

## **1. Nature and Nurture in learning your first language**

### **1.1 Why we should be impressed by first language acquisition**

- It's **unlikely you have real memories of learning to talk**
- you **did not require explicit instruction** to begin talking.

By age 4, children have generally mastered the full grammar of their native language, in spite of the fact that they are quite bad at most other tasks

Adults past the age of about 15 are mostly incapable of duplicating this feat, in spite of the fact that they are generally quite good at other tasks

- Language acquisition is different from other general learning processes
  - no explicit instruction.

When adults try to correct children's errors, the children don't seem to care: "other one spoon"

- No negative evidence:
  - what sentences are in their language? - they can hear what adults say,
  - but they have no evidence clearly telling what sentences are not in their language.

Four possible learning scenarios: first 3 – correctable by "positive evidence" alone

Guessing that too much is possible – need negative evidence

BUT: kids are not getting any, really!

- Possible sentences of a language are infinite, so it can't be that children simply repeat only those sentences that they actually hear.
- Rather, they produce and understand novel sentences on the basis of the grammar that they construct.

### **Chomsky's argument from the "poverty of the stimulus":**

Without any head start, the problem of correctly deducing the structure and rules of a grammar on the basis of a finite sample like the one children are exposed to is probably impossible. Rather, it seems that they must have some idea of what they are looking for from birth.

### **1.2 Basic Observations**

- a child can learn any language of the world before he/she can tie his/her shoes
- language acquisition-at least some of its ingredients – is quite independent of other cognitive developments
- language is extremely complex: why we have linguistics departments
- no other species has communicative abilities with language-like form or functions

## **CONCLUSION 1**

**There is SOMETHING in our genes.**

### 1.3 Not a true instinct

- languages differ (apparently) greatly

English or French or Chinese cannot be innate – they all have to be learned from exposure!

Vocabulary – has to be learned from exposure

- although we are biased learners (gavagai & flimmock)

Grammar – principles and parameters

Usage – culturally determined

- whatever is hardwired, it cannot be soldered on
  - Second Language learning
  - individual variation
  - language change in progress: historical linguistics
- also need to bear in mind the overwhelming genetic similarities between humans and our closest kin
  - yet primates don't have language
  - how do we account for the evolution of the innate parts of language?

as a research strategy, need to minimize the presupposed innate components of language

### 1.4 Evidence for Universal Grammar

1. Children's errors & linguistic creativity
2. Stages of acquisition are universal  
e.g., deaf children babble, same milestones)
3. Language universals; no “primitive” languages
4. Creolization (e.g. Nicaraguan Sign Language) children are incapable of learning non-UG-driven pidgin, so they impose extra grammar on it

## 2. Modularity: separate “mental organs?”

- Learning to speak
- Learning to see
- Learning motor control
- Learning to reason

### 2.1 The Critical Period

Children learn languages much more easily than adults.

- This difference is generally attributed to the **critical period**:
  - if you don't learn a particular language as a child, you'll never learn it as easily/well
- Ignoring a certain range of individual variation, experiments suggest that:
  - learning **before the age of 7** yields **perfect command**;
  - learning **between the ages of 8 and 15** yields **progressively less perfect command**;
  - learning at a **greater age** includes **no advantage** for relative youth.

Case studies: in situations of extreme family dysfunction or misfortune, a child might be kept from social and linguistic interaction until a more advanced age. Language ability can be permanently impaired then.

- **Chelsea** – misdiagnosed as severely mentally retarded and/or emotionally disturbed. In fact she was profoundly deaf. Not exposed to language until age 31 (deafness discovered, hearing near-normal with hearing aids). Learned about 2000 words, no syntax

The boat sits water on.      The girl is cone the ice cream shopping buying the man.

- **Genie** - isolated until the age of 13 1/2, achieved **telegraphic speech** (strings of words with an elementary syntax, without the full grammatical apparatus of inflection and function words).

Mike paint.    Applesauce buy store.      Neal come happy; Neal not come sad.

Genie have Momma have baby grow up.    I like elephant eat peanut.

- **Isabelle** - isolated until the age of 6 1/2, and within a year and a half had mastered **complex grammar**, producing sentences like the following:

Why does the paste come out if one upsets the jar?

Do you go to Miss Mason's school at the university?

The **difference in their ages** is believed to be the crucial factor in their very different outcomes

- The critical period resembles **other aspects of maturation** in humans and animals:
  - in **ducklings**: ability to identify and follow the mother
  - in **kittens**: ability to perceive visual images
  - in **sparrows**: ability to learn the father's songs

**Maintaining the neural circuits** that allow acquisition of these skills is **costly to the organism** => evolution favors losing this allocation of resources when learning has (normally) occurred. There is **no species-wide need to maintain the costly flexibility throughout the lifespan**.

### 2.3 Language, brain, and genes

- Aphasia studies: specific language-related abilities have specialised parts of the brain associated with them (Broca's area, Vernicke's area)
- Specific language impariment: cognition ok, language impaired
- Williams syndrome: language ok, cognition impaired

### 2.4 General learning mechanisms

Other factors: the course of language acquisition corresponds well to the **general rate of metabolic activity in the brain**, which peaks at the age of 4 and declines through adolescence.

Hard to say: does this increased activity permit language learning? Or is it caused by it?

**Other views:** “better learning” period rather than “critical” one

### Probabilities and connections

- Our neurons “learn” by frequency-matching (associations)
- humans are very good at problem-solving and pattern detection – could language just be a complex pattern that can be learned statistically?

### 3. Stages of language acquisition.

#### 3.1 Two perspectives on language acquisition

##### From less to more.

- no child starts out knowing any words, though they can follow the rhythm of speech
- the babbling sounds of “mama”, “papa” are not words
- the first year basically has no (receptive) words
- by 1;6, toddlers may know a few dozens of words
- initial words are often incomplete
- initial sentences are short, with many grammatical ingredients missing

##### From more to less.

- infants can distinguish sound pairs that adult speakers of the language fail to distinguish
  - Japanese (and Korean) infants have no trouble distinguishing R from L
- children exercise grammatical options that are not attested in the language of the environment
  - “What do you think what he said?”

#### 3.2 Steps of acquisition

Back to innateness (Gleitman and Newport 1995):

Language learning proceeds uniformly despite variability in environment.

In nearly all cases, children's language development follows a **predictable sequence**.

There is a great deal of **variation in the age** at which children reach a given milestone.

Each child's development is usually characterized by **gradual acquisition of particular abilities**:

e.g. "correct" use of English verbal inflection will emerge over a period of a year or more

On the **production** side, one way to name the stages is as follows, focusing primarily on the unfolding of **lexical and syntactic knowledge**: The notation **X;Y** means X years and Y months of age.

Stage	Typical age	Description
Babbling	0;6 - 0;8	repetitive CV patterns
One-word	0;9 - 1;6	single open-class words or word stems
Two-word	1;6 - 2;0	"mini-sentences" with simple semantic relations
Early multiword	2;0 - 2;6	"telegraphic" sentence structures of <i>lexical</i> rather than <i>functional</i> or <i>grammatical</i> morphemes
Later multiword	2;6 on	<i>grammatical</i> or <i>functional</i> structures emerge

Parts of language (e.g., complex morphology, certain sounds at times) are not mastered so early, but in general the fundamentals of the grammar are present by around **age four**.

From **4-7 months**: "**vocal play**", manipulating pitch (to produce "squeals" and "growls"), loudness (producing "yells"), and also manipulating tract closures to produce friction noises, nasal murmurs, "raspberries" and "snorts".

At about **7 months**, "canonical **babbling**" appears: extended sounds that are chopped up rhythmically into syllable-like sequences (consonant plus vowel, or CV).

The range of sounds produced are heard as **stop-like and glide-like**.

Fricatives, affricates, and liquids are more rare; clusters of consonants are even rarer. Vowels tend to be low and open, at least in the beginning.

Repeated sequences ([**bababa**] or [**nanana**]); also "variegated" sequences (C-like articulations are varied). The variegated sequences are initially rare and become more common later on.

Vocal play & babbling: more often in **interactions** with caregivers, but also **alone**.

deaf children babble a bit: **babbling is instinctual**.

deaf children raised with signing parents "babble" with their hands -- trying out various movements as they learn the specific handshapes etc. of the ambient sign language:

**babbling is influenced by experience of speech around the baby**

**No other animal does anything like babbling.**

Maybe: vocal play and babbling have the function of "**practicing**" speech-like gestures

Pre-speech infants can distinguish the basic intonation patterns of their parents' language from that of other languages.

### **The one-word (holophrastic) stage**

At about **10 months**, infants start to utter **recognizable words**.

Mostly used in **naming**:

**duck** while hitting a toy duck off the edge of the top      **sweep** while sweeping with a broom

Young children often use words in ways that are **too narrow or too broad**:

**bottle** only for plastic bottles      **teddy** only for a particular bear

**dog** for dogs, lambs, cats, & cows      **kick** for kicking, pushing & wing-flapping.

These *underextensions* and *overextensions* **develop and change over time**

Overextension in production is likely a **compensation for limited vocabulary**, in addition to misunderstanding the reference of a word. - partly that's why it's so common

### **Perception vs. production**

Infants show (e.g., by gaze direction) **understanding of some words at the age of 4-9 months**, often even before babbling begins.

### **Perception vs. production in vocabulary development**

Benedict (1979): mothers kept records of words children produced, & words they gave **evidence of understanding**.

Results: when producing 10 words, understanding about 60 words;  
an **average gap of five months** between understanding 50 words & producing 50 words.

Both maternal diaries & checklists: **underestimate** # of words children **know something** about a **overestimate** # of words with **adult-like meanings**.

E.g., a child may "know" the word *doggie*, but may also think that it applies to any four-legged creature, including cows.

Difference between perception and production, e.g. 'fis' phenomenon

## Combining words: the emergence of syntax

During the second year, **word combinations** begin to appear.

Novel combinations as early as 14 months.

At **18 months**, 11% of parents say child is often combining words; 46% say sometimes.

By **25 months**, 80% often, and almost all children are sometimes combining words.

### Early multi-unit utterances

Developing grammars overwhelmingly follow the **correct word order** for the ambient language.

In **early multi-word stage**, children asked to **repeat** sentences may leave out the function words:

<u>Original</u>	<u>Repeated</u>	(child)
I can see a cow	<b>See cow</b>	Eve, 25 months
The doggy will bite	<b>Doggy bite</b>	Adam, 28 months
Where does Daddy go?	<b>Daddy go?</b>	Daniel, 23 months

The same pattern can be seen in their own **spontaneous utterances**:

<b>Baby doll ride truck</b>	Allison, 22 months
<b>Want lady get chocolate</b>	Daniel, 23 months

The pattern of leaving out most grammatical/functional morphemes is called **telegraphic**.

One way to think about these utterances: **longer, more adult structure is chopped down to its essential elements** (mostly lexical words), with the adult order maintained.

(Roger Brown.1973.*A First Language: The Early Stages* p.205; Steven Pinker.1994.*The Language Instinct* p.273)

It seems, the child is partly **modeling the adult grammar**, but is not yet able to "fill in all the slots" in potential sentences.

### Grammatical elements and corresponding structures

At about the **age of 2**, children gradually begin to use **grammatical elements**.

English: finite auxiliaries (*is, was*) verbal tense and agreement affixes (*-ed, -s*)  
nominative pronouns (*I, she*) complementizers (*that, where*) determiners (*the, a*).

E.g., the boy Adam **progressed in one year from two- or three- word sentences to complex structures, though still with some errors** (Brown 1973, Pinker 1994).

As grammar becomes more complex, the **elements of the sentence develop internal complexity**.

<b>Big doggie</b>	NP = Adj N
<b>Give doggie paper</b>	S = V N N
<b>Give big doggie paper</b>	S = V <u>NP</u> N

Such **hierarchical structure** is, of course, a fundamental property of adult language.

### Perception vs. production again

Children who regularly omit grammatical elements **expect them from adults**: their sentence comprehension suffers if the grammatical elements are missing or absent.

**Grammar understanding** is also in advance of grammar use (= production).