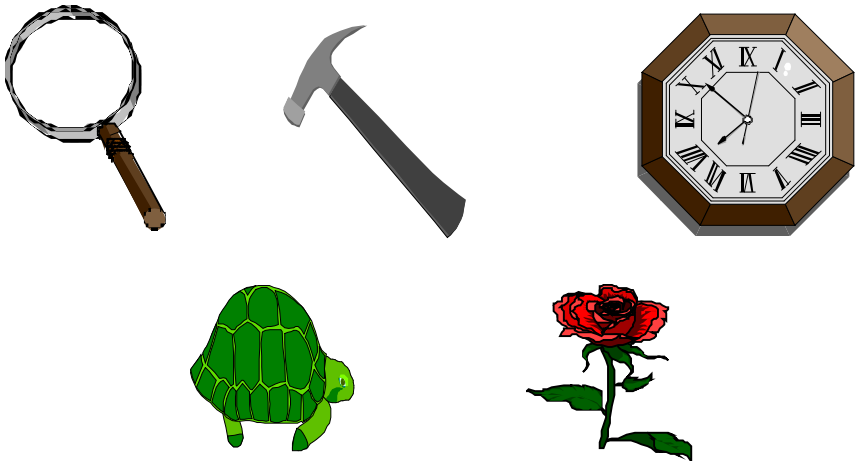


Experiment 2 — Akthar and Tomasello 1996

Let's find the toma.



- The referent condition
- The absent condition



Conclusion

There are several factors that facilitate word learning:

- Cognitive constraints such as the whole object constraint, the mutual exclusivity constraint, and the taxonomic constraint
- Linguistic cues derived from grammatical morphemes (and word order)
- Social-pragmatic cues derived from general principles of social interactions.

6. Theories of language acquisition

O'Grady, William. 1997. UG-based theories of the acquisition device. In William O'Grady. 1997. Syntactic development, chap 13, 265-292. Chicago: Chicago University Press.

Two theoretical approaches to the study of grammatical development

There are two major approaches to the study of grammatical development:

1. The nativist approach assumes that language acquisition is based on an innate universal grammar.
2. Alternatively, many child language researchers assume that language acquisition is based on general learning mechanisms such as analogy.

The nativist approach

Semantic bootstrapping

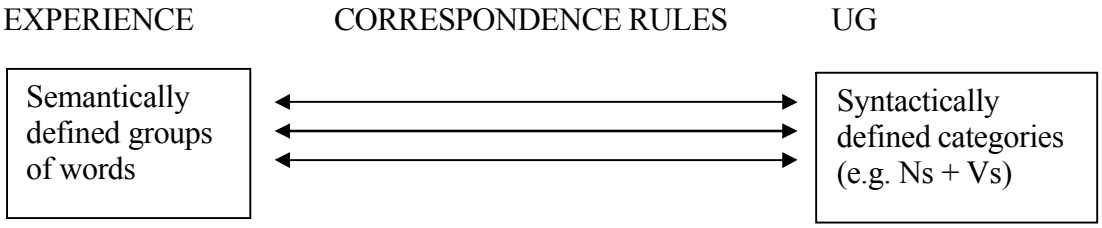
Table 1. Syntactic categories of universal grammar

Category	Meaning
Noun	Person, thing, animal
Verb	Action, change of state
Adjective	Attribute
Preposition	Spatial relation, path, direction

Semantic bootstrapping involves two steps:

Step 1: Children construct semantic word classes based on the input and establish connections between the semantically defined word classes and the categories of UG.

Step 2: Once the connection between input and UG has been established (for a specific category), children can use the particular grammatical properties of the grammatical categories in their language to learn category members that are semantically atypical (e.g. deverbal nouns, subject of passive sentences).

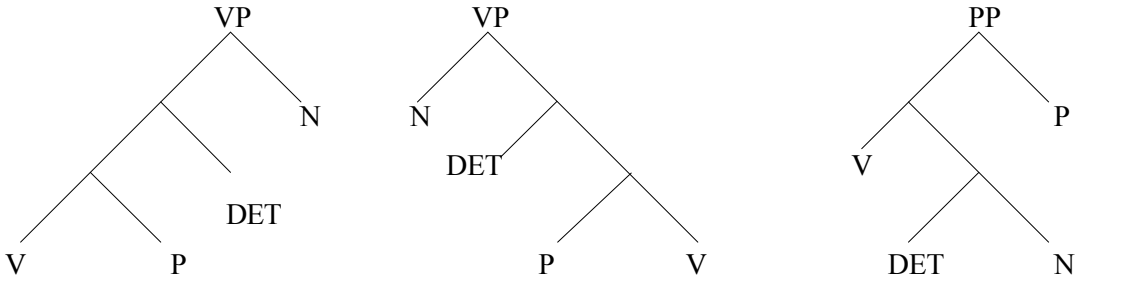


Parameter-setting

You can think of a parameter as a switch providing two choices. A child learning a specific language has to find out the correct choice of the language s/he learns.

Table 1. Greenberg's word order correlations

Head initial	Head final
V O	O V
P NP	NP P
AUX V	V AUX
SUB S	S SUB
ART N	N ART
N REL	REL N
V COMP	COMP V



(a) 'walked across the street (b) 'street the across walked' (c) 'walked the street across'

The innateness hypothesis

Language is species-specific

Aphasia and brain function studies

SLI children

The no negative evidence problem

Positive evidence: The information provided by the ambient language
Negative evidence: Explicit corrections and language teaching

CHILD:	Want other one spoon, daddy.
FATHER:	You mean, you want the other spoon.
CHILD:	Yes, I want the other spoon.
FATHER:	Can you say 'the other one spoon'?
CHILD:	other … one … spoon.
FATHER:	Say 'other'.
CHILD:	Other.
FATHER:	'Spoon'.
CHILD:	Spoon.
FATHER:	'Other spoon'.
CHILD:	Other … spoon. Now give me the other one spoon.

Indirect negative evidence:	Correlation between children's errors and adult behavior (e.g. number of repetitions)

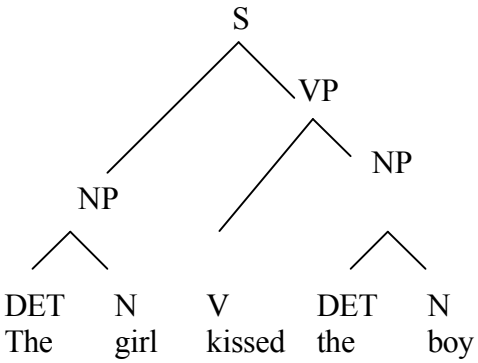
The poverty of the stimulus

Chomsky:	There is an enormous gap between the grammatical system of adult speakers and the "meager and degenerated data" that children receive during language acquisition.

Grammatical constructions

(1) The boy kissed the girl.

Categories: N, DET, V, P, NP, VP, S
Rules: S → NP VP
NP → DET N
VP → V' PP



Grammatical constructions are linguistic symbols: They combine a specific form with a specific function or meaning.

(1) Peter hit Mary.
(2) Peter kicked the horse.
(3) Peter pressed the button.
(4) Peter pushed the elephant.

NP	V	NP
<X affected Y>		

Transitive construction

(1) Peter put the pencil away.
(2) Peter took the lid off.
(3) Peter put the book back.
(4) Peter knocked the elephant down.

NP	V	NP	P
<X moved Y somewhere>			

Verb-particle construction

(1) What did she do?
(2) Who did she talk to?
(3) Where did she go?
(4) When did he leave?

WH	AUX	NP	V
<WH did X do?>			

Content question

Nativist Theories vs. Learning Theories

Nativist theories	Learning theories
• Grammar is innate • Grammatical development involves language-specific learning mechanisms such as parameter-setting • Grammatical development needs very little data	• Grammar is not innate • Grammatical development involves general learning mechanisms such as analogy and pattern extraction • Grammatical development needs robust data

7. Morphological development

Ingram, David. 1996. First language acquisition. Method, description and explanation, 435-443. Cambridge: Cambridge University Press.

Bates, Elizabeth and Jeffrey Elman. 2002. Connectionism and the study of change. In Mark Johnson (ed.), Brain development and Cognition. Oxford: Oxford University Press. (second edition)

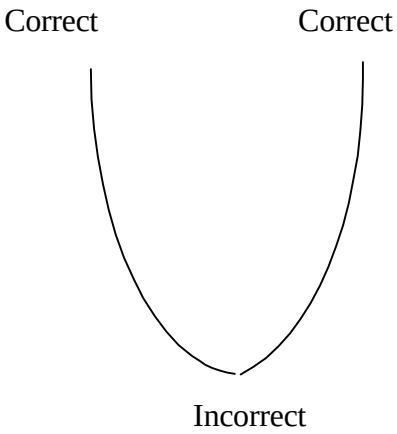
Overextension errors in morphology

- Errors of omission
- Errors of commission

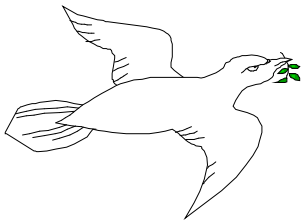
Overgeneralization errors:

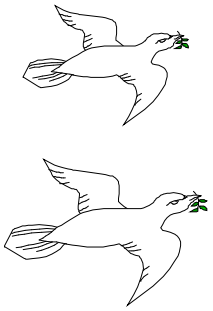
buy	→	buyed
hit	→	hitted
bring	→	bringed
go	→	goed
foot	→	foots
child(ren)	→	childrens

U-shaped development



Berko (1958) The wug test





This is a wug. (showing them a picture with one wug)
Now there is another one. (showing them a picture with two wugs)
There are two of them.
There are two __ .

This is a man who knows how to rick.
He is ricking. He did the same thing yesterday.
What did he do yesterday?
Yesterday he __ .

Table 1. Inflectional morphemes tested by Berko (1958)

Category	Allomorphs
Plural	[s] [z] [əz]
Possessive	[s] [z] [əz]
3rd singular agreement	[s] [z] [əz]
Past	[t] [d] [əd]
Progressive	[ɪŋ]

Table 2. Percentage of correct responses (Berko 1958)

Nouns			Verbs		
Plural			*Past*		
glasses	[əz]	91	binged	[d]	78
wugs	[z]	91	glinged	[d]	77
luns	[z]	86	ricked	[t]	73
tors	[z]	85	melted	[əd]	73
heafs	[z], [s]	82	spowed	[d]	52
cras	[z]	79	motted	[əd]	33
tasses	[əz]	36	bodded	[əd]	31
gutches	[əz]	36	rang		16
kashes	[əz]	31	*3rd singular*		
Possessive			loodges	[əz]	56
bik's	[s]	87	nazzes	[əz]	48
wug's	[z]	84	*Progressive*		
niz's	[əz]	49	zibbing		90

German inflection

Table 3. German plural forms

	MASC	FEM	NEUT
-e	Fische-Fische	Kenntnis-Kenntnisse	Jahr-Jahre
-(e)n	Bauer-Bauern	Tür-Türen	Auge-Augen
-er	Geist-Geister	—	Kind-Kinder
-s	Park-Parks	Mutti-Muttis	Auto-Autos
ZERO	Adler-Adler	—	Fenster-Fenster
Umlaut + ZERO	Vater-Väter	—	—
Umlaut + er	Sohn-Söhne	Kuh-Kühe	—
Umlaut + e	Wald-Wälder	—	Volk-Völker

Ritter	→	Ritters
Zettel	→	Zettels
Esel	→	Esels
Schlüssel	→	Schlüsseln
Bruder	→	Brudern

Bild	→	Bildern
Indianer	→	Indianerns
Elefant	→	Elefänten
Bus	→	Büsse
Bot	→	Böte
Arzt	→	Ärzten
Ball	→	Bäller

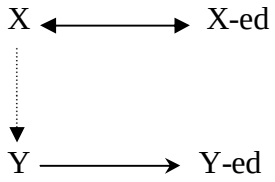
eine Pizza	→	zwei __
ein LKW	→	zwei __
ein Einhorn	→	zwei __
eine Kerstin	→	zwei __

The usage-based model

In the usage-based model, linguistic productivity is based on analogical reasoning rather than rules. Analogy is a very general psychological mechanism that does not only occur in language but is involved in all kinds of cognitive behaviors.

Analogy

walk	walked
stay	stayed
dance	danced



meek	*meek-ed*

Associations between present and past tense forms

1.	walk	walked
	talk	talked
	show	showed
2.	sing	sang
	ring	rang
	drink	drank

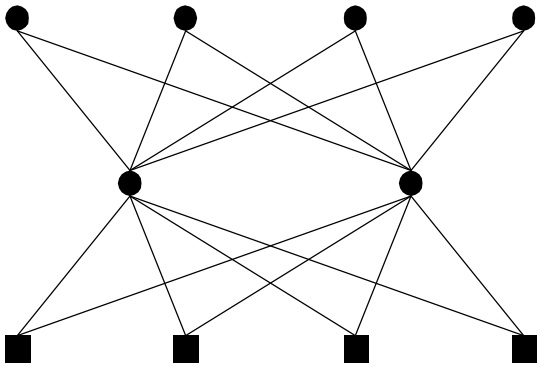
3. find — found
   fight — fought
   bind — bound

4. hit — bit
   let — let
   bid — bid

Provide the past tense forms:

git
tring
blight

Connectionism



Distributed network model

Two computer metaphors:

- The human mind works like the digital computer: clear-cut categories, rules like in math or logic.
- The human mind works like a connectionist model: fuzzy categories, associations and analogy rather than rules.

8. First word combinations

Clark, Eve. 2003. Early words. In Eve Clark. 2003. First language acquisition, 79-92. Cambridge: Cambridge University Press.

Tomasello, Mike. 2003. Early constructional islands. In Michael Tomasello. 2003. Constructing a language. A usage-based theory of language-acquisition, 113-121. Cambridge: Harvard University Press.

Sentence formulas

Agent and verb
- Kendall swim.
- Kimmy come.
- Doggie bark.
- Mommy read.
- Pillow fall.

Experiencer and verb
- See Kendall. [= Kendall sees]

Verb and Goal
- Writing book.

Verb and Locative
- Play bed.
- Sit pool.

Verb and patient
- Kendall look. [= look at Kendall]
- Kimmy kick. [= kick Kimmy]
- Shoe off.

Agent and patient
- Kendall spider [= Kendall is looking at a spider]
- Kendall book [= Kendall is reading a book]

Possessor and possessed
- Kimmy bike.
- Papa door.
- Kimmy pail.

Locative and object
Kendall water.
Towel bed.
Three cow.

Pivot grammar

Martin Braine (1976) suggested that children's early utterances consist of words that belong to two word classes:

1. pivot words
2. open class words

Pivot words: spatial particles (e.g. up, off, back)
pronouns/deictics (e.g. that, it)
possessives (my, your)
certain verbs (put, take, see)
certain adjectives (big, pretty)
other relational expressions (e.g. other, more, allgone, bye-bye)

Table 1. Pivot grammar

P + O	O + P	O + O
See boy	Shoe off	Mommy sleep
See sock	Shirt off	Milk cup
		Baby sit.
Pretty boat	Daddy do	
Pretty fan	Mommy do	
My Mommy	Blanket away	
My milk	Daddy away.	
Allgone shoe		
Allgone egg		
More taxi		
More melon		

Pivot grammar rules.

$S \rightarrow P\ O$
$S \rightarrow O\ P$
$S \rightarrow O\ O$
$S \rightarrow O$

Item-specific constructions

Dat Daddy.	2;0
Dat's Weezer.	2;0
Dat my chair.	2;1
Dat's him.	2;1
Dat's a paper too.	2;4
That's too little for me.	2;9
More car.	1;11
More that.	2;0
More cookie.	2;0
More fish.	2;1
More jump.	2;1
More Peter water.	2;4
No bed.	1;11
No bread.	2;0
No eat.	2;2
No milk.	2;2
No apple juice.	2;5
Block get-it.	2;3
Bottle get-it.	2;3
Mama get-it.	2;4
Towel get-it.	2;4
Dog get-it.	2;4
Books get-it.	2;5
Boot off.	2;0
Light off.	2;1
Hands off.	2;1
Pants off.	2;1
Hat off.	2;3
Spoon back.	2;2
Tiger back.	2;3
Give back.	2;3
Ball back.	2;3
Want ball back.	2;4
All broke.	2;0
All buttened.	2;3
All clean.	2;4
All done.	2;4

Clock on there.	2;2
Up on there.	2;2
Hot in there.	2;2
Milk in there.	2;4
Water in there	2;5
All gone milk.	2;2
All gone shoe.	2;2
All gone juice.	2;2
All gone bear.	2;3

Adult constructions

Intransitive construction	NP V	Peter was sleeping.
Transitive construction	NP VNP	Peter saw Mary.
Ditransitive construction	NP V NP NP	Peter gave Mary a book.
Verb-particle construction	NP V NP P	Peter took the hat off.
Imperative construction	V (NP) (NP)	Show me the picture.
Resultative construction	NP V NP ADJ	Peter wiped the table clean.

Item-slot templates

That's __.
More __.
__ get-it.
__ away.
Allgone __ .
What __ ?

Experimental evidence for lexically-specific learning (Brooks and Tomasello 1999)

Passive condition

- Look, the car is going to get meeked.
- The car is going to get meeked by Big Bird.
- What's going to get meeked? (experimenter points to the car)
- That's right, the car is going to get meeked.
- The car is going to get meeked by who? (eperimenter points to Big Bird)
- Yes, the car is getting meeked by Big Bird. (while performing action)
- Did you see what got meeked by Big Bird? (experimenter points to the car)
- Exactly! The car got meeked by Big Bird.

Active condition

- Look, Big Bird is going to meek something.
- Big Bird is going to meek the car.
- Who's going to meek the car? (experimenter points to Big Bird)
- That's right, Big Bird is going to meek the car.
- Big Bird is going to meek what? (experimenter points to the car)
- Yes, Big Bird is meeking the car. (while performing action)
- Did you see who meeked the car? (experimenter points to Big Bird)
- Exactly! Big Bird meeked the car.

(1) What happened to the PATIENT?
(2) What did the AGENT do?

Table 1. Passive and active responses of 2-year olds (Brooks and Tomasello 1999)

	Passive training		Active training	
	Passive response	Active response	Passive response	Active response
What happened to the PATIENT?	85	5	12	100
What is the AGENT doing?	45	15	0	100

9. Syntactic development 1: subject-drop, passives, causatives, and questions

O'Grady, William. 1997. Subject drop. In William O'Grady. 1997. Syntactic development, 81-85, 98-99. Chicago: The university of Chicago Press.

O'Grady, William. 1997. Passives. In William O'Grady. 1997. Syntactic development, 192-208. Chicago: The university of Chicago Press.

Clark, Eve. 2003. First language acquisition, 228-239. Cambridge: Cambridge University Press.

Subject drop

Run away.	(21 months)
Drink milk.	(23 months)
Touch duck.	(27 months)
Wanna apple.	(24 months)

Hypothesis: Children leave out the subject because they have difficulties in producing long utterances.

Peter ate a banana.
Sally wrote a letter.
The dog bit the girl.
The cat was chasing the mouse.

Object deletion

Put __ in there.	(18 months)
Touch __ .	(18 months)
Lady do __ .	(21 months)
Push __ in there.	(23 months)
Jem have __ .	(24 months)
Not reach __ .	(24 months)
Put __ on.	(23 months)
Mummy get __ . Man taking __ .	(23 months)

Valian 1991. Subject-deletion vs. object deletion in 2-year olds

Overt subject	29%
Overt object	91%

Processing theories of subject deletion

- *The information-structure hypothesis:* Since the subject tends to express old or given information, it can be eassily omitted.
- *The metrical hypothsis:* Since children tend to leave out unstressed syllables the subject is often omitted.

Gerken 1991. Materials of an imitation experiment comparing subject and object deletion in 2-year olds

He	kissed	her
He	kissed	Jane
He	kissed	the lamb
Peter	kissed	Jane
Peter	kissed	the lamb
The bear	kissed	her
The bear	kissed	Jane
The bear	kissed	the lamb

- Children leave out the subject more often than the object:

Subject deletion	19%
Object deletion	3%

- Pronominal subjects are more often omitted than lexical subjects:

Deletion of pronominal subjects	32%
Deletion of count nouns subjects	13%
Deletion of proper name subjects	11%

Grammar-based theories of subject deletion

English

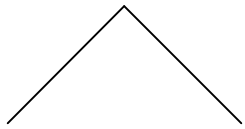
*Has talked to Mary.

Italian

Ha visto Piero.
'(S/he) has seen Peter.'

Innate Universal Grammar:

There are languages in which the subject is obligatory [– pro-drop], and there are languages in which the subject can be omitted [+ pro-drop].

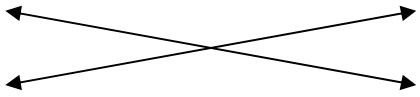


[+ pro drop] (default) [– pro drop]

Hypothesis: English-speaking children often leave out the subject because the pro-drop parameter is initially set to the wrong value [+ pro drop]. (Hyams 1986)

Passives

The boy [agent] kicked the ball. [patient]



The ball [patient] was kicked by the boy. [agent]

The comprehension of passives

Experiment — Turner and Rommetveit 1967

The girl is pushing the boy

Group 1
The teacher sees the student.
The pig pushes the cow.
The car hits the truck.

Group 2
The man feeds the horse.
The teacher carries the chair.
The girl kicks the ball.

Group 3
The student is seen by the teacher.
The cow is pushed by the pig.
The truck is hit by the car.

Group 4
The horse is fed by the man.
The chair is carried by the teacher.
The ball is kicked by the boy.

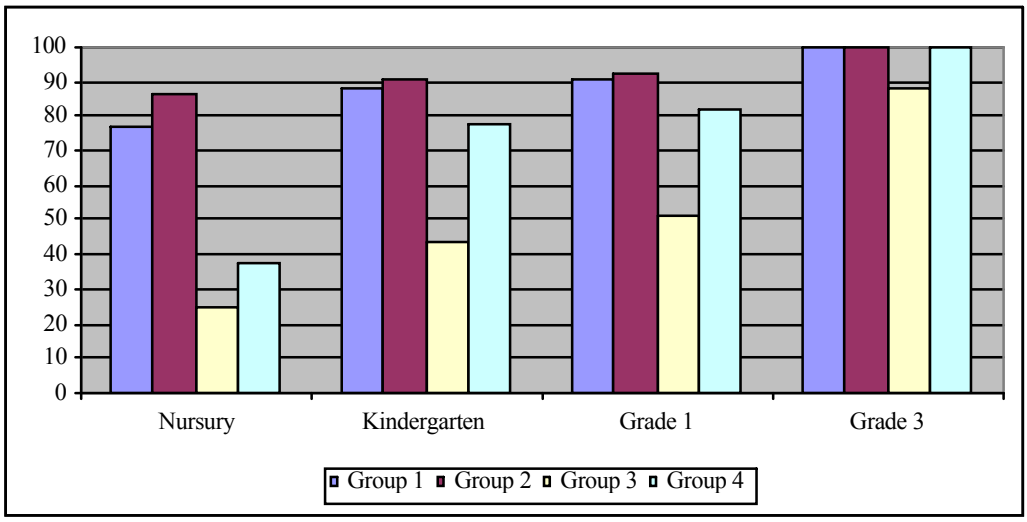


Figure. Percentage of correct responses — Turner and Rommetveit 1967

NP	V	NP
Agent	Action	Patient

The canonical sentence schema (Bever 1970)

Production of passives

Door shut.	[Peter 1;11]
Get hurt.	[Nina 2;0]
That's fixed.	[Nina 2;3]
Car broken.	[Adam 2;4]
It's all finished.	[Nina 2;4]
I wanna get dressed.	[Nina 2;4]
I got scared.	[Nina 2;5]
Is it locked?	[Adam 2;8]
It's frozen.	[Peter 2;9]
It's fold up.	[Adam 2;9]

(1) The frozen milk.
(2) The broken car.
(3) *The attacked city.

Causatives

(1)	Jump me down.	2;4
(2)	You sad me.	2;3
(3)	Kendall fall that toy.	2;3
(4)	Who deaded my kitty cat?	2;6
(5)	I'm talking my birdie.	2;2
(6)	I'm gonna disappear the duck.	3;7
(7)	Did she bleed it?	3;6
(8)	You ached me.	4;1

Transitive sentences

Peter hit the cow.	AG V PA
Sally pushed John.	AG V PA

Intransitive sentences

Sally is working	AG V
The ball is rolling	PA V

Verbs that can be both transitive and intransitive

Peter opened the door.
The door opened.

Peter broke the cup.
The cup broke.

Overgeneralization errors

(1)	That flower cuts.	[= can be cut]	2;8
(2)	Bert knocked down.	[= get knocked down]	3;0

WH-questions

(1) Whassis?
(2) Whatchadoing?

Stage 1. Can-I-V-PARTICLE?

Can I get down?	1;11
Can I get up?	1;11
Can I lie down?	1;11

Stage 2. Can-(I)-V-NP?

Can eat ice cream?	1;11
Can do this?	1;11
Can have this?	2;0

Stage 3. Could-(I)-V-NP?

Could do this?	2:0
Could I throw that?	2:0
Could I have this?	2:0

Stage 4. Can-PRO-V-NP?

Can you draw eyes?	2;1
Please can we do this?	2:1
Can you show me?	2;1

Stage 1. What's NP doing?

What's donkey doing?	2;0
What's toy doing?	2;0
What's Nomi doing?	2;0

Stage 2. What's NP Ving?

What's Mommy holding?	2;0
What's Georgie saying?	2;1
What's Andy making?	2;1

Stage 3. What is NP Ving?

What is the boy making?	2;10
What is Andy doing?	2;11
What is Mommy pushing?	2;11

10. The acquisition of complex sentences 1

O'Grady, William. 1997. Embedded clauses. In William O'Grady. 1997. Syntactic development, chap 6, 107-123. Chicago: Chicago University Press.

Complex sentences

(1) We were watching TV **when** somebody knocked at the door.
(2) Peter talked to the man **who** just entered the store.

(3)	Peter bought a banana **and** then he left the store.	[COOR clause]
(4)	He tried hard, **but** he failed.	[COOR clause]
(5)	Peter promised **that** he would come.	[finite COMP clause]
(6)	Sally bought the bike **that** was on sale.	[finite REL clause]
(7)	He arrived **when** Mary was just about to leave.	[finite adverbial clause]
(8)	Sue wants Peter to leave.	[nonfinite COMP clause]
(9)	Sue noticed the guy following her.	[nonfinite REL clause]
(10)	She left the door open **to** hear the baby.	[nonfinite ADV clause]

Nonfinite complement clauses

(1) Peter wants to come.
(2) The doll is easy to see.

(3) Peter wants Mary to come.
(4) Jack promised Ann to come.

The comprehension of early infinitives

Experiment 1 — Chomsky 1969

1. Is the doll is to see or hard to see?
2. Could you make her easy to see?

Experiment 2

(1) Bozo tells Donald to hop up and down.
(2) Bozo promises Donald to hop up and down.

The production of infinitives

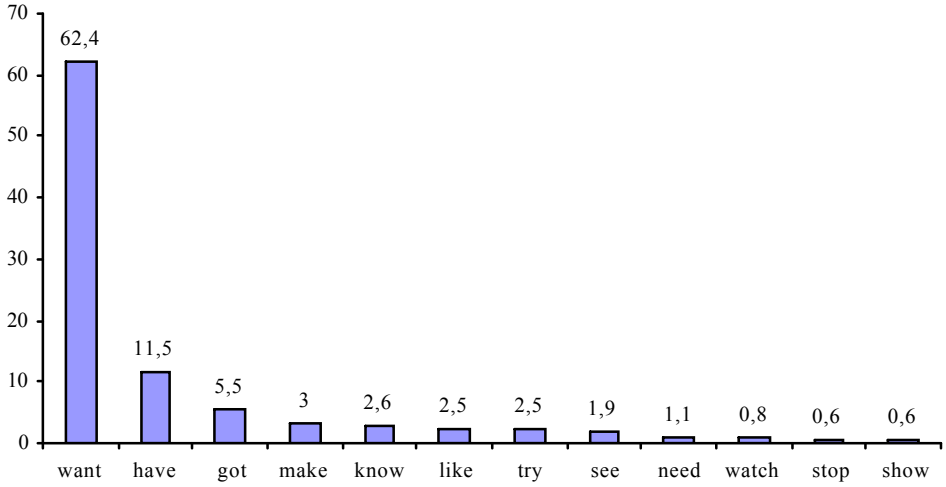


Figure 1. Mean proportions of children's early infinitival complements

(1)	Wan Bobo.	2;1
	I wan a bottle.	2;1
	Want bag, Mommy.	2;2
	Want bag.	2;2
	I wan that.	2;2
	I wan Bobo.	2;3
	I wanna ride.	2;3
	I wanna ride my horse.	2;3
	I wan milk.	2;4
	I wan ride, ride… two doll.	2;4
	I wan ride a horsie.	2;4
	I want ribbon.	2;4
	I wan two ribbon head.	2;4
	I want my dolly.	2;4
	I want celery.	2;4
(2)	I want you to play with me.	2;10
(3)	Want me open it?	2;9
	Want me get out?	2;9
	Want car go, go dat way?	2;10
	Want me get it?	2;10
	Want me see it?	2;10
	Do you want me get in?	2;10

Do want he walk?	2;10
Do want me ride it?	2;10
Do you want me drink hot coffee?	2;10
Do want wheel come off?	2;10

Adverbial clauses

Adverbial clauses are commonly divided into several semantic subclasses:

1. conditional clauses: *if*
2. temporal clauses: *when, since, after, while, before*
3. causal clauses: *because*

(1) We will stay at home, <u>when it rains</u>.
(2) <u>When it rains</u>, we will stay at home.
(3) Mary works in the library <u>and Peter is a psychiatrist</u>.
(4) *<u>And Peter is a psychiatrist</u> Mary works in the library.

AND

(1) CHILD: Nina has dolly sleeping.
ADULT: The doll is sleeping too?
CHILD: **And** the man's sleeping on the big bed. [Nina 2;2]

(2) ADULT: That's yours?
ADULT: Ok.
CHILD: **And** this is mine. [Peter 2;5]

(3) CHILD: Piggy went to market.
ADULT: Yes.
CHILD: **And** piggy had none. [Naomi 2;7]

BUT

(1) ADULT: It is called the skin of the peanut. [Naomi 2;11]
CHILD: **But** this isn't the skin.

(2) ADULT: No, it's not raining today Pete. [Peter 2;6]
CHILD: **But** … it's raining here.

(3) ADULT: I think it's time to put your dolly to bed. [Nina 2;11]
CHILD: **But** the Snoopy is asleep.

BECAUSE

(1) ADULT: Did you run over my blocks? [Peter 2;5]
CHILD: Mmhm.
ADULT: Why?
CHILD: **Because** it's a fire engine.

(2) CHILD: No you can't get a napkin. [Peter 2;7]
ADULT: Hmhm.
CHILD: No!
ADULT: Why?
CHILD: **Cause** it's Mommy's, … Mommy's cleaning.

(3) CHILD: No, don't touch this camera. [Peter 2;7]
ADULT: Why?
CHILD: **Cause** it's broken.

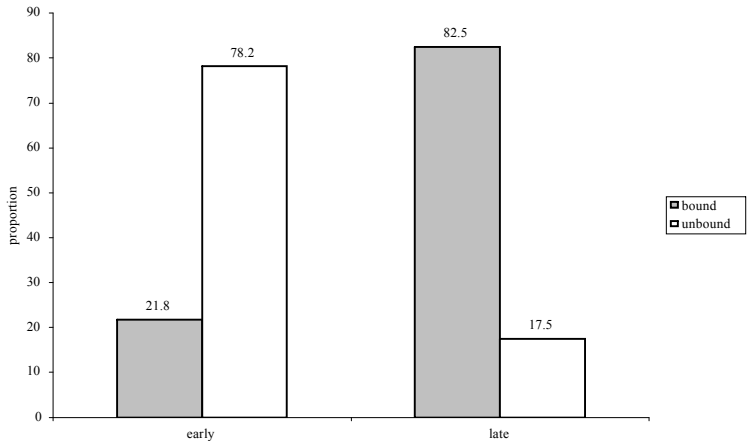


Figure 1. Proportion of bound and unbound conjoined clauses (Diessel 2004)

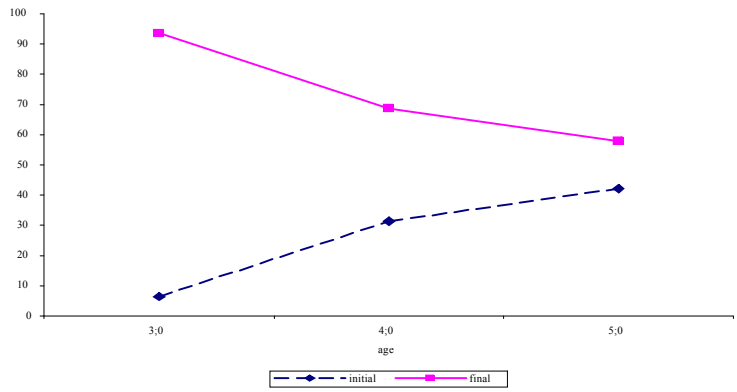


Figure 2. The development of initial and final *when* clauses (Diessel 2004)

The acquisition of complex sentences 2

Diessel, Holger and Michael Tomasello. 2000. The development of relative clauses in spontaneous child speech. *Cognitive Linguistics* 11: 131-151.

Finite complement clauses

1. verbs of saying:	say, tell, argue, promise
2. verbs of perception:	see, hear, notice, observe
3. verbs of cognition:	think, know, guess, believe
4. verbs of wish and desire:	wish, hope, desire

Search for finite COMP-clauses in the CHILDES database..

Relative clauses

(1) The dog that jumps over the fence bumps into the lion.
(2) The dog bumps into the lion that jumps over the fence.

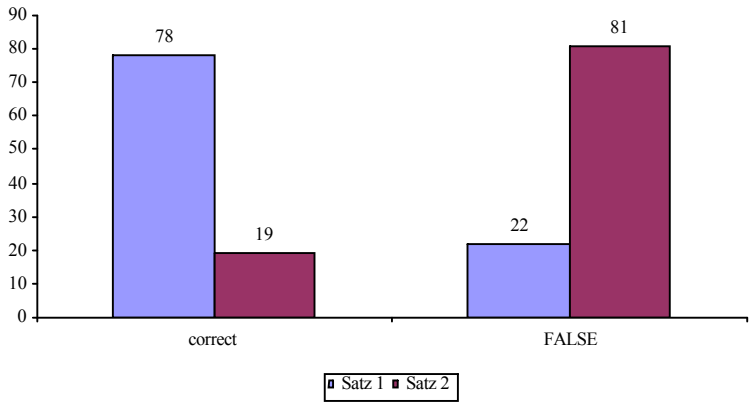


Figure 1. Tavakolian 1977

The "conjoined clause hypothesis" (Tavakolian 1977)

The dog that jumps over the fence bumps into the lion. >>>
>>> The dog jumps over the fence **and** bumps into the lion.

The dog bumps into the lion that jumps over the fence.
>>> The dog bumps into the lion **and** jumps over the fence.

The production of relative clauses

(1)	That's the rabbit that fall off.	[Nina 2;7]
(2)	Look at dat train Ursula bought.	[Adam 2;10]
(3)	This is the sugar **that** goes in there.	[Nina 3;0]
(4)	That's a picture I made.	[Adam 3;0]
(5)	Here's a tiger **that**'s gonna scare him.	[Nina 3;1]
(6)	It's a song **that** we dance to.	[Nina 3;2]

Syntactic amalgams

(1)	That's doggy turn around.	[Nina 1;11]
(2)	This is my doggy crys.	[Nina 2;0]
(3)	That's a turtle swim.	[Nina 2;2]
(4)	Here's a mouse go sleep.	[Nina 2;3]
(6)	That's the roof go on that home.	[Nina 2;4)
(7)	That's the rabbit fall off.	[Nina 2;4]
(8)	There's a tape go around right there.	[Peter 2;0]
(9)	It's the wheels go.	[Peter 2;3]
(10)	This is the fire engine go 'whoo whoo'.	[Peter 2;6]

Later relative clauses

(1)	You left this toy I am playing with.	[Peter 3;4]
(2)	I wanna go to the zoo that has those animals.	[Nina 3;5]
(3)	I gon draw everything I like.	[Adam 3;5]

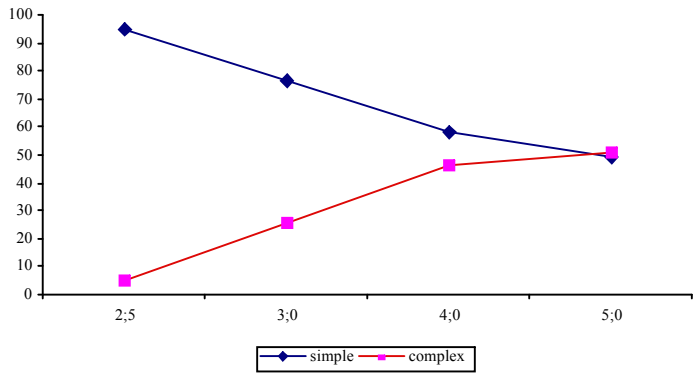


Figure 2. Diessel 2004 — percentage of simple and complex relative constructions