No complementation without predication: The role of predication in the emergence of language structure

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The Symbolic Species (Deacon 1997)

Predication as a prerequisite for symbolic reference:

“The earliest symbolic systems would necessarily have been combinatorial and would have exhibited…subject-predicate structure…right from the start.” (p. 334)

Overview

• Background
  – animal “language” vs. home sign
  – figure/ground organization
  – topic/comment structure
  – grammatical subject/predicate
• Relativization and beyond
  – relative clauses
  – other types of unbounded dependencies
• Complementation
  – Adyghe
  – home sign, pidgins, and heritage languages

Overview

• Background
  – animal “language” vs. home sign

The (dis)continuity problem

• There is no good evidence for subject-predicate structure in the utterances of language-trained animals

• Even the most impoverished human forms of communication show evidence of subject-predicate structure

Ape two-word utterances

Terrace et al. (1979)

• Nim’s top ten 2-word utterances
  
  play me  me eat
  me Nim  Nim eat
  tickle me  finish hug
  eat Nim  drink Nim
  more eat  more tickle

• Nim’s orderings
  
  hug me (74)  me hug (40)
  hug Nim (106)  Nim hug (23)
Ape two-word utterances

Greenfield & Savage-Rumbaugh (1990)

- **Kanzi**: action (31) + object (6)
  
  - bite ball
  - carry ball
  - grab Austin
  - hide Austin
  - hide peanut
  - hug ball
  - keepaway balloon
  - slap ball
  - tickle ball

- **caregivers**: action (51) + object (7)
  
  - tickle bite
  - positions himself for caregiver to tickle
  - Coke chase
    - request for chase to Coke station
  - m&m grape
    - “You want both of these foods?”
  - playyard Austin
    - wants to visit Austin in the playyard
  - food blackberry
    - request for more blackberries
  - potato oil
    - researcher rubs him with oil while he eats a potato
  - keepaway balloon
    - teasing male with balloon to start a fight

Home sign two-word utterances

(Goldin-Meadow)

**theme + recipient + action + agent**

- **hit mother**: ‘mother hit blocks’
- **walk duck**: ‘duck will walk’
- **duck twist**: ‘you twist duck’
- **cookie give**: ‘she give cookie to me’
- **duck Susan**: ‘you give duck to Susan’
- **hat head**: ‘you put hat on Mother’s head’

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From home sign to Aristotle

The notion of the subject-predicate relation goes at least as far back as Aristotle:

"Everything … is either said of a subject which is a primary substance or is present in a subject which is a primary substance."
- *Categories*, V

Defining the predication relation

- *description* is a one-step operation
  - no referent is foregrounded as the subject of which the rest of the situation is predicated
- *predication* involves two steps
  - establishment of an ontologically independent referent ("logical subject")
  - attribution of some property to this referent

Defining the predication relation

- *thetic* judgment
  - no referent is foregrounded as the subject of which the rest of the situation is predicated
- *categorical* (bipartite) judgment
  - establishment of an ontologically independent referent ("logical subject")
  - attribution of some property to this referent

Realization of the predication relation

- Analogous bipartite structures in language
  - figure/ground
  - topic/comment
  - grammatical subject/predicate

Figure/ground
Talmy (1979, 2001)

- analogy with visual system
- *figure*: conceptually salient entity
- *ground*: reference point set within a reference frame with respect to which other entities are characterized

Topic/comment
(Reinhart 1982, Lambrecht 1994)

- *topic*: what the utterance is about ("aboutness" condition)
- *comment*: asserted part of utterance

- well-known example: Japanese topics [topic-wa] [comment]
Grammatical subject/predicate

- grammatical subject (Keenan 1976):
  - dominant structural position
  - bearer of grammatically “privileged” properties
  - semantically autonomous expression
    (cf. also Dowty 1991)

- grammatical predicate (Perlmutter 1979):
  - relational expression in need of saturation by an external argument

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- Relativization and beyond

Linguistic review

The reporter [who (___) attacked the senator] admitted the error.

The reporter [who the senator attacked ___] admitted the error.

Relativization as predication

- The Thematic Constraint on Relative Clauses:
  “A relative clause must be a statement about its head noun.” (Kuno 1976: 420)

- “…the relative clause, taken as an open sentence, is predicated of the head.”
  (Chomsky 1982: 92)

What does a predication analysis of relativization buy us?

Possible account of patterns in
  - cross-linguistic distribution
  - processing
Subject relatives are preferred over object relatives

The reporter

[**who** (__) attacked the senator]

admitted the error.

is preferred over

The reporter

[**who** the senator attacked __]

admitted the error.

Noun Phrase Accessibility Hierarchy
Keenan and Comrie (1977)

Accessibility Hierarchy (AH)

SU > DO > IO > OBL > GEN > OCOMP

(subject > direct object > indirect object > “oblique” expression
[e.g. locative adverbial] > possessive [e.g. whose] > comparative
[e.g. That’s the man that she’s taller than])

The Hierarchy Constraints (HCs)
1. A language must be able to relativize subjects.
2. Any RC-forming strategy must apply to a continuous segment of the AH.
3. Strategies that apply at one point of the AH may in principle cease to apply at any lower point.

Why are subject relatives privileged?

The Functional Principle: Generalizing the Notion of “Subject of” (Keenan 1974)

The Functional Principle
i. The reference of the argument expression must be determinable independently of the meaning or reference of the function symbol.
ii. Functions which apply to the argument however may vary with the choice of argument (and so need not be independent of it).
The Functional Principle: Generalizing the Notion of “Subject of” (Keenan 1974)

“The head of a [restrictive relative clause], as we have argued, is the argument expression, and the restricting clause the function symbol. But the restricting clause is basically sentential in nature, and has its own function-argument structure, its subject being its argument, its predicate its function symbol.” (p. 304)

“The Functional Principle: Generalizing the Notion of “Subject of” (Keenan 1974)

“…evaluating RRCs [restrictive relative clauses] whose heads function as subjects of the restricting clause is psychologically simpler than evaluating ones whose heads function as non-subjects. For to evaluate a RRC we must in general determine the reference of two independently referring expressions: the head NP [noun phrase] and the subject of the restricting clause. But in the special case where the head functions as the subject there is only one independent reference to make.” (p. 306)

The Functional Principle: Generalizing the Notion of “Subject of” (Keenan 1974)

Subject relative clauses are psychologically simpler than other types of relative clauses

- To comprehend a non-subject relative clause, one must determine two independent references: the head noun and the subject of the relative clause.
- To comprehend a subject relative clause, only one independent reference is required, because the head noun is the subject of the relative clause.

Subject relatives are preferred over object relatives

The reporter
[who (___) attacked the senator] admitted the error.

is preferred over

The reporter
[who the senator attacked ___] admitted the error.

Processing of relative clauses

Subject relatives are easier to process than object relatives in English, as shown by:

- Reading time: King and Just (1991)
- ERPs: King and Kutas (1995)
- PET: Stromswold et al. (1996); Caplan et al. (1998, 1999, 2000)
- fMR: Just et al. (1996); Caplan et al. (2001); Cooke et al. (2001)
- Eye-tracking: Traxler et al. (2002)

Processing of relative clauses

Subject relatives are also easier to process than object relatives in:

- Brazilian Portuguese (Gouvea 2003)
- Dutch (Frazier 1987)
- French (Cohen & Mehler 1996)
- German (Mecklinger et al. 1995)
- Hebrew (Amon 2005)
- Japanese (Miyamoto and Nakamura 2003)
- Korean (Kwon et al. 2006)
- Chinese (Lin & Bever 2006, Kuo & Vasishth 2006)
Korean relative clauses

- **Subject relative clause**
  "The actor [who ___ hit the writer of the soap opera at the bar near the TV station] appeared on the front page of the newspaper."

- **Object relative clause**
  "The actor [who the writer of the soap opera hit ___ at the bar near the TV station] appeared on the front page of the newspaper."

(see Kwon et al. 2005, 2006)

Korean relative clauses

- verbs come at the end of clauses
- relative clauses precede their head nouns
- gapped positions precede their head noun fillers
- subjects and objects can be dropped if clear from context

Relative clause

| ku | tulama-uy | kukka | kgaungku | knun | yuul/eyse | phokhaynga |n |
|----|-----------|-------|----------|------|------------|------------|
| that | soap opera-GEN | writer | broadcast station | vicinity | bar-at | hit | REL |

W1 W2 W3 W4 W5 W6 W7

Subject relative clause
‘…who ___ hit the writer of the soap opera…’
Object relative clause
‘…who the writer of the soap opera hit ___ …’

Main clause

<table>
<thead>
<tr>
<th>payuw-ka</th>
<th>simmwun-uy</th>
<th>limyen-ul</th>
<th>cangsikhaysst</th>
</tr>
</thead>
<tbody>
<tr>
<td>actor-nom</td>
<td>newspaper-GEN</td>
<td>front-page-ACC</td>
<td>decorated</td>
</tr>
</tbody>
</table>

W8 W9 W10 W11

‘…the actor appeared on the front page of the newspaper.’

Korean reading time results

Subject vs. object relative clauses

Korean subject preference: possible accounts

Accessibility hierarchy (Keenan and Comrie 1977)
Structural distance (O’Grady 1997)
Frequency considerations
Korean ‘because’ clauses

• **Subject-drop**
  ‘Because ___ hit the writer of the soap opera at the bar near the TV station, the actor, appeared on the front page of the newspaper.’

• **Object-drop**
  ‘Because the writer of the soap opera hit ___ at the bar near the TV station, the actor, appeared on the front page of the newspaper.’

Main clause

<table>
<thead>
<tr>
<th>payw-ka</th>
<th>sinnwun-uy</th>
<th>limyen-uf</th>
<th>cangsihaystta</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom</td>
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<td></td>
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<td>W8</td>
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<td>W11</td>
</tr>
</tbody>
</table>

‘…the actor appeared on the front page of the newspaper.’

Korean reading time results

<table>
<thead>
<tr>
<th>subject-drop vs. object-drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>subj-drop</td>
</tr>
<tr>
<td>obj-drop</td>
</tr>
</tbody>
</table>

Subject- vs. object-drop in Korean

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>subject drop</td>
<td>69.4%</td>
</tr>
<tr>
<td>object drop</td>
<td>45.6%</td>
</tr>
</tbody>
</table>

Y.-J. Kim (2000)

‘because’ clause

Subject-drop
‘Because ___ hit the writer of the soap opera…’

Object-drop
‘Because the writer of the soap opera hit ___ …’
Korean subject preference: possible accounts
Accessibility hierarchy (Keenan and Comrie 1977)
Structural distance (O’Grady 1997)
Frequency considerations

Subject- vs. object-drop in Korean

Subject drop 69.4%
Object drop 45.6%

Y.-J. Kim (2000)

Korean embedded clauses
• Subject relative clauses
  "The actor [who ___i hit the writer of the soap opera at the bar near the TV station] appeared on the front page of the newspaper."

• Object relative clauses
  "The actor [who the writer of the soap opera hit ___i at the bar near the TV station] appeared on the front page of the newspaper."

• Subject-drop in 'because' clauses
  "Because ___i hit the writer of the soap opera at the bar near the TV station, the actori appeared on the front page of a newspaper."

• Object-drop in 'because' clauses
  "Because the writer of the soap opera hit ___i at the bar near the TV station, the actori appeared on the front page of a newspaper."

Korean relative clauses
• The ending on the embedded verb marks the right edge of the embedded clause
• Before this ending, one can’t know if the gap is inside a relative or an adverbial clause
Embedded clause

Subject gap
‘Because / who ____ hit the writer of the soap opera…’

Object gap
‘Because / who the writer of the soap opera hit ____ …’

Main clause

‘…the actor appeared on the front page of the newspaper.’

Summary

Object relatives take much longer to read at the head noun position than subject relatives.

This is not consistent with linear distance metrics (Gibson 1998, 2000; Hawkins 2004).

It is consistent with:
– structural distance metrics (O’Grady 1997)
– possible frequency differences (SR 5% vs. OR 0.8%)

What does a predication analysis of relativization buy us?

The privileged status of subject relatives in
– cross-linguistic distribution and
– processing
is consistent with the Accessibility Hierarchy, which (with regard to the subject privilege, modulo the Functional Principle) is based on considerations of predication.

Summary

Object-drop ‘because’ clauses also take much longer to read at the main clause subject than subject-drop ‘because’ clauses.

This is fully consistent with the AH/Functional Principle.

This is also still consistent with a structural distance metric if it is assumed that:
– linguistic representational differences translate directly into processing differences
– cataphor-antecedent binding relations are computed in the same way as variable-operator relations

Also consistent with frequency differences, but:
– which frequency matters, and how much?
– is frequency a cause or an effect of the Accessibility Hierarchy?
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A relative clause under every bed

Relative clauses are more ubiquitous than you might think; they can be used to form:
• *wh*-questions
  What is it [that you had in mind]?
• focus constructions
  It was relatives [that I had in mind].
  [What I had in mind] was relatives.
  (cf. [That [which I had in mind]] was relatives.)

A relative clause in every *wh*-question

Malagasy (Austronesian, spoken in Madagascar): only subject relatives are possible (AH)

(1) Namaky ny boky i Jean.
    read the book the John
    ‘John read the book.’
(2) Iza [no namaky ny boky __]?
    who [no] read the book
    ‘Who [is it that] read the book?’
(3) Inona [no novakin’ i Jean __]?
    what read the John
    ‘What [is it that] was read by John?’

A relative clause in every focus construction

Creoles place focus constituents in sentence-initial position, followed by a restrictive relative clause, e.g., Hawaiian Pidgin English (a creole):

(1) John wen see one woman.
    ‘John saw a [particular] woman.’
(2) [A John] [ ___ wen see one woman]
    ‘It was John who saw a [particular] woman.’
(3) [A one woman] [John wen see ___].
    ‘It was a [particular] woman that John saw.’
Unbounded dependencies as predication structures

Lambda abstraction creates complex predicates that can be combined with arguments to form propositions

Used to characterize unbounded dependencies:

- relativization (Montague 1974, Rodman 1976, Thomason 1976)
- question formation (Hamblin 1973, Karttunen 1975)
- clefting (which relies on relativization) (Halvorsen 1978)

Unbounded dependencies as predication structures

Topichood Condition for Extraction:

“Only those constituents in a sentence that qualify as the topic of the sentence can undergo extraction processes (i.e., Wh-Q Movement, Wh-Relative Movement, Topicalization, and It-Clefting).” (Kuno 1987: 23)

D[iscourse]-linking of wh-phrases

In some languages, there is evidence that D-linked wh-phrases have the status of topics:

Hungarian (Radó 1998, 2000)
Tsez (Polinsky 2002)
Malagasy (Polinsky 2004)

Antakarana Malagasy

(1) nisitrïkныsitraiky
hide child
‘The child is hiding.’ / ‘There is a child hiding.’

(2) misy nisitrïkynisitrïk
exist child hide
‘A child is hiding.’ / ‘There is a child hiding.’

The topic expression is at the right edge.

Antakarana Malagasy D-linking

(1) azovy nisitrïky
who hide
‘Who is hiding? (lit. Who is it that is hiding)?’

(2) *nisitrïky azovy
hide who

(3) nisitrïky tsaiky azovy
hide child who
‘Which child is hiding?’

D-linked-wh-phrase is in the same position as topic.

D[iscourse]-linking of wh-phrases


(1) Which article don’t you remember [who wrote]? (Maling & Zaenen 1982)
(2) What don’t you remember [who wrote __ ]?

Could it be because D-linked wh-phrases are more like topics?
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  – Adyghe

An RC in every complement clause

Some languages even go so far as to use relativization for purposes of complementation (Adyghe [NW Caucasian], Aghem [Niger-Congo])

(1) They believed that grammar was fun.
(2) They believed [the belief such that] grammar was fun.
(3) They asked what we were going to study.
(4) They asked [about the stuff such] that we were going to study.

Where Adyghe is spoken

How to embed questions in Adyghe

(1) č’aler školəm maŋəeŘ
  boy to-school went
  ‘The boy went to school.’

(2) xet-a [ __ školəm kəeŘ-] Œ-er?
  who-Q to-school went-DEF
  [such that] went to school is who?

(3) *jane [xet(-a) [ __ školəm kəeŘ-]er] jašep
  mother who(-Q) to-school went-DEF not-know
  (‘Mother does not know [who went to school].’)
Adyghe = CA English

She’s like, ‘This is crazy’, and I’m all, ‘Why not?’

jane jašep, xet-a školam ər-wa?
mother not-know who-Q to-school went-DEF-LIKE

‘Mother doesn’t know, like, ‘Who went to school?’’

Complement clause = RC with a null head

(1) čaler školam məvəer boy to-school went

‘The boy went to school.’

(2) xet-a [ __ školam ər-] Q-er?

who-Q to-school went-DEF

‘[such that] went to school is who?’

(3) jane [ __ školam ər-] Q-er ješep

mother to-school went-DEF not-know

‘Mother does not know [such that] went to school.’

Summary for Adyghe

• There is no evidence for real complement clauses in Adyghe.
• All clausal complementation work in this language is done by means of relativization.
• Thus even a language as morphologically complex as Adyghe can get by without clausal complementation as long as predication relations are available.

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Home sign two-word utterances

(theme + recipient + action + agent)

hit mother ‘mother hit blocks’
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duck twist ‘you twist duck’
cookie give ‘she give cookie to me’
duck Susan ‘you give duck to Susan’
hat head ‘you put hat on Mother’s head’

Pidgins

• Pidgins do not exhibit consistent embedding, while creoles do
• Nonetheless, pidginized forms of language draw on basic predication relations
Hawaiian Pidgin English (Bickerton 1981)

(1) "No, the men, ah – pau [finished] work – they go, make garden. Plant this, ah cabbage, like that. Plant potato, like that. And then – all that one, all right, sit down. Make lilly bit story."

(2) "And a too much children, small children, house money pay.

('And I [had] too many children, small children, I had to pay the rent.')

Heritage language

• A language that an individual is exposed to during childhood, usually in the home, that s/he does not learn to "full capacity"

    Learning is interrupted by the switch to a different dominant language

Heritage language speaker

• A person who grew up hearing (and possibly speaking) a language, who can understand and perhaps speak it to some degree, but who now feels more at home in another, more dominant language

• Here we are considering only heritage speakers at the lower end of the proficiency scale ("overhearers" and early interrupted learners)

Heritage languages

• Like pidgin speakers, heritage language speakers tend to avoid embedding

• Nonetheless, like pidgin speakers, they rely fundamentally on predication relations

Low proficiency heritage language

Heritage Lithuanian, interrupted at age 4

( #: pause, __ : code-switching)

I was born here { = Chicago} # I moved # California # San Francisco # and then # my grandfather # my mother’s father # he had # cancer # and then # I went # I visit him # he does not speak English # I speak with him # I speak Lithuanian # he speak Lithuanian # many words # I don’t understand that # and then so it was # many times # I feel soul # I liked this # I decide # I learn Lithuanian # I go dance, I sing # and I can now I speak

Low proficiency heritage language

Heritage Armenian, interrupted at age 8

( #: pause, __ : code-switching)

My house # where we lived in Erevan # it # there # the color # there it was dark # and # what-do-you-call-it # stairwell it was dark # dark everything # I dark # I don’t like it # you know # I think about the school # and then I see dark # it is all dark # I see that # I don’t like that # I don’t want # I go to Yerevan (capital of Armenia) and then # all dark
Avoidance of embedding in HL

1. “I went – I visit him.”
2. “I decide – I learn Lithuanian.”
3. “He speak Lithuanian – many words – I don’t understand that.”
4. “I know a girl – this girl was born in Japan.”

Summary

- Home signers, pidgin speakers, and low proficiency heritage language speakers all show lack of embedding (recursion)
- Nonetheless, in contrast to trained animal language output, these restricted human language systems make ready and ubiquitous use of basic predication relations

So was Deacon right?

“The earliest symbolic systems would necessarily have been combinatorial and would have exhibited...subject-predicate structure...right from the start.” (p. 334)

Conclusions

- Predication is a fundamental linguistic property found even in the most restricted human language systems, in the absence of embedding
- Predication is a necessary and sufficient structural mechanism for human language.
- Not much is needed to get predication up and running, and once it is, it can do a lot.
- Predication structures are pervasive (and not always obvious) in human language, possibly because they are so basic to it.

Open questions

- It appears to be the case that human language can exist without recursion, but not without predication – so what triggers the emergence of recursion in human language?
- What direct or indirect precursors of the predication relation does one find in sensory systems?
- What might be the evolutionary trajectory from figure/ground organization of the sensory systems to its manifestation in human language?

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