
The effect of rounding on the learnability of backness vowel harmony/disharmony

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Research question

- The effect of vowel rounding on learnability of vowel harmony or disharmony

Vowel Harmony

- Vowel Harmony: vowels of a given domain (usually a word) be in the same natural class.
- A common case: backness harmony
- Two consequences of backness harmony:

Vowels in roots agree: **FF** or **BB**;

Vowels in affixes also harmonize: **FF-F**; **BB-B**.

(Van der Hulst, 2016)

General harmony and disharmony rules (constraints)

a. Harmony: $V \rightarrow [\alpha F]/[\alpha F] \text{ ______ }$ (or $*[\alpha F][-\alpha F]$)

b. Disharmony: $V \rightarrow [-\alpha F]/[\alpha F] \text{ ______ }$ (or $*[\alpha F][\alpha F]$)

(Martin & White, 2021)

Background

- Martin & White (2021): vowel disharmony patterns are harder to learn than vowel harmony patterns.
- Their research is based on experiments with English speakers learning an artificial language with a subset of English vowel inventory.

Martin & White's (2021) artificial language learning experiment

Vowel Inventory of both
Harmony/Disharmony conditions

Front

Back

i

u

e

o

Suffix 1

front allomorph: -pe

back allomorph: -po

Suffix 2

front allomorph: -fi

back allomorph: -fu

Well-formed words in harmony condition

FF-F-F, BB-B-B

Well-formed words in disharmony condition

FB-F-B, BF-B-F

Rounding as a redundant feature

Contrastive feature	Front	Back
Redundant feature	Unrounded	Rounded
	i	u
	e	o

The artificial languages in our research

No Rounding Control

Front

Back

i

u

e

o

Rounding Controlled

Front

Back

y

u

ø

o

Hypothesis

- Rounding distinction has a positive effect on the learnability of vowel harmony and disharmony pattern.

Experiment design

- 32 training stems & 16 test stems
- Different stems in the training and test phases, same suffixes CVCV - CV
- Single/double suffix trials
- Consonants for stems from [p, t, k, d, r, n, s, z], vowels from [i, e, y, ø, u, o]
- Two suffixes for plural/diminutive: /f/ + [i, u, y]; /b/ + [e, o, ø]
- Audio stimuli and pictures

Experiment design

Conditions	Harmony	Disharmony
No rounding control	Same backness back vowel rounded	Different backness back vowel rounded
Rounding controlled	Same backness all vowels rounded	Different backness all vowels rounded

No rounding control: [i]/[u]

Rounding controlled: [y]/[u]

Experiment design

Single suffix items	Harmony	Disharmony
No rounding control	Pinefi, *pinefu	Pinofi, *pinofu
Rounding controlled	Pynøfy, *pynøfu	Pynofy, *pynofu

Double suffix items	Harmony	disharmony
No rounding control	pekefibe *pekefibo *pekefube *pekefubo	pekofibo *pekofibe *pekofubo *pekofube
Rounding controlled	pøkøfybø *pøkøfybo *pøkøfubø *pøkøfubo	pøkøfybo *pøkøfybø *pøkøfubo *pøkøfubø

Procedure



Replay

Continue



Play

Option 1

Play

Option 2



Play

Option 1

Play

Option 2

Procedure

- Training: select an answer and receive feedback, press “next” to continue
- Test: select an answer and proceed to next question



Correct!

▶ Play

▶ Play

Option 1

Option 2



Incorrect
the other option is
the correct answer

▶ Play

▶ Play

Option 1

Option 2

Procedure



Replay

Continue



Play

Option 1

Play

Option 2

Play

Option 3

Play

Option 4

Procedure

- 4 attention check trials intermixed with test trials

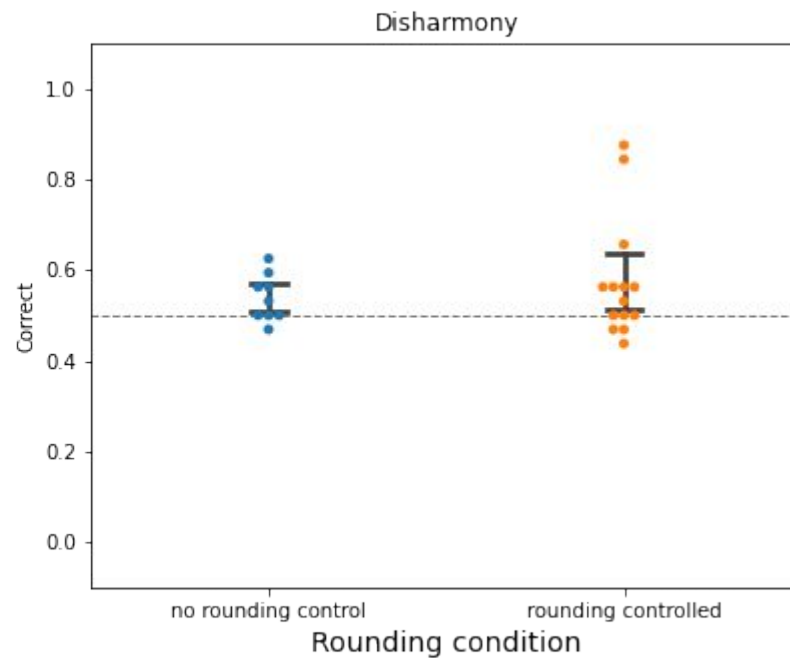
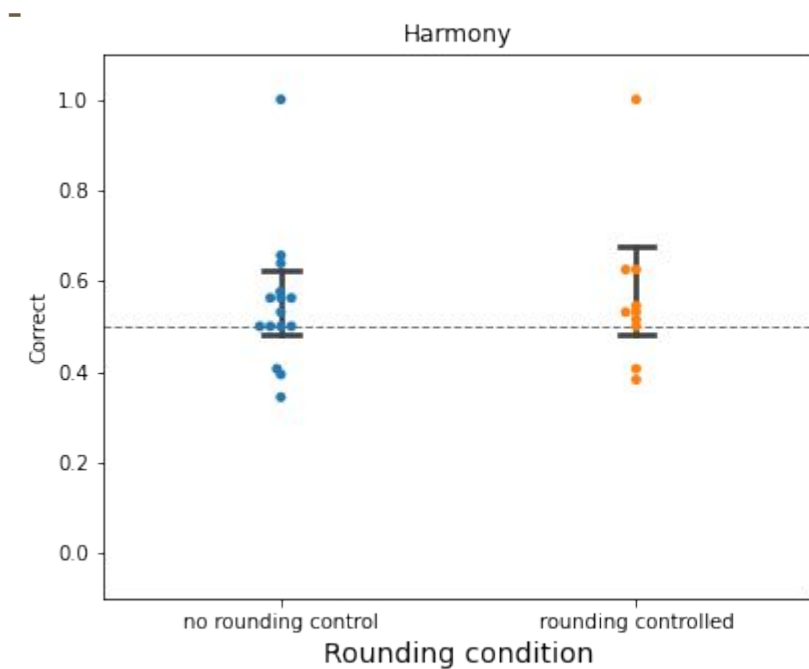
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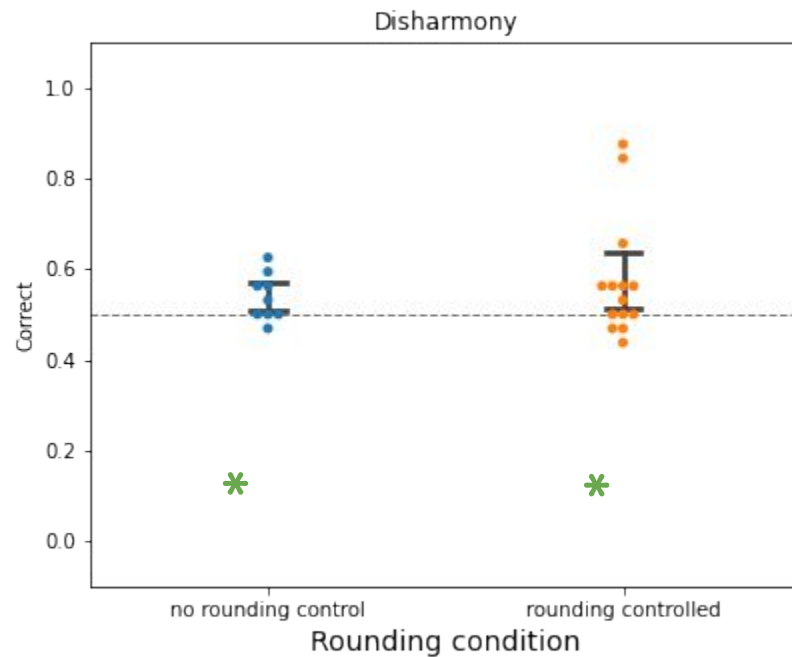
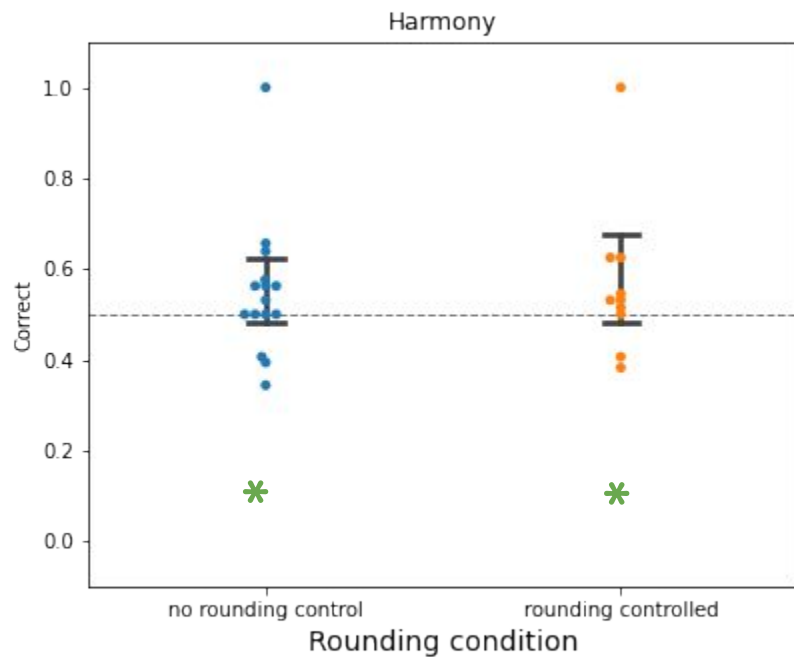
Results

- The experiment collected the data of 60 participants
 - 48 participants were analysed (9 failed attention checks, 3 unmatched linguistic backgrounds)
- The data were analysed using the logit mixed model implemented in R
 - All models contained random intercepts for participants

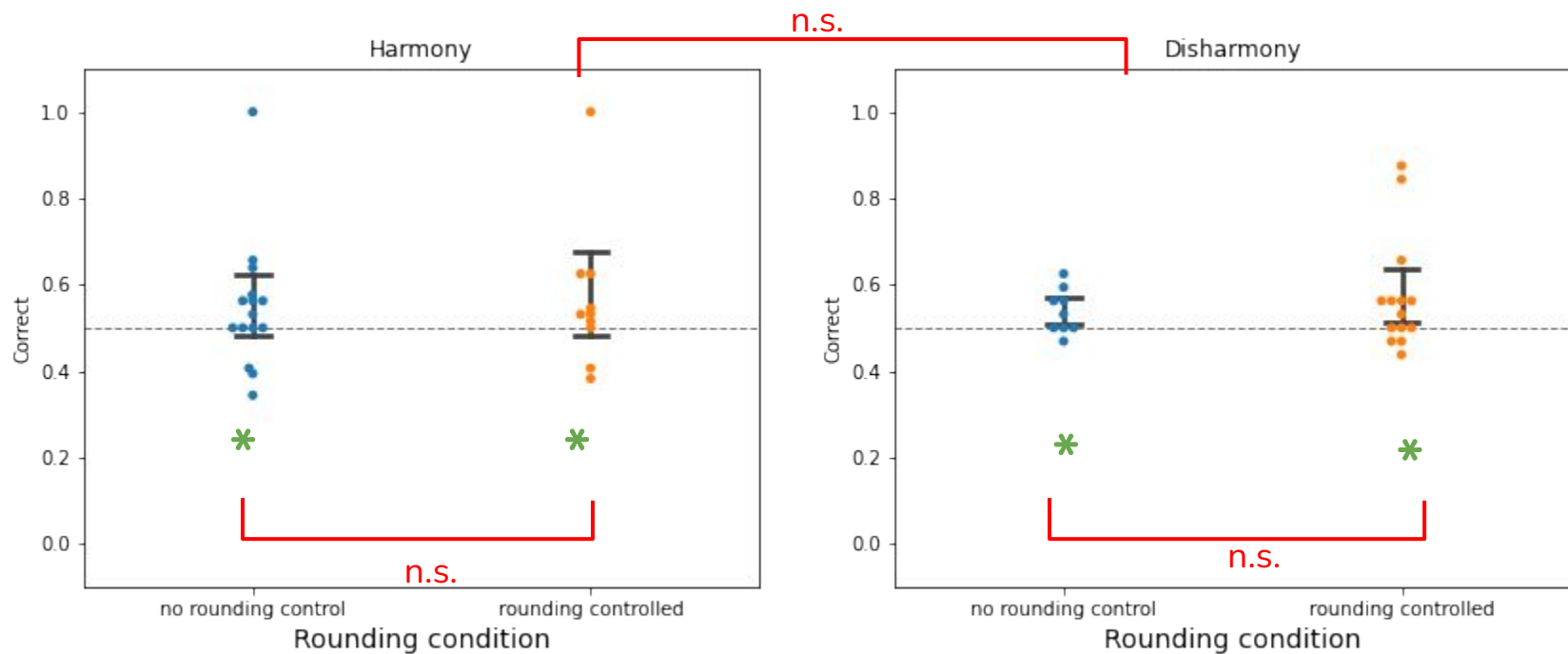
Single suffix test trials



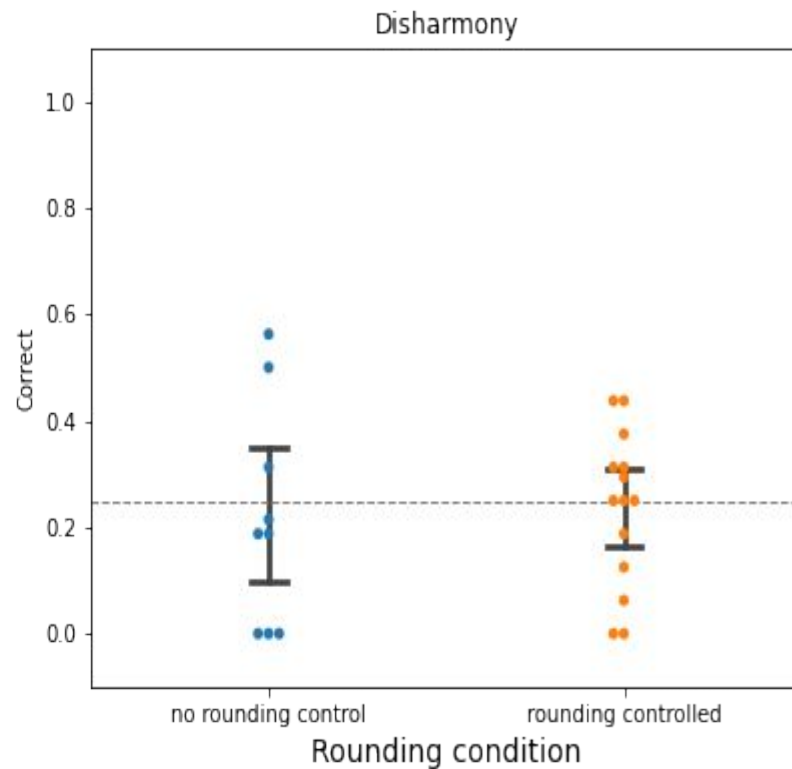
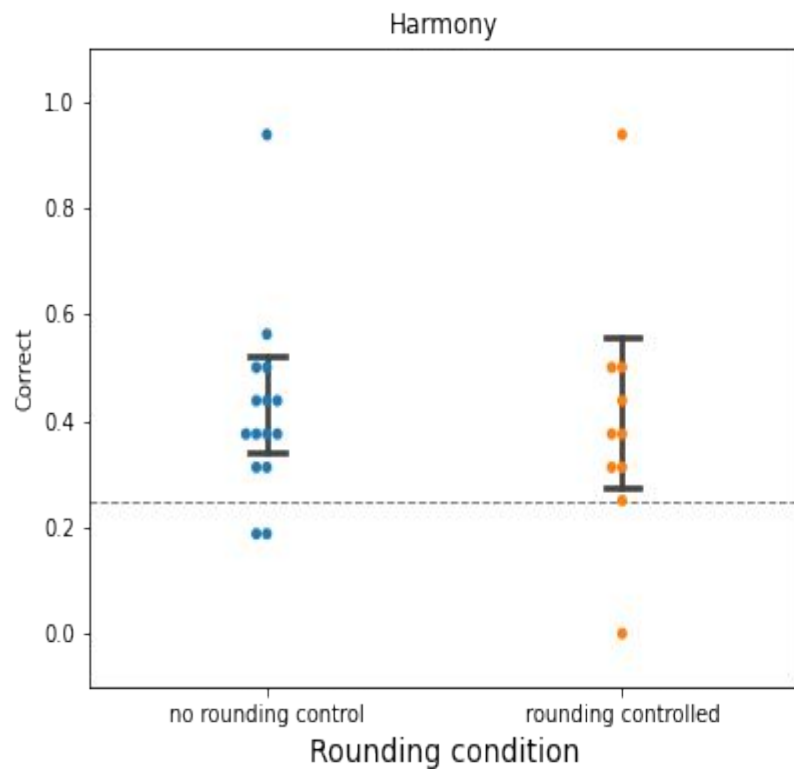
Single suffix test trials



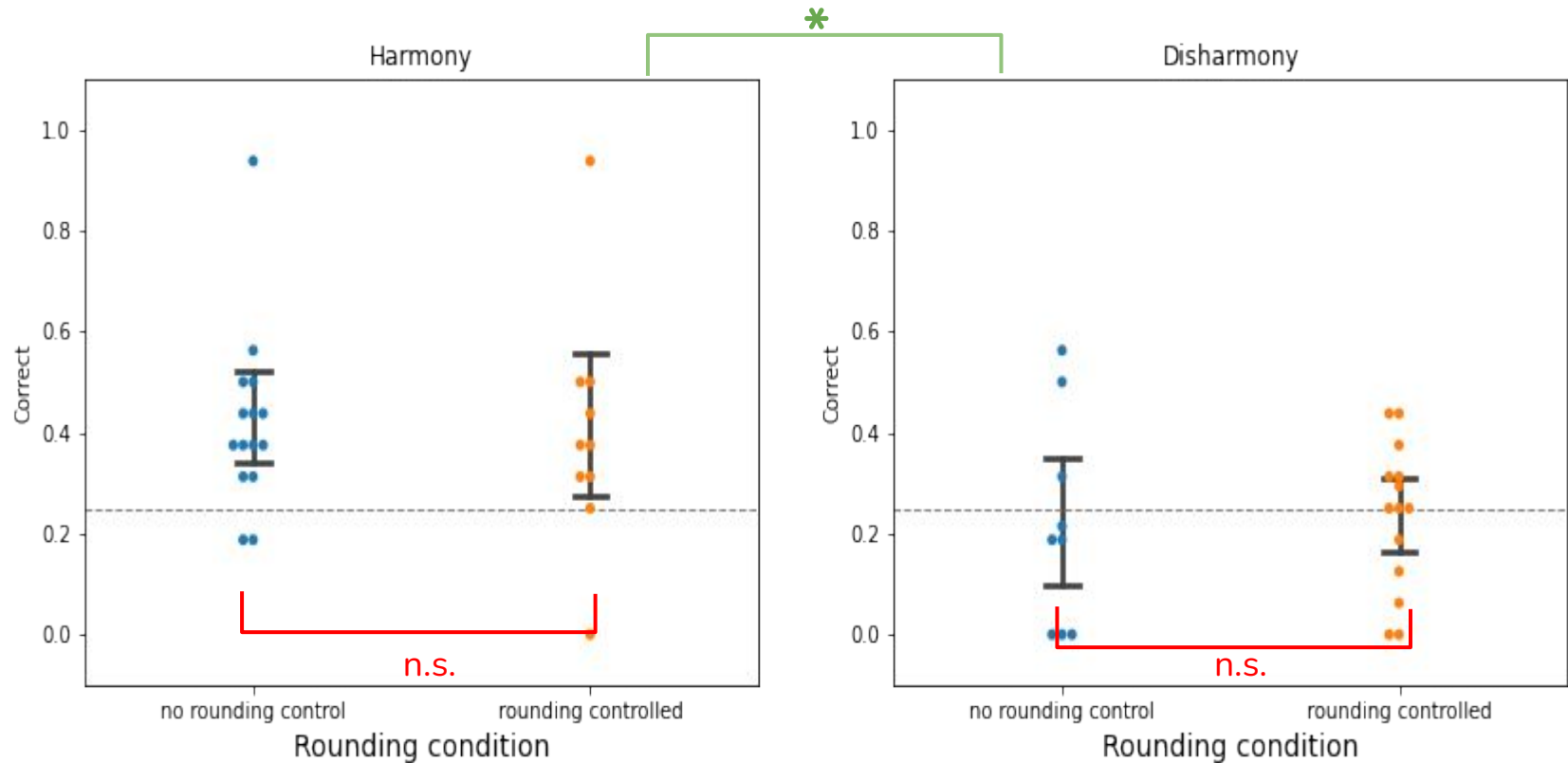
Single suffix test trials



Double suffix test trials



Double suffix test trials



Discussions

- Control on rounding feature does not affect the learnability of vowel harmony/disharmony
- Asymmetric tendency toward harmony pattern (in double suffix trial)
 - Aligned with previous study (Martin & White, 2021).
- Similar effect found in other study: Finley & Badecker (2009)
 - Participants were able to pick up a backness harmony rule before and after eliminating rounding

Limitations & further implications

- More samples are required to further investigate the relationship between rounding and vowel harmony
- Can further investigate predisposed preference among participants
 - Participants might prefer harmony rule even without training

Reference List

Finley, S., & Badecker, W. (2009). Artificial language learning and feature-based generalization. *Journal of Memory and Language*, 61(3), 423–437.

Martin, A., & White, J. (2021). Vowel harmony and disharmony are not equivalent in learning. *Linguistic Inquiry*, 52(1), 227–239.

Van der Hulst, H. (2016). Vowel harmony. In *Oxford research encyclopedia of linguistics*. Available at:
<https://oxfordre.com/linguistics/display/10.1093/acrefore/9780199384655.001.0001/acrefore-9780199384655-e-38;jsessionid=A6209BD2D93354BABC825CCB2404A569>

Q&A
