

# Psycholinguistics in the field: Accessibility-driven production in Yukatek Maya

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## Abstract

**Keywords:** Accessibility, Availability, alignment, direct and indirect effects of accessibility, animacy, constituent order, Yukatek Maya

The language production system is assumed to be universal, yet surprisingly few languages have been investigated to date. We tested the effects of accessibility on constituent order variation in Yukatek Maya, an indigenous language of Mexico, which is typologically very different from Indo-European and other languages. Through this study, we contribute to the emerging discipline of cross-linguistic psycholinguistics [11].

## Field-based psycholinguistics

### Logistics

- Transporting researchers and equipment
- Finding an appropriately quiet and secure setting

### Participants

- Speakers of understudied languages may or may not be: familiar with computers, literate in the language in question, or familiar with testing paradigm

### Ethics and understudied languages

- Access to data on part of the speech community and the greater academic community
- Giving back to the community: giving lectures or lessons, setting up a library in the community, aiding in the development of pedagogical materials, etc.

## Yukatek Maya morphosyntax

### Head marking

- Rather than case-marking (on nouns/dependents), arguments are marked by affixes on the verb (head)

- Pronominal cross-reference markers

- Yukatek has two sets, called **Set A** and **Set B**

- 1) *k-uy il-ik-en le=paal-o'*  
IMPF-A3 see-INC-B1 DET=child-D2  
'The child sees me'

- With two third person referents, there is ambiguity as to which referent is the agent and which is the patient

- Can be resolved by a prominence hierarchy:
- Topic > Definiteness < Animacy [3]

- 2) *t-u=chi'-ah le=paal hun-tuul*  
PRV-A3=mouth-CMP.B3 DET=child one-CL.AN  
Bit the child a

*x-chiiwo'-o'*  
F-tarantula-D2  
tarantula

Intended: 'A tarantula bit the child' [4]

- Resolved by left dislocation of agent or passivization (see 5) and 6) on handout for examples)

### Constituent order

- Canonical: Verb-Patient-Agent (VPA) [4]
- Most frequent: AVP by left dislocation of the agent
- Also available: PVA by left dislocation of the patient

### Voice

- Yukatek has many voices (active, passive, middle, antipassive)

- Active and passive voices are relevant here

- Passive voice is marked by verbal inflection, either infixing a glottal stop into the vowel of the verb root (root transitives), or by suffixing *-a'b* (derived transitives)

## Accessibility-driven production

### Conceptual accessibility

- Referents that are more easily represented in thought are more highly conceptually accessible and more easily retrieved in lexical search [3]

- Contributions to conceptual accessibility: animacy, givenness, concreteness, perspective, etc.

- Accessibility has been hypothesized to affect syntactic production in two ways:

### Availability

- Referents that are more easily retrieved will be more accessible [9, 11, 13, *inter alia*]

- Accessibility **directly** affects word order by early mention of more accessible referents

### Alignment

- More accessible referents will be preferentially assigned a grammatical function along the hierarchy of grammatical function: SU > DO > IO [3, 8]

- Similar linguistic alignment theories have been proposed for various linguistic phenomena, e.g. Differential Object Marking [1])

- Accessibility **indirectly** affects word order

### Previous studies

- Support for both availability and alignment effects
- Earliest evidence favored alignment account of English active-passive alternation [3]
- 3) Lightning struck the boy
- 4) The boy was struck by lightning
- Later evidence favored an availability account [14]
- Most recent evidence from speakers of Greek and Japanese finds independent effects of direct and indirect accessibility [5, 10]

- ✓ **Could discourse function assignment be another type of alignment?**

## Our experiment

### Design

- 2x2 manipulating animacy (human, inanimate) and thematic role (agent, patient) in transitive events

### Why Yukatek?

- Passive does not presuppose a word order change like it does in English

- Constituent order possibilities

- VPA, AVP, PVA

### Predictions

- Availability** predicts that the more animate referent will be mentioned first (through left dislocation)

- Alignment** predicts that more animate referents will be assigned subject function, and thus a passive voice construction will be chosen

## Methods

- Multilevel logit models with maximal random effect structure for participants and items justified by model comparison

### Procedure

- Video description task
- Target videos manipulated agent and patient animacy in transitive events such as *ball hit policeman* (Figure 1) or *dog chase farmer* (Figure 2)



Figure 1



Figure 2

### Participants

- 23 native speakers of Yukatek Maya, bilingual in Spanish

### Materials

- Videos created with Poser software
- 16 items, 20 fillers

## Results

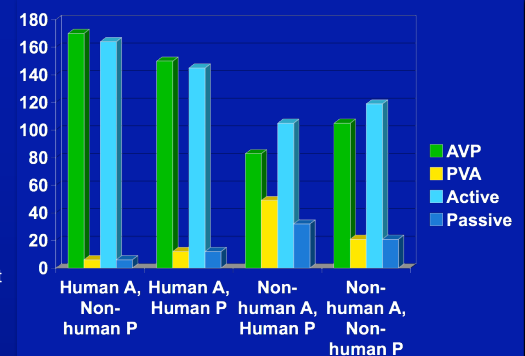
### Constituent order

- Human agents and patients more likely to be mentioned earlier** (agent:  $p < 0.001$ ; interaction: n.s.,  $N = 597$ )
- Additional effects of **definiteness**:
  - Definite agents more likely to be mentioned earlier ( $p < 0.0002$ ) and agent definiteness stronger if patient was also definite (interaction  $p < 0.001$ ; no main effect of patient definiteness)
- Additional effects of **transitivity**:
  - Inanimate agents were less often described transitively ( $p < 0.002$ ; no patient effects; e.g. *An apple hit a man* or *An apple fell on a man*)
- Although partly correlated with these two effects, **animacy effects held after controlling for definiteness and excluding intransitive sentences** ( $p < 0.002$ ; no interaction,  $N = 502$ )

### Voice

- Human agents correlated with use of active voice** ( $p < 0.0001$ ) and **human patients with use of passive voice**, though more weakly ( $p < 0.02$ ,  $N = 604$ )

Voice	AVP	PVA	Other	Total
Active	481 (82.9%)	19 (3.3%)	80 (13.8%)	580
Passive	7 (8.3%)	61 (72.7%)	16 (19%)	84



## Conclusions

- Speakers of Yukatek showed a significant tendency to mention animate referents first
- In line with cross-linguistic findings for Japanese [6], Greek [5], Spanish [13], Odawa [7] and others
- Definiteness and animacy were correlated but had independent effects on constituent order
- Speakers of Yukatek also showed a significant tendency to use the passive voice when human referents were patients and inanimate referents were agents
- Passive voice and constituent order were correlated!
- Can animacy have direct and indirect effects [6]?

## Discussion

- We clearly see the effects of availability
- We cannot rule out the effects of alignment
- Alignment may play a role in encoding of discourse function in place of, or in addition to, grammatical function (if discourse function is marked syntactically)
- We show feasibility of field-based psycholinguistic studies
- **References, additional language data and abbreviations available on handout**

## Yukatek repair of prominence hierarchy violation (in 2))

Left dislocation

- 5) *hun-túul*      *x-chiiwol=e'*      *t-u=chi'-ah*      *le=pàal-o'*  
one-CL.AN      F-tarantula-D3      PRV-A3=mouth-CMP.B3      DET=child=D2  
**A**      **taranutla,**      **it bit**      **the child** [4]

Passivization

- 6) *h-chi'-b*      *le=pàal*      *tumèen*      *hun-túul*      *x-chiiwol=o'*  
PRV-mouth-PASS.CMP.B3      DET=child      CAUSE      one-CL.AN      F-tarantula-D2  
**Was bit**      **the child**      **by**      **a**      **tarantula** [4]

## Example responses to experimental stimuli

Human Agent, Inanimate Patient, Active AVP

- 7) *Le=máak=o'*      *t-u=fah-ah*      *le=mesa=o'*  
DET=person=D2      PRV-A3=slap-CMP.B3      DET=table=D2  
**The person**      **is slapping**      **the table**

Inanimate Agent, Human Patient, Passive PVA

- 8) *Le=máak=o'*      *túun*      *híirix-t-a'l*      *tuméen u=káamyon*  
DET=person=D2      PROG.A3      slide-APP-PASS.INC      CAUSE A3=truck  
**The person**      **is being slid along**      **by a truck**

## Abbreviations

A	Set A pronominal cross-reference marker
APP	Applicative
B	Set A pronominal cross-reference marker
CAUSE	Causal
CL.AN	Animate Classifier
CMP	Completive
D2	Distal/anaphoric indexical particle
D3	Text deictic particle
DET	Determiner
PASS	Passive
PROG	Progressive
PRV	Perfective

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