

# Does seeing vowels increase the probability of acquisition?

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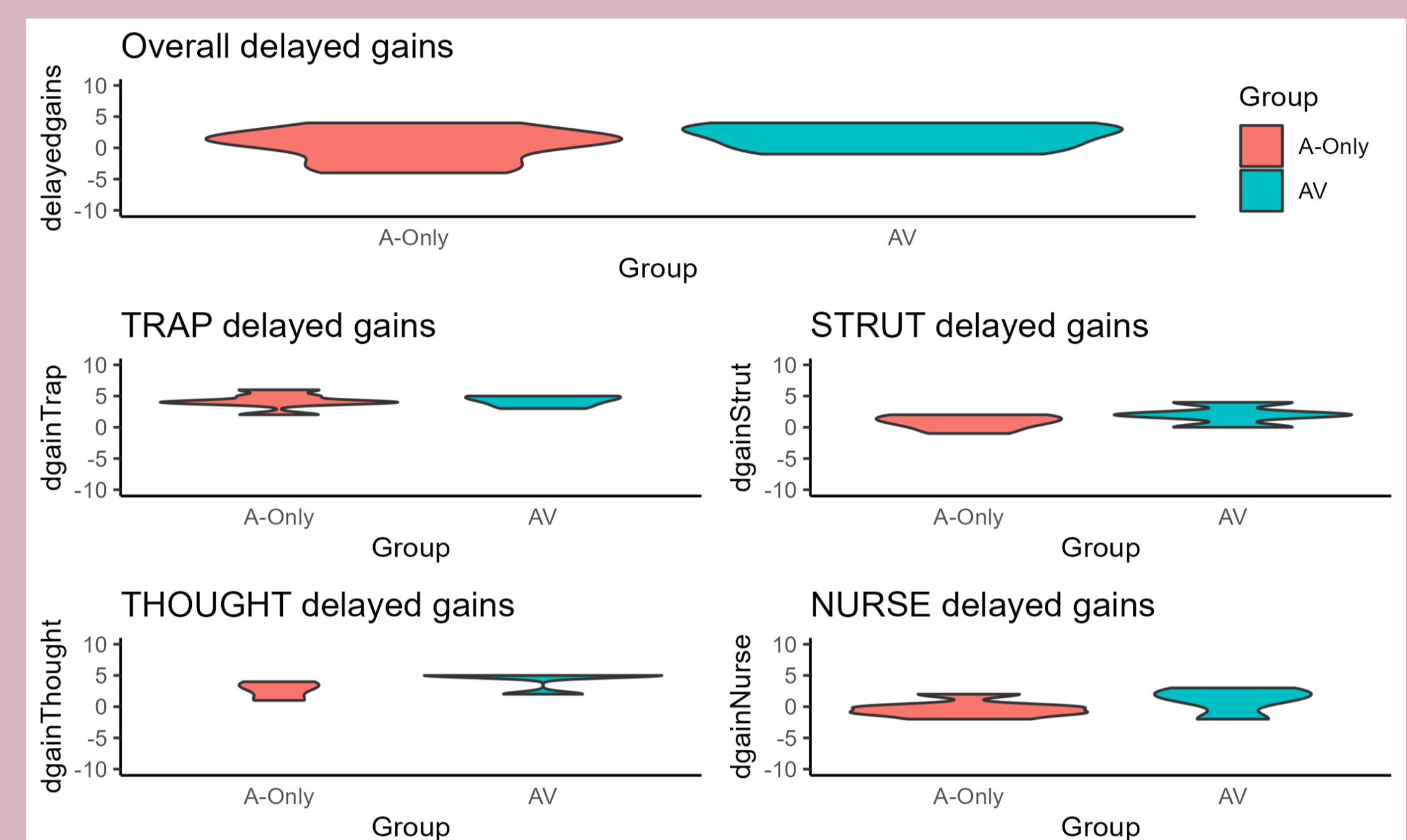
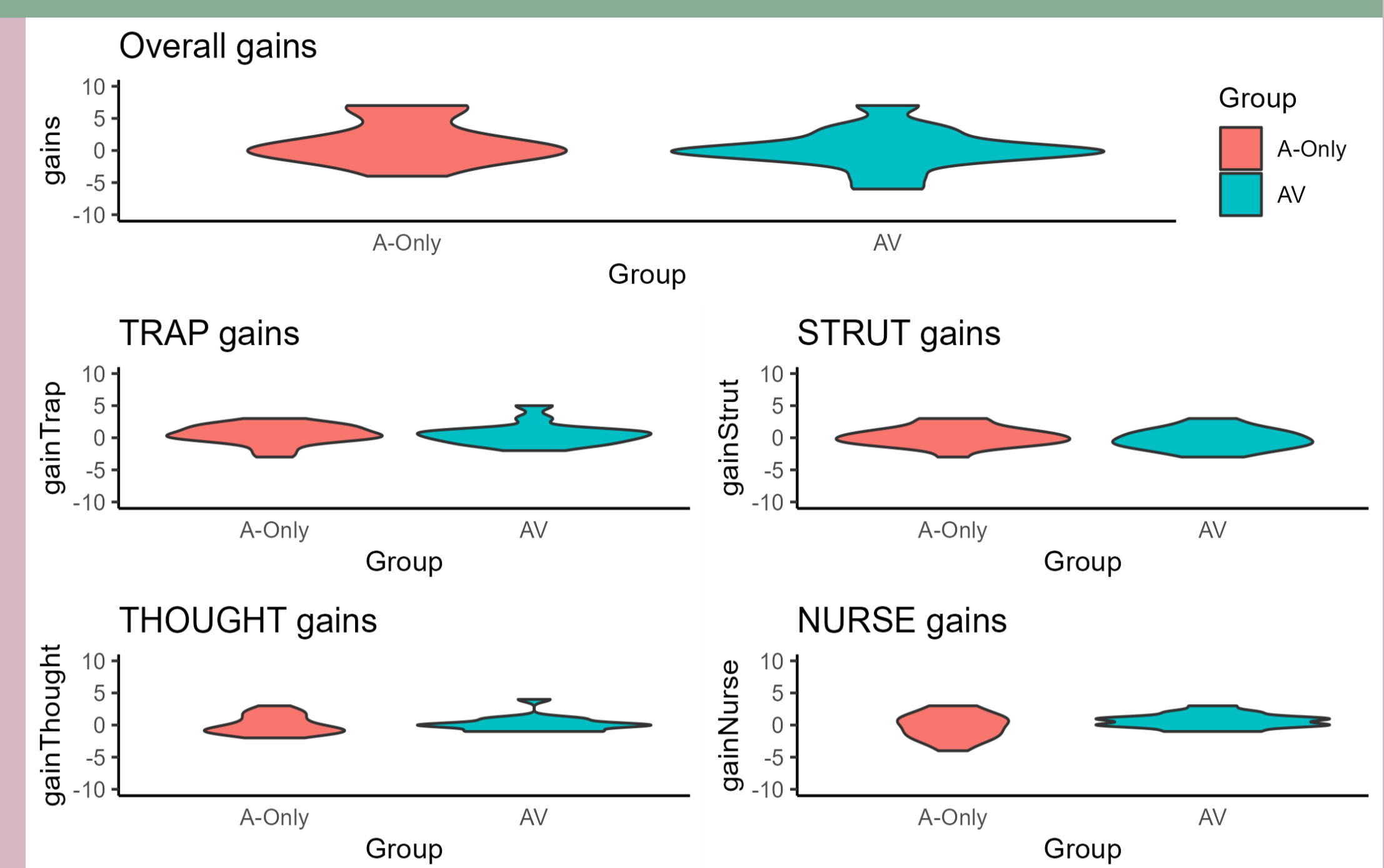


Description	t score	Bayes factor
Overall gains	0.959	0.473
TRAP gains	-0.0585	0.334
STRUT gains	0.769	0.420
THOUGHT gains	-0.307	0.345
NURSE gains	-1.52	0.740

N.B. Delayed post test data are insufficient for meaningful interpretation

N=32

N=10



**No. But it should in theory.**  
**Lab conditions ≠ classroom conditions**

## Rationale

Findings in neuroscience (e.g. Glanz et al, 2018) suggest that the same area of the brain, the prefrontal cortex, is activated by hearing speech as well as seeing speech articulated. The ramifications for this is that if perception is a multimodal phenomenon, then multimodal input should aid the acquisition of phonology for listening. The widespread availability of internet video media, which frequently shows articulatory gestures, means that teachers are already using multimodal input but the effectiveness for phonology acquisition has not been fully investigated.

In a laboratory-based vowel discrimination study, Masapollo et al. (2017) found that media provided in a natural audiovisual modality (i.e. where visuals are congruent with the audio) provided greater means for functionally monolingual listeners to discriminate between cross-language examples of French and English /u/ phonemes, although examples of more central to more peripheral shifts were easier to perceive than more peripheral to more central. These effects were less prominent in visual-only or audio only modalities. This shows that multimodal input can have an effect on vowel discrimination.

Based upon the Natural Referent Vowel framework (Polka & Bohn, 2012), where peripheral vowels are more easily discriminated, and the PAM (L2) framework (Best & Tyler, 2007), Japanese learners may not easily categorise, and thus discriminate between the TRAP, STRUT, NURSE & THOUGHT phonemes. It would be beneficial to increase the chances of categorisation and in turn acquisition.

Orthography appears to be an obvious way to increase visual salience. However, English is not highly orthographically transparent. Grapheme-phoneme correspondences do not map one-to-one in all languages, and therefore orthography is difficult to harness in order to increase visual salience of phonological items (Hayes-Harb & Barrios, 2021). Therefore, while use of orthography can work between some pairs of languages (Showalter and Hayes-Harb, 2013) it is unsuccessful for others (Barrios & Hayes-Harb, 2020), and because English is orthographically less transparent, L1 Japanese learners are likely to experience no advantage in using it to aid phonology acquisition.

Wave form displays have also been found to be useful for phonology acquisition, (Motohashi-Saigo & Hardison, 2009) although mainly this has been done with students specializing in linguistics. While obviously beneficial to those learners whose instructors are able to access wave forms and produce learning materials with them, a disadvantage is that this cannot be used with speech in a natural or naturalistic setting because for most speech in our lives nobody sees accompanying wave forms.

Furthermore, the work of Hardison (Hardison, 2017; Sueyoshi & Hardison, 2005) on increasing visual salience for consonants in speech with gated video was found to be effective with L1 Japanese and L1 Korean learners of L2 English. However, similar work has not been carried out with regard to the visual salience of vowels.

It was therefore decided to proceed with a naturalistic study to investigate whether modality effects perceptual acquisition among L1 Japanese learners in an intact class.

## Research Questions

Does visual salience affect vowel acquisition?

*Hypothesis: visual salience improves vowel acquisition.*

Are certain vowels affected more by visual salience than others?

*Hypothesis: Vowels closer to the periphery of the vowel space are more easily acquired than central vowels.*

## Method

36 students in an intact class were requested as part of class work to complete a vowel discrimination pretest administered in Moodle and taken on participants' own devices, a mixture of laptop computers, tablets and smartphones. 4 students did not complete the pretest or complete 4 or more lessons, therefore these 4 students were not included in data analysis therefore the sample size was N=32. After the pretest, students took 6 lessons, one per week, during class time, in either audiovisual or audio-only modality. Each lesson involved 4 sets of vowel identification and transcription of the vowel in utterance context. After all lessons were finished a post test was assigned. After 4 weeks, a delayed post test was administered, which was completed by N = 10 participants during the summer vacation. All work was subject to academic credit.

## Discussion

The results of the data analyses of post test gains and the simple plots of delayed post tests suggest that there is no strong statistical evidence for an effect in favour of either modality, audiovisual or audio-only. This suggests that there is little difference in providing listening input in audiovisual or audio-only modality for vowel acquisition. However, it may be the case that undertaking the lessons in a CALL system in a classroom context, or by taking the lessons on smaller mobile devices, renders any additional salience from the visual modality moot, particularly for the differences between more central vowels rather than phonemes located toward the periphery of the vowel space.

It should also be noted that the current study was undertaken with a small sample, and therefore may not generalise across different contexts or language pairs. Thus, caution must be exercised when comparing the results of this study to other phonological acquisition studies.

