Semantic and morphophonological productivity of Kĩĩtharaka noun classes

Patrick Kanampiu
The University of Edinburgh
(Supervised by Jennifer Culbertson & Alexander Martin)

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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 **û**ra
1.young man 1.dem.dist

(2) **kĩ**banga **kĩ**ra
7.machete 7.dem.dist

(3) **i**banga **bi**ra
8.machete 8.rel

French

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

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

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French

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What determines noun class in language?

- **Semantics**
- **Form of the noun** (morphology and/or phonology)

Kîîtharaka

(1) **mû**thaka **û**ra ← semantics (human)
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(2) **kî**banga **kî**ra
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What determines noun class in a language?

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

Kĩĩtharaka

(6) mûthaka **û**ra ← semantics (human)
1.young man 1.dem.dist

(7) kîroria **kĩ**îra ← ?
7.prophet 7.dem.dist

(8) îthe **ûûra**
5.father 1.dist.dem

(9) nkoma aathi ?
9.devil 1.went

French

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

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

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

(13) **le** squel**ette**
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morpho-phonology (*-ette*)

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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)
- Do traditional approaches to Bantu noun classes answer these questions?

Required:

- A **theory** of productivity
- **Empirical evidence** for speakers' use of different cues.

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Traditional approaches to Bantu noun classes

The Proto-Bantu System (Richardson, 1967; Welmers, 1973)

Noun Classes	Meaning
1/2	human, other animates
1a/2a	kinship terms, proper nouns
3/4	trees, plants, non-paired body parts, other inanimates
5/6	fruits, paired body parts, natural phenomena
6	Liquid masses
7/8	manner
9/10	animates/ inanimates
12/13	diminutives
14	Abstract nouns, mass nouns
15	infinitives
16, 17, 18	locatives (near, remote, inside)
19	diminutives
20/22	augmentatives (diminutives)
21	augmentative pejoratives

Traditional approaches to Bantu noun classes

Key features:

- Classes marked by the prefix (rather than agreement) – problematic

Swahili (Carstens 1991)

(13) **ki**faru **m**dogo
7.rhino 1.small

Kĩĩtharaka (corpus data)

(14) **n**koma **a**athi
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- Centred on semantics – problematic (lack of semantic regularity for some classes, several classes sharing semantic features)

- Do not make use of any theory of productivity

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A different approach to Kîîtharaka

- The project aims to establish productive features that determine noun class membership in Kîîtharaka:
  - 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)
  - ✓ 1000 collected from Kĩĩtharaka bible and,
  - ✓ 1327 translated from SIL comparative African Wordlist (Snider and Roberts, 2006).
- Coded for singular/plural agreement, semantics and morphophonological features (prefixes).

Semantic features coded for

Target Class	Semantic Feature(s)
1	(super)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	Target class
M(u)û-	1
Mû-	3
Î-	5
Kî-	7
N, ø	9
Rû	11
Ka-	12
U-	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 children acquiring a language 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 $\leq \boldsymbol{\theta}_N (N/\ln(N))$

Corpus Results

Results: a productive semantic feature for 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

Results: unproductive semantic feature for class 3

Semantic features	N	Class 3	e	θ_N	Productive?
Animal	155	15	140	31	No
Protruding	16	3	13	6	No
Tree/plant	55	25	30	14	No
Artefact	136	32	104	28	No
Narrow	115	32	83	24	No
Derived	1081	33	1048	155	No
Cohesive	58	10	48	14	No
Dispersive	64	13	51	15	No
Extended	161	82	79	32	No
Spread	49	1	48	13	No

Corpus results: productive semantic features (overall)

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

Results: productive semantic features

What about [+Human] feature!

Results: a productive semantic feature (class-feature mapping)

Class	Human	N	e	θ_N	Productive?
1	198	198	0	37	Yes
3	4	223	219	41	No
5	2	177	175	34	No
7	21	262	241	47	No
9	22	428	406	71	No
11	0	120	120	25	No
12	6	81	75	18	No
14	0	105	105	23	No
15	0	684	684	105	No

Results: a productive morphophonological feature

Morpho-phonological features	N	Class 7	e	θ_N	Productive?
mû-	397	0	397	66	No
rû-	122	0	122	25	No
kî-	268	262	6	48	Yes
ri-	5	0	5	3	No
kû-	677	0	677	104	No
û-	107	0	107	23	No
î-	188	0	188	36	No
ka	82	0	82	19	No
n-	329	0	329	57	No

Results: productive morphophonological features

i) [+î-/ri-] ⟶ 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

Corpus results: productive morphophonological features

[+Mû-] is not productive!

Experiments: Observation of human behaviour

- Test to what extent statistical measure of productivity reflects speakers' own usage
  - 3 experiments (two done)

Experiment 1: Semantic features tested

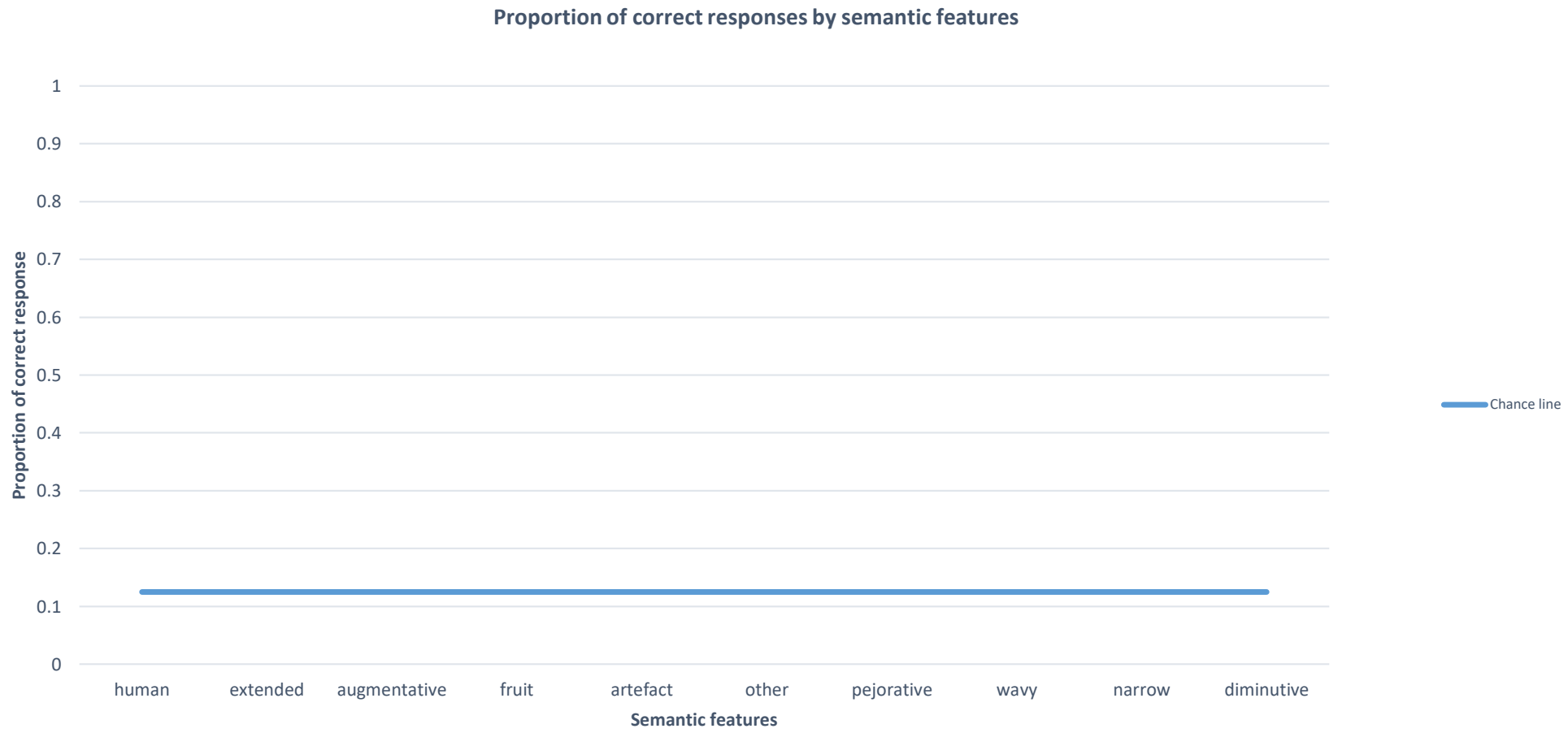
Semantic Feature	Target Class
Human	1 (mû-û)
Extended	3 (mû-û)
Augmentative	5 (î-rî)
Fruits	5 (î-rî)
Artefacts	7 (k(g)î-k(g)î)
Pejorative	7 (k(g)î-k(g)î)
Other (loan)	9 (n(ø)-i)
Narrow	11 (rû-rû)
Wavy	11 (rû-rû)
Diminutive	12 (k(g)a-k(g)a)

Stimuli

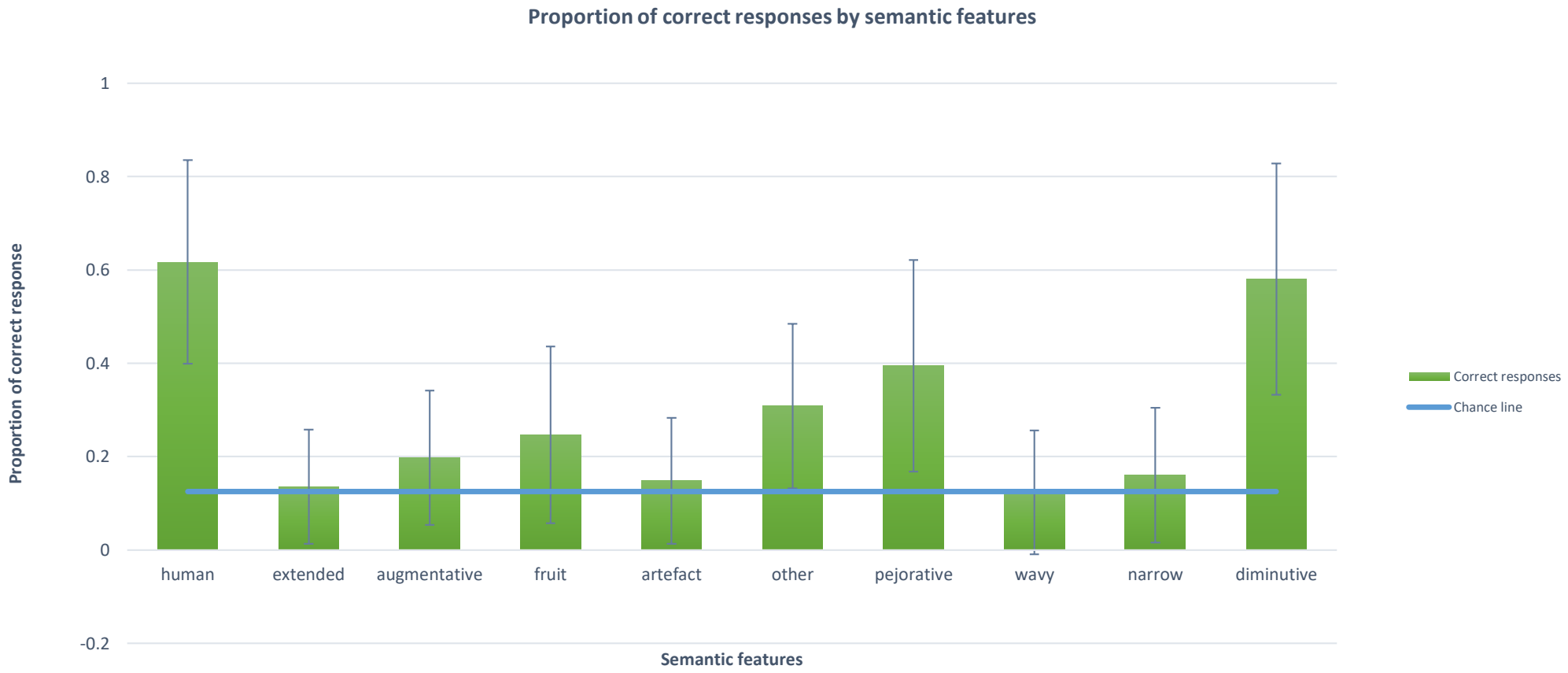
- Participants saw an unfamiliar image followed by a DP(novel noun> num) with an underscore at the beginning of each word
- Required to use their Kîîtharaka knowledge to judge if part of the words were missing and type them in full.
- Order in which the stimuli appeared and image-DP pairing randomized across participants

_thindû _mwe

Experiment 1 results: productive semantic features



Experiment 1 results: productive semantic features



Experiment 2: Morphophonological features tested

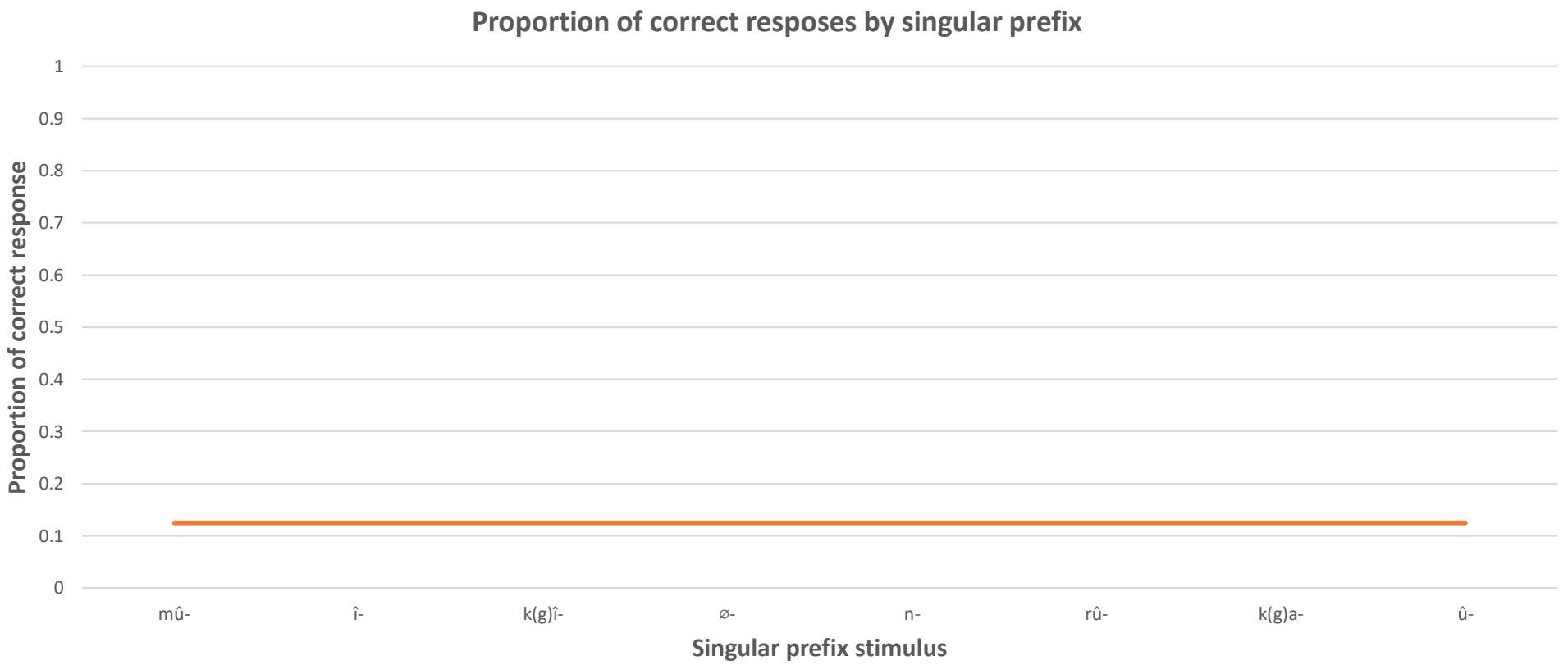
- Prefix-agreement pairing tested in three levels:
  - Singular prefix – singular agreement
  - Plural prefix – Plural agreement
  - Singular prefix – Plural noun + agreement

Stimuli

- Participants saw a (non)prefixed novel noun followed by a short sentence with two gaps, as in *Nkwona* ____ _*mwe* “I have seen _one ____”.
  - Required to fill in the gaps using the noun seen and its agreement

Results: productive morphophonological features

singular stimulus – singular agreement (class)



Results: productive morphophonological features

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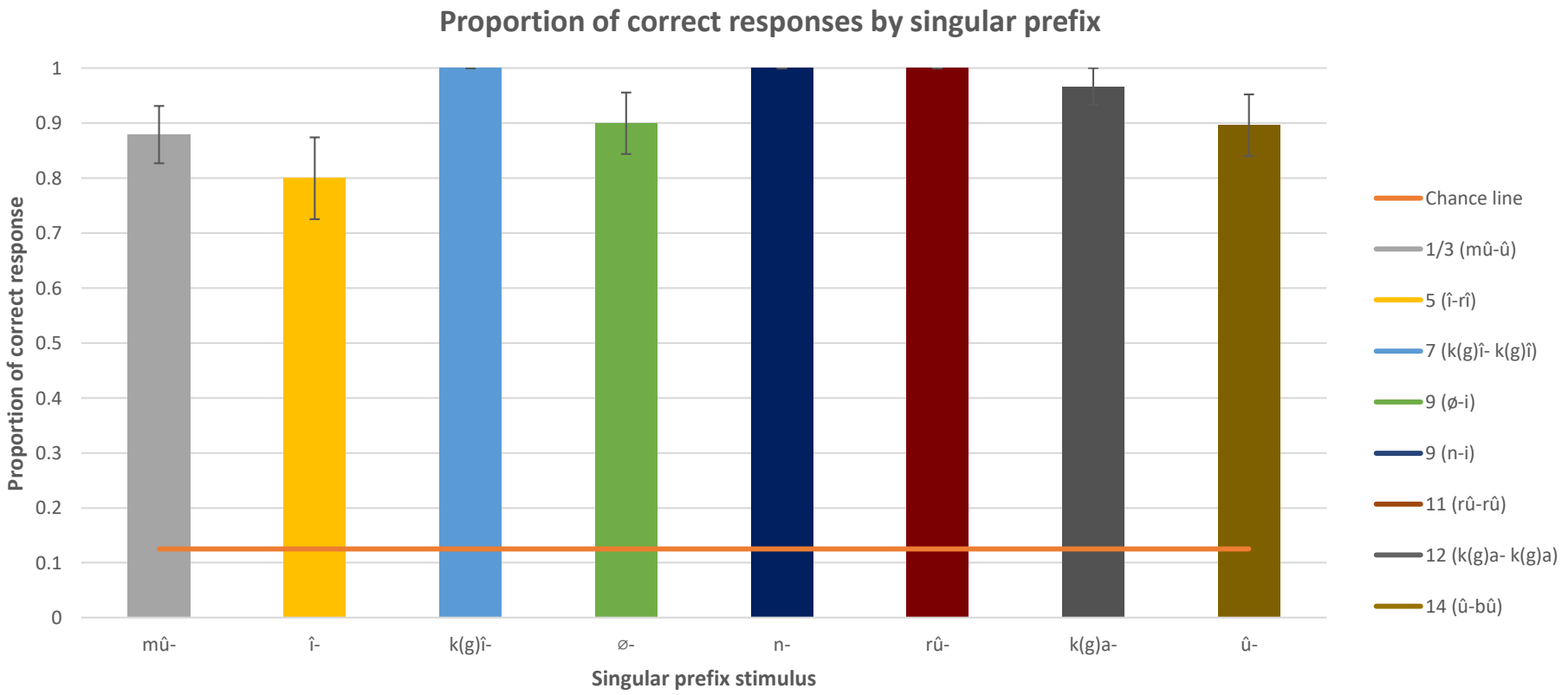
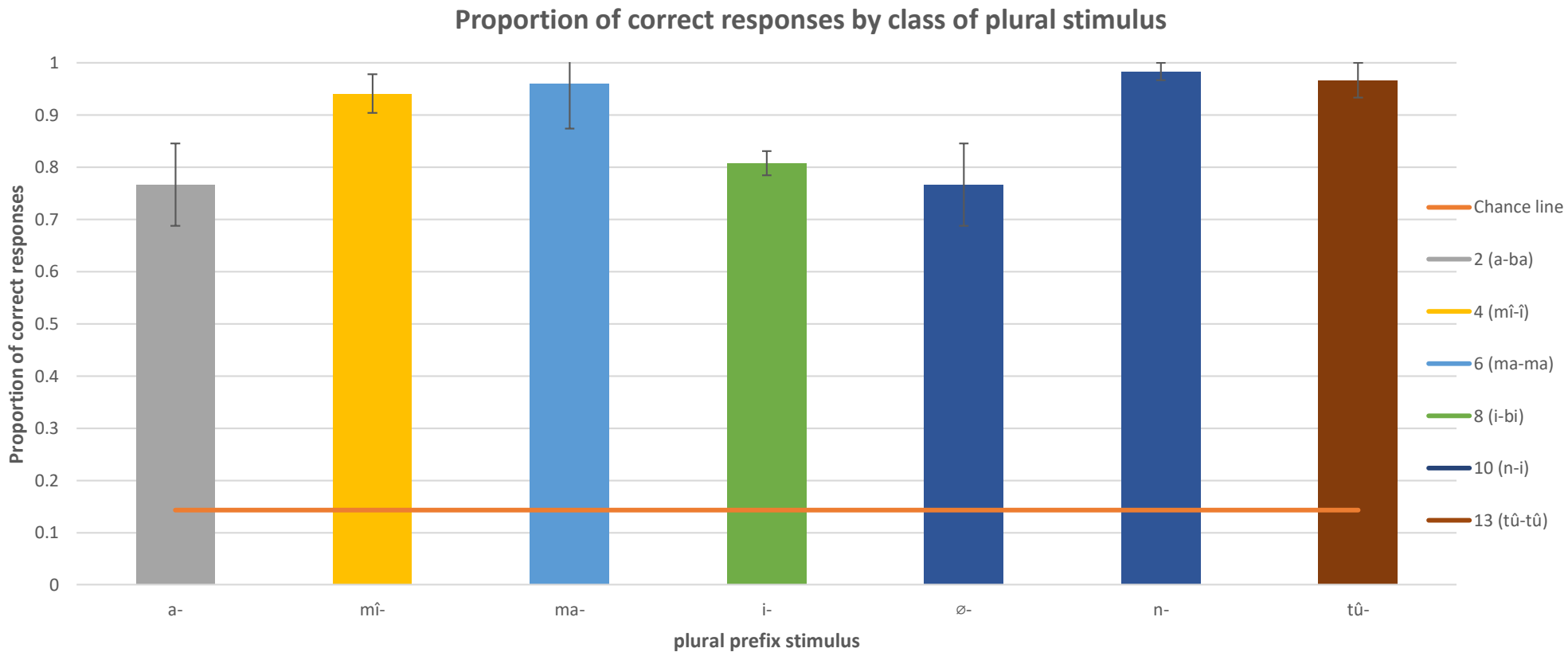


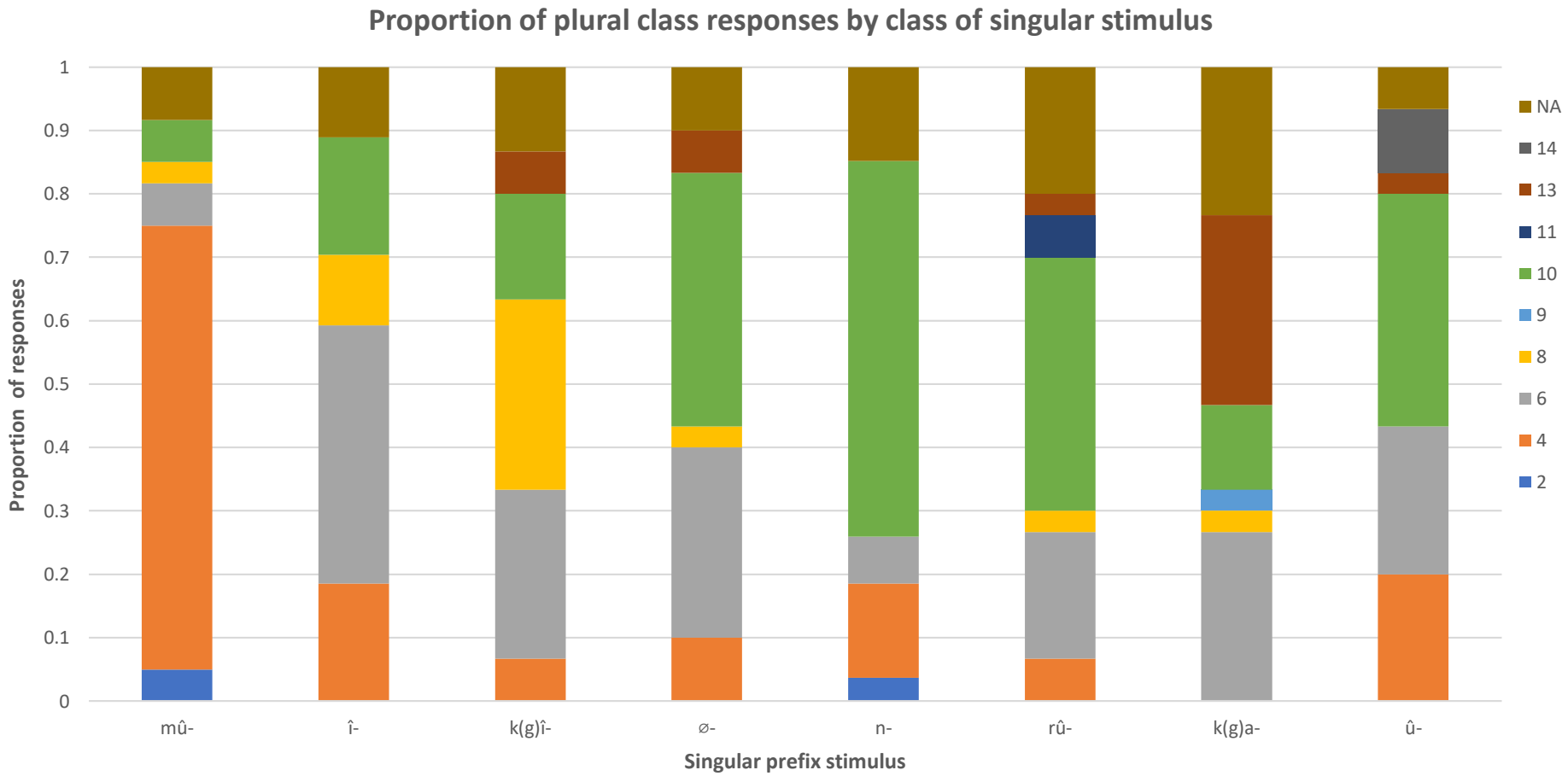
Results: productive morphophonological features

plural stimulus – plural agreement (class)



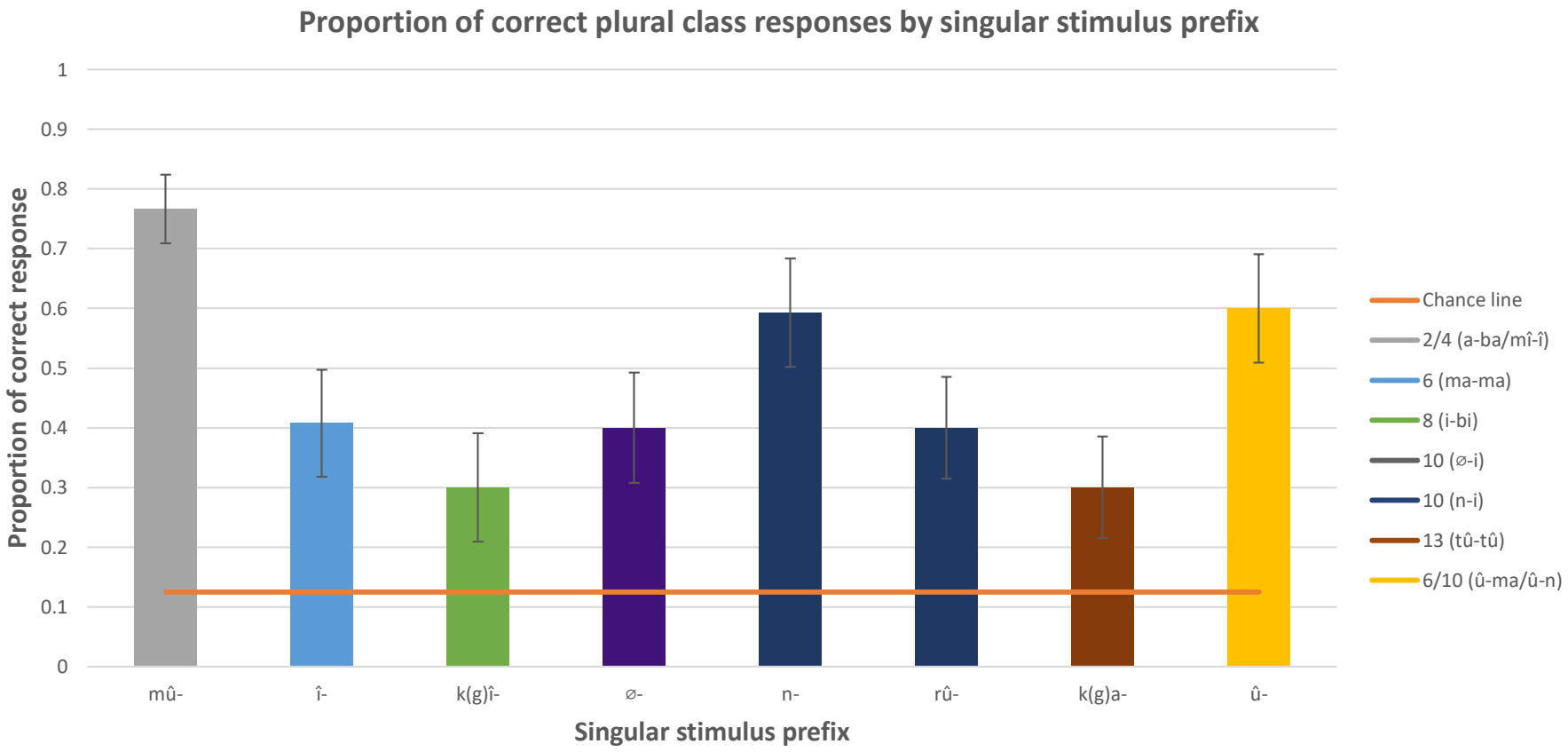
Results: productive morphophonological features

singular stimulus – plural agreement (class)



Results: productive morphophonological features

singular stimulus – plural class



Implications

- Both semantics and formal features are necessary cues to class in Kîîtharaka
  - Class 1 & 3 (need human – nonhuman distinction)
    - Evaluative semantic features highly productive
  - Formal features –needed in classifying non-evaluative non-human 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?

Implications: a possible schema

Thing (most prototypical)

Evaluative

Augmentative (î - ma)?

Pejorative (k(g)î - bi)?

Collective (* -ma)

Non-evaluative

(Super)Human

û - ba (1/2)

Non-(super)human

Morphophonological rules

û - î (3/4)

î - ma (5/6)

k(g)î-bî (7/8)

î - i (9/10)

k(g)a - tû (12/13)

û - bû (14)

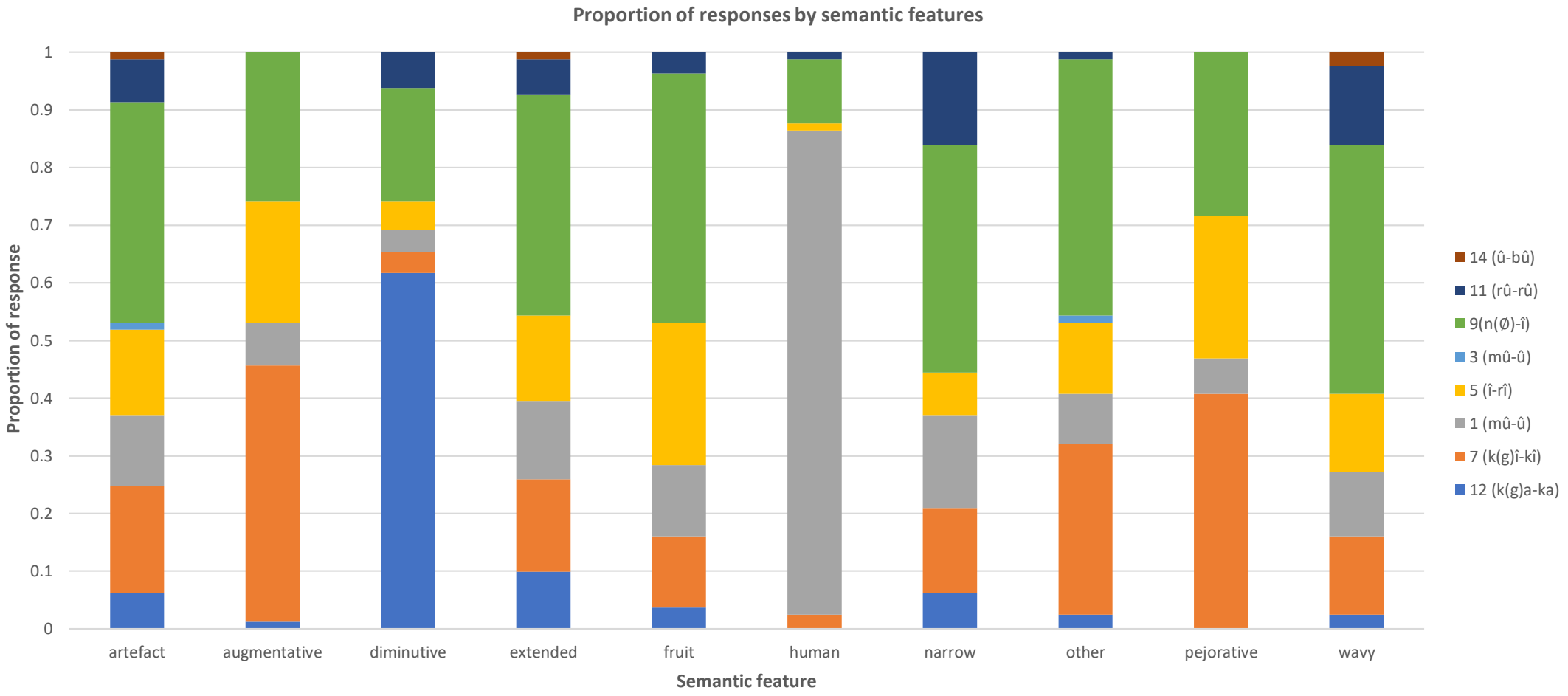
k(g)û – k(g)û (15)

a - g(k)û – (16,17)

Implications

A possible merger of *î-* and *k(g)î-* in deriving augmentative and pejorative meaning?

Implications: a merger of î- and k(g)î in meaning?



Next steps

- Establish relative importance of semantic & morphophonology (experiment 3)
  - Provide stimuli with conflicting semantic and morphophological cues

(following; Karmiloff-Smith, 1981; Gagliardi & Lidz 2014, and others).

The End

Thank you!

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