Lexical flexibility: Expanding the empirical coverage

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Lexical Flexibility

The use of a word in more than one discourse function (reference, predication, modification) with no overt derivational morphology.

In other words …

The use of the same word for more than one part of speech (noun, verb, adjective).

(bad definition)

English (Indo-European > Germanic)

N: And the spots of **paint** would change every hundred degrees.

V: One story does come to mind though where you **painted** the foundation coating on the house and got tar all over you.

A: And it happened to be one of the rare **paint** jobs.

English (Indo-European > Germanic)

N flexibility:

N: administrat**or**

V: administrate

A: administrat**ive**

unmarked (“primary” / “basic”) form

Mandinka (Mande > Manding)

N:	**Kuuráŋ**-o	mâŋ	díyaa.
	sick-DEF	PFV.NEG	pleasant
	‘Sickness is not pleasant.		

V:	Díndíŋ-o	máŋ	**kuraŋ**.
	child-DEF	PFV.NEG	**sick**
	‘The child is not sick.’		

Creissels (2017: 46)

Mundari (Austroasiatic > Munda)

buru=ko bai-ke-d-a.
mountain=3PL.SUBJ make-COMPL-TR-IND
'They made the mountain.'

saan=ko **buru**-ke-d-a.
firewood=3PL.SUBJ **mountain**-COMPL-TR-IND
'They heaped up the firewood.'

Evans & Osada (2005: 354)

Nuuchahnulth (Wakashan > Southern Wakashan)

N:	watqšiƛ	ʔaƛimt
	watq-ši(ƛ)	**ʔaƛa**-imt
	swallow-MOM	**two**-PAST
	completely.swallowed	two
	‘He swallowed two of them […]’	

V:	wiḵaƛ	haʔukšiƛ	ʔaƛiičiƛ
	wik-ʾaƛ	haʔuk-ši(ƛ)	**ʔaƛa**-ʿi·čiƛ
	not-FIN	eat-MOM	**two**-INCEP
	didn’t	ate	became.two
	‘He [Mink] didn’t eat them and [the crabs] became two.’		

A:	hiiɬtqyaaṗup	**ʔaƛa**	qʷayaćiik
	hiɬ-tqya·ṗi-up	**ʔaƛa**	qʷayaćiːk
	there-back-MOM.CAUS	two	wolf
	put.on.the.back	two	wolf
	‘Two wolves put [the dead wolf] on their back.’		

Louie (2003: Qawiqaalth 57, Mink 266, FoodThief 46)

Quechua (Quechuan)

N: rikaška: **hatun**-(kuna)-ta
I.saw **big**-(PL)-ACC
'I saw the big one(s)'

V: chay runa **hatun** (kaykan)
that man **big** (is)
'that man is big'

A: chay **hatun** runa
that **big** man
'that big man'

Tongan (Austronesian > Polynesian)

N: na’e **lele** e kau **fefiné**
PAST **run** SPEC PL.HUM **woman**.DEF
‘The women were running.’

V: na’e **fefine** kotoa e kau **lelé**
PAST **woman** all SPEC PL.HUM **run**.DEF
‘The ones running were all female.’

Broschart (1997: 134)

Central Alaskan Yup’ik (Eskimo-Aleut > Yup’ik)

	[illegible]	‘dirt’; ‘be dirty’
	[illegible]	‘very’
N:	[illegible]	‘one that is very dirty’
V:	[illegible]	‘be very dirty’

	[illegible]	‘see’
	[illegible]	‘imitation, inauthentic’; ‘pretend to, without serious purpose’
N:	[illegible]	‘movie, vision, hallucination’
V:	[illegible]	‘hallucinate, watch a movie’

	[illegible]	‘corner of mouth’
	[illegible]	‘thing held in one’s mouth’; ‘to put in one’s mouth’
N:	[illegible]	‘chewing tobacco’
V:	[illegible]	‘put in one’s mouth’

Mithun (2017: 159-160)

The “problem” of lexical flexibility

Tongan (Austronesian > Polynesian)

N:	na’e	**lele**	e	kau	**fefiné**
	PAST	**run**	SPEC	PL.HUM	**woman**.DEF
	‘The women were running.’				

V:	na’e	**fefine**	kotoa	e	kau	**lelé**
	PAST	**woman**	all	SPEC	PL.HUM	**run**.DEF
	‘The ones running were all female.’					

The “problem” of lexical flexibility

Proposed Solutions

- be selective about the criteria
  - methodological opportunism
- treat them as separate words
  - overlooks a potentially huge portion of the lexicon
  - *why* are some words flexible (or not)?
- create new supercategories
  - how do you explain the idiosyncratic / non-predictable meanings and gaps?
- create new subcategories
  - why subcategories rather than categories?
  - where does the splitting stop?
- deny the existence of categories
  - how to explain the prototypical patterns we see?

A functional approach

- **Construction Grammar:** Languages don’t have categories; they have *constructions*.

Numerals in Russian

		odin 1	*dvo* 2	*tri* 3	*pjat'* 5	*sto* 100	*tysjača* 1,000	*million* 1,000,000
	1. Agrees with N in syntactic number	+	–	–	–	–	–	–
	2. Agrees in case throughout	+	–	–	–	–	–	–
	3. Agrees in gender	+	(+)	–	–	–	–	–
	4. Marks animacy	+	+	+	–	–	–	–
not the case that	5. Has own plural	+	+	+	+	(–)	–	–
not the case that	6. Takes agreeing determiner	+	+	+	+	+	–	–
not the case that	7. Takes N in genitive plural throughout	+	+	+	+	+	±	–

Corbett (1978: 359)

Adjectives & Adverbs in English

	1	2	3	4
asleep	–	–	–	–
alike	–	?+ [60])	–	–
one, two, etc.	–	–	–	+
inside, downstairs	–	–	–	+
top, bottom	–	–	+	+
old, young, fast, big, poorly, small	–	+	+	+
hard, kindly, low	?+	+	+	+

Crystal (1967: 51)

A functional approach

Construction Grammar: Languages don't have categories; they have *constructions*.

Cognitive Linguistics: Mental categorization is *prototypal*.

Prototypes in Categorization

Highly Prototypical

- chair
- sofa
- couch
- table
- dresser
- coffee table
- desk

Less Prototypical

- lamp
- piano
- mirror
- television
- stove
- ashtray
- telephone

Rosch (1975: 229)

Prototype Effects

- prototypical members are consistently rated as good examples of the category
- prototypical members are listed first
- prototypical members are listed more frequently
- prototypical members are identified more quickly

Taylor (2003: 46-47), summarizing Rosch's research

A functional approach

Construction Grammar:	Languages don't have categories; they have *constructions*.
Cognitive Linguistics:	Mental categorization is *prototypal*. The meanings and functions of words are also prototypal.
Typology:	The uses of words in different functions are constrained by *universals*.

Typological Markedness (Croft)

Parts of speech emerge from the way that speakers use object, action, and property words for different functions in discourse (reference, predication, and modification).

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MEANING	**object**			
	action			
	property			

Typological Markedness (Croft)

Parts of speech emerge from the way that speakers use object, action, and property words for different functions in discourse (reference, predication, and modification).

		FUNCTION		
		reference	**predication**	**modification**
MEANING	**object**			
	action			
	property			

Typological Markedness (Croft)

Parts of speech emerge from the way that speakers use object, action, and property words for different functions in discourse (reference, predication, and modification).

		FUNCTION		
		reference	**predication**	**modification**
MEANING	**object**	prototypical noun		
	action		prototypical verb	
	property			prototypical adjective

Typological Markedness (Croft)

		FUNCTION		
		reference	**predication**	**modification**
MEANING	**object**	prototypical noun	predicate nominal	noun-noun modification
	action	infinitive gerund action nominal	prototypical verb	participle relative clause
	property	abstract noun	predicate adjective	prototypical adjective

Typological Markedness (Croft)

		FUNCTION		
		reference	**predication**	**modification**
MEANING	**object**	prototypical noun	predicate nominal	noun-noun modification
	action	infinitive gerund action nominal	prototypical verb	participle relative clause
	property	abstract noun	predicate adjective	prototypical adjective

These non-prototypical uses tend to have special markers for these functions!

Typological Markedness (Croft)

Non-prototypical uses of words are marked:

- morphologically
- behaviorally
- frequentially
- semantically

Typological Markedness (Croft)

Non-prototypical uses of words are ~~marked~~ ***at least as marked***:

- morphologically
- behaviorally
- frequentially
- semantically

Stronger Claim: Non-prototypical uses of words are *always* marked in at least one of these ways, and perhaps always semantically.

Lexical flexibility: A functional perspective

- Lexical flexibility is the natural and expected result of the fact that these non-prototypical uses are *not* always morphologically marked, even when they are marked in other ways.

- Lexical flexibility is not so much a problem as a *design feature of language*.

Lexical flexibility: A functional perspective

- A functionalist approach inverts the lexical flexibility question: The interesting question is not why some languages fail to make distinctions in parts of speech (framing it as a deficit), but rather why languages develop specialized constructions for different discourse functions in the first place.

- Lexical flexibility exists in the areas where specialization has yet to develop in the grammar. It should be considered the natural state of affairs.

Lexical flexibility as an object of study

- Studies treating lexical flexibility as worthy of study in its own right, rather than a problem, are recent.

- We know very little about the *behavior* or *extent* of lexical flexibility.

Behavior: Locus of Categoriality (root)

Central Alaskan Yup'ik (Eskimo-Aleut > Yup'ik)

	[illegible]	'dirt'; 'be dirty'
	[illegible]	'very'
N:	[illegible]	'one that is very dirty'
V:	[illegible]	'be very dirty'

Mithun (2017: 159)

Behavior: Locus of Categoriality (stem)

Coos (Coosan)

tsoːwe^{x}tɬ
‘grease’

tɬ’kwiː
‘blanket’

n̥-**tsoːʷ^{x}tɬ**-ts
1SG-**grease**-TR
‘I greased it’

tɬ’kwi-t
cover-TR
‘she covered [them] with blankets’

Frachtenberg (1922: 328-329)

Behavior: Locus of Categoriality (inflected word)

Chitimacha (isolate)

dzampuyna
dza-m-puy-na
thrust-PLACT-HAB-NF.PL
V: ‘they usually thrust / spear (with it)’
N: ‘spear’

pamtuyna
pa-m-tuy-na
ford-PLACT-HAB-NF.PL
V: ‘they usually cross (it)’
N: ‘spear’

Cayuga (Iroquoian)

ǫtekhǫnyáʔthaʔ
ye-ate-khw-ǫni-aʔt-haʔ
INDEF.AGT-REFL-meal-make-INSTR-IPFV
V: ‘one makes a meal with it’
N: ‘restaurant’

kaǫtanéhkwi
ka-rǫt-a-nehkwi
NEUT.AGT-log-EP-haul.IPFV
V: ‘it hauls logs’
N: ‘horse’

Chitimacha: Swadesh (1939); Cayuga: Mithun (2000: 200)

Extent of Flexibility: Mundari

noun only	722	20%
verb only	1,099	28%
noun and verb	1,953	52%
Total	**3,824**	**100%**

Evans & Osada (2005: 383)

Extent of Flexibility: Central Alaskan Yup’ik

noun only	35%
verb only	53%
noun and verb	12%
Total	**100%**

Mithun (2017: 163)

Variability in Extent of Flexibility

	Mundari	**Yup'ik**
noun only	20%	35%
verb only	28%	53%
noun and verb	52%	12%
Total	**100%**	**100%**

Mundari: Evans & Osada (2005: 383); Yup'ik: Mithun (2017: 163)

Open Questions on Lexical Flexibility

- Generally how flexible are languages and individual words within them? Just how prevalent is lexical flexibility?
- Is there a correlation between degree of flexibility for a word and its frequency / corpus dispersion?
- What are the semantic properties of more or less flexible words?

Data

- English (Indo-European > Germanic)
  - Open American National Corpus
  - 15 million words total
  - spoken portion: 3.2 million words (Charlotte + Switchboard)

- Nuuchahnulth (Wakashan > Southern Wakashan; Vancouver Island)
  - George Louie & Caroline Little, with Toshihide Nakayama (UCSB alum)
  - 24 texts, 8,300 words (fully glossed)
  - All spoken texts: personal narratives, myths, procedural texts
  - Retyped texts in scription format; parsed into DLx format

(In)famous Nuuchahnulth Examples

qo·ʔas-ma **ʔi·ḥ**-ʔi

man-3SG.IND **large**-DEF

‘The large one is a man.

ʔi·ḥ-ma **ʔo·ʔas**-ʔi

large-3SG.IND **man**-DEF

‘The man is large.’

mamo·k-ma **ʔo·ʔas**-ʔi

work-3SG.IND **man**-DEF

‘The man is working.’

ʔo·ʔas-ma **mamo·k**-ʔi

man-3SG.IND **work**-DEF

‘The working one is a man.’

Methods: Measuring Flexibility

1. Count the number of times that each lexeme (stem) is used for reference, predication, and modification.

English: *paint*

N: And the spots of **paint** would change every hundred degrees.

V: One story does come to mind though where you **painted** the foundation coating on the house and got tar all over you.

A: And it happened to be one of the rare **paint** jobs.

Methods: Measuring Flexibility

1. Count the number of times that each lexeme (stem) is used for reference, predication, and modification.

lexeme	reference	predication	modification	flexibility
paint	131	139	47	???

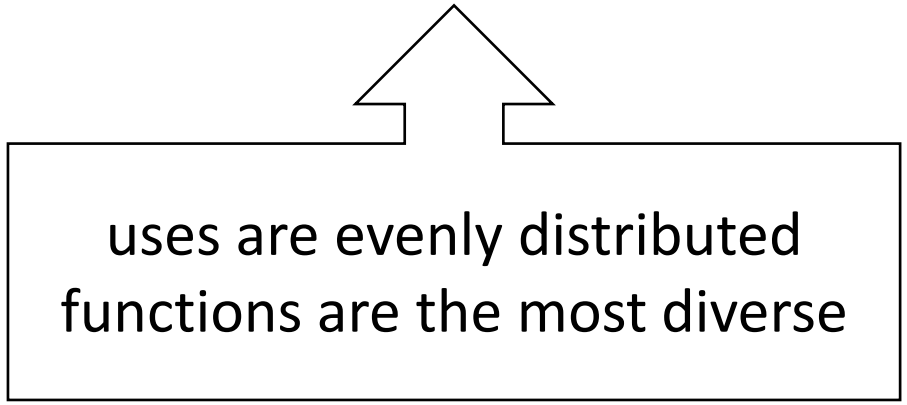
Methods: Measuring Flexibility

Perfectly Flexible

lexeme	reference	predication	modification
stem	100	100	100

Perfectly Rigid

lexeme	reference	predication	modification
stem	300	0	0



Methods: Measuring Flexibility

1. Count the number of times that each lexeme (stem) is used for reference, predication, and modification.
2. Calculate how diverse the functions of the lexeme are using a statistical diversity measure (normalized Shannon's H).

lexeme	reference	predication	modification	flexibility
paint	131	139	47	???

Methods: Measuring Flexibility

Shannon's H

- Originally a measure of entropy (uncertainty / information content)
- diversity = uncertainty
- Frequently used as a diversity index in ecology.

Shannon's H Normalized ($0 \leq H \leq 1$)

$$H_{rel} = -\frac{\sum_{i=1}^{n}(p_i \cdot \ln p_i)}{\ln n}$$

```
# Shannon's H for "paint"
frequencies <- c(131, 139, 47)
percents    <- frequencies/sum(frequencies)

H <- sum(
  percents * log(percents) /
  log(length(percents))
)
```

Methods: Measuring Flexibility

1. Count the number of times that each lexeme (stem) is used for reference, predication, and modification.
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lexeme	reference	predication	modification	flexibility
paint	131	139	47	**0.92**

$$H \approx 0.92$$

Very flexible!

Methods: Measuring Flexibility

1. Count the number of times that each lexeme (stem) is used for reference, predication, and modification.
2. Calculate how diverse the functions of the lexeme are using a statistical diversity measure (normalized Shannon's H).
3. Repeat with other lexemes.

lexeme	reference	predication	modification	flexibility
paint	131	139	47	0.92
study	1	3	1	0.86
back	272	54	143	0.84
end	604	693	34	0.72
work	1381	3698	323	0.71
		⋮		
know	7	11496	41	0.03
hate	0	442	2	0.03
week	1476	0	3	0.01
way	3730	1	1	0.005
like	1	3105	0	0.003

Methods: Measuring Flexibility

4. Repeat with other languages.

lexeme	gloss	reference	predication	modification	flexibility
□□□	all	3	3	2	0.99
□ □□	four	2	3	1	0.92
□□□□□□□□	eight	2	3	1	0.92
□□□□	some	9	8	3	0.92
I□□□□□	one	3	8	2	0.84
			⋮		
□□□□□	chief	29	6	0	0.42
□□□	say	6	199	0	0.12
□□□□	canoe	36	1	0	0.11
□□□□□□	person	78	2	0	0.11
□□□	not	1	138	0	0.04

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qo·ʔas-ma ʔi·ḥ-ʔi
man-3SG.IND large-DEF
‘The large one is a man.

ʔi·ḥ-ma **ʔo·ʔas**-ʔi
large-3SG.IND **man**-DEF
‘The man is large.’

mamo·k-ma **ʔo·ʔas**-ʔi
work-3SG.IND **man**-DEF
‘The man is working.’

ʔo·ʔas-ma mamo·k-ʔi
man-3SG.IND work-DEF
‘The working one is a man.’

Methods: Measuring Flexibility

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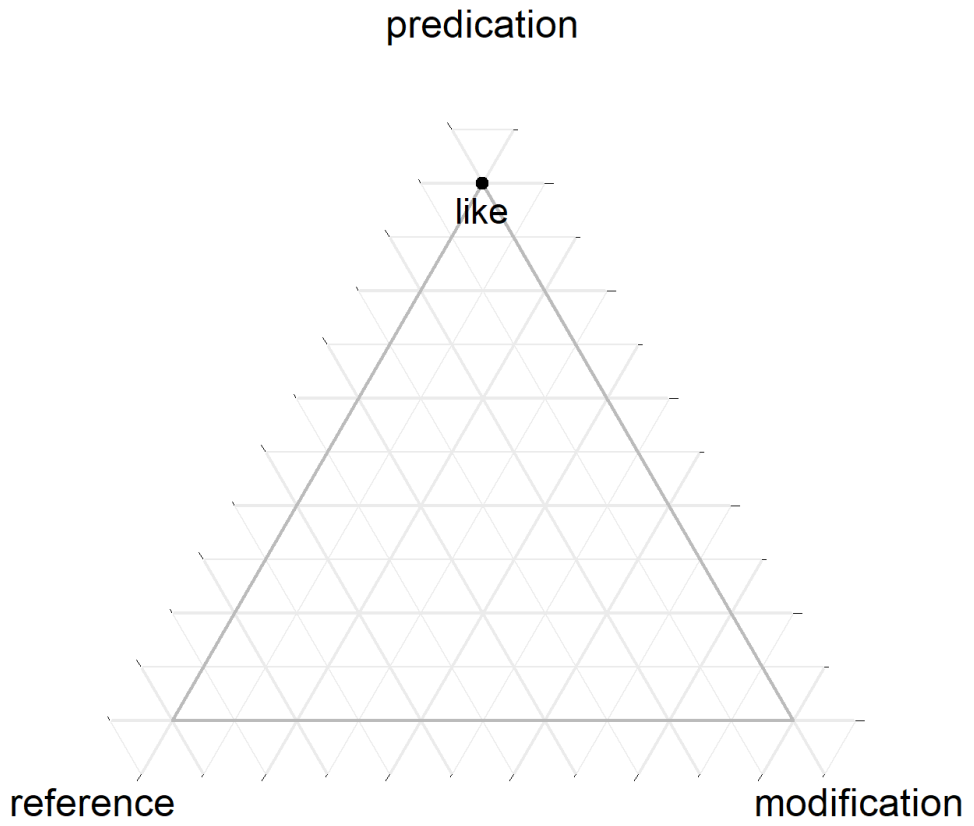
Methods: Measuring Flexibility

4. Repeat with other languages.
5. Visualize the results.

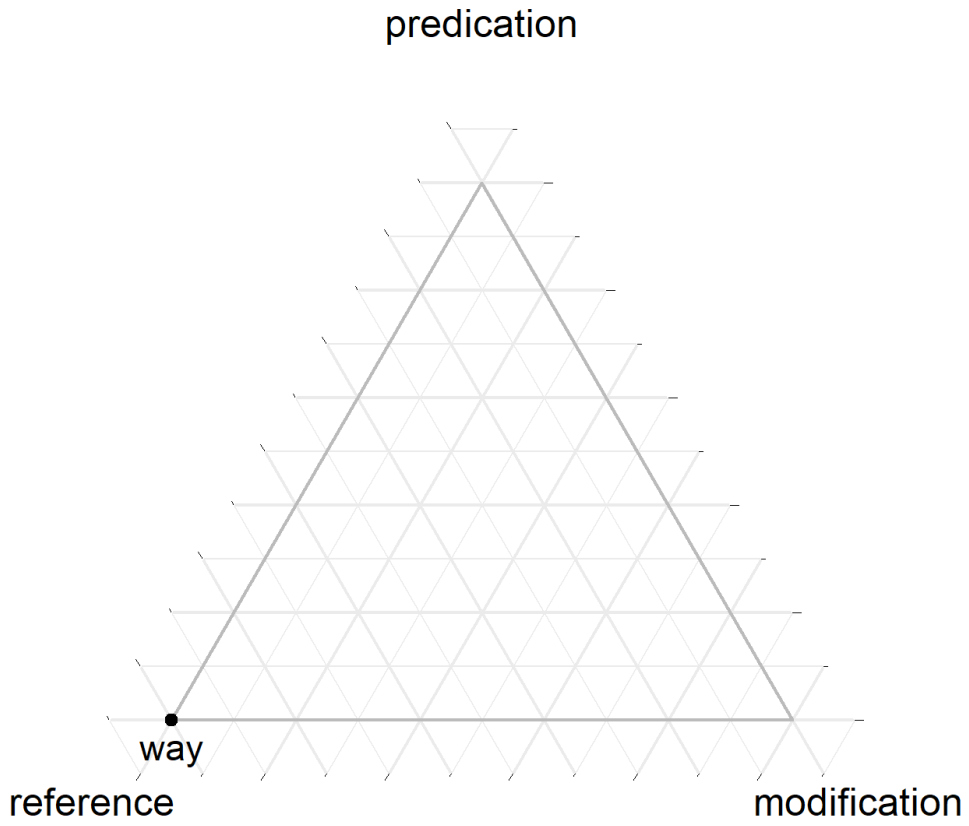
lexeme	reference	predication	modification	flexibility
like	1	3105	0	0.003



Methods: Measuring Flexibility

4. Repeat with other languages.
5. Visualize the results.

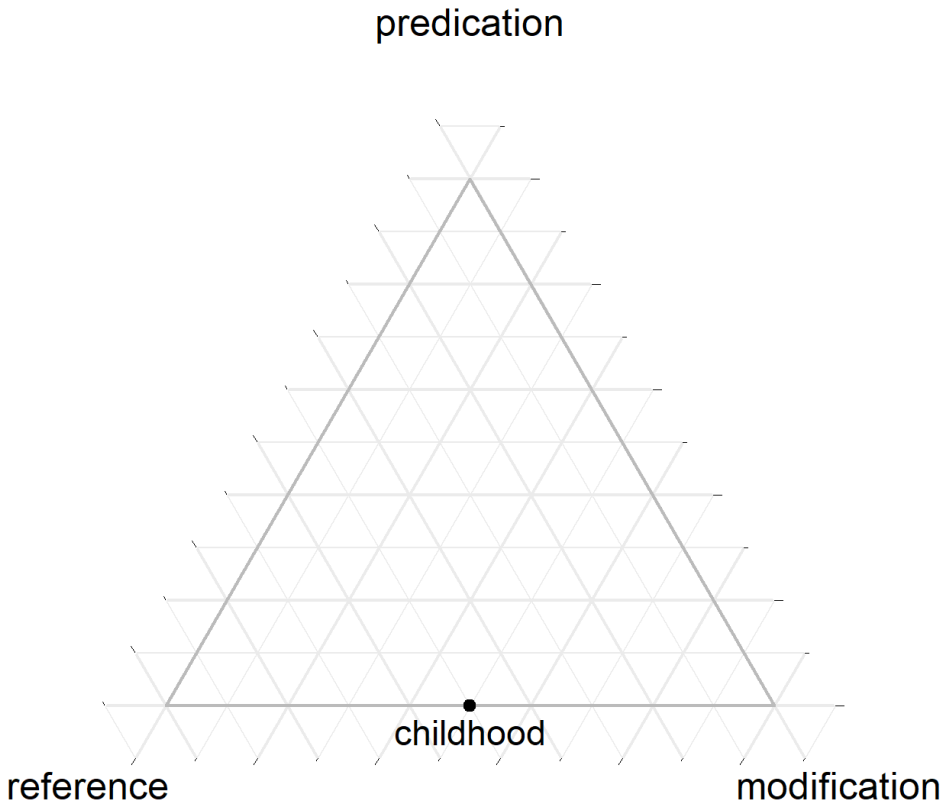
lexeme	reference	predication	modification	flexibility
way	3730	1	1	0.005



Methods: Measuring Flexibility

4. Repeat with other languages.
5. Visualize the results.

lexeme	reference	predication	modification	flexibility
childhood	2	0	2	0.63



Methods: Measuring Flexibility

4. Repeat with other languages.
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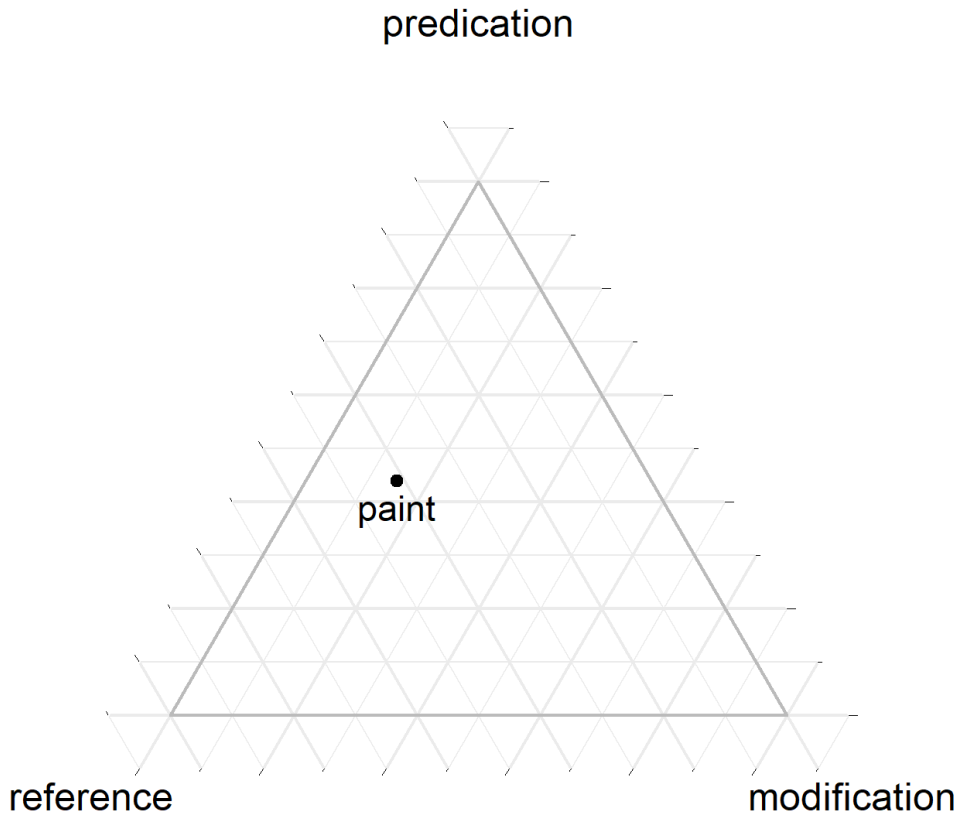
lexeme	reference	predication	modification	flexibility
paint	131	139	47	0.92

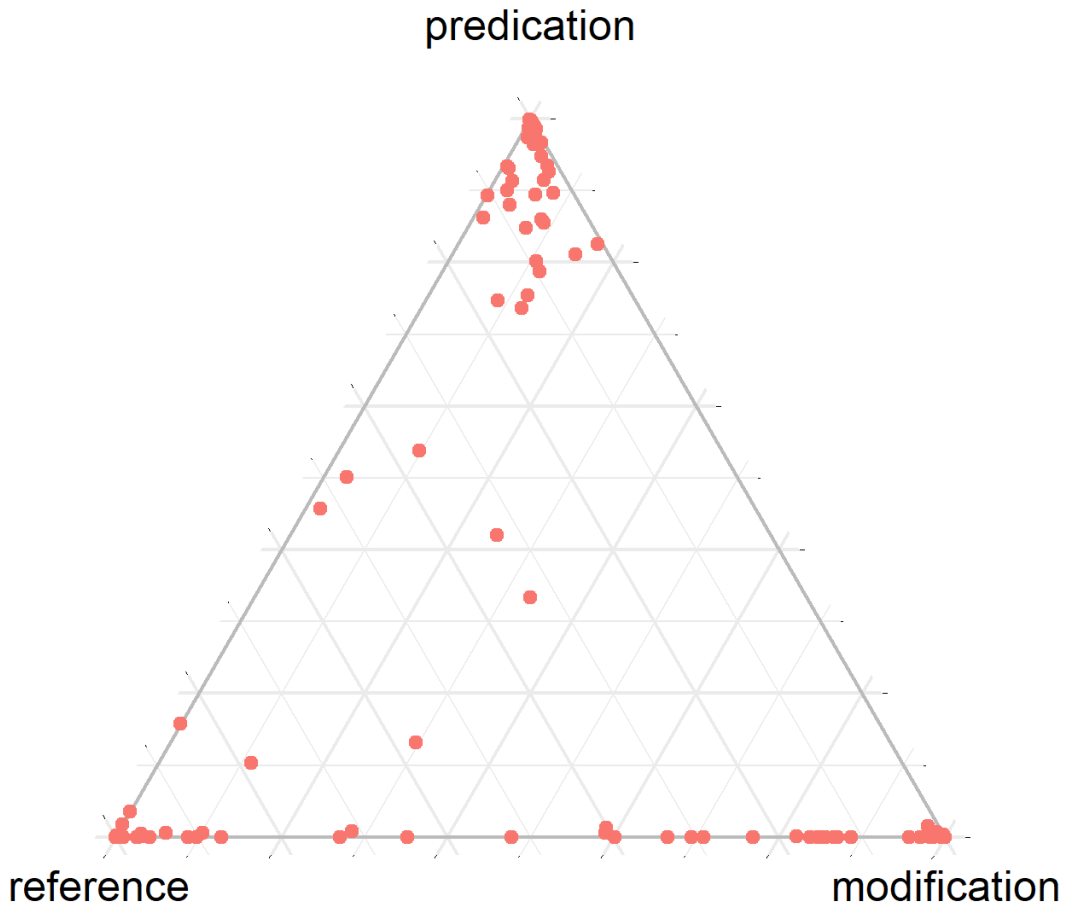


Results

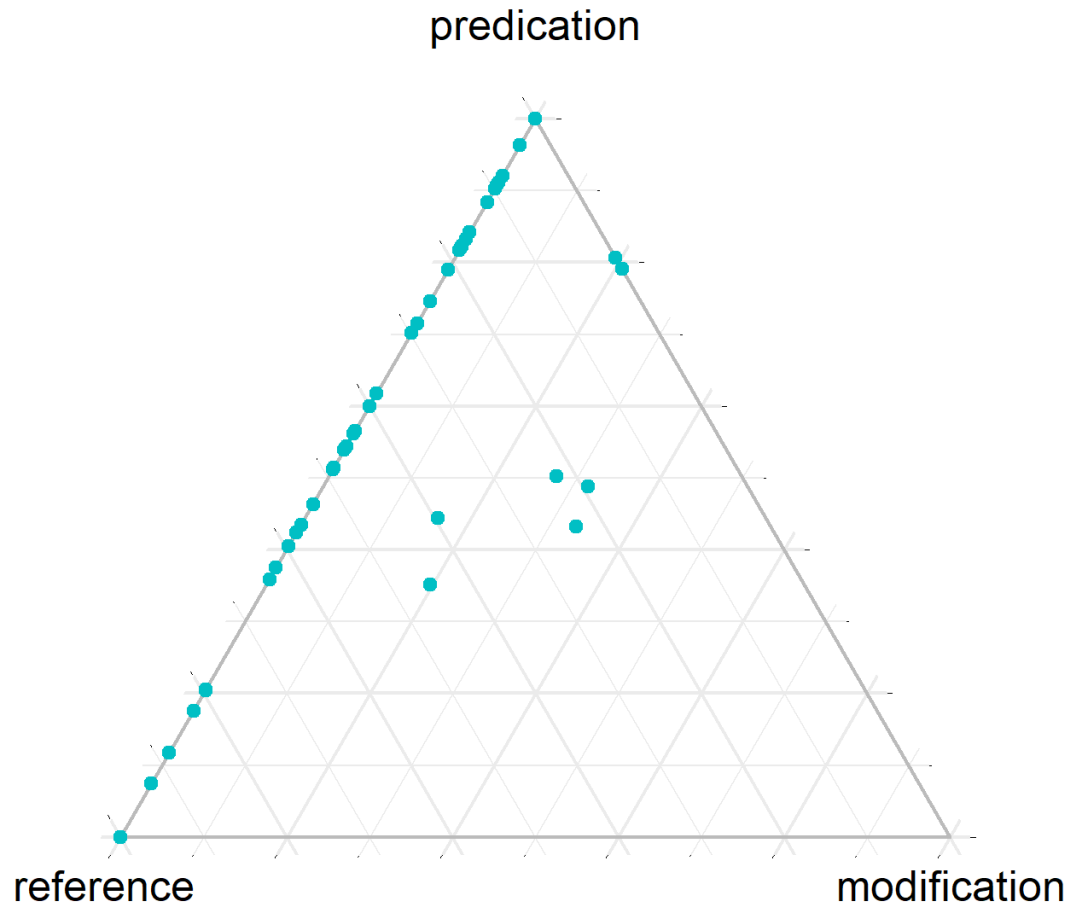
What happens when you plot an entire language?

100-lexeme sample

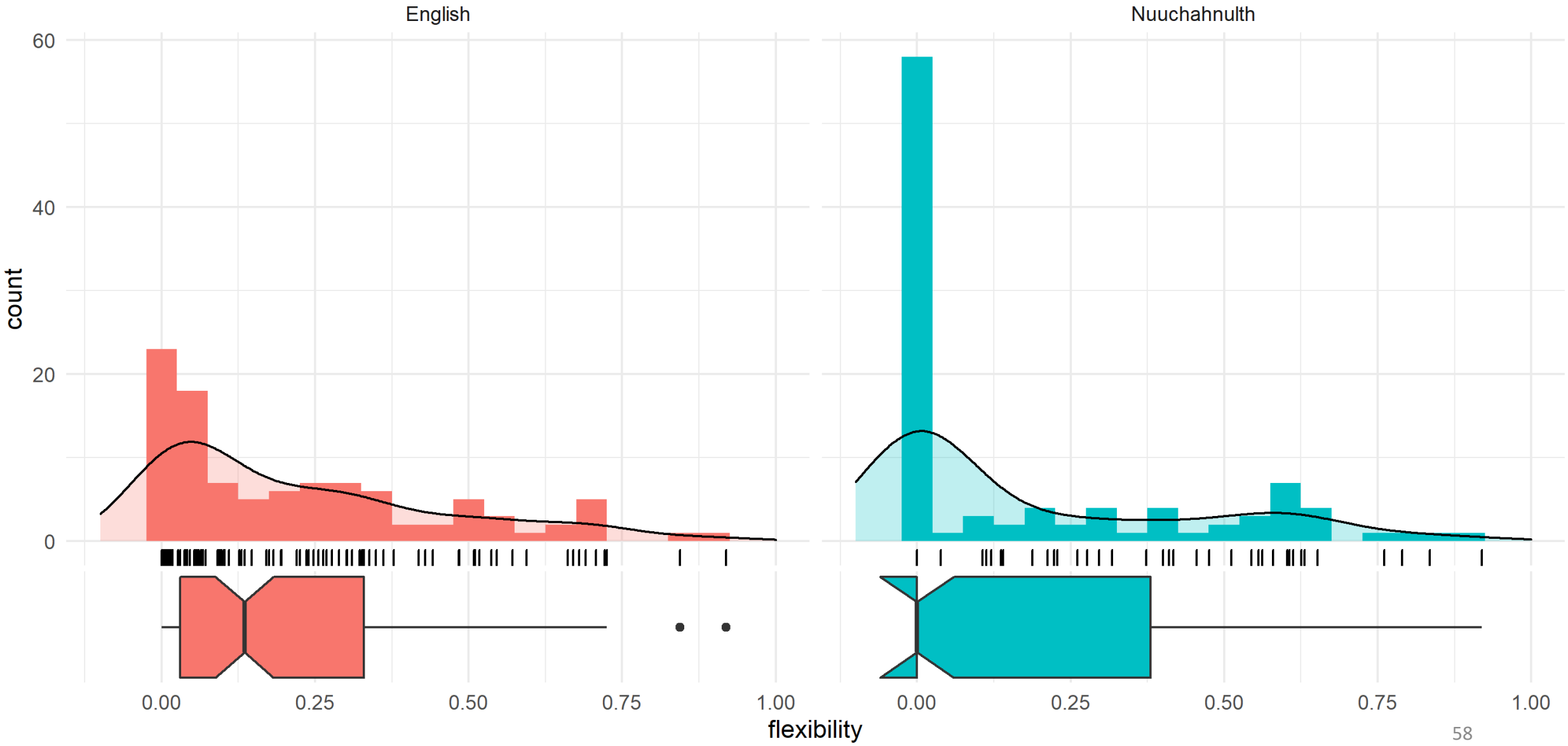
English



Nuuchahnulth

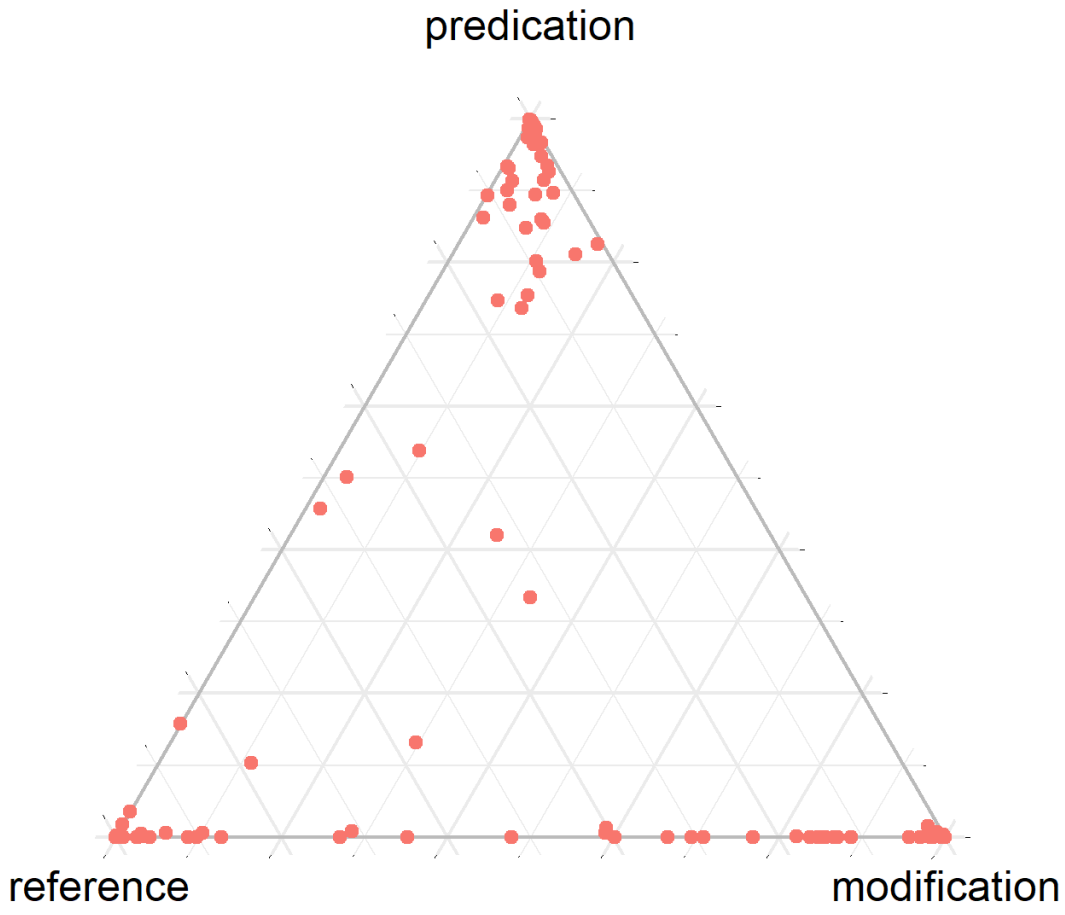


100-lexeme sample

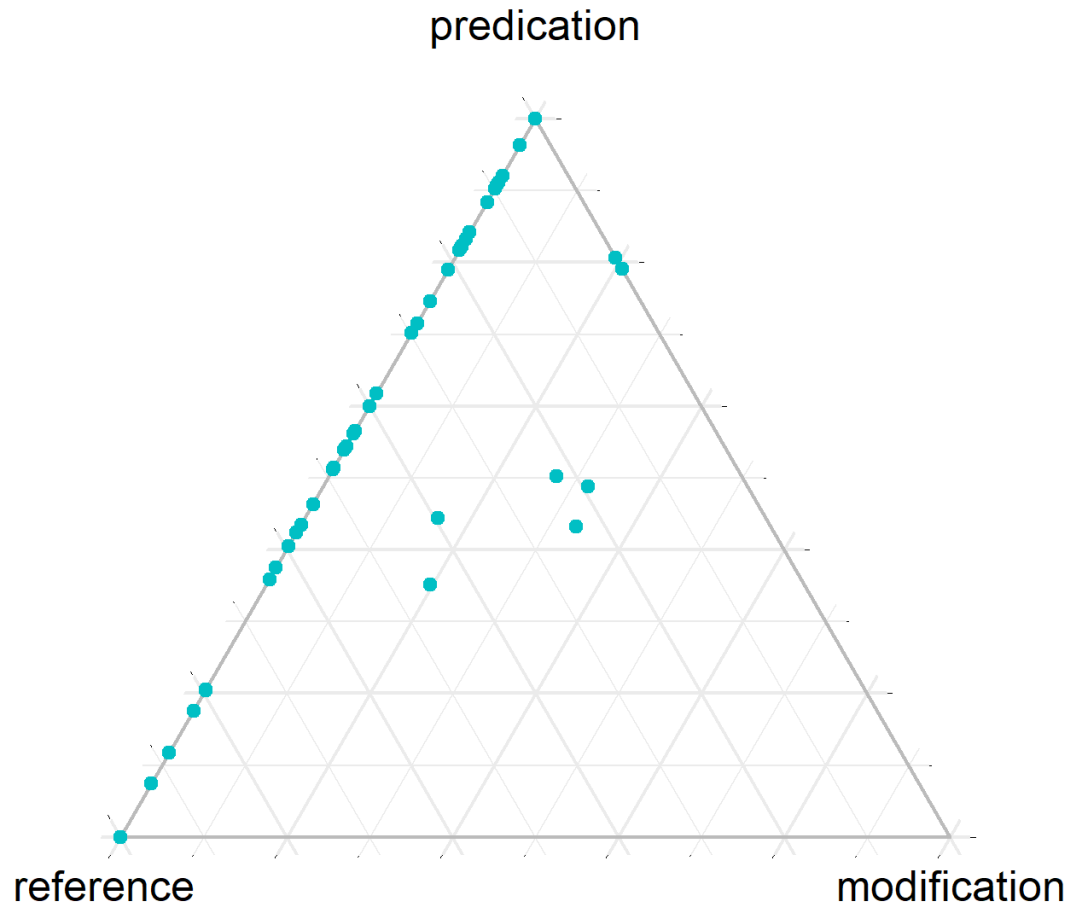


100-lexeme sample

English

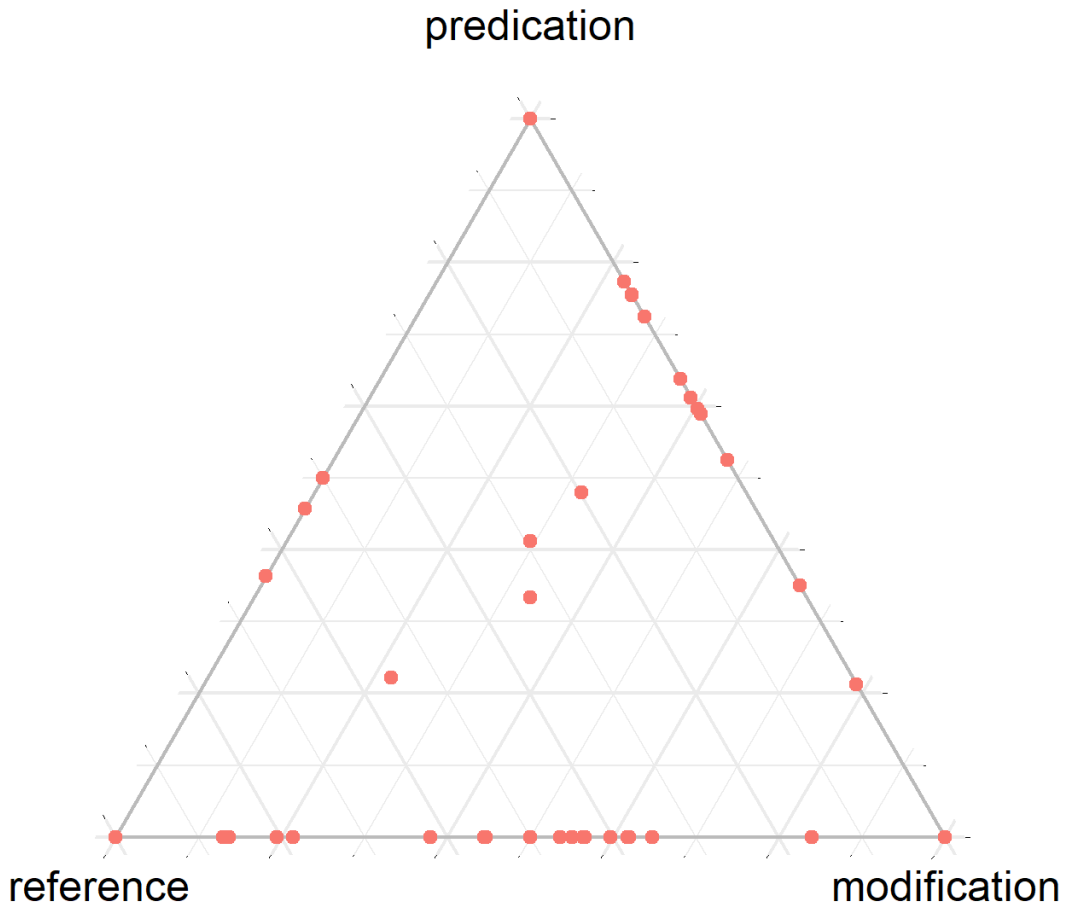


Nuuchahnulth

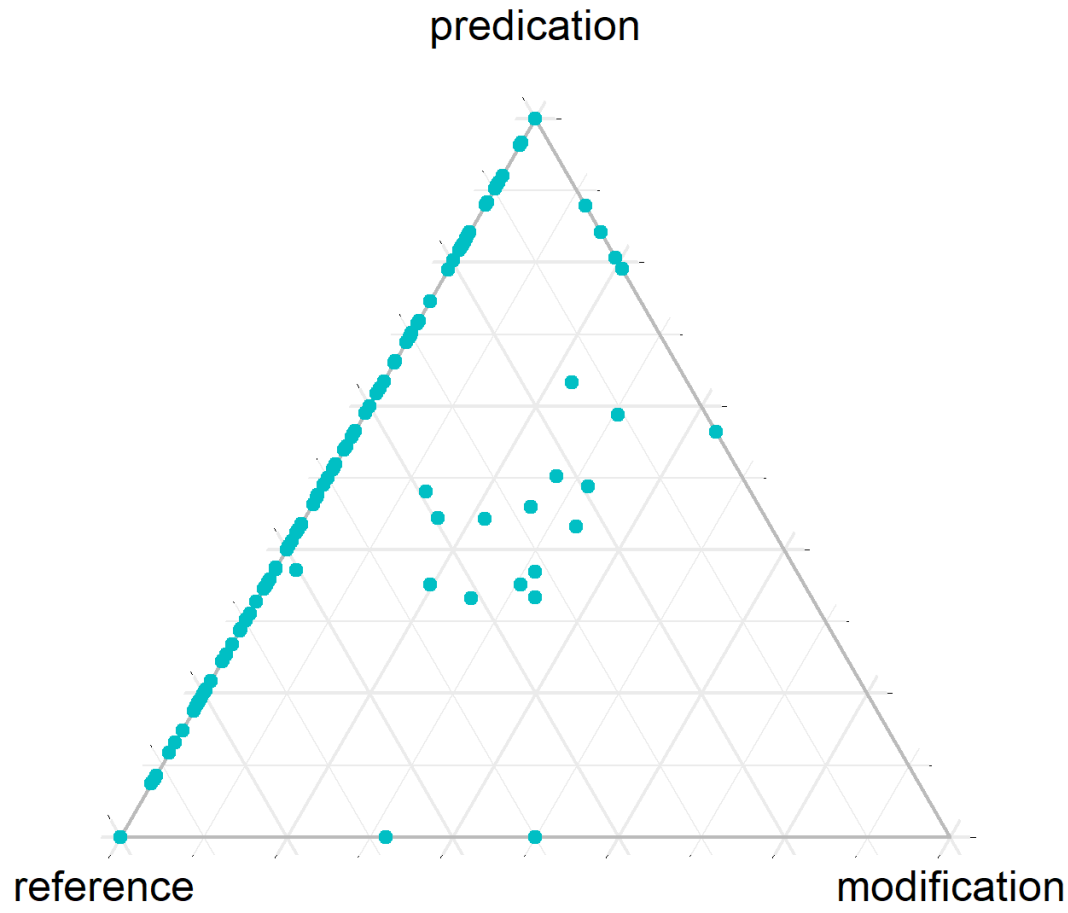


Small corpus sample (~10,000 tokens)

English



Nuuchahnulth



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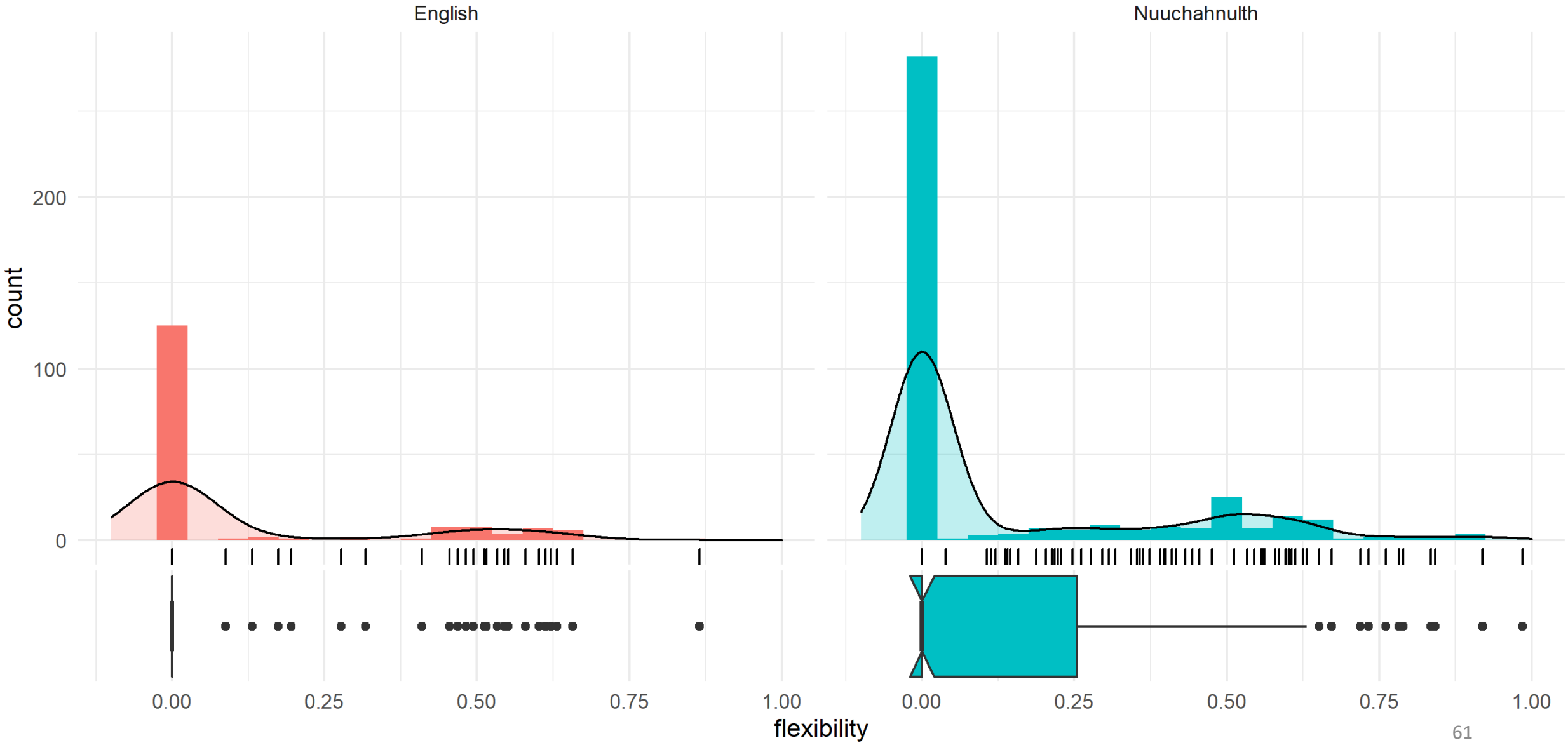


Semantic Patterns

- Nuuchahnulth has a definite marker *-ʔiː*, which is always used to refer. It is sometimes thought to have a disambiguating function (e.g. when predicates are used to refer).
- Nuuchahnulth has a set of aspect markers that indicate how speakers are construing the temporal structure of an event (e.g. something ongoing / continuous, bounded, repetitive, etc.)
- Aspect markers in Nuuchahnulth are *not* always used to predicate. They can also be used on nominals. This is generally thought to be a contributing factor to Nuuchahnulth's flexibility.

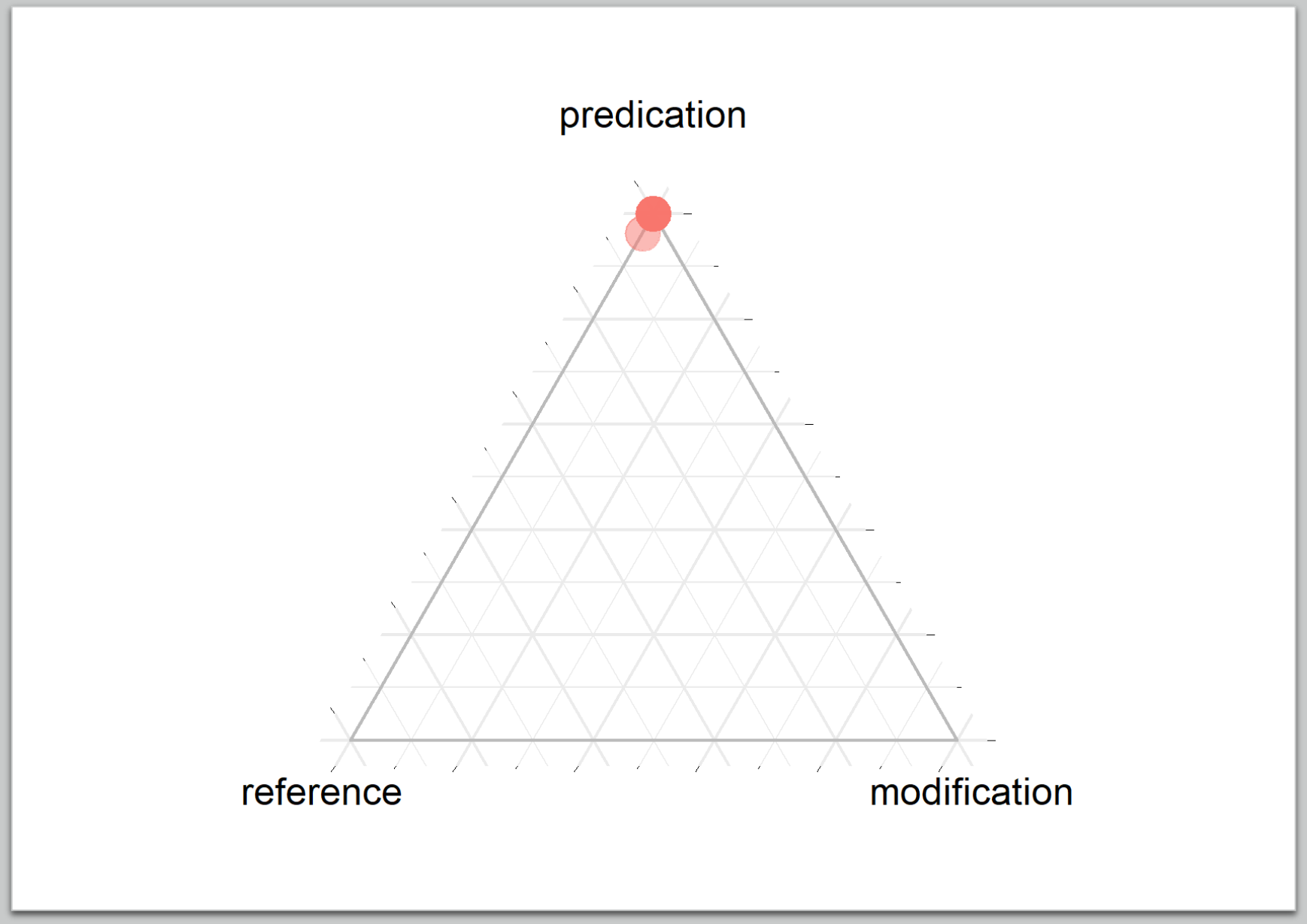
Semantic Patterns

Question: Are some aspect markers more strongly associated with certain functions?

Question: Are some aspect markers more strongly associated with the definite marker?

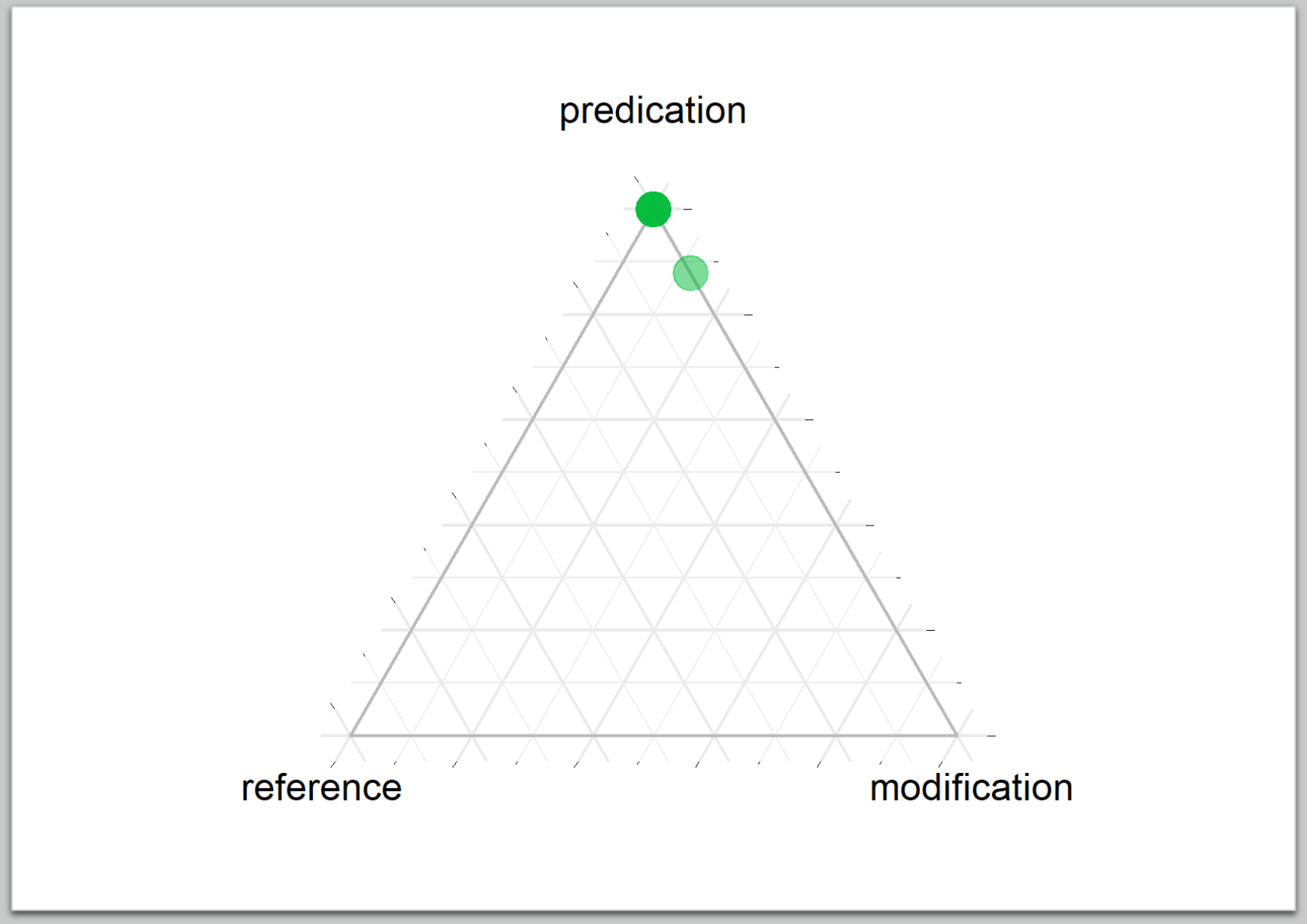
Continuative

‘ongoing’



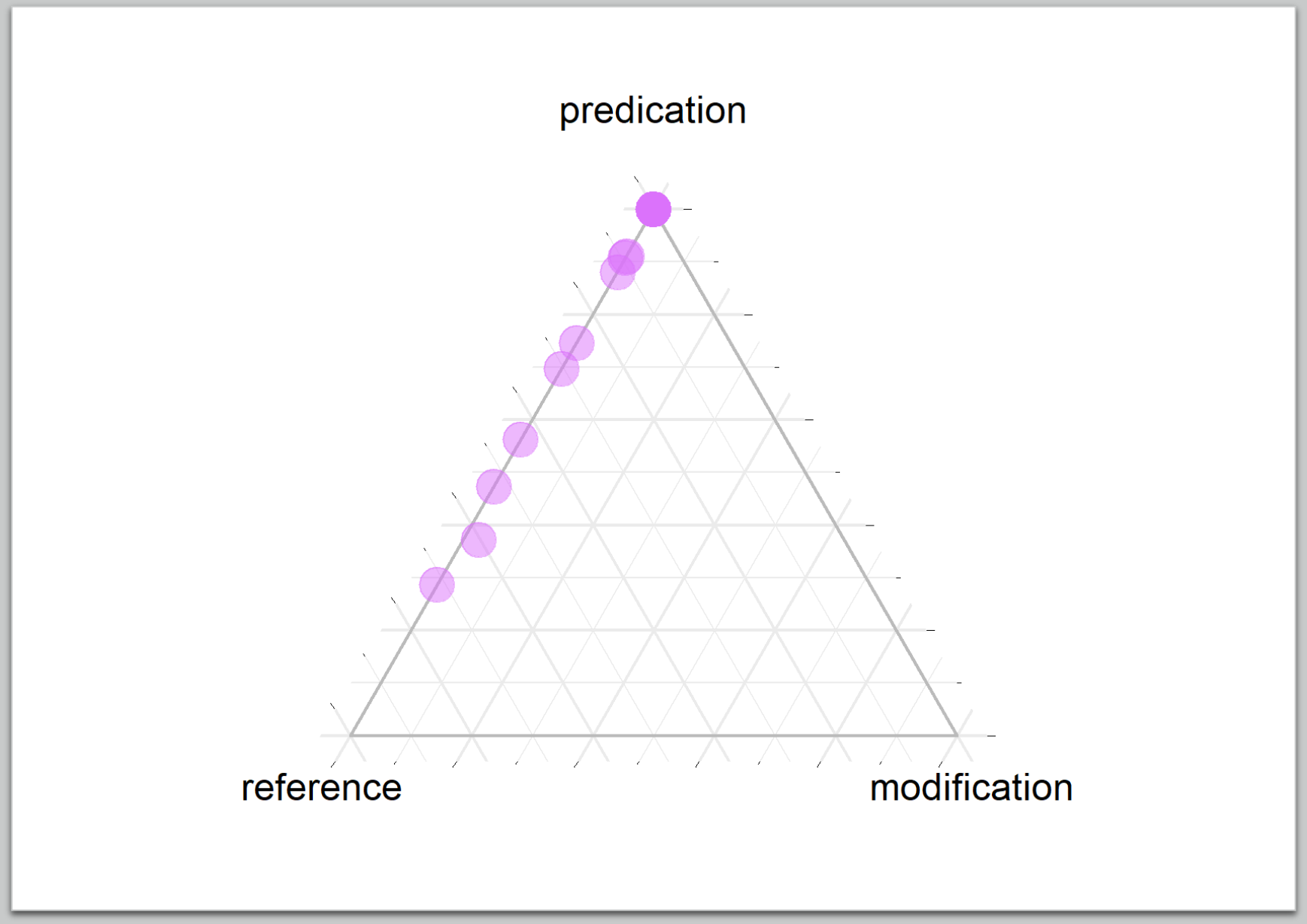
Inceptive

‘beginning’



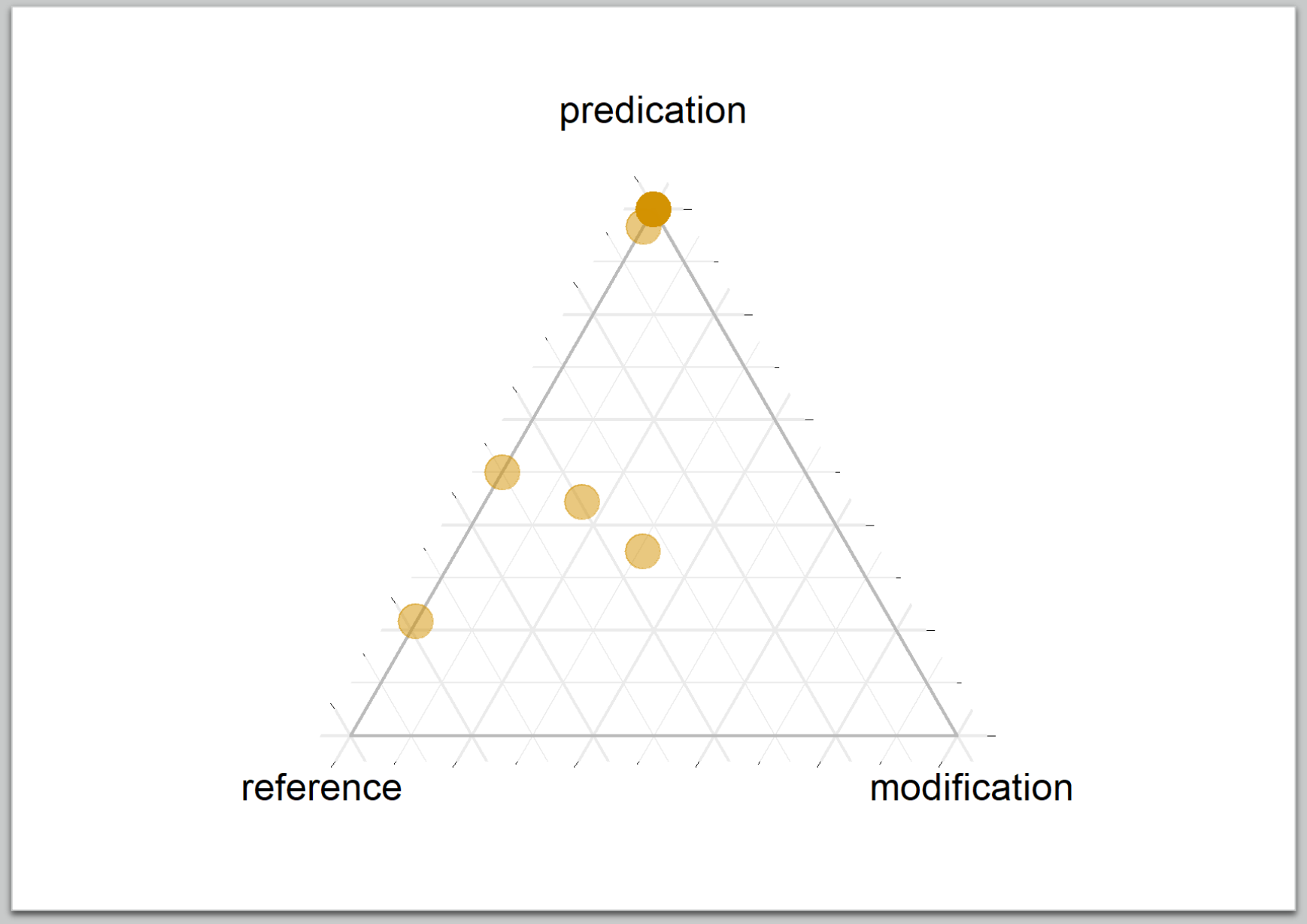
Telic / Finite

‘ended’

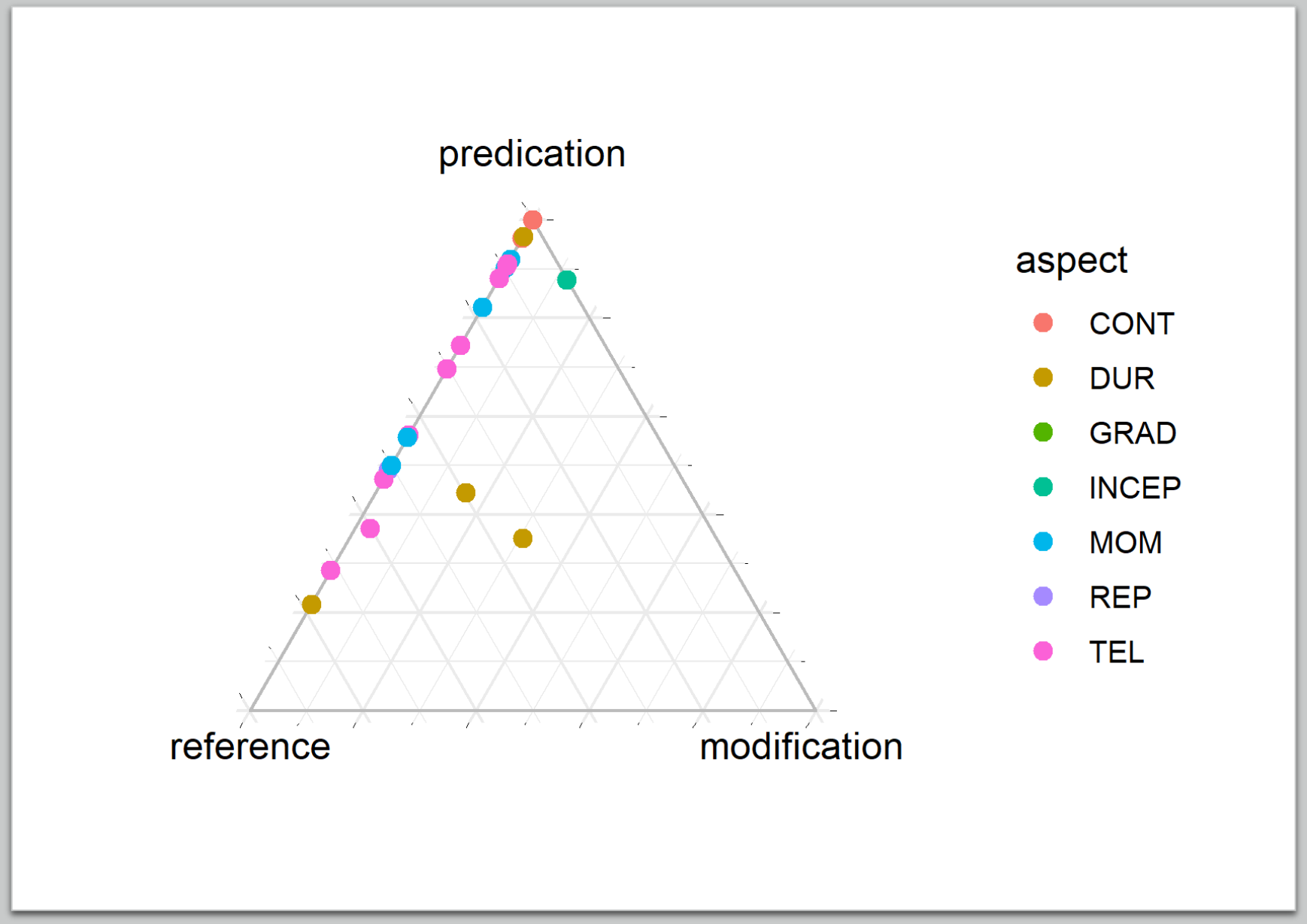


Durative

‘duration’



All Aspects


predication
reference
modification
aspect
CONT
DUR
GRAD
INCEP
MOM
REP
TEL

Nuuchahnulth Definite Markers vs. Aspect

- Definite marker: 213 out of 1935 stems (11.01%)
- Only 17 of these 213 (7.98%) have an aspect marker (CONT, DUR, MOM, TEL).
- Definite markers and aspect markers are *almost* mutually exclusive. (Contrary to the great attention their overlap has received.)
- Supports Hopper & Thompson's (1984) claim that prototypical uses of words exhibit inflectional behavior characteristic of their class.
- Even in a language with extensive flexibility, that flexibility is constrained by typological universals.

Summary of Findings

- Lexical flexibility differs significantly between languages.
- English is consistently flexible, but only marginally.
- Nuuchahnulth is highly flexible, but almost entirely along the noun-verb dimension.
- The most flexible words in Nuuchahnulth are property words.
- Prototypical uses of words in Nuuchahnulth bear inflectional marking characteristic of their meaning.

Contributions & Conclusions

- Methodological: Measuring lexical flexibility
- Empirical: Lexical flexibility is everywhere. Improved understanding of prevalence of lexical flexibility in English and Nuuchahnulth, and how it operates
- Theoretical: Lexical flexibility is a natural result of the cognitive and diachronic forces at work in language.