Mechanisms of Language Change

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Human beings are the only species with language.
Attempts at teaching nonhuman primates language have failed.
Language evolution

Where does language come from?
Language evolution

What are the genetic prerequisites for language?
Language evolution

FOXP2 - the language gene

People with a defective FOXP2 gene are unable to produce the fine movements with the tongue and lips that are necessary to speak clearly.
‘A Language Gene is identified.’

Language evolution

FOXP2 seems to play an important role in controlling motor movement, but motor movement has nothing to do with language and cognition.
Language evolution

How did language (notably grammar) evolve?
Language evolution

Many researchers agree that language evolution / development has two important cognitive prerequisites:

- The ability to understand (linguistic) symbols
- The ability to combine symbols to larger units
The symbolic nature of language
The symbolic nature of language

What are the cognitive prerequisites for understanding symbols?

In order to understand/use symbols I need to understand that other people are mental beings like I am.

[Tomasello 1999]
The evolution of grammar

Where does grammar come from?

1. Where do constructions come from?
   (1) Peter was hit by a car.
   (2) The letter was written by Mary.
   (3) She was kissed by someone.

2. Where do grammatical morphemes come from?
   Articles: the, a, some, any
   Prepositions: on, in, under, between
   Auxiliaries: is, be, will
The evolution of grammar

Words are commonly divided into two basic types:

- Content words
- Grammatical markers
The evolution of grammar

Content words are prototypical signs (or symbols) that combine a sequence of speech sounds with a particular concept (or meaning).

Grammatical markers are semantically more abstract and their occurrence seems to be dependent on the occurrence of content words.
The evolution of grammar

The categories of content words (i.e. nouns and verbs) are universal.

But the categories of grammatical markers are language-specific: There are many languages that do not have articles, auxiliaries, relative pronouns, complementizers, modal verbs etc.
Content words and grammatical markers are two different types of expressions that may have evolved differently in the evolution of human language.
If human language is symbolic, as commonly assumed, one can easily imagine a scenario in which our ancestors came up with words for *fire, tree* or *stone*:

But how do we explain the evolution of grammatical markers?

How do we explain the evolution of bound morphemes such as the English past tense suffix *–ed* or the grammatical case markers in German: *der Mann, den Mann, dem Manne, des Mannes*
The evolution of grammar

(1) Jack’s gonna come because he has won.

- *is gonna*  >  motion verb (is going to)
- *because*  >  PP (by cause)
- *he*  >  DEM
- *has*  >  verb of possession
Grammaticalization is the process whereby lexical items develop into grammatical items and items that are already grammaticalized assume new grammatical functions.

[Hopper and Traugott 1993]
Grammaticalization

<table>
<thead>
<tr>
<th>Auxiliaries</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gonna</td>
<td>motion verb</td>
</tr>
<tr>
<td>will</td>
<td>verb of intention</td>
</tr>
<tr>
<td>have</td>
<td>verb of possession</td>
</tr>
</tbody>
</table>
Grammaticalization

<table>
<thead>
<tr>
<th>Conjunctions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>while</em></td>
<td>DEM hwile SUB (hwile = ‘time’)</td>
</tr>
<tr>
<td><em>therefore</em></td>
<td>DEM + P</td>
</tr>
<tr>
<td><em>given</em></td>
<td>PTC</td>
</tr>
</tbody>
</table>
Grammaticalization

Prepositions

- *during*  
- *in front of*  
- *ago*  

V-ing  
PP  
prefix-gone (‘a-gone’)
Grammaticalization

Indefinite markers

- *somebody*  
  - NP

- *a*  
  - numeral (‘one’)


Grammaticalization

Epistemic markers

- *y’know*  
  ‘(do you) you know’ [question]
- *(I) think*  
  main clause
- *guess*  
  imperative main clause
Grammaticalization

Transparent forms

nevertheless    that’s why
however        in order to
moreover       gotta
in case        regarding
is about to    in the course of
The origins of grammatical function words in German
Weil ich gerne lese, hat mir jemand ein Buch geschenkt, das jetzt auf meinem Schreibtisch steht und das ich noch vor den Ferien lesen werde.
Grammaticalization

Pronouns/determiners

\begin{itemize}
  \item \textit{ein} \hspace{1cm} \text{numeral}
  \item \textit{der} \hspace{1cm} \text{DEM}
  \item \textit{jemand} \hspace{1cm} \text{je ein Mann (=irgendeine beliebige Person)}
\end{itemize}
# Grammaticalization

## Conjunctions

<table>
<thead>
<tr>
<th>Conjunction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>weil</em></td>
<td>Phrase include the noun ‘Weile’</td>
</tr>
<tr>
<td><em>nachdem</em></td>
<td>P + DEM</td>
</tr>
<tr>
<td><em>falls</em></td>
<td>Fall</td>
</tr>
<tr>
<td><em>dadurch</em></td>
<td>DEM + P</td>
</tr>
<tr>
<td><em>deswegen</em></td>
<td>DEM + P</td>
</tr>
<tr>
<td><em>vorausgesetzt</em></td>
<td>PTC</td>
</tr>
</tbody>
</table>
Grammaticalization

Prepositions

(1)  *Anhand* des Beispiels
(2)  *Infolge* des Angriffs auf den Irak
(3)  *Anlässlich* seines Geburtstags
Grammaticalization

(1) An der Hand dieses Beispiels > anhand
(2) In der Folge dieses Ereignisses > infolge
(3) Aus Anlass dieses Ereignisses > anlässlich
Grammaticalization

Where do bound morphemes come from?
## Grammaticalization

<table>
<thead>
<tr>
<th>Spanish</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>cantaré</td>
<td>‘I’ll sing’</td>
</tr>
<tr>
<td>cantarás</td>
<td>‘you’ll sing’</td>
</tr>
<tr>
<td>cantará</td>
<td>‘he’ll sing’</td>
</tr>
<tr>
<td>cantaremos</td>
<td>‘we’ll sing’</td>
</tr>
<tr>
<td>cantareís</td>
<td>‘you’ll sing’</td>
</tr>
<tr>
<td>cantarán</td>
<td>‘they’ll sing’</td>
</tr>
</tbody>
</table>
## Grammaticalization

<table>
<thead>
<tr>
<th>Spanish</th>
<th>Gloss</th>
<th>Latin</th>
</tr>
</thead>
<tbody>
<tr>
<td>cantaré</td>
<td>‘I’ll sing’</td>
<td>cantare habeo</td>
</tr>
<tr>
<td>cantarás</td>
<td>‘you’ll sing’</td>
<td>cantare habes</td>
</tr>
<tr>
<td>cantará</td>
<td>‘he’ll sing’</td>
<td>cantare habet</td>
</tr>
<tr>
<td>cantaréis</td>
<td>‘we’ll sing’</td>
<td>cantare habermus</td>
</tr>
<tr>
<td>cantarán</td>
<td>‘you’ll sing’</td>
<td>cantare habetis</td>
</tr>
<tr>
<td></td>
<td>‘they’ll sing’</td>
<td>cantare habent</td>
</tr>
</tbody>
</table>
Grammaticalization

Bound morphemes

*N-ly* noun meaning ‘with an x-appearance’
*N-hood* noun meaning ‘person/sex/quality’
*N-ful* hand full of x
*V-ed* auxiliary ‘do’ (uncertain)
The grammaticalization of demonstratives
Grammaticalization

All grammatical morphemes have developed out of lexical morphemes, principally nouns and verbs…

[Bybee 2003]
Cline of grammaticalization

lexicon  grammar
Grammaticalization of demonstratives

There is at least one other (important) source for grammatical morphemes: demonstratives (or spatial deictics) such as English *this* and *that* and *here* and *there*.
Grammaticalization of demonstratives

Third person pronouns

he / it
er / sie / es
Grammaticalization of demonstratives

Definite article

the

der/die/das
Grammaticalization of demonstratives

Relative pronouns

that
der/die/das
Grammaticalization of demonstratives

Complementizers

that
dass
Grammaticalization of demonstratives

Sentence connectives/conjunctions

*thus / therefore*

*deshalb / dadurch*
Grammaticalization of demonstratives

Directional preverbs

*hin-gehen*
*her-kommen*
Grammaticalization of demonstratives

Copulas

NP, [DEM NP] > NP be NP

Der Mann, der ein Polizist. >

Der Mann ist ein Polizist.
Grammaticalization of demonstratives

Common assumption: demonstratives are function words, thus they must have developed from content words.

But there is no evidence from any language that demonstratives developed from content words.

Thus, we may assume that demonstratives are older than other function words.
Grammaticalization of demonstratives

Demonstratives have a special status in language; they serve one of the most basic functions of human communication.

In their basic use, demonstratives function to establish joint attention.
Joint attention
Joint attention

Triadic situation (Bühler 1934)
Joint attention

dyadic interactions
Joint attention

The shift from dyadic to triadic interactions is reflected in the emergence of joint attentional behaviours such as eye gaze and pointing.
Joint attention

Scaife & Bruner 1975; Butterworth 1998; Franco 2005; Brooks & Meltzoff 2005
Joint attention

- Proto-imperatives
- Proto-declaratives

Bates et al. (1976, 1979)
Joint attention

Proto-imperatives are pointing gestures that resemble reaching gestures produced with the intention to obtain an object.

Proto-declaratives are pointing gestures produced with the sole intention to focus the addresses’ attention on a particular object.
Joint attention

Declarative pointing is a unique trait of human communication.

Declarative pointing gestures are produced with the sole intention to establish joint attention.

Declarative pointing (and joint attention) presupposes that the communicative partners understand each other as mental or intentional agents and are able to engage in triadic interactions.
Demonstratives have a special status in language because they are the quintessential linguistic device to establish joint attention.
Demonstratives

- Demonstratives are universal.
- Demonstratives emerge very early in language acquisition.
## Demonstratives

<table>
<thead>
<tr>
<th></th>
<th>Eve</th>
<th>Naomi</th>
<th>Nina</th>
<th>Peter</th>
<th>Total</th>
<th>%mean</th>
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<tbody>
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<td>1.</td>
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<td>1414</td>
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<td>234</td>
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<td>341</td>
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<td>61</td>
<td>314</td>
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<td>7.</td>
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<td>146</td>
<td>511</td>
<td>10</td>
<td>829</td>
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<td>8.</td>
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<td>353</td>
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<td>9.</td>
<td>mommy</td>
<td>283</td>
<td>187</td>
<td>148</td>
<td>647</td>
<td>1.2</td>
</tr>
<tr>
<td>...</td>
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<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>13.</td>
<td>this</td>
<td>41</td>
<td>406</td>
<td>52</td>
<td>596</td>
<td>1.2</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>15.</td>
<td>here</td>
<td>67</td>
<td>31</td>
<td>247</td>
<td>441</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
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<td>13.072</td>
<td>8.551</td>
<td>12.255</td>
<td>54.390</td>
<td>100</td>
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</tbody>
</table>
Demonstratives

- Demonstratives are universal.
- Demonstratives emerge very early in language acquisition.
- Demonstratives are very old.
## Demonstratives

<table>
<thead>
<tr>
<th>Reinforcement:</th>
<th>German</th>
<th>French</th>
<th>Swedish</th>
<th>Latin</th>
<th>Vulgar Latin</th>
<th>Old French</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>der hier</em></td>
<td><em>celui-ci</em></td>
<td><em>denhär</em></td>
<td><em>ille</em></td>
<td><em>ecce ille</em></td>
<td><em>cest cel</em></td>
<td><em>ce</em></td>
</tr>
</tbody>
</table>
Demonstratives

Demonstratives emerged very early in the evolution of language so that we simply do not know how they evolved.

Demonstratives are part of the basic vocabulary of every language.

Demonstratives provide a common historical source for some of the most frequent grammatical markers.
Demosntratives

The grammaticalization of demonstratives originates from the anaphoric and discourse-deictic uses.

(1) The Yukon lay a mile wide and hidden under three feet of ice. On top of this ice were as many feet of snow.

(2) Oh, pretty big. Big enough so that the rock doesn't look nearly as tall as it is. The top's bigger than the base. The bluff is sort of worn away for several hundred feet up. That's one reason it's so hard to climb.
Demonstratives

Anaphoric and discourse-deictic demonstratives involve the same psychological mechanisms as demonstratives that speakers use with text-external reference. In both uses, demonstratives focus the interlocutors’ attention on a particular referent.

Joint attention is thus not only important to coordinate the interlocutors’ attentional focus in the speech situation, it also plays an important role in the internal organization of discourse.
Demonstratives

When anaphoric and discourse deictic demonstratives are routinely used to express a particular relationship between two linguistic units, they often loose their deictic force and develop into grammatical markers.
Demonstratives

Demonstratives > complementizer

(1) Listen to **this**: Jack told me that he won’t come.
Demonstratives

Demonstratives > complementizer

(1) Middle High German

joh gizalta in sâr tha₃,
and told them immediately that
thiu sâlida untar in uuas
theluck among them was

‘And he told them immediately that good fortune was among them.’
Demonstratives

Demonstratives > complementizer

(1)  

*Old English*

þt gefremede Diulius hiora consul
that arranged Diulius their consul

þt þt angin wearð tidlice Durthogen
COMP that beginning was in.time achieved

‘Their consul Diulius arranged (it) that it was started on time.’
Demonstratives

Grammatical markers that commonly develop from demonstratives:

- Complementizers
- Relative pronouns
- Third person pronouns
- Definite articles
- Conjunctions
- Directional preverbs
- Copulas
- Focus markers
Demonstratives

Content words

Grammatical markers

Demonstratives

Grammatical markers
Mechanisms of Language Change
Review

Questions:
- Where do grammatical morphemes come from?
- Where do grammatical constructions come from?

Sources of grammatical markers:
- Content words
- Demonstratives
Where do grammatical constructions come from?
The development of constructions

Peter saw that: Mary kissed John.
The development of constructions

Peter saw that Mary kissed John.
The development of constructions

I am going to marry Bill.
The development of constructions

S

<table>
<thead>
<tr>
<th>VP</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
</tr>
<tr>
<td>AUX</td>
</tr>
<tr>
<td>PRO</td>
</tr>
<tr>
<td>I am.going.to</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VP</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
</tr>
<tr>
<td>V</td>
</tr>
<tr>
<td>marry</td>
</tr>
</tbody>
</table>

| |
| N |
| Bill. |
The development of constructions

Free discourse configurations  ->  phrase structure
Grammaticalization

Phonetic reduction

- going to > gonna
- I will > I’ll
- I am > I’m
- do not > don’t
Grammaticalization

Loss of inflectional properties

that / those > that [complementizer]
go-ing > gonna
give > given
Grammaticalization

Loss of constituent structure

want to > wanna
[in [front [of___]]] > [in front of [ ___ ]]
some DET body N > [somebody] PRO
Grammaticalization

Semantic bleaching

*have* (poss) > *have* (aux)
*go* (motion) > *gonna* (aux)
*stomach* (concrete) > *in* (relational)
Grammaticalization is unidirectional.
Grammaticalization

ups and downs
if and buts
I dislike her use of isms
a downer
ziezen/duzen
das Für und Wider
Grammaticalization

- It provides a straightforward answer to the question ‘Where does grammar come from?’
- It challenges the assumption that linguistic categories have rigid category boundaries: Is *in front of* a PP or a preposition? Indirect support for a prototype approach to linguistic categorization.
- It challenges the static view of grammar: Linguistic structures and linguistic categories are constantly changing. What we need is a dynamic theory of grammar.
Grammaticalization involves general cognitive or psychological process.

Grammaticalization often involves a mapping between two cognitive domains.
From space to time

(1) a. The priest stood before the altar.
   b. St. Michael's day is before Christmas.

(2) a. Bill is in Leipzig.
   b. He will come in the spring.

(3) a. The balloon flew over the hill.
   b. The game is over.

(4) a. He followed him.
   b. World War II was followed by a 45 year period of Cold War.
From space to time

(5) a. That’s a pretty long log.
    b. It has been a pretty long day.

(6) a. They were driving along the river.
    b. He new it all along.

(7) a. He is going to the village.
    b. The rain is going to help the farmer.

(8) a. At the end of the queue.
    b. At the end of the day.
From space to time
From space to time

Christmas is coming up soon

Boroditsky 2000
From space to time

is going to

komma att

Christmas is coming up soon

Boroditsky 2000
From space to time

(1) The revolution is before us. (ego-moving)
(2) The revolution is over before breakfast. (time-moving)
From space to time

(1) a. I have been waiting for you **since** the train left this morning.
   b. **Since** I have an exam tomorrow, I won’t be able to go out tonight.

(2) a. **Wenn** wir angekommen sind, rufen wir dich an.
   b. **Wenn** er dort angekommen ist, hätte er angerufen.

(3) a. all die Weile > weil
   b. while
On the role of frequency in diachronic change
<table>
<thead>
<tr>
<th>Verb</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give</td>
<td>12</td>
</tr>
<tr>
<td>Keep</td>
<td>3</td>
</tr>
<tr>
<td>Bring</td>
<td>4</td>
</tr>
<tr>
<td>See</td>
<td>12</td>
</tr>
<tr>
<td>Think</td>
<td>7</td>
</tr>
<tr>
<td>Know</td>
<td>5</td>
</tr>
<tr>
<td>Eat</td>
<td>2</td>
</tr>
</tbody>
</table>

- **7 types**
- **47 tokens**
Frequency and change

summary [ˈsʌməri]
mammary [ˈmʌməri]

summary, memory, family, salary, artillary, cursory
Frequency and change

Bybee (2001)

- every: 60.2
- family: 18.2
- memory: 11.1
- salary: 6.2
- summary: 2.6
- artillery: 1.3
- cursory: 0.5
- mammary: 0

Verwendungshäufigkeiten

Summe von Häufigkeit
Zipf’s law

Frequently used expressions tend to undergo phonetic reduction.

Since frequently used expressions are more easily predictable, they are more easily identifiable even if they are phonetically reduced.
Only about 50% of all words produced in continuous speech are phonetically recognizable in isolation.

Especially difficult to identify in isolation are grammatical markers and frequent content words.

Frequent words tend to be phonetically reduced because in a given context they are easily predictable (e.g. you know that nouns are often preceded by an article, which therefore is easily identified even if it is phonetically reduced).

Frequently used expressions may be shorter because speakers have more practice producing them.
The reduction effect can also be observed in sequences of linguistic expressions.

- *that is* vs. *that's*
- *we will* vs. *we’ll*
- *I have* vs. *I’ve*
Krug (1998)
Bybee & Scheibman (1999)

- Tokens with an initial [d] and a full vowel [dõt, dõn]
- Tokens with an initial flap and a full vowel [ɾõt, ɾõ]
- Tokens with a flap and a reduced vowel [ɾ ŋə]
- Tokens with just a reduced vowel [ɾ ŋə, ŋ]
<table>
<thead>
<tr>
<th></th>
<th>[dōt, dō]</th>
<th>[rōt, rō]</th>
<th>[rəʔ]</th>
<th>[rə̃, ə]</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
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<td>22</td>
<td>38</td>
<td>12</td>
<td>88</td>
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<td>You</td>
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<td>We</td>
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<td>They</td>
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<td>[rə]</td>
<td>[rə̃, ə]</td>
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<td>-----------</td>
<td>-----------</td>
<td>-------</td>
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<td>1</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>have to</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>want to</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>see</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>like</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
High frequency strings such as *I don’t know* and *I don’t think* have turned into processing units.

Processing units originate as variants of full forms, but may become conventionalized.

The conventionalization of small biases in language production leads to diachronic change.
The development of irregular verbs

Frequency can also be a conservative force.

<table>
<thead>
<tr>
<th></th>
<th>Old Form</th>
<th>New Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>climb</td>
<td>clomb</td>
<td>climbed</td>
</tr>
<tr>
<td>creep</td>
<td>crope</td>
<td>crept</td>
</tr>
<tr>
<td>laugh</td>
<td>low</td>
<td>laughed</td>
</tr>
<tr>
<td>yield</td>
<td>yold</td>
<td>yielded</td>
</tr>
<tr>
<td>step</td>
<td>stope</td>
<td>stepped</td>
</tr>
</tbody>
</table>
The development of *do*-support

Questions

(1) Know you where Peter is?
(2) **Do** you know where Peter is?

Negation

(1) Peter know not that we are here.
(2) Peter **does** not know that we are here.
They know not what they do.
Two frequency effects

- Reduction effect: Development of new forms
- Preserving effect: Protection of high frequency items from analogical leveling
Two types of markedness

The two frequency effects have given rise to some striking cross-linguistic tendencies, which typologists characterize with the notion of markedness:

- Structural markedness
- Behavioral markedness
## Structural markedness

<table>
<thead>
<tr>
<th></th>
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<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
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<td>tree-s</td>
</tr>
</tbody>
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<td>tree-Ø</td>
</tr>
<tr>
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<td>tree-y</td>
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</table>
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<td>tree-y</td>
</tr>
<tr>
<td></td>
<td>tree-x</td>
<td>tree-Ø</td>
</tr>
</tbody>
</table>
Structural markedness

If singular nouns occur with an overt number marker, plural nouns also take a number marker.
## Structural markedness

<table>
<thead>
<tr>
<th>Turkish</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominative</td>
<td>adam</td>
<td>adam-lar</td>
</tr>
<tr>
<td>Accusative</td>
<td>adam-ı</td>
<td>adam-lar-ı</td>
</tr>
<tr>
<td>Genitive</td>
<td>adam-un</td>
<td>adam-lar-un</td>
</tr>
<tr>
<td>Dative</td>
<td>adam-a</td>
<td>adam-lar-a</td>
</tr>
<tr>
<td>Locative</td>
<td>adam-da</td>
<td>adam-lar-da</td>
</tr>
<tr>
<td>Ablative</td>
<td>adam-dan</td>
<td>adam-lar-dan</td>
</tr>
</tbody>
</table>
If a language uses a case marker for the object it also uses a case marker for the subject.
Structural markedness

How do we account for the asymmetries?

- Frequently used categories are structurally unmarked because their endings have been reduced.
- Frequently used categories are structurally unmarked because they function as the default, and marking the default would be redundant.
Local markedness

Turkana

ŋa-muk1                    ‘shoes’
 a-muk-àt                  ‘shoe’

English

fish, deer, sheep
Behavioral markedness

<table>
<thead>
<tr>
<th>Case</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; SG</td>
<td>am</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; SG</td>
<td>are</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; SG</td>
<td>is</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; PL</td>
<td>are</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; PL</td>
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Behavioral markedness

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<th>Past</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(^{st}) SG</td>
<td>am</td>
<td>was</td>
</tr>
<tr>
<td>2(^{nd}) SG</td>
<td>are</td>
<td>were</td>
</tr>
<tr>
<td>3(^{rd}) SG</td>
<td>is</td>
<td>was</td>
</tr>
<tr>
<td>1(^{st}) PL</td>
<td>are</td>
<td>were</td>
</tr>
<tr>
<td>2(^{nd}) PL</td>
<td>are</td>
<td>were</td>
</tr>
<tr>
<td>3(^{rd}) PL</td>
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Behavioral markedness

How do we account for the asymmetry?

The preserving effect of frequency accounts for behavioral markedness: Frequent (irregular) forms can be memorized more easily than infrequent ones (and thus infrequent forms are more easily regularized).
Behavioral markedness

- Since the singular is more frequent than the plural, singular verb forms tend to have more irregularities than plural verb forms.
- Since the present tense is more frequent than the past tense, present tense forms tend to have more irregularities than past tense forms.
Conclusion

Frequency is an important determinant of language change.

Linguistic knowledge is determined by our experience with language.

Grammar is shaped by language use.
Grammar is a fluid system that is constantly changing by virtue of the psychological mechanisms involved in language use.
Conclusion

In the past, linguistic research was concerned with invariable categories and eternal rules.

In the future, linguistics should focus on cognitive and psychological mechanisms driving the emergence of linguistic structure.

What we need is a dynamic theory of grammar, in which linguistics categories and constructions are seen as emergent phenomena that we will only understand if we take into account how they evolved, both in history and in language acquisition.
This is the end.