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Background

Speech perception is influenced by spectral context effects (Stilp, 2020). Among these is the contrastive effect of f₀ on the perception of center of gravity (CoG) in voiceless fricatives (i.e., a lead-in sentence with low f₀ facilitates high subsequent CoG perception [e.g., /s/], and a sentence with high f₀ facilitates low subsequent CoG perception [e.g., /ʃ/]; Niebuhr, 2017). However, whether knowledge of a talker's typical f₀ can produce similar effects is unknown.

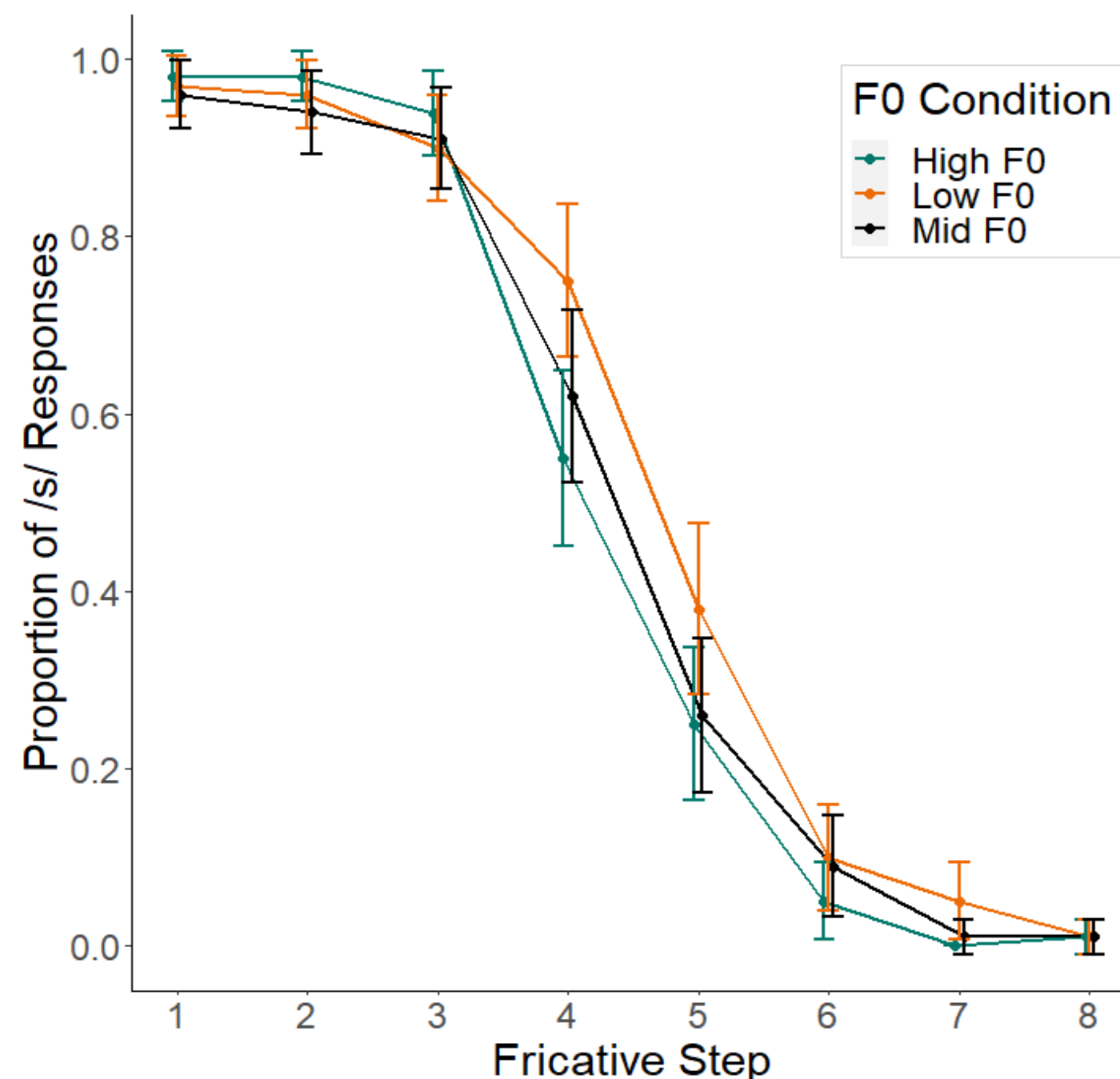
Experiment 1

Method

In a 2AFC task, 10 participants heard synthesized fricatives from an 8-step continuum between /s/ and /ʃ/ in the context *Nu komt het woord /ʔok/* "Now comes the word /ʔok/" and were asked to indicate whether they heard *sok* or *sjok*. The sentence context was pitch-shifted.

- High (+4st), mid (baseline), and low (-4st) f₀ conditions
- 8 fricatives and 3 f₀ conditions for a total of 240 trials

Results



Participants were more likely to categorize ambiguous fricatives as /s/ in low f₀ contexts, and as /ʃ/ in high f₀ contexts, indicating a contrastive effect of f₀ context on fricative CoG perception.

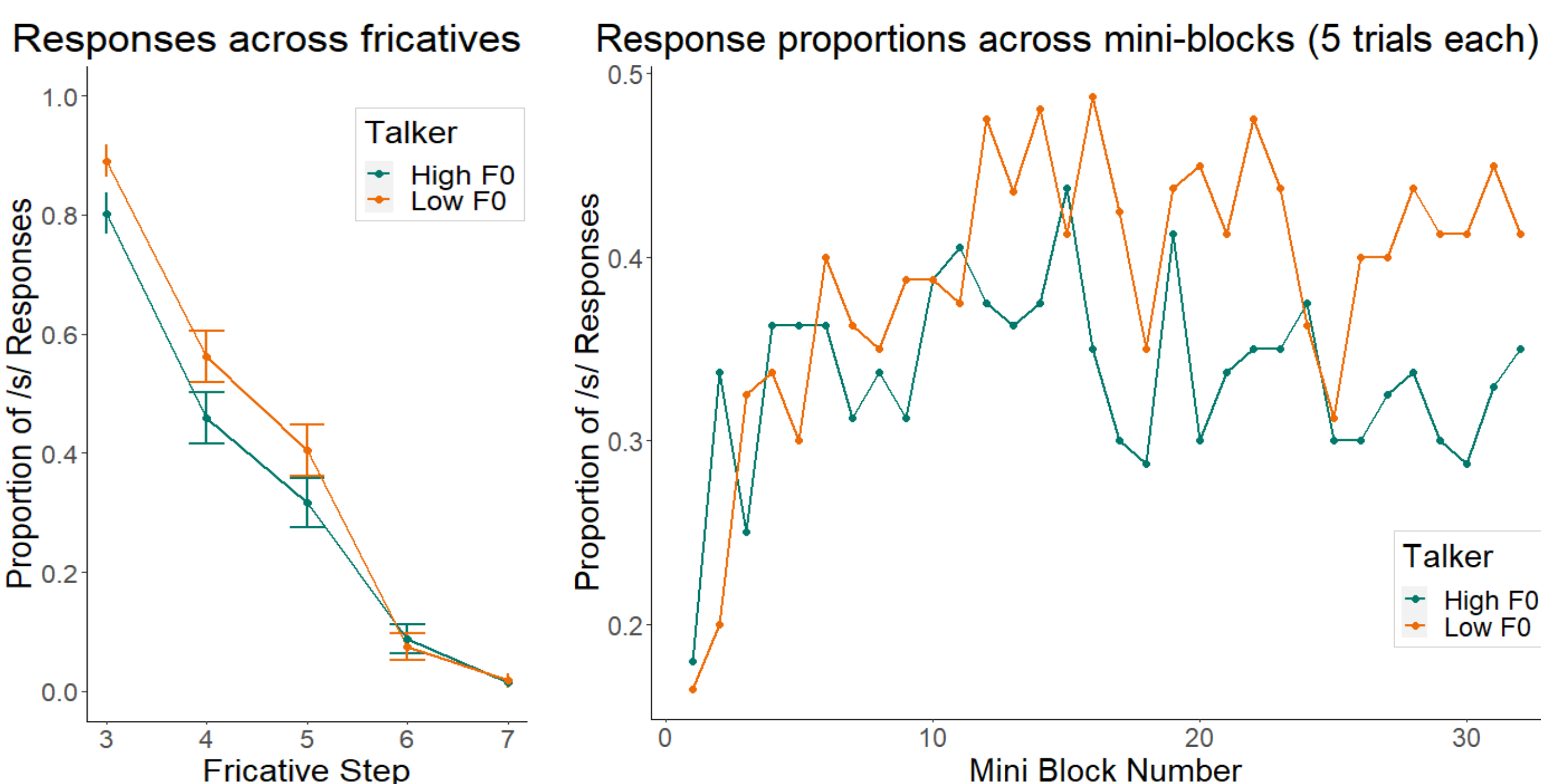
Experiment 2

This experiment tested whether talker f₀ information acquired in an exposure task would produce a comparable contrastive effect on fricative perception (i.e., a talker f₀ effect).

Method

- High and low f₀ exposure groups (N = 16 each) in a 20-minute exposure task instead of varying f₀ at test
- 5-step subset of the original continuum (i.e., steps 3-7)
- Only the word /ʔok/ without preceding context in 2AFC

Results



The two f₀ exposure groups diverged in the expected direction. However, across both groups, we observed a strong early /ʃ/ bias prior to this divergence. The group f₀ effect was only statistically robust after the first ~30 trials.

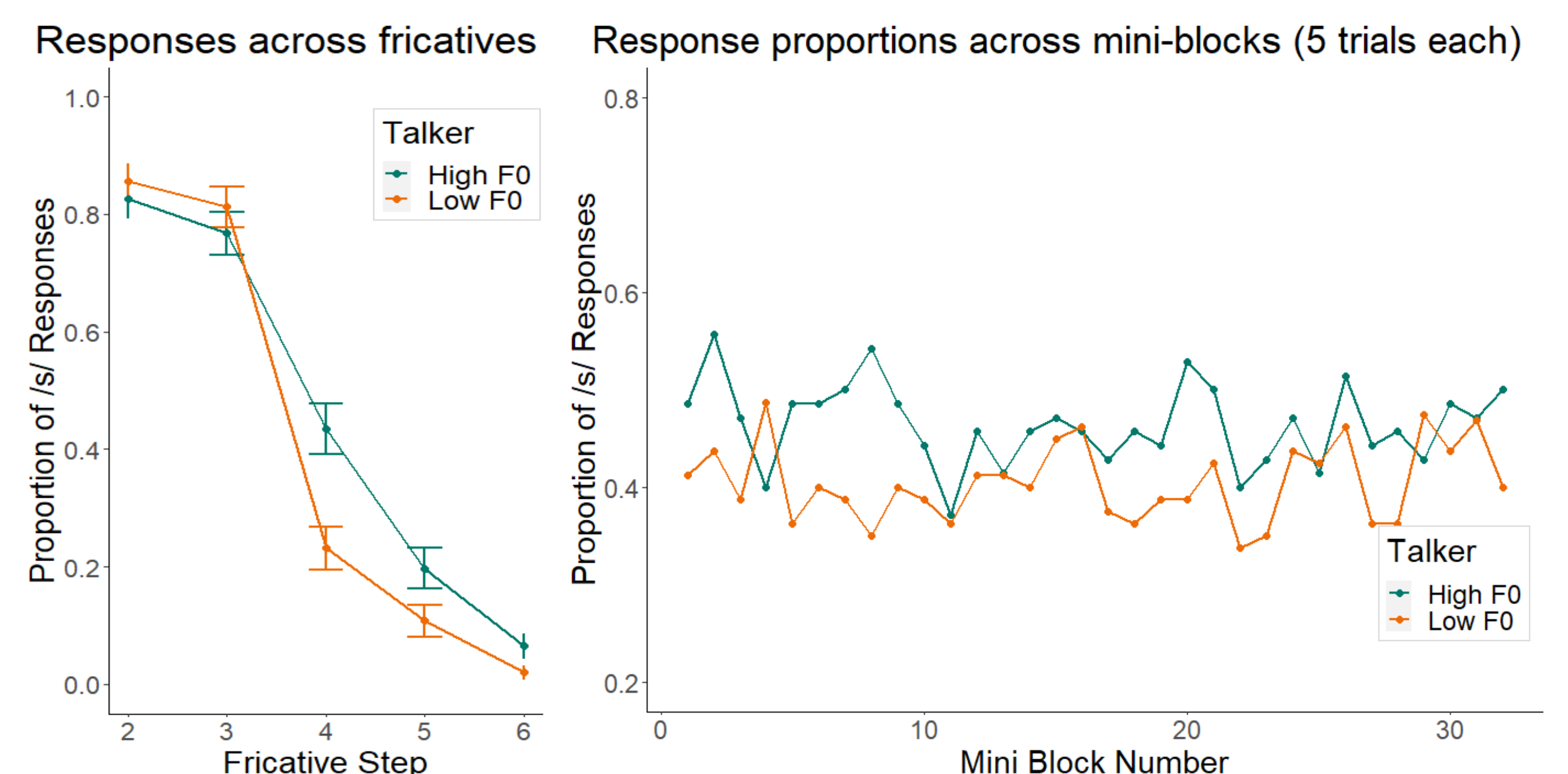
Experiment 3

This experiment was designed as conceptual replication of Experiment 2 with minor design adjustments aimed at eliminating the early /ʃ/ bias observed in Experiment 2.

Method

- Same f₀ group exposure and 2AFC tasks as Experiment 2
- A more /s/-like subset of the continuum (i.e., steps 2-6)
- Online data collection (using Gorilla)

Results

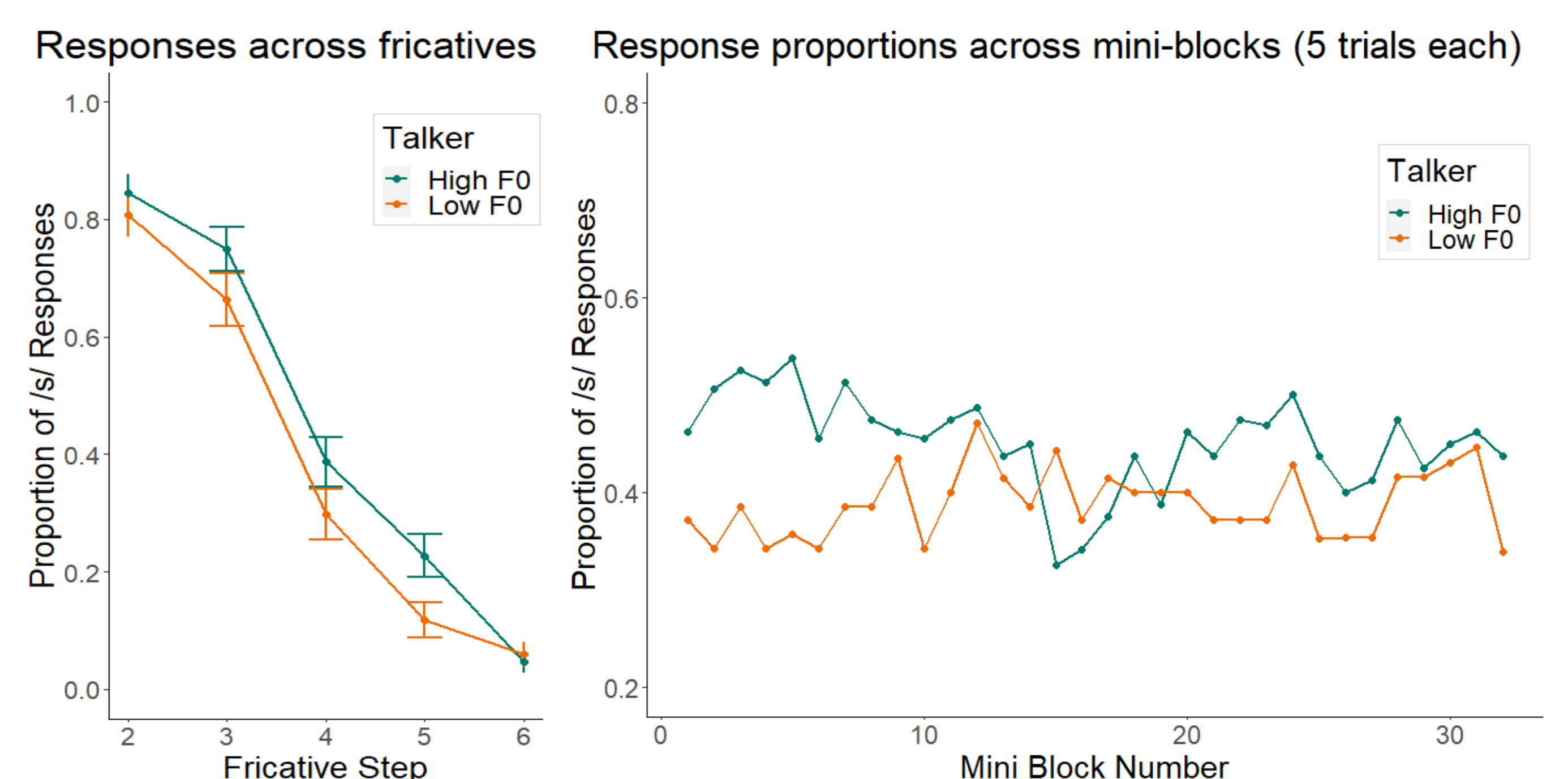


We successfully eliminated the early /ʃ/ bias in both groups, although a global /ʃ/ bias persisted. The talker f₀ effect was not statistically significant, but reversed whereby it became assimilatory (i.e., high f₀ → high CoG, low f₀ → low CoG)

Experiment 4

This experiment was an in-house replication of Experiment 3, prompted by the unexpected reversal of the f₀ effect direction.

Results



The early /ʃ/ bias was once again absent, with a smaller global /ʃ/ bias compared to Experiments 2 & 3 as well. However, the assimilatory effect of Talker f₀ persisted, this time reaching statistical significance.

Conclusion

We found contrastive effects of f₀ context on fricative perception. However, further research is required to establish the reliability of the talker f₀ effects, and whether they are contrastive or assimilatory in nature.