Semantic and morphophonological productivity of Kĩîtharaka noun classes: corpus and experimental evidence

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Noun class systems

- Nouns grouped based on agreement (Hockett 1958, Corbett 1991, Katamba 2006)
- Used interchangeably with gender (Corbett, 1991:1; Aikhenvald, 2006)

Kĩĩtharaka

(1) **mû**thaka **ûû**ra
1.young man 1.dem.dist

(2) **kî**banga **kĩî**ra
7.machete 7.dem.dist

(3) **i**banga **bii**ra
8.machete 8.dem.dist

French

(4) **le** vieil homme
Det.M old.M man.M

(5) **la** camionn**ette**
Det.F van.F

What determines noun class in language?

- **Semantics** (Corbett 1991, Contini Morava 1997, Aikhenvald 2019 etc)
- **Form of the noun** (morphology and/or phonology) (e.g., Bleek 1869, Helden 1993, Biswanandan 2014, Corbett 1991, 2022, etc)

Kîîtharaka

(6) **mû**thaka **ûû**ra ← semantics (human)
1.young man 1.dem.dist

(7) **kî**banga **kîî**ra ← morpho-phonology (kî-)
7.machete 7.dem.dist

(8) **i**banga **bii**ra
8.machete 8.dem.dist

French

(9) **le** vieil homme ← semantics (male)
Det.M old.M man.M

(10) **la** camionn**ette** ← morpho-phonology (*-ette*)
Det.F van.F

What determines noun class in language?

- But there are typically, many exceptions!

Kĩĩtharaka

(11) **mû**thaka **ûû**ra ← semantics (human)
1.young man 1.dem.dist

(12) **kî**roria **kĩĩ**ra ← ?
7.prophet 7.dem.dist

French

(13) **le** vieil homme ← semantics (male)
Det.M old.M man.M

(14) **la** personne ← ?
Det.F person.F

What determines noun class in a language?

- But there are typically, many exceptions!...

Kîîtharaka

(15) **kî**banga **kî**ra ← morpho-phonology (*kî-*)
7.machete 7.dem.dist

(16) **î**the **û**ra ← ?
5.father 1.dist.dem

(17) **n**koma **û**yû
9.devil 1.dem.prox

French

(18) **la** camionn**ette** ← morpho-phonology (*-ette*)
Det.F van.F

(19) **le** squel**ette** ← ?
Det.M skeleton.M

?

Theoretical and empirical questions…

- How do we know what semantic or morphophonological cues are productive amidst such exceptions?
- Do speakers treat different types of cues the same way? (e.g., Karmiloff-Smith, 1981; Perez-Pereira 1991; Gxilishe et al., 2009; Gagliardi & Lidz 2014 a.o.)
- Issues with traditional accounts of noun class in Bantu
  - Assumption that class is indicated by the prefix alone
  - Assumption that semantics is centrally important to class assignment (see e.g., wa Mberia, 1993 for similar observations)
  - No formal theory of what makes a semantic or (morpho)phonological cue productive

A different approach to Kĩîtharaka

- The project aims to establish productive features that determine noun class membership in Kĩîtharaka:
  - Corpus analyses using Tolerance Principle (Yang, 2016)- provides a way of establishing productivity of rules in a set of items with exceptions (exceptions should not exceed a certain threshold)
  - Psycholinguistic tests – shows what speakers pay attention to
  - Includes testing the relative importance of semantic and morpho-phonological cues (following e.g., Karmiloff-Smith, 1981; Gagliardi & Lidz 2014, and others).

Building a Corpus

- The study uses a corpus (2327 nouns)
  - ✓ 901 collected from Kĩĩtharaka bible (published in 2019) and,
  - ✓ 1426 translated from SIL comparative African Wordlist (Snider and Roberts, 2006).
  - Translation of SIL list done to achieve a balanced corpus
- Coded for singular/plural agreement, semantics and morphophonological features (prefixes).

Semantic features coded for

Expected Class	Semantic Feature(s)
1	human
3	Extended shape, spread shape, protruding shape, trees & plants, dispersive mass
5	Fruits, round shape, plant part, augmentative, made of wood, cohesive mass
7	Artefacts, pejorative, derived
9	Animals, artefacts, loan (other)
11	Narrow things, wavy-shaped things
12	Diminutives
14	Abstract, mass
15	Derived, infinitives

Morphophonological features coded for

Morphophonological feature	Expected class
Mû-	1
Mû-	3
Î-	5
Kî-	7
N, ø	9
Rû-	11
Ka-	12
Û-	14
Kû-	15

Corpus Analysis

- Corpus analysed for rule productivity using Tolerance Principle (Yang, 2016)
- Tolerance Principle demonstrates how to establish the productivity of rules with exceptions.
  - Proposed to account for how and when e.g., language learners make generalizations and when they don't.
  - provides a threshold beyond which the exceptions should not exceed for the rule to be productive.
  - Makes use of 2 integer values N (number of items in the lexicon) and e (number of items not obeying the rule)

  - Let a rule be defined over a set of N items.
  - The rule is productive if the number of exceptions does not exceed a threshold, $\boldsymbol{\theta}_{N.}$

    exceptions (e) $\leq \boldsymbol{\theta}_N (N/\ln(N))$

Corpus Results

Results: a productive semantic feature for class 5

Rule: [+augmentative] ⟶ class 5

Semantic features	N	Class 5	e	θ_N	Productive?
Human	252	2	250	46	No?
Augmentative	32	25	7	9	Yes
Round	44	12	32	12	No
Plant part	47	6	41	12	No
Fruit	17	8	9	6	No
Made from wood	12	1	11	5	No
Derived	1081	40	1041	155	No
Cohesive mass	58	5	53	14	No

Corpus results: productive semantic features (overall)

i) [+Human] → class 1
ii) [+augmentative] → class 5
iii) [+pejorative] → class 7
iv) [+diminutive] → class 12
v) [+derived] → class 15
vi) [+infinitive] → class 15

Results: productive morphophonological features

i) [+î-/rî-] → class 5
ii) [+kî-] → class 7
iii) [+n-] → class 9
iv) [ø-] → class 9
v) [+rû-] → class 11
vi) [+ka-] → class 12
vii) [+û-] → class 14
viii) [+kû-] → class 15
ix) [[+mû], + human]] → class 1
x) [[+mû, -human]] → class 3

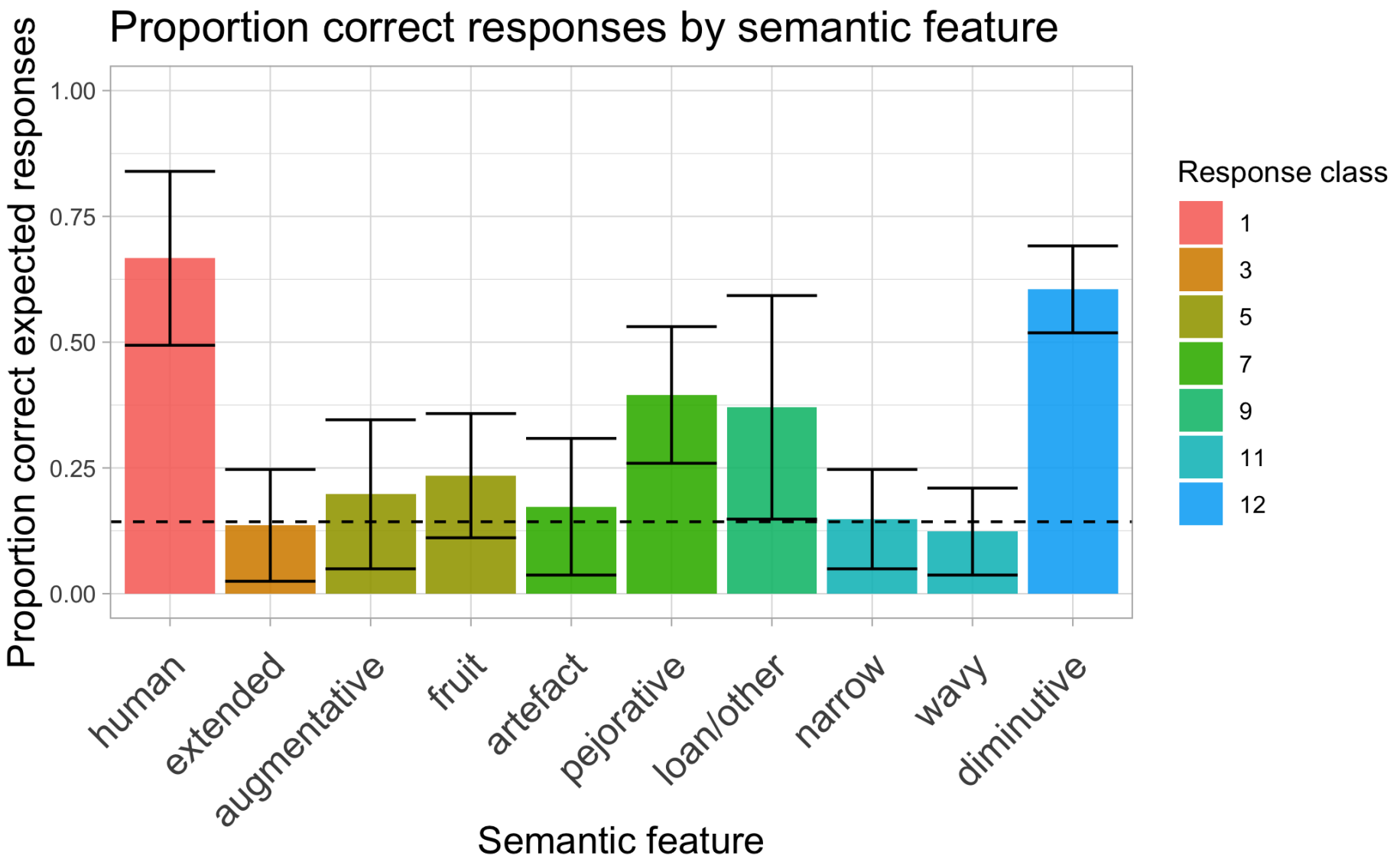
Experiments: Observation of human behaviour

- Test to what extent statistical measure of productivity reflects speakers' own usage
  - 3 experiments (2 done)
  - 30 native speakers (males & females; age 18—45)

Experiment 1: Semantic features tested

Semantic Feature	Expected Class
Human	1
Extended	3
Augmentative	5
Fruits	5
Artefacts	7
Pejorative	7
loan (other)	9
Narrow	11
Wavy	11
Diminutive	12

Experiment 1 results: productive semantic features



Experiment 2: Morphophonological features tested

Morphophonological feature	Expected class
Mû-	1
Mû-	3
Î-	5
Kî-	7
N, ø	9
Rû-	11
Ka-	12
Û-	14
Kû-	15

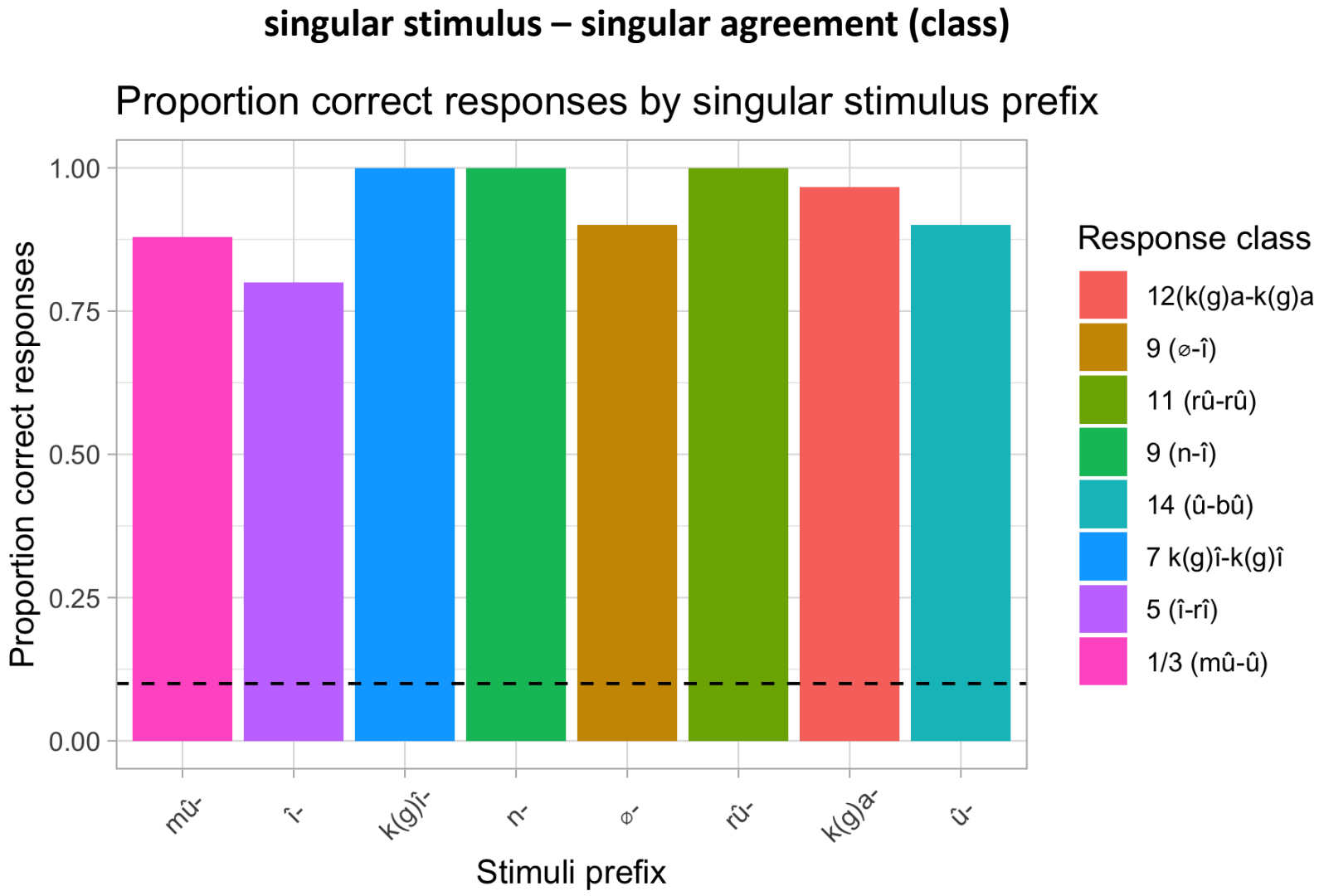
Experiment 2: Morphophonological features tested

- Prefix-agreement pairing tested in three levels:
  - Singular prefix – singular agreement
  - Plural prefix – Plural agreement
  - Singular prefix – Plural noun + agreement

- Participants (30 native speakers, age 18-45)

Results: productive morphophonological features

- Both singular and plural prefixes highly productive as cues to agreement
- Singular prefixes – plural prefixes/classes have reduced productivity

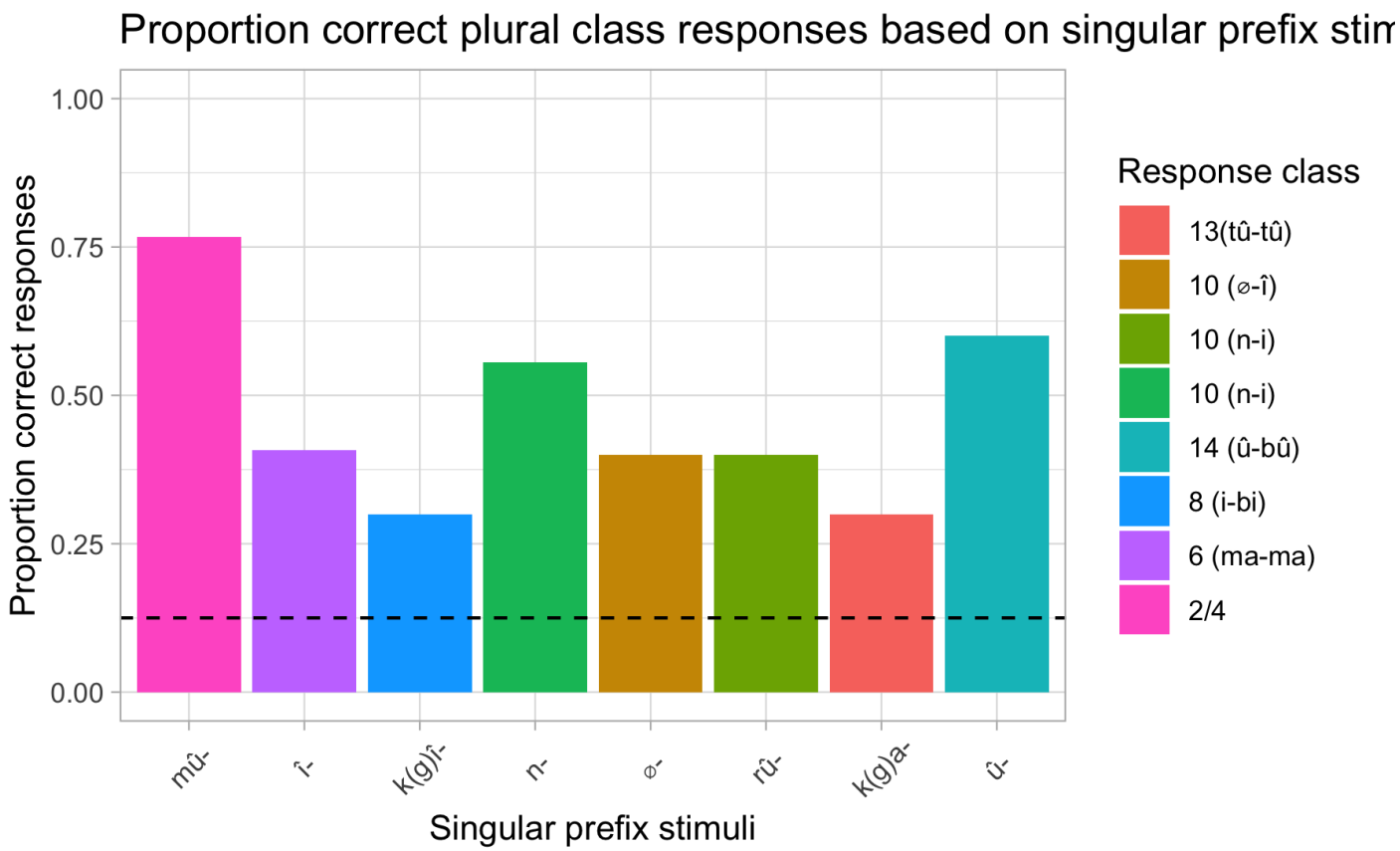


Results: productive morphophonological features

- Both singular and plural prefixes highly productive as cues to agreement

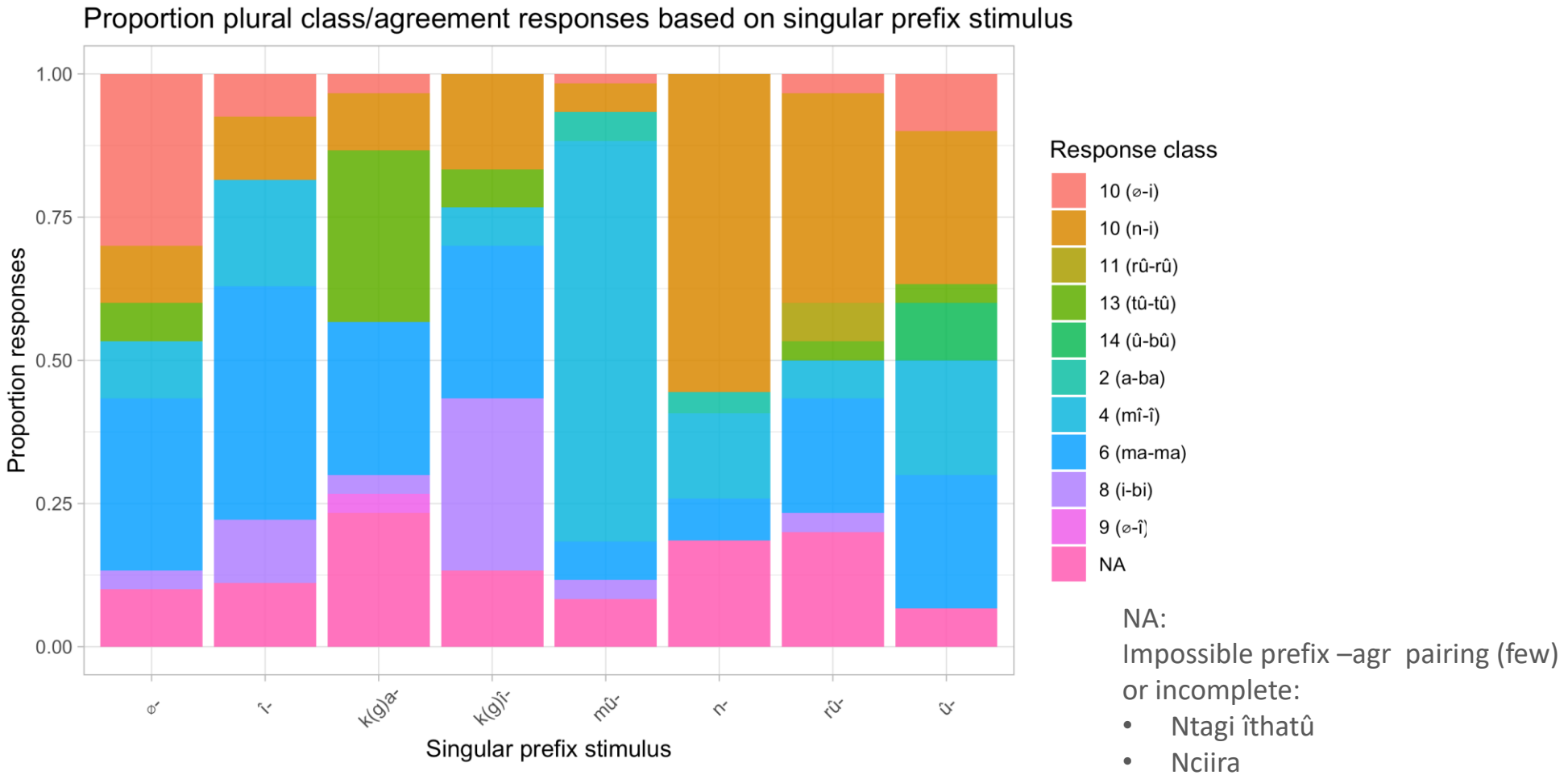
- Singular prefixes – plural prefixes/classes have reduced productivity

singular stimulus – plural agreement (class)



Results: productive morphophonological features

singular stimulus – plural agreement (class)



NA:
Impossible prefix –agr pairing (few) or incomplete:

- Ntagi îthatû
- Nciira

Does Experiment 1 confirm TP predictions?

- The experimental results largely mirrors the the TP predictions:
  - ¾ features predicted by TP are productive.
  - Augmentative unproductive in the experiment
- Productivity of ‘other’ at chance in the experiment (was unproductive in the corpus)

Does Experiment 2 confirm TP predictions?

- All prefixes productive in the corpus also productive in the experiment
- The *mû-* prefix is interesting–only productive for class 3
  - Prefix is underspecified– but why is it overwhelmingly productive for class 3?
    - Could be a default morphophonological rule that applies in the absence of semantic specification
    - Could be because non-human are more represented in the world than humans

Implications

- A theory of productivity is instrumental in establishing which features productively determine nominal (gender) agreement
  - Experimental results reflect TP based results to a greater extent.
- Both semantics and formal features are necessary cues to class in Kîîtharaka
  - Semantics- human–nonhuman distinction (class 1/2 vs others); evaluation (class 5, 7, 12)
  - Morphophonology- applies productively for all non-human non-evaluative classes
- Singular-plural class mapping somewhat regular in 1/3, 9 and 14 and less of it in other classes (level 3 exp. 2) – interesting?

The End

I bwega!
Thank you!

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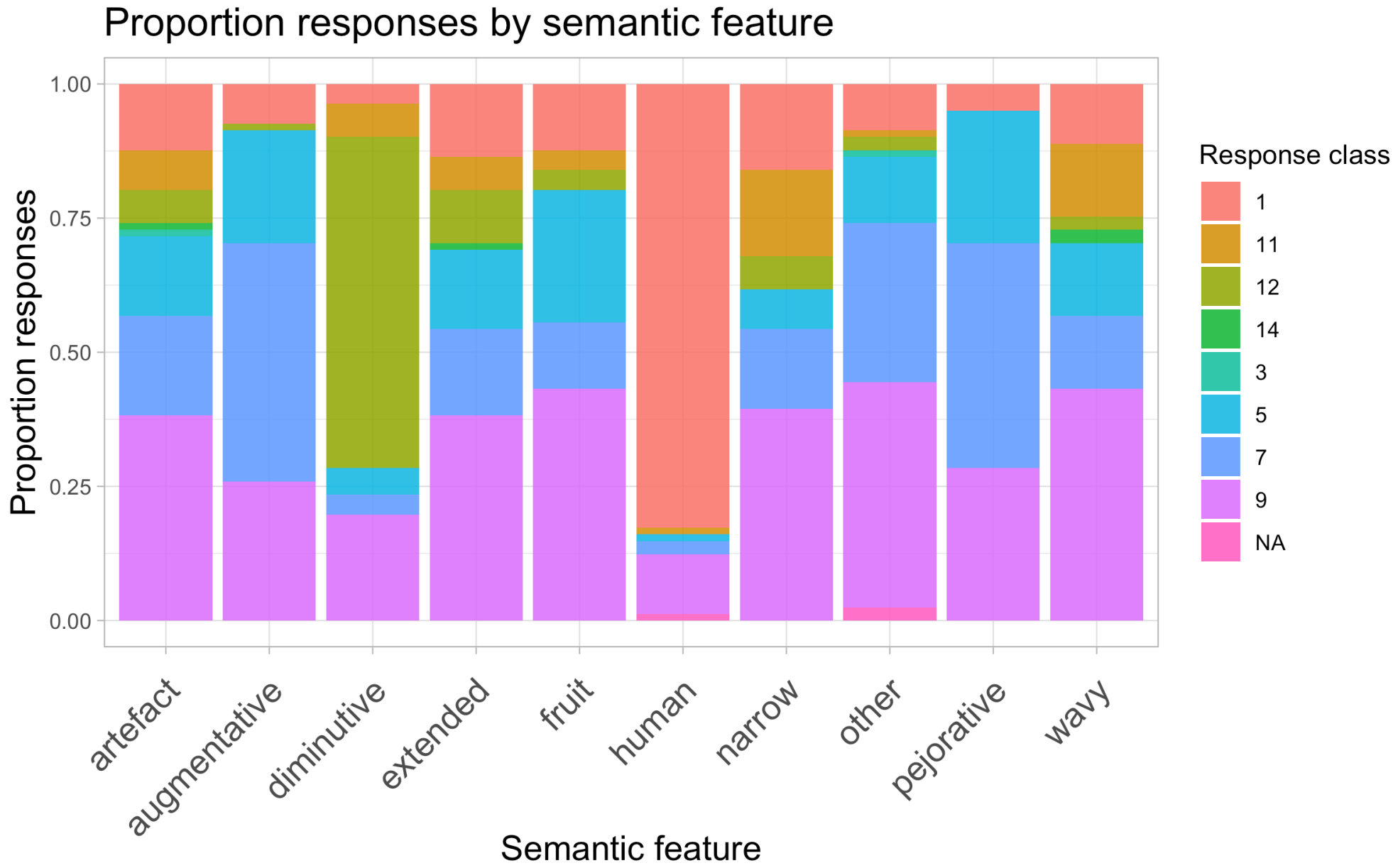
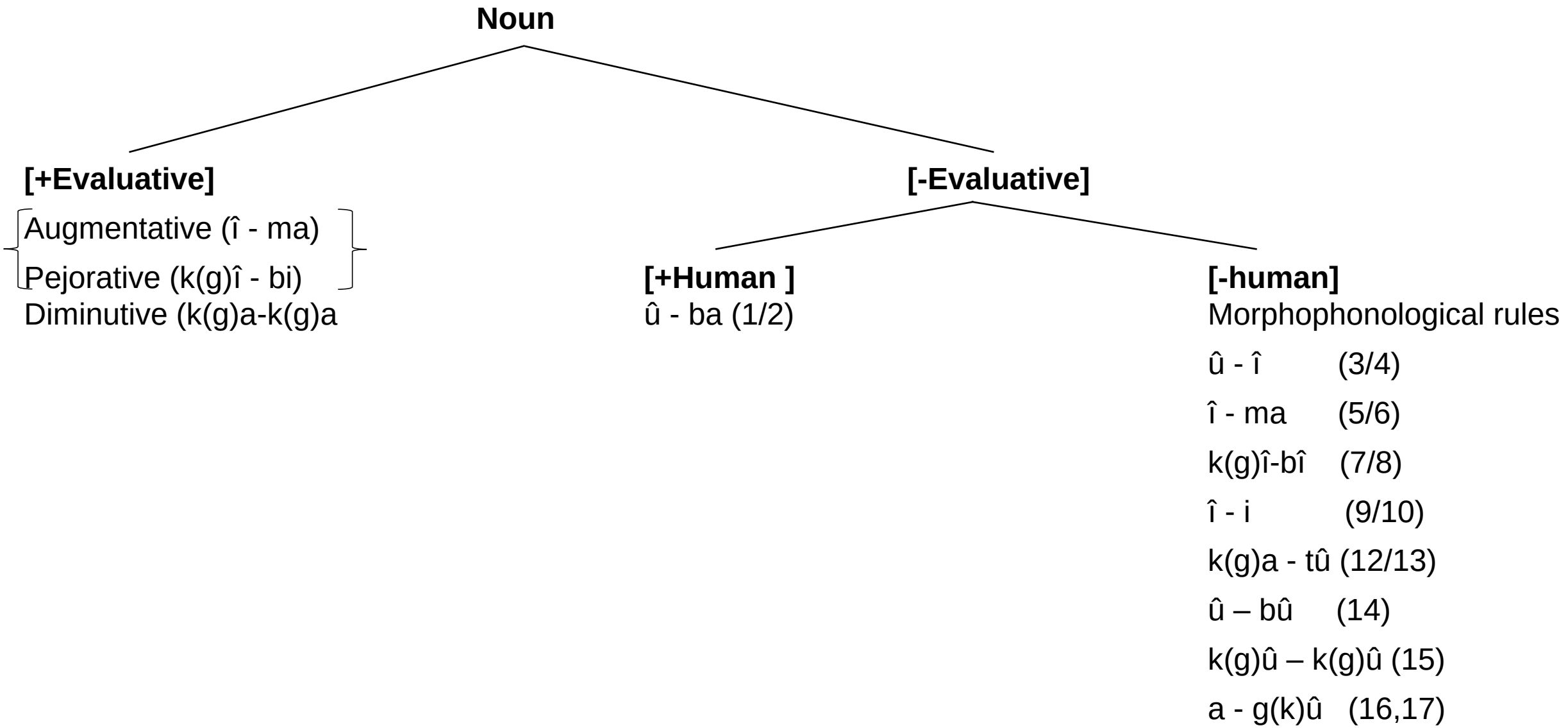
Experiment 1 results: What's up with augmentative?



Experiment 1 results: What's up with augmentative?

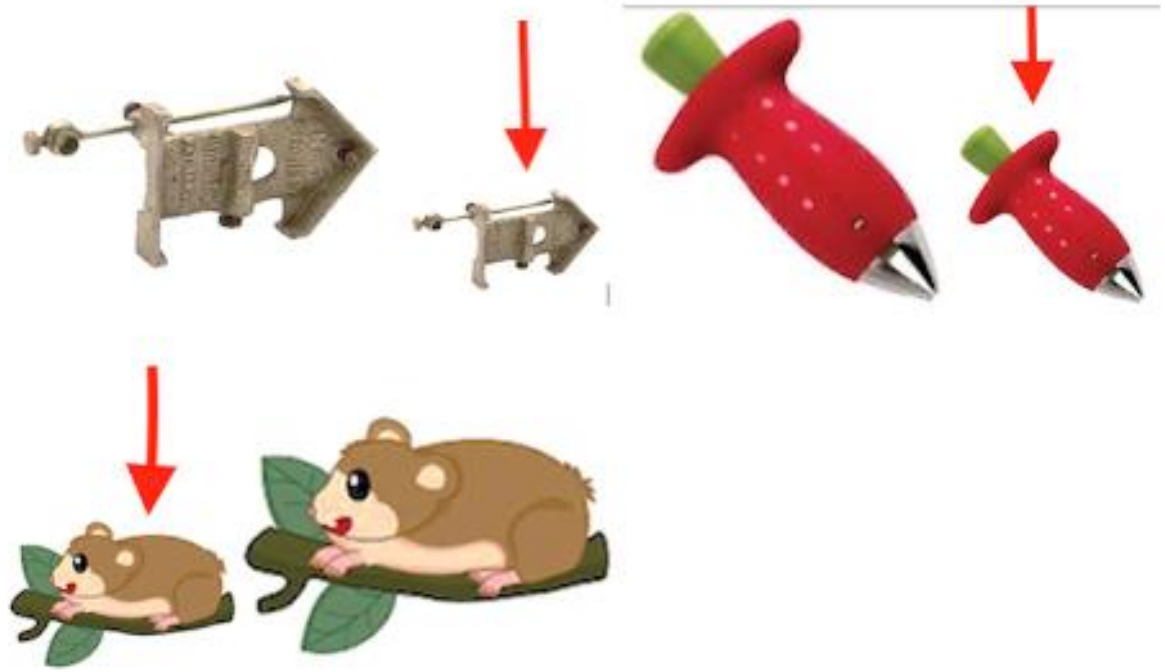
- A possible merger in augmentative and pejorative encoding?
- Evidence from speaker's lexicon show the morphemes associated with augmentation and pejoration may be used interchangeably:
  - Îrori/ kîrori "a lorry"
  - Îrinya/kîrinya "a big hole/ditch"
  - Îthoka/kîthoka " an axe"
  - The two are also used to express disdainful tone:
    - Îmuntû/kîmuntû rîrî/gîkî "this bad person'

Implication: a possible schema

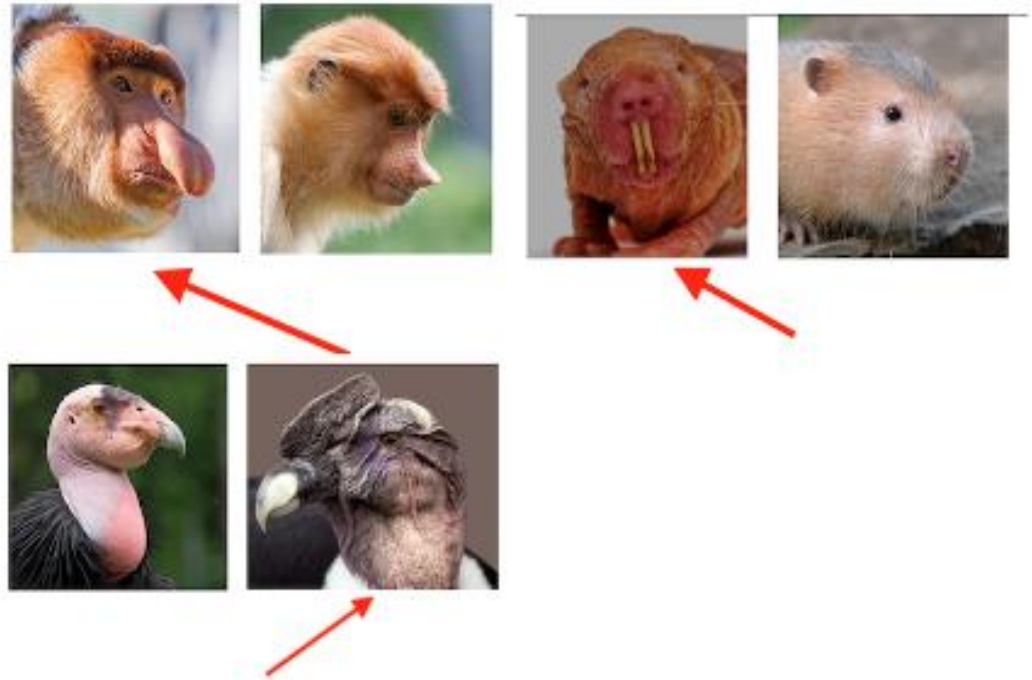


Experiment 1: image stimuli

Diminutive image stimuli



Pejorative image stimuli



Experiment 2: Image Stimuli

Augmentative image stimuli