The Universal Grammar Hypothesis:

There exist domain-specific syntactic principles that are biologically determined (“innate”).

1) **Domain-specificity**: language acquisition is constrained by representations, principles, or cognitive mechanisms that are specific to language.

3) **Universality**: these representations, principles or mechanisms are universal.

5) **Innateness**: these representations, principles or mechanisms are not learned.

7) **Autonomous Syntax**: these representations, principles or mechanisms depend on syntactic representations and not their functional correlates.

why should you care?

- UG Hypothesis has been received wisdom for 50 years.
  - Language is a key thing that makes humans special
  - It’s assumed we understand how.

- Analogy to other domains is common (cf. Hauser’s Universal Grammar for Morality)

- Parallel questions come up in other fields whether or not analogy is explicit (e.g. face recognition)

Traditional arguments for nativist view of language:

- **Syntactic Universals**
- The fact that there is a sensitive (“critical”) period for language learning.
- Almost all children learn language and no other primates do
- Children spontaneously regularize pidgin languages
- Issue of brain localization
- Claimed disassociations between language and general cognition
  - Williams Syndrome
  - KE family with FoxP2 mutation
- Poverty of the stimulus argument

Universals (or “universals”)

Need to ask:

A. Is generalization truly universal?
B. Alternatively, are there a set of facts that systematically appear in language A and do not appear in language B?

If answer to A or B is **yes**, then we also need to ask:

- Is there an alternative explanation for the generalization (or tendency)? Is the generalization specific to syntax?
- If B, How would parameter on the principle be set exactly?

“universals” of UG

The “head-direction” parameter (if VO <-> PO)

It is a true universal? Persian is OV and PO

- Is there a tendency?
  - Yes.
- It is coincidental?
  - Probably not.
- Is there an alternative explanation for the tendency?
Diachronically, Ps often evolve from Vs (due to semantic similarity/conceptual metaphor):

a. Akan (spoken in Ghana)
   o-ye adwunma ne ne nua barima no
   Lit, “He gave his brother the work” (Intended, “He does work for his brother.”)

b. Medieval Chinese
   Shuo yu ta dao
   “Speak to him (about) Dao”

c. Thai
   Than ca bin caak krungtheep.
   “He will fly from Bangkok.”

Also, processing motivation has been proposed: less cost to keeping V&P close in the string
(Hawkins 1994; Newmeyer 2005)

VO & PO: \[V[PO]\]
OV & OP: \[[OP]V\]

Recall:
How are parameters supposed to be set exactly?

A problem:
Oddball constructions often provide misleading triggers:

Bagels, I like.

Hauser, Chomsky and Fitch (2002, Science): the only domain-specific linguistic universal is recursion.

“I think that [he believes that [she knew that [he left]]].”
“Pat came and Sam came.”

But it’s not clear all languages have recursion:

- Pirahna (Everett 2006)
  “I think this. He believes that. She knows something. He left.”
  “Ko’oi came. Kohoi came (too).”
- Walpiri (K. Hale 1976)
There are approximately X linguistic universals that are agreed to require innate domain-specific knowledge.

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Critical period:
- begins and ends abruptly
- period beyond which a phenomenon will not appear

Sensitive period:
- begins and ends gradually
- period of maximal sensitivity

Eric Lenneberg: Critical Period Hypothesis 1967:

Claimed that L1 had to be acquired within a certain time frame; after critical period, L1 acquisition would be difficult or impossible.
Critical period for L1 grammatical acquisition?

Newport (1990)

- Subjects: 35-70 years old
  - Native learners
  - Early learners learned from deaf peers at 4-6 years old
  - Late learners: first exposed after age 12 (had first attended strict “oral schools”, not exposed to ASL before)

- All had minimum of 30 years of daily exposure to ASL.
- Tested: complex morphology, verbs of motion: agreement, classifiers, aspect, number (verbal inflections); derivational morphology distinguishing Ns and Vs.

- Basic word order: all at ceiling.
- Morphological tests: decline with age.

Scores on tests of ASL morphology (Mean z-score on tests adapted from Newport 1990)

- Slow decline in sensitivity throughout life (i.e., no “flattening out”)

It’s not clear there’s a discontinuity

Flege (1999)

- Pronunciation of Italian immigrants to Ontario, Canada
- Length of residence ≥ 15 years
- No cutoff point where decline begins
- No flattening out in adulthood

Key point

There are age-effects.
But the pattern of decline is not marked by a discontinuity.
Sensitive period for learning language

Do simple age effects imply innateness?

Can you think of any other skills that people learn better when they learn young?

Explanations for sensitive period

General brain plasticity declines with age.

“Less is More” hypothesis (Newport 1990; Elman 1993): constraints on working memory may actually serve to simplify the data that children attempt to analyze.

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If someone hides food in one of three buckets, and then a competitor graps for food unsuccessfully (arm through hole in plexiglass)…

Do apes ape? (Horner and Whiten 2005)

If someone hides food in one of three buckets, and then points to where the food is…. (Fate and Tomasello 2004)
When chimps were given the opaque box, **two-thirds imitated** the experimenter to retrieve the food.

…Do apes ape?

New box with **transparent walls**:

No chimps copied the experimenter. They all went straight for the door.

The transparent box demonstrated to 16 nursery school aged *children*.

Experimenter told the children that they could do whatever they thought necessary to get a sticker, and then left the room.

80% of children do the unnecessary steps.

Non-human primates don’t learn language

- Non-human primates do not understand pointing.
- Only humans show the same predilection to imitate.

...> Non-human primates may lack the social/cognitive *prerequisites* for language

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Children tend to regularize grammars (e.g. pidgins)

- Singleton and Newport (2004):
  - Simon witnessed obligatory morphemes that code movement only 70% of the time (from his late-learner parents).
  - He himself produced the obligatory morphemes 90% of the time.
Review of (domain-general) “probability matching”

Two lights A B: A flashes 70% of the time.

Task: predict which light will flash:
Subjects guess light A 70% of the time.
They “probability match”

But, if input is more complicated (e.g., lights B and C both flash 15% of the time),
subjects tend to maximize, choosing A 80-90% of the time (Gardner 1957; Weir 1964)

If adults are taught an artificial language with determiners expressed 60% of the time,
they probability match, producing the determiner roughly 60% of the time.

If subjects are taught artificial language with
determiner expressed 60% of the time, and
several other determiners expressed more rarely,
Then subjects tend to produce the determiner >
80% of the time (they regularize) (Hudson Kam and Newport 2005)

Children are more likely to regularize than adults (Hudson Kam and Newport 2005).

Recall “less is more” hypothesis....

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Brain localization?

True to some extent:
Any part of the brain may be active during language, depending on the content of the language, but

- In 95% of right-handers, the left side of the brain is dominant for language.
- Even in 60-70% of left-handers, the left side of brain is dominant for language.

Broca’s aphasia

- Have trouble with production, especially function morphemes such as a, the, in, by, was and inflections -ing, -s, -ed
- Also have problems with comprehension of complex grammatical patterns (e.g., passives)
  - The dog was bitten by the mailman.

But Broca’s area is neither necessary nor sufficient for the syndrome of Broca’s aphasia (Mohr et al. 1978).

Only 35% of patients who have lesions to Broca’s area display Broca’s aphasia, and all of them have lesions to more than Broca’s area.

Area is not domain-specific

Broca’s area is activated in music perception and motor imitation as well as language (Iacoboni, 1999).
One hypothesis

- Broca's area: the seat of SELECTION between conflicting sources of information: domain general mechanism. (Thompson-Schill)

Why should language be generally dominant in the left hemisphere?

- The left hemisphere: Is dominant in problem solving
  Is home to “the interpreter mechanism (creative, narrative) (confabulates in order to make sense)”
  Seeks the meaning, order, reason, explanation.
  Tends to overgeneralize
  Develops schemata, "rules"


Early plasticity: left hemisphere is not necessary

- Children with left hemispherectomies: often have fairly normal language abilities (when matched for overall IQ).
- Infants born without left hemisphere develop normal language.

- Thus, localization of language in the left hemisphere with special attention to “broca’s area” (or larger area) is not necessary, and function of area does not appear to be specific to language.

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Williams syndrome

"you're looking at a professional book writer. My books will be filled with drama, action, and excitement. Everyone will want to read them. I'm going to write books, page after page, stack after stack."—Crystal (14 years old)

Crystal has an IQ of 49. Has reading, writing, math skills of a first grader, cannot be left alone without a babysitter.

People with WMS can produce passives, conditionals, relative clauses, etc.

Is the language development of people with WMS normal/above normal?

Children with WMS are extremely delayed in language acquisition

Normals score nearly perfect on morphosyntactic tests at age 8-9. People with WMS don’t reach ceiling until they are 14-16…

And there is some evidence WMS language is unlike normals’; e.g., is more bilateral.
• As adults, people with WMS function at the level of normal 5-7 year olds, and the language of normal 5-7 year old contains passives, conditionals, relative clauses, etc.

• People with WMS do consistently outperform those with Down Syndrome in language tasks (except in their equally delayed onset of language learning).

• But then WMS children have unusually strong auditory abilities and social skills, two skills that should give them some advantage in language learning compared with DS.

FoxP2 gene
(KE family in England)

• Initially, affected community claimed to have problem only with grammatical “rules” – problem only with regular past tense, plurals.

• But, they actually have problems with both ‘rules’ and stored items (regular and irregular morphology).

• In fact, deficit is broad, involving hand/mouth fine motor problems in speech, rhythm.

• Comprehension is intact.

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Is UG needed to explain language learning?

E.g., is ‘head-direction’ parameter required for learning?

Each P and each V must be witnessed in the input.

Generalizations for novel items could be based on analogy to hundreds of similar cases.

Poverty of the stimulus?

Generalizations may arise on the basis of:
  – Statistical generalizations in the input
  – General pragmatic (e.g., Gricean) principles
  – Domain general abilities of analogy and categorization
  – Constraints that follow from the function of the constructions involved.

E.g., Tomasello and Bates (2001); Tomasello (2003); Goldberg (2006)
Summary

• Syntactic Universals
  – None are agreed upon; generalizations often have functional explanations (cf. also Newmeyer 2005).

• The fact that there is a sensitive period for language learning.
  – No clear cutoff for language-learning; age effects -> innateness; immature domain-general working memory may explain early advantage in language learning.

• Almost all children learn language and other primates do not
  – Other primates appear to lack social/cognitive prerequisites for language learning.

• Fact that language is in general terms localized in the same area(s) of the brain across different people.
  – True to some extent, but localization -> domain specificity; Also, localization -> innateness.

• Regularization of irregular input
  – Imperfect input tends to get regularized (due to the fact that we have trouble keeping track of unpredictable (meaningless) irregularities).

• Claimed disassociations between language and general cognition
  – Williams Syndrome: language abilities actually match cognitive abilities pretty darn well.
  – FoxP2 mutation does not result in deficits that are specific to language

  Clear disassociations have yet to be found.

• Poverty of the stimulus argument
  It’s not clear the input is so impoverished. What is required may well be a domain-general ability to generalize, symbolize, and produce and comprehend rapidly presented input as well as powerful social cognition.