Application of Semiotic Experiments in Linguistic Research

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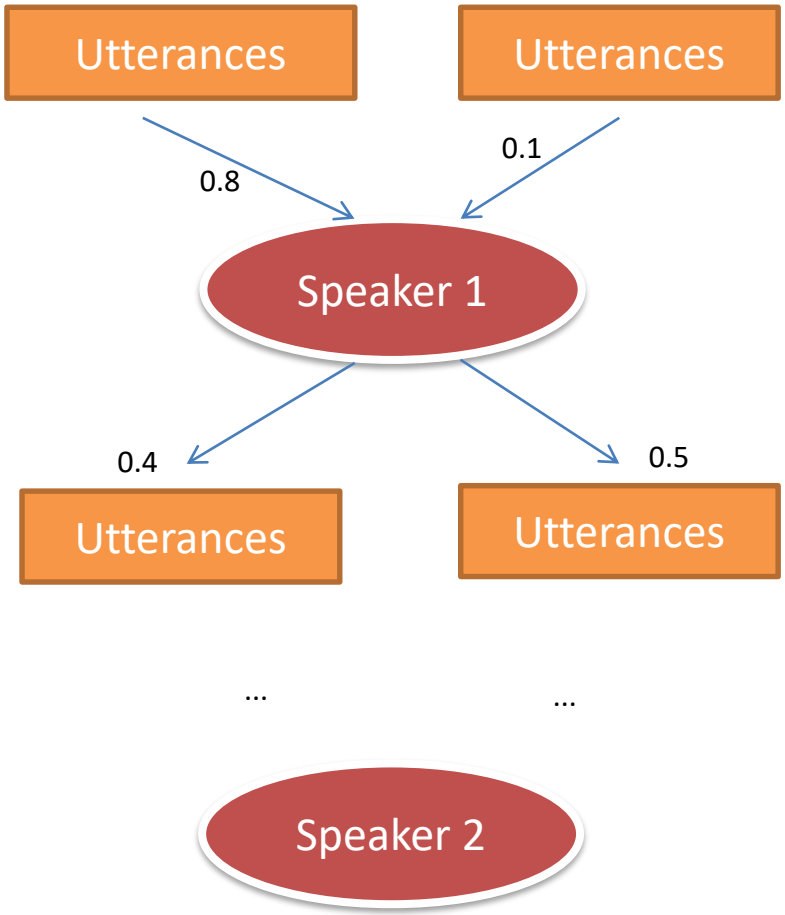
Outline

- Basic concepts
- Potential of semiotic experiments
- One experimental study
  - Language Simplification in Composite Populations (supervised by Simon Kirby, Hannah Cornish)

A view on language

- Language as a population of utterances

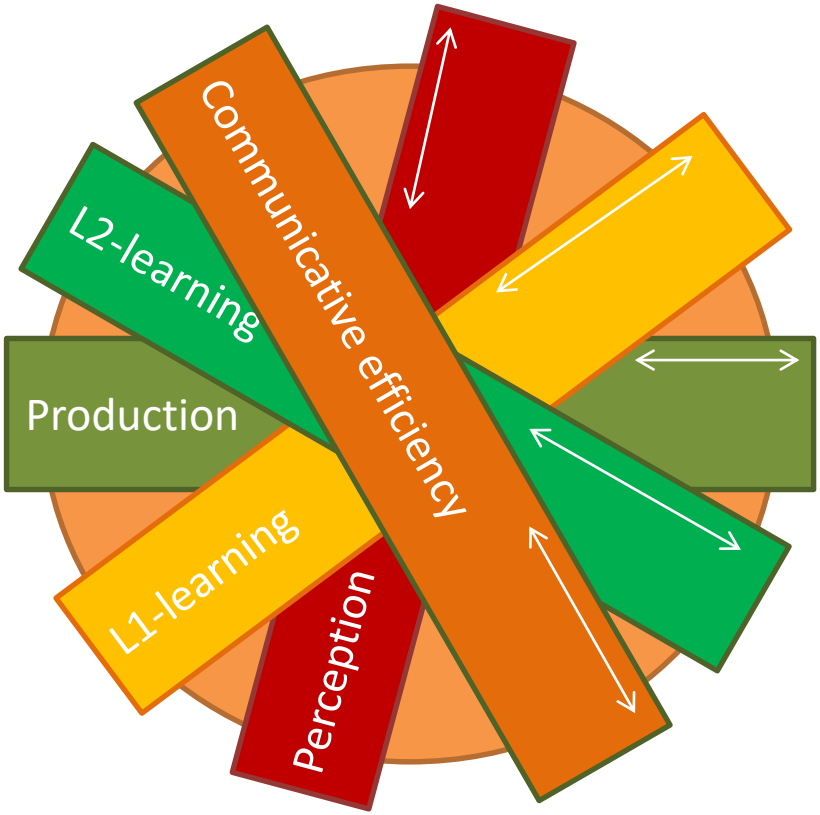


Some transmission biases

- Learning bias
- Communication bias

- Substantive bias

Potential adaptive pressures



Dimensions adapted from Kusters, 2003.

- Depending on their particular situation of use, a language would come to rest on a dynamic balance between different processing dimensions.
- It can be possible to map this to explicitly linguistic categories (Kusters, 2003).

Preferences for processing dimensions

Table 2.5 Preferences for inflectional phenomena in various processing dimensions
+ = preference, 0 = neutral and -, --, and --- = degrees of difficulty.

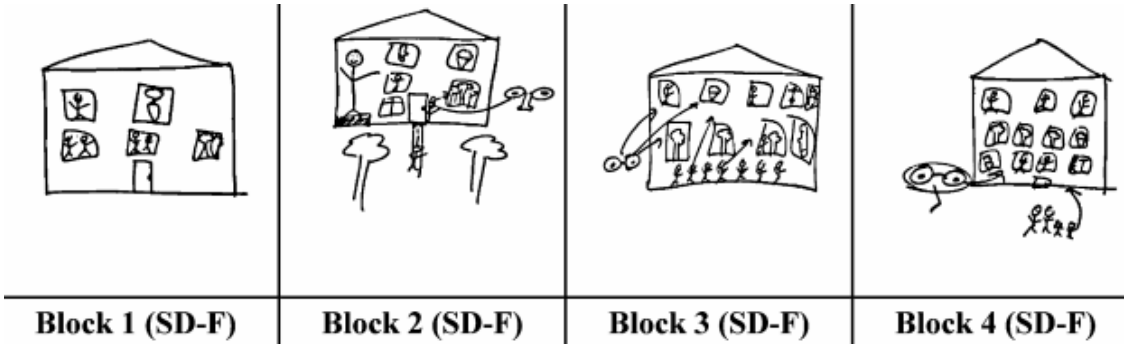
	Speaker	L1 learner	Symbolic use	Hearer	L2 learner
Redundant agreement	--	+	0	+	--
Non-redundant agreement	--	+	+	-	--
Aspect/Tense/Mood	-	+	+	0	-
Voice	0	+	+	+	-
Morphological allomorphy	-	--	+	-	---
Accidental homonymy	0	--	0	--	---
Fission	-	-	+	+	--
Fusion	+	0	0	0	-
Phonological allomorphy	+	-	+	0	--
Structural homonymy	+	+	0	0	+
Isomorphy	+	0	0	+	+
Marked affix order	0	0	0	0	0
Inconsistent affix order	-	0	0	-	-

Reproduced from Kusters, 2003, p. 60

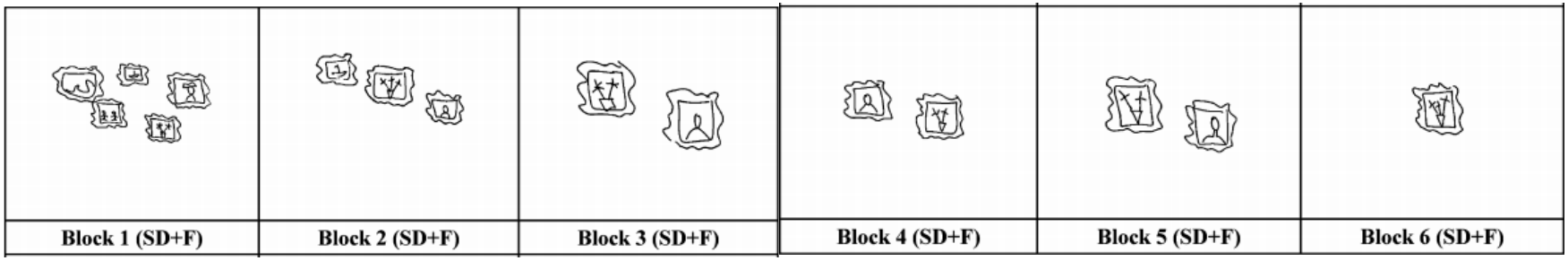
Semiotic experiments

- Often investigate domain-general principles.

Art gallery – no feedback

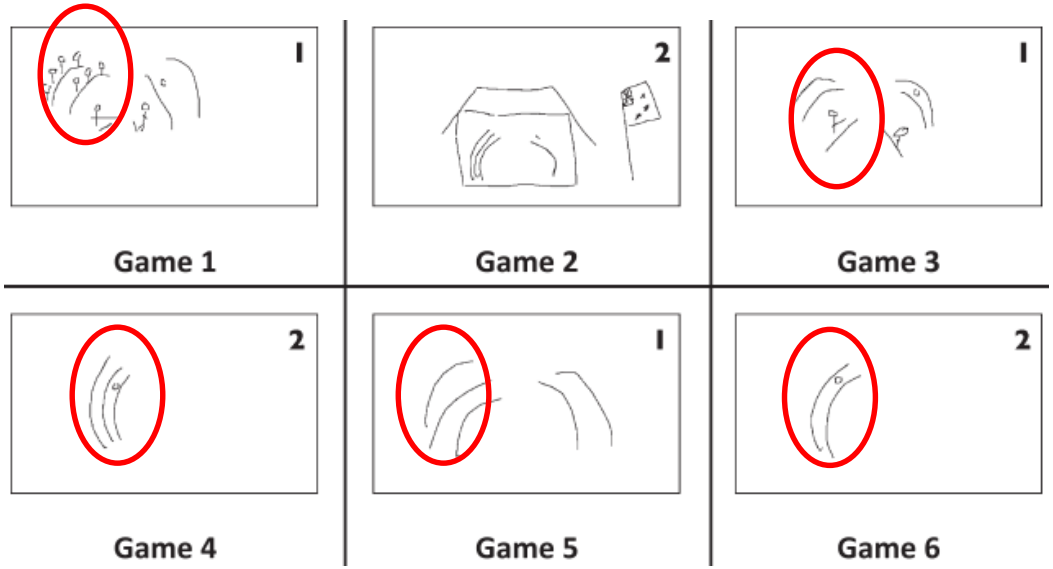


Art gallery – with feedback



Images reproduced from Garrod et al. 2007.

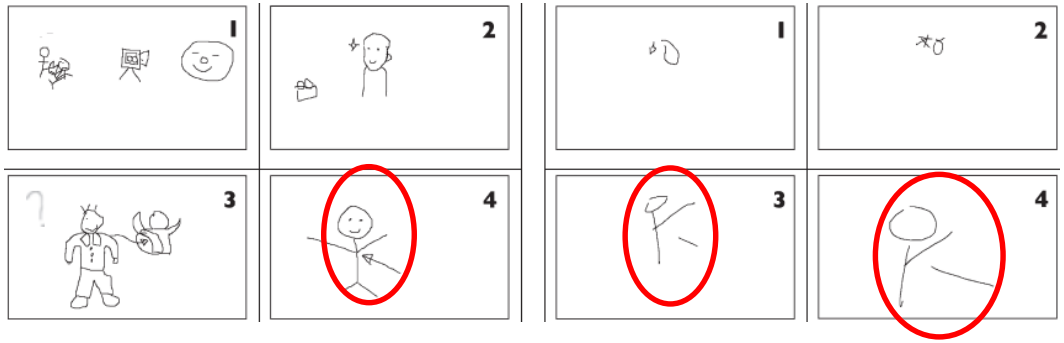
Parliament



(from Scruton 1974: 204 via Sonesson 1994: 297)

FACE

Brad Pitt



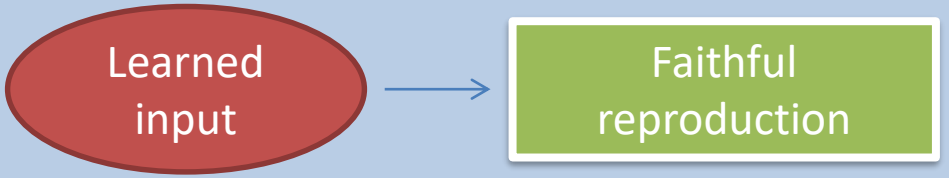
Images reproduced from Fay et al. 2010.

Miniature Artificial Languages

- Stand as proxy for the challenges and uses of historical linguistic forms (i.e. good for testing biases on particular linguistic forms)
- Are learnable within laboratory conditions under time-constraints and expected changes may happen in a quickened pace
- Increases control over personal language experience
- Primarily have been used in studies on learning

Learning experiments

(e.g. Christiansen, 2000; Kirby et al., 2008; Smith et al. 2010; Culbertson et al., 2012)



Probable influences
- inability to learn (bad memory)
- convenience of production*
- participants' expectations?

Iterated learning

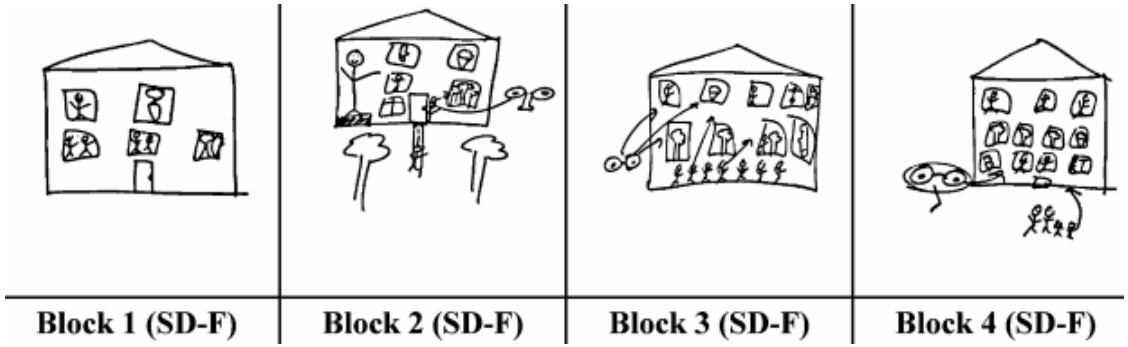
* - Usually limited by asking them to produce as faithfully as possible.

Communication experiments

Attempted communication

Learned input

Probable influences
- expectations about listener(s)
  - feedback loop therein
- convenience of production



(Exemplary studies with miniature languages: Roberts, 2010; Kalnins, 2010)

The study

- „ Language Simplification in Composite Populations“ (sup. S. Kirby, H. Cornish)

- Combined artificial language learning with communicative situations
- Prelearned miniature languages
- Tested for a bias for systematicity

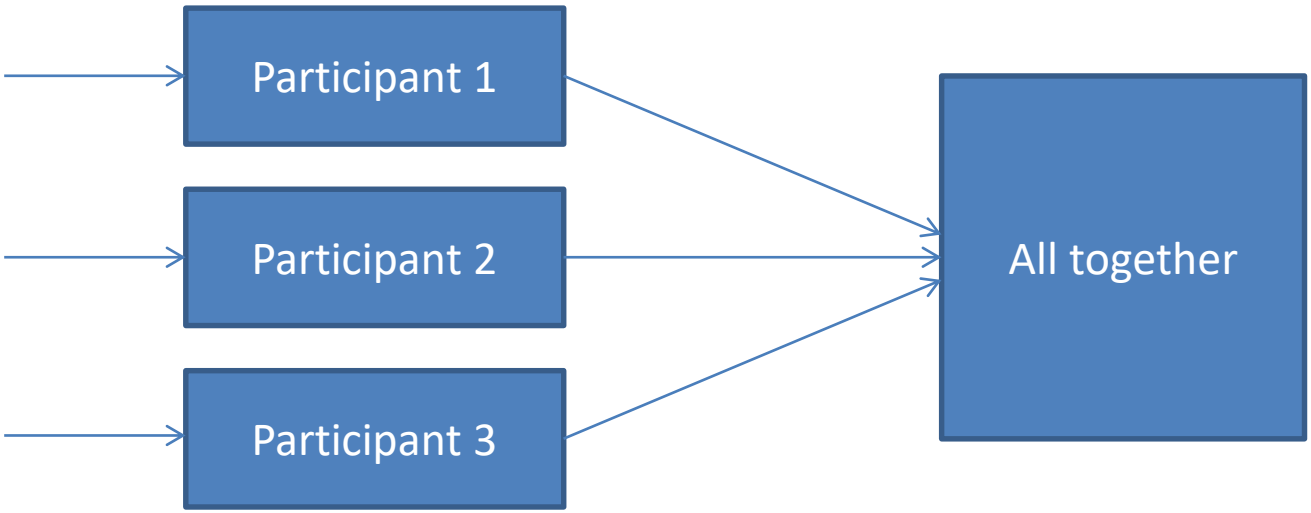
Participants

- 18 participants (6 groups of 3 people)
  - Native English speakers
  - No impairments
  - No linguists
  - Unfamiliar within the group

Experiment in 2 parts

1. Solitary learning sequence

2. Communal interaction game



~32 minutes

~35 minutes

Languages

- 9 items per language (3x3 meaning space)
- 2 languages in each group
  - Minority
  - Majority
- 2 types of varieties
  - Simple
  - Complex
- Minority and majority differed in 2 items

Two conditions

Simple Condition

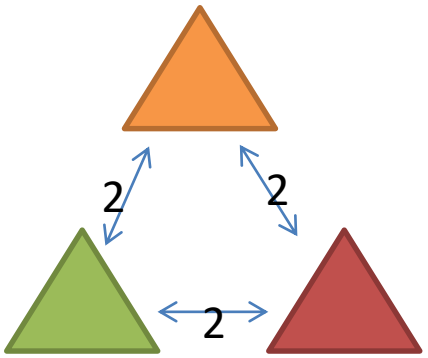
Subject 1 – Simple language

Subject 2 – Complex language
Subject 3 – Complex language

Complex Condition

Subject 1 – Complex language

Subject 2 – Complex language
Subject 3 – Complex language

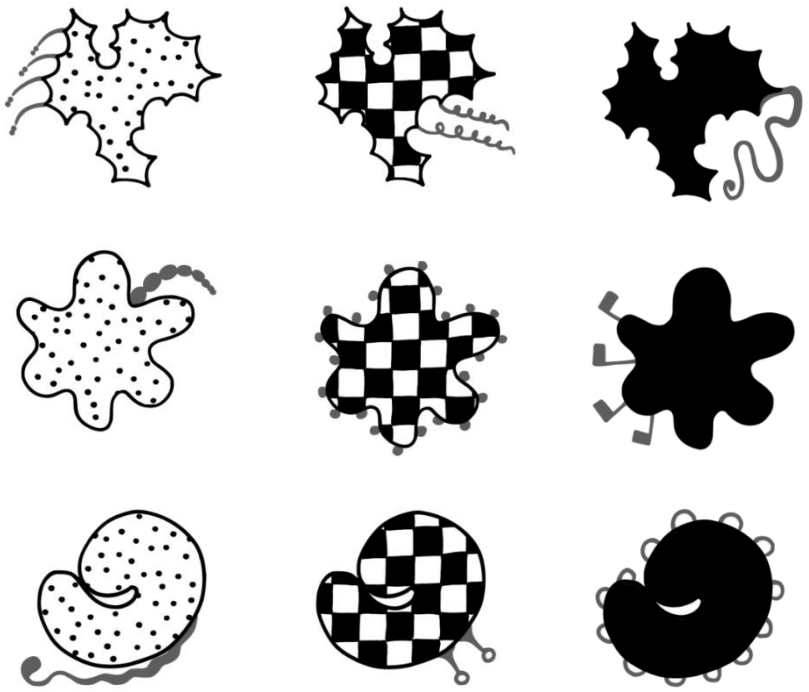


Systematicity/
Simplicity

*Languages were created in sets of three, where each differed from the others by **two** maximally different items. Later they were compared pairwise.

Meanings

- From a study by Tamariz et al. (2012)
- 3 x 3 interrelated
- Systematically related, yet idiosyncratic



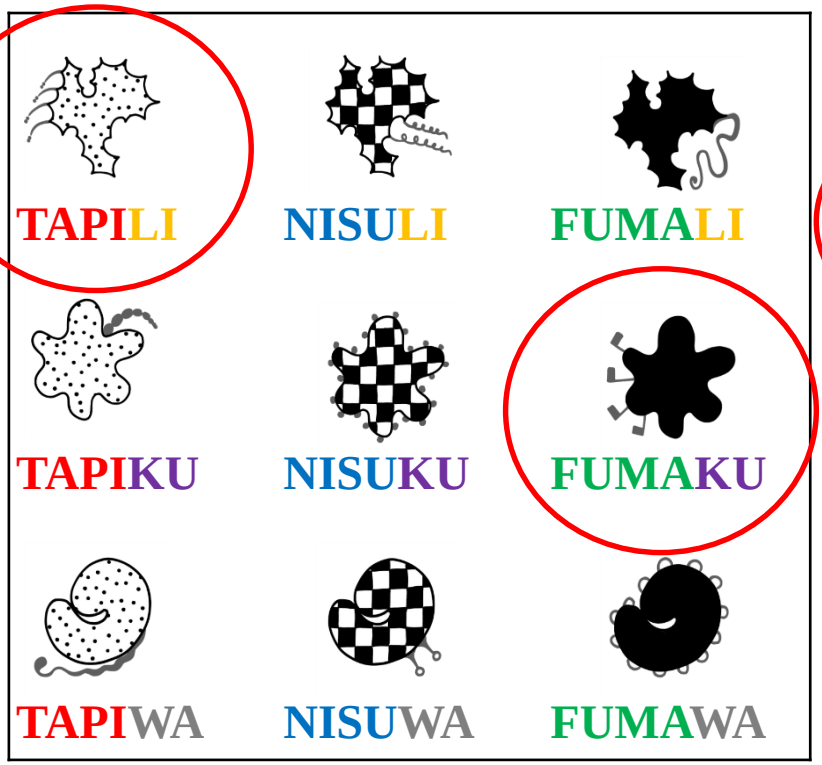
The images are designed for Tamariz et al. (2012)

Form

- Limited phoneme space in the training items
- CV-CV-CV structure
- 9 consonants, 3 vowels (/k/, /p/, /t/, /s/, /m/, /n/, /l/, /f/, /w/, /a/, /i/, /u/)
- Tested against chance similarities

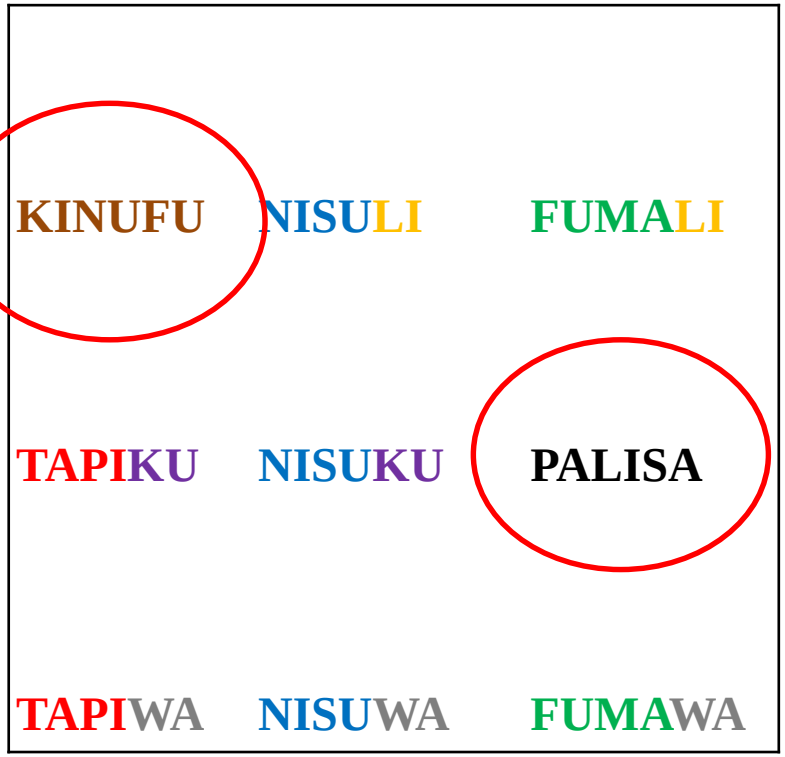
Simple Condition

Minority language



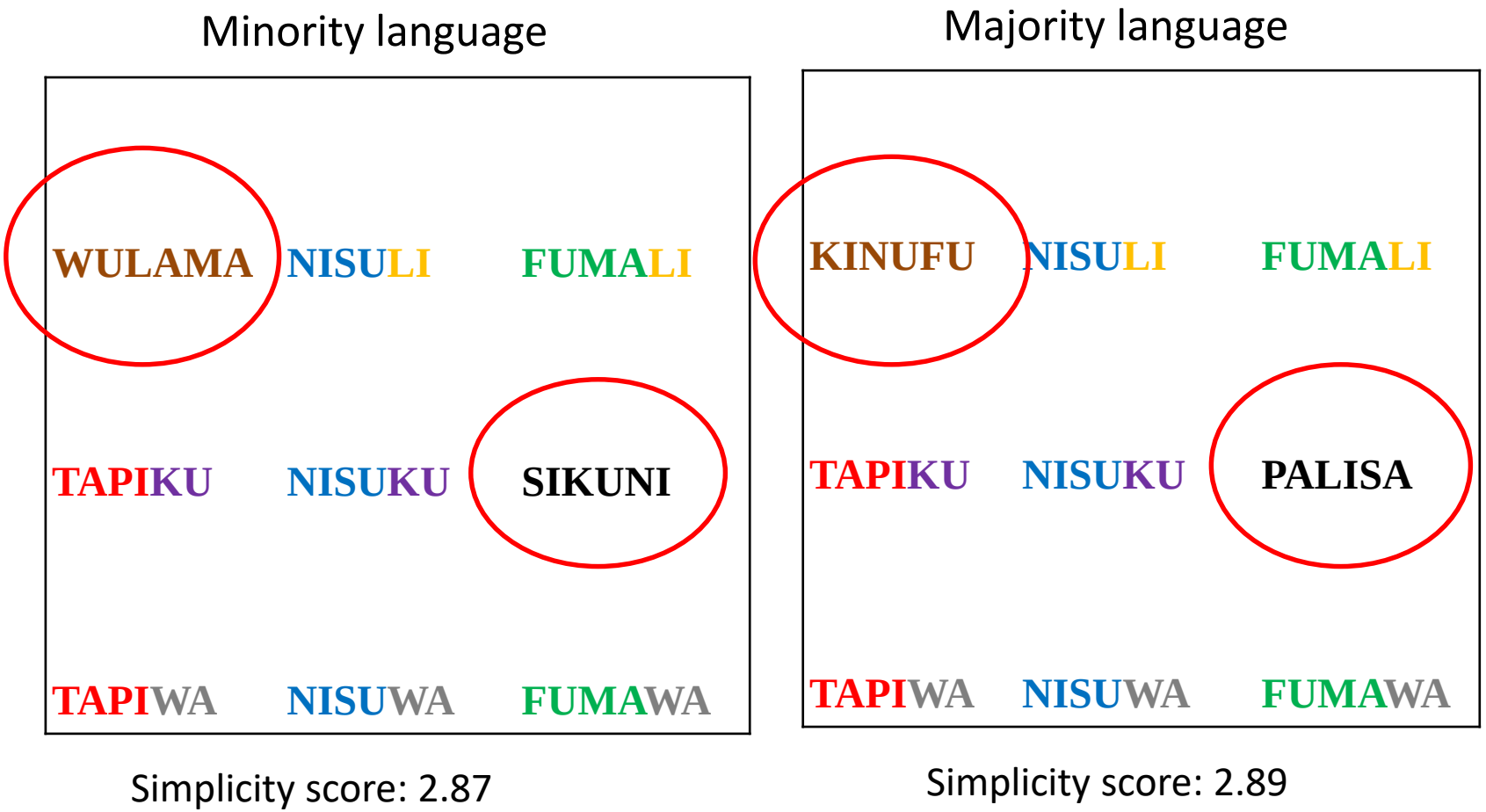
Simplicity score: 4.66

Majority language



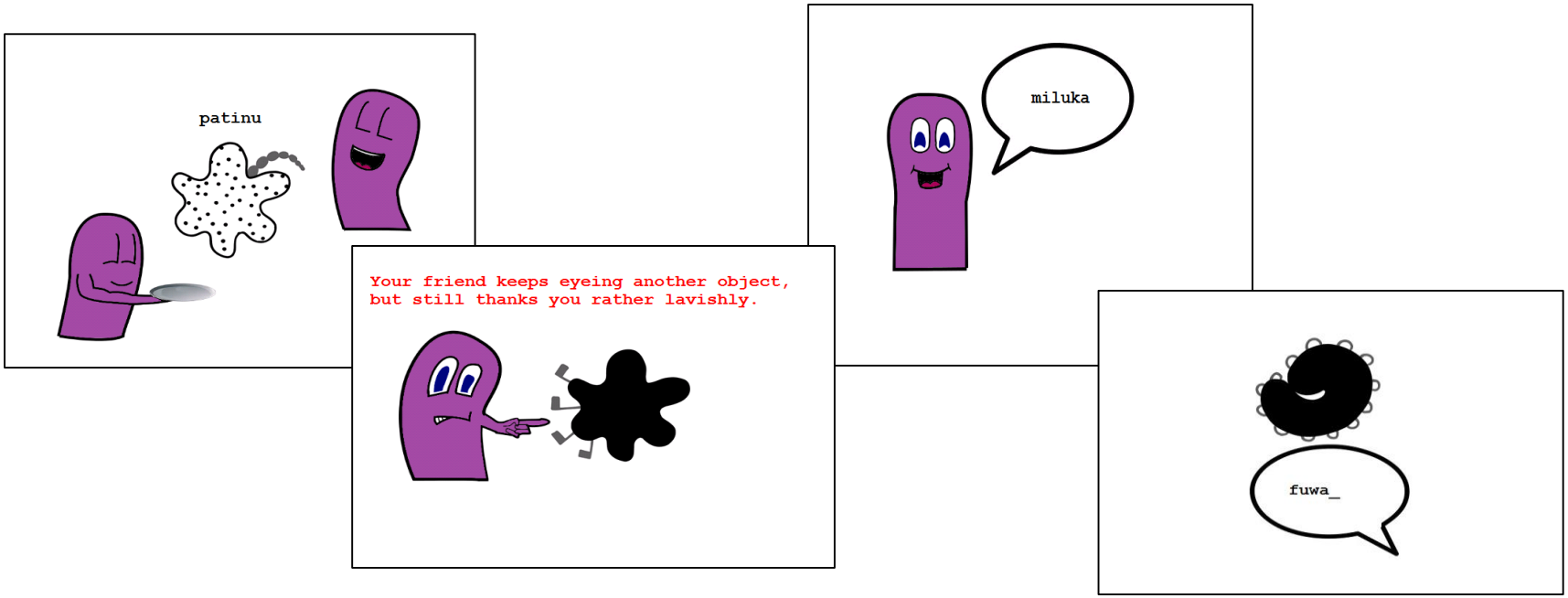
Simplicity score: 2.89

Complex Condition



Learning

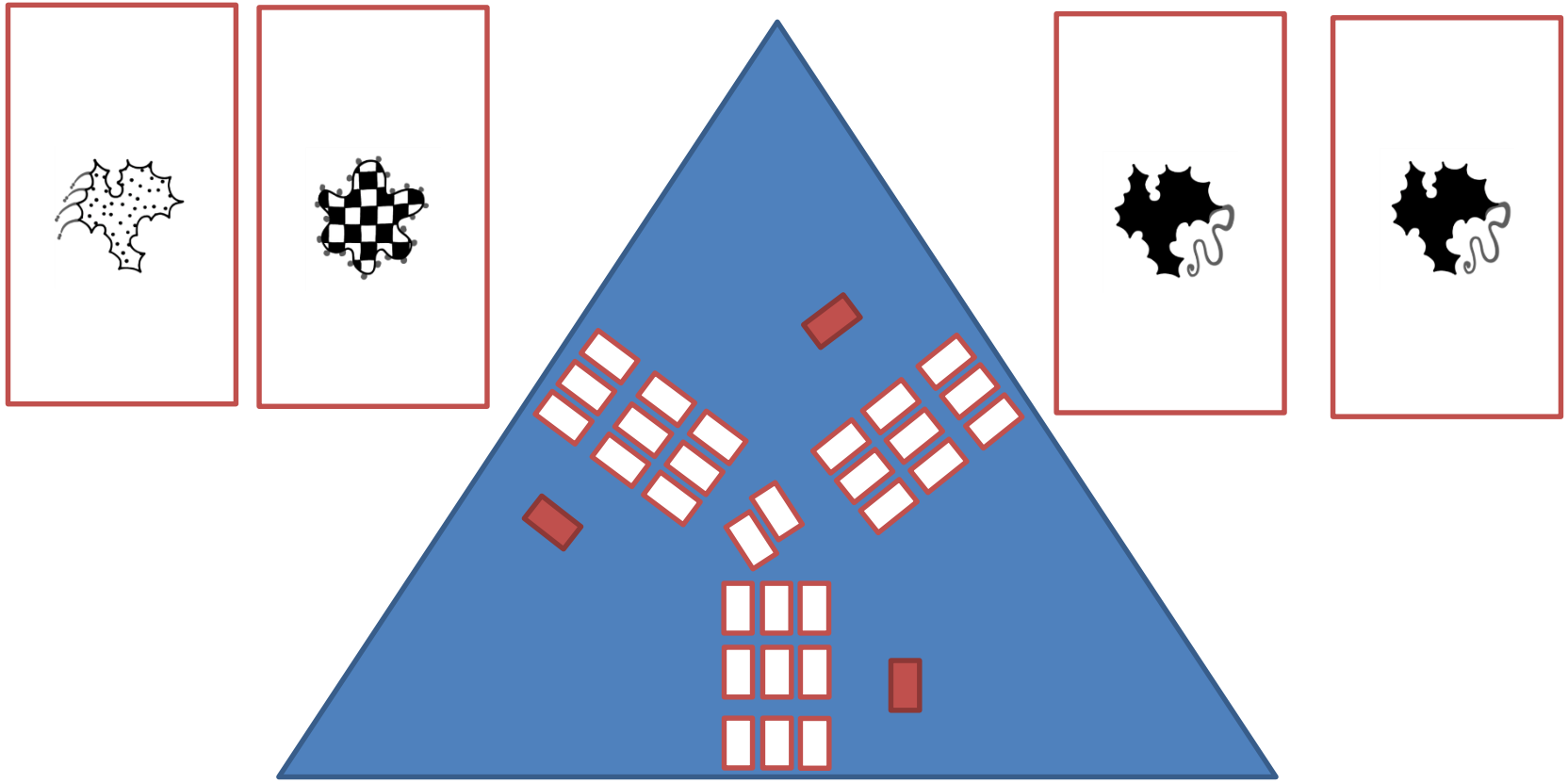
- 8 rounds = equal # of trials for all participants
  - (192 x production, 192 x perception, 192 x observation interweaved)
  - (2 obs -> 1 perc -> 2 prod -> 1 perc ... repeats)
- Expected to be competent by the end



The Game

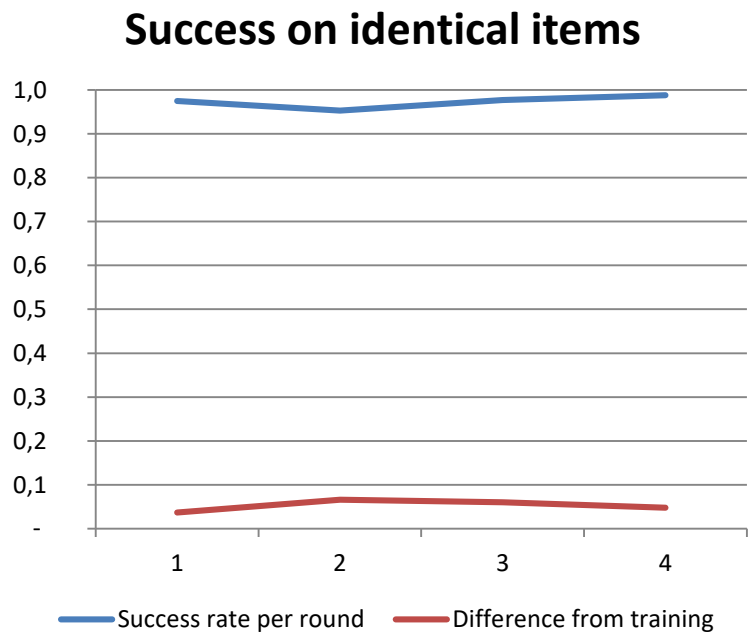
Mismatch

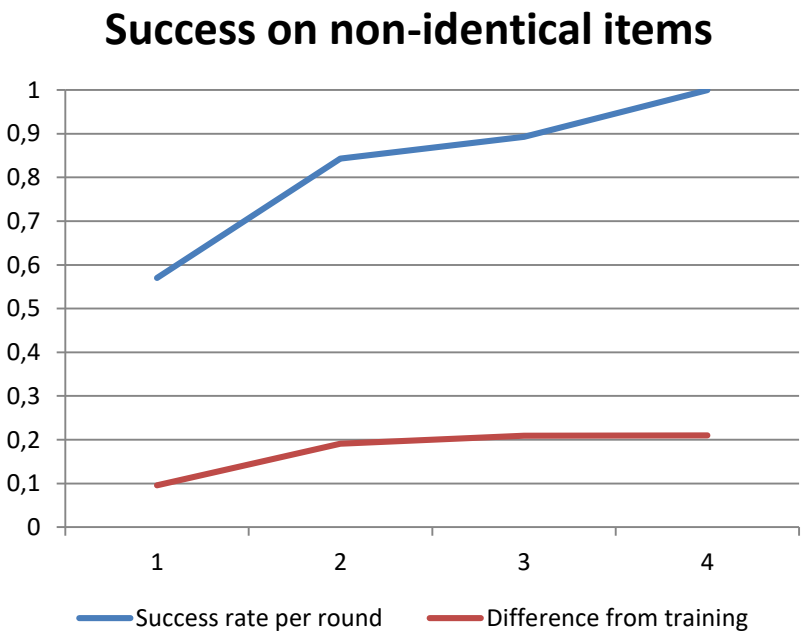
Match



Results

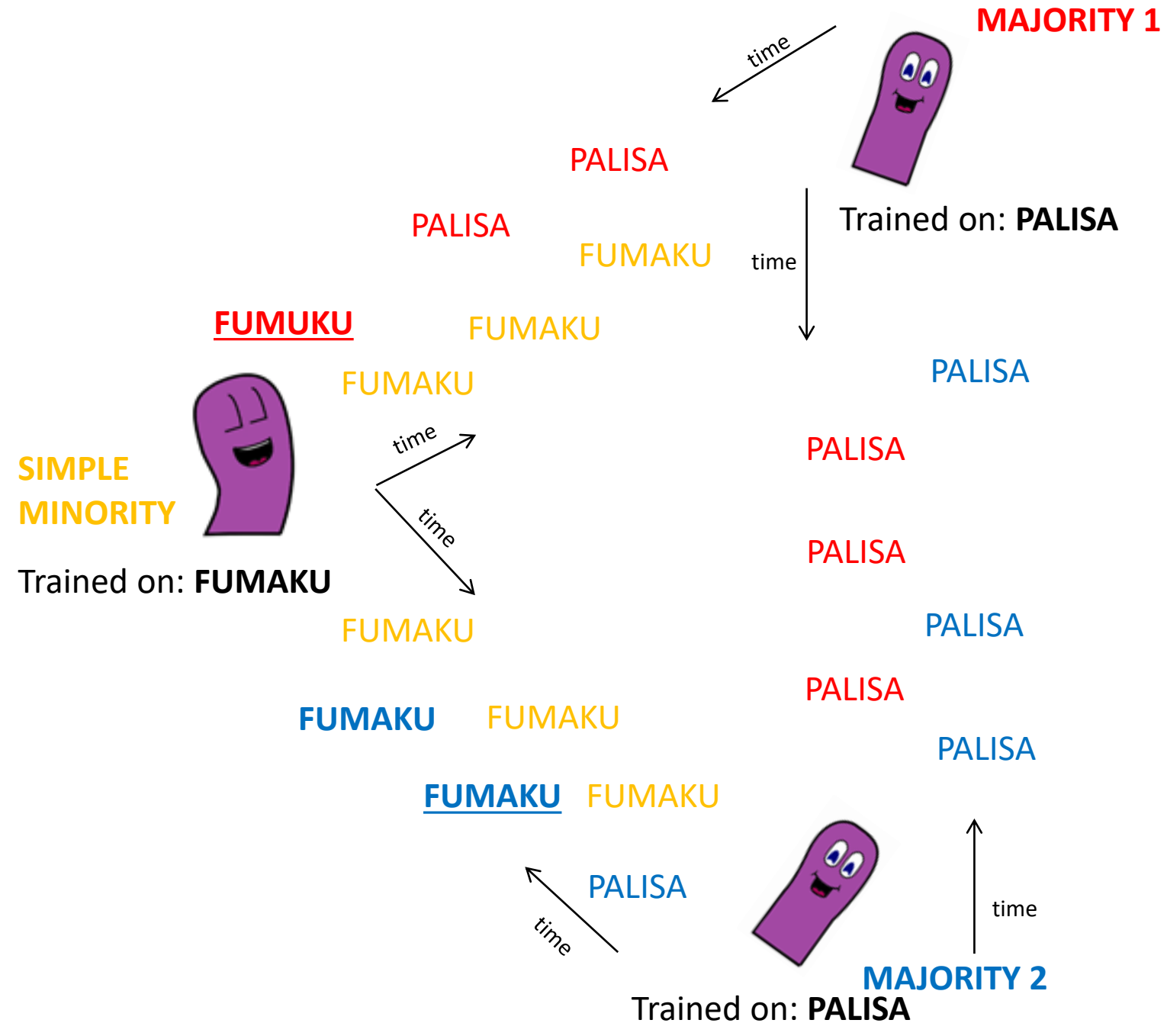
- Learned to a competent level (1 outlier)
- Test items did cause problems at first





Solving the communicative problem

- A robust trend:
  - Complex minority accommodated to the majority
  - Simple minority did not
    - They reached either a mutual understanding, or sometimes also the majority accomodated to the minority


MAJORITY 1
time
PALISA
PALISA
FUMAKU
Trained on: PALISA
time
FUMUKU
FUMAKU
FUMAKU
PALISA
SIMPLE MINORITY
time
time
PALISA
PALISA
FUMAKU
PALISA
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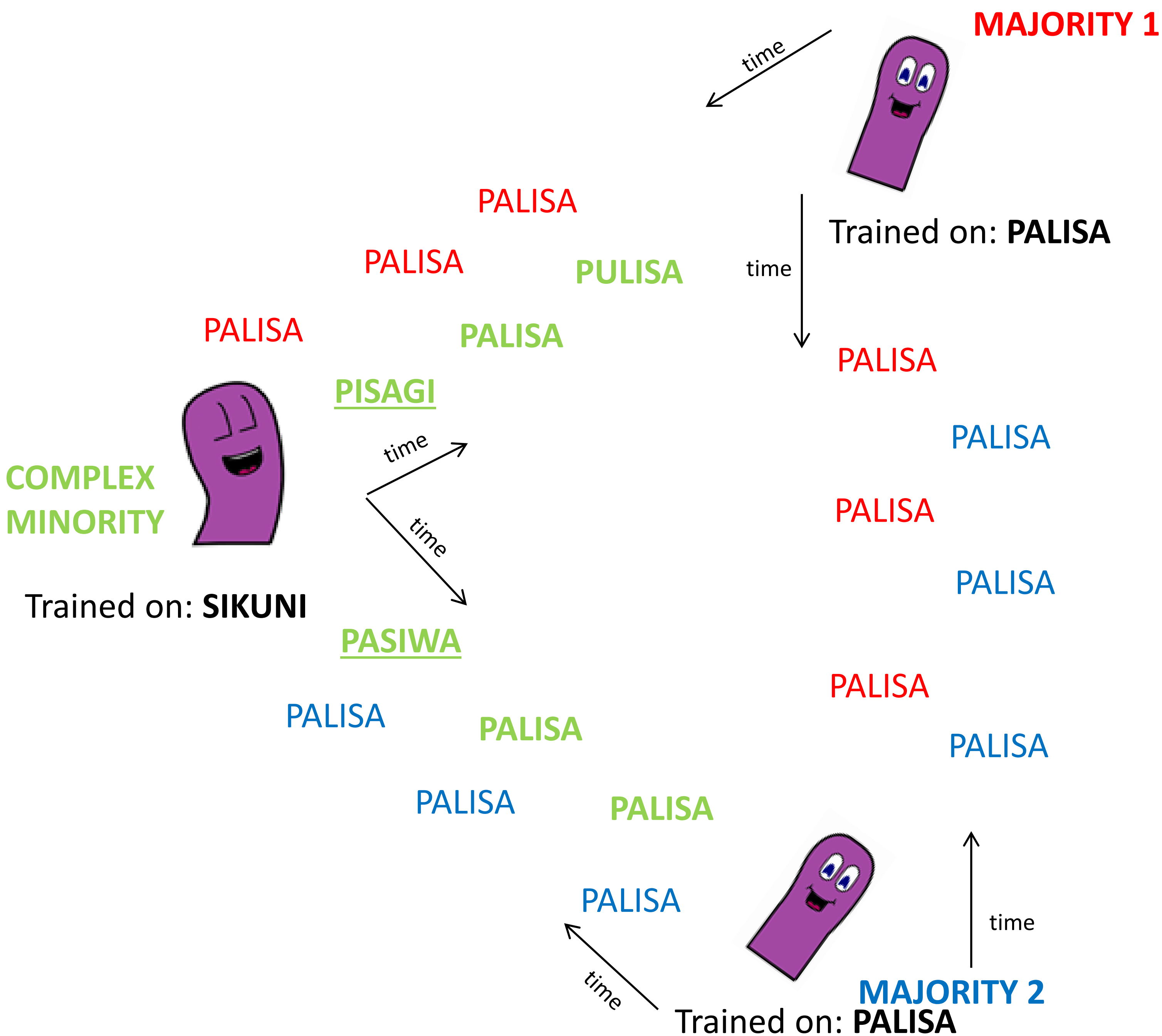
time
time
MAJORITY 2
Trained on: PALISA



MAJORITY 1
time
Trained on: **PALISA**
time
PALISA
PALISA
PULISA
PALISA
PALISA
PISAGI
PALISA
PALISA
time
COMPLEX MINORITY
time
PALISA
PALISA
Trained on: **SIKUNI**
PASIWA
PALISA
PALISA
PALISA
PALISA
PALISA
PALISA
PALISA
time
time
MAJORITY 2
Trained on: **PALISA**

For the 2nd test item

Change

Complex minority – Complex majority

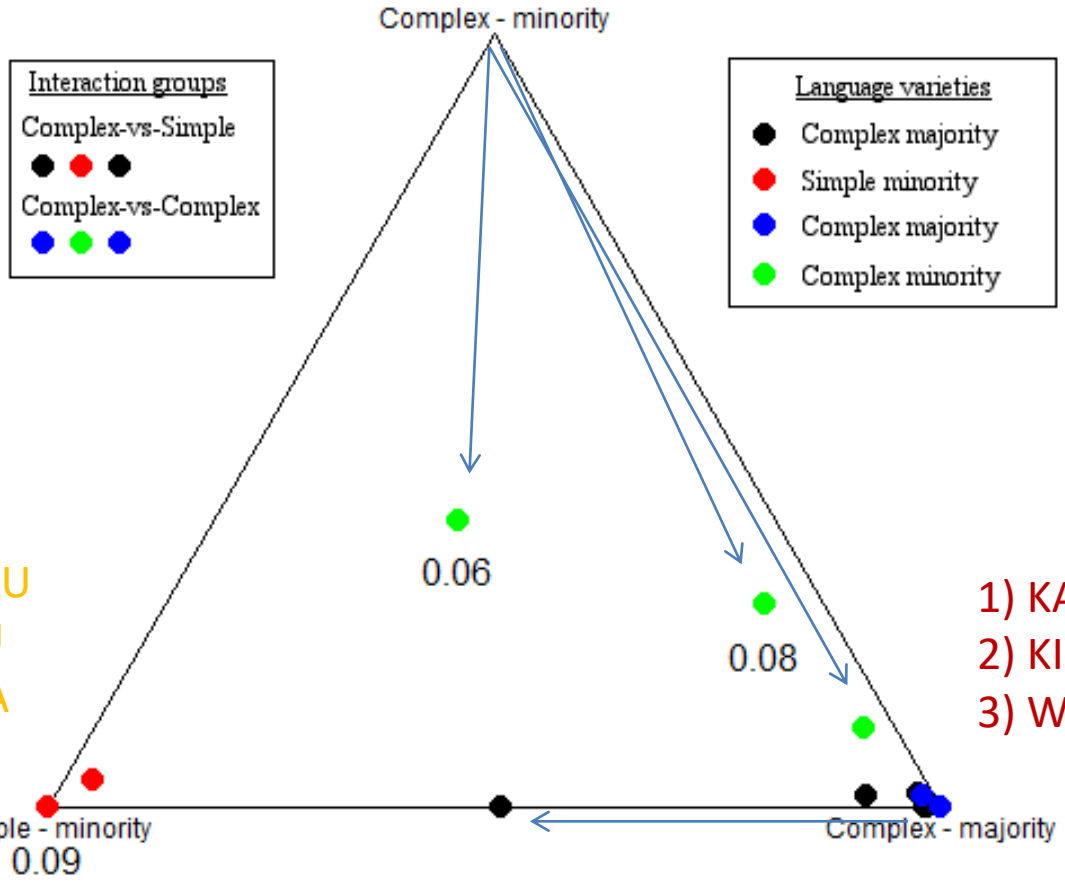
WULAMA	WULAMA	KINUFU	KUSALI	KINUFU	KINUFU
KINUFU	KINUFU	KINUFU	KINUFU	KINUFU	KINUFU
KINUFU	KINUFU	KINUFU	KINUFU	KINUFU	KINUFU

Simple minority – Complex majority

TAPIWI	TAPIWI	TAPIWI	TAPIWI	TAPIWI	TAPIWI
KINUFU	KINUFU	TAPIWI	TAPILI	KINUFU	TAPILI
KINUFU	KINUFU	KINUFU	KINUFU	KINUFU	KINUFU

Turned bilingual

1) TUFINU + MILAWA
2) WULAMA + SIKUNI
3) KANIFI + SULAWU



1) PILAMA + SANUKU
2) TAPILI + FUMAKU
3) MILUNU + PATIKA

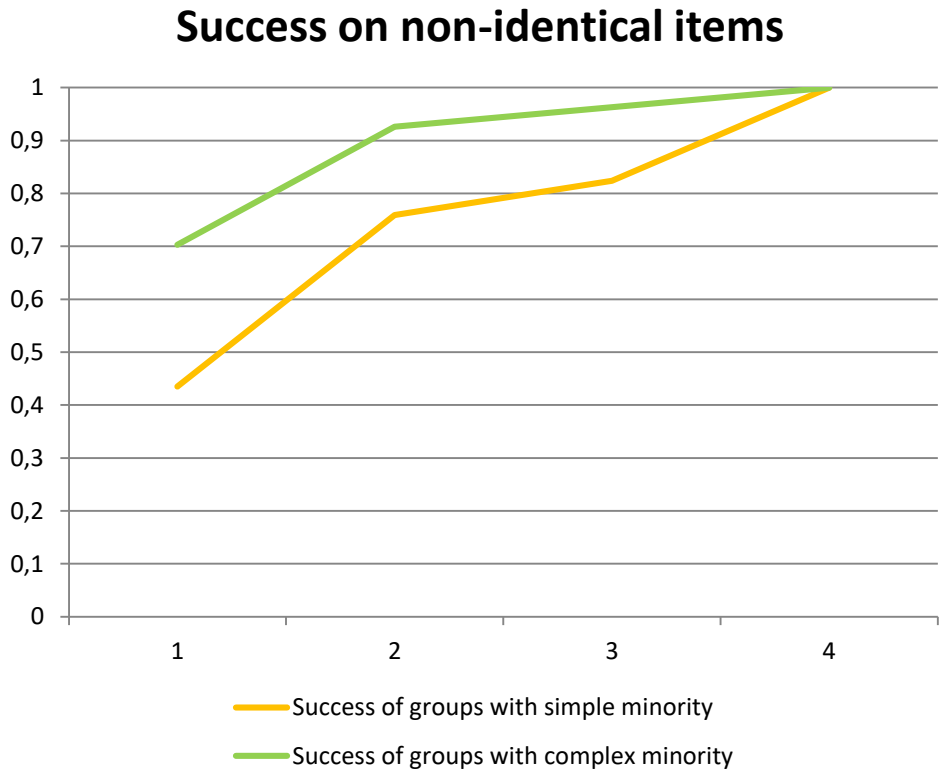
1) KASUTA + FUWIPI
2) KINUFU + PALISA
3) WUTAPA + LIFUMI

Distance from training stimuli for the minority, between two conditions

one-tailed pairwise t-test, $t(2) = -13.503 < .01$**

An interesting note

- The simple minority groups lost the game



Discussion

- Current sample size is too small to make conclusions, but the results seems plausible. Further experiments needed.
- If confirmed, you could expect speakers of a systematic variety to stay true to their ideals even when slightly unreasonable.
- This might provide one piece of the puzzle as to the proximal mechanisms explaining an attractor point of a simpler language in certain situations of language contact

Conclusions

- Bias for systematicity in communicative situations?
- Miniature artifical languages can work with communication experiments
- Other possible biases in historical linguistics can be tested with this platform

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