

VOCALIZATION-SELECTIVE SUPERIOR TEMPORAL REGIONS ARE NOT CONSPECIFIC-SPECIFIC IN HUMANS

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INTRODUCTION

Temporal voice regions responding selectively to conspecific vocalizations have been found in both humans (Belin et al. 2000) and macaques (Petkov et al. 2008).

Are voice-selective regions specialized for conspecifics?

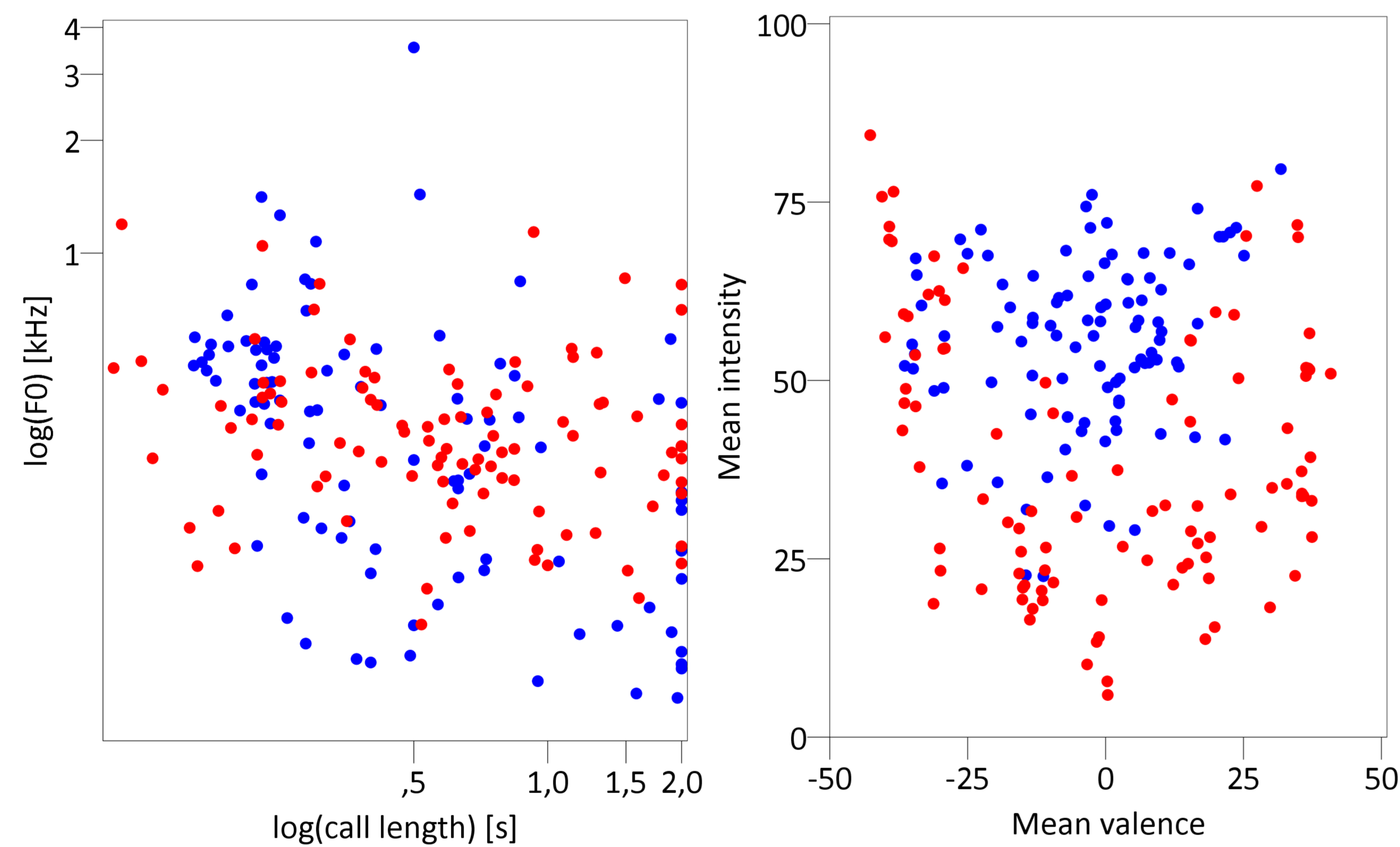
Is species-specific selectivity driven by emotions / acoustics?

Are there human brain regions specialized for animal vocalizations?

METHODS

Participants. 22 human listeners (11 female; 12 dog owners)

Stimuli. 96 human vocalizations (nonlinguistic, emotional)
96 dog vocalizations (various contexts, emotional)
96 nonvocal sounds (familiar environmental)
Human and dog stimuli rated for perceived emotional valence and intensity



Design. 8-s-long blocks of 4 stimuli (all < 2 s) with similar perceived emotional valence
24 blocks per condition (human, dog, nonvocal and silence)
3 runs of 6 mins (35 volumes each), passive listening
Philips Achieva 3T, TR=10 s (2 s acquisition + 8 s silent gap)

Analysis. Standard preprocessing in SPM8.

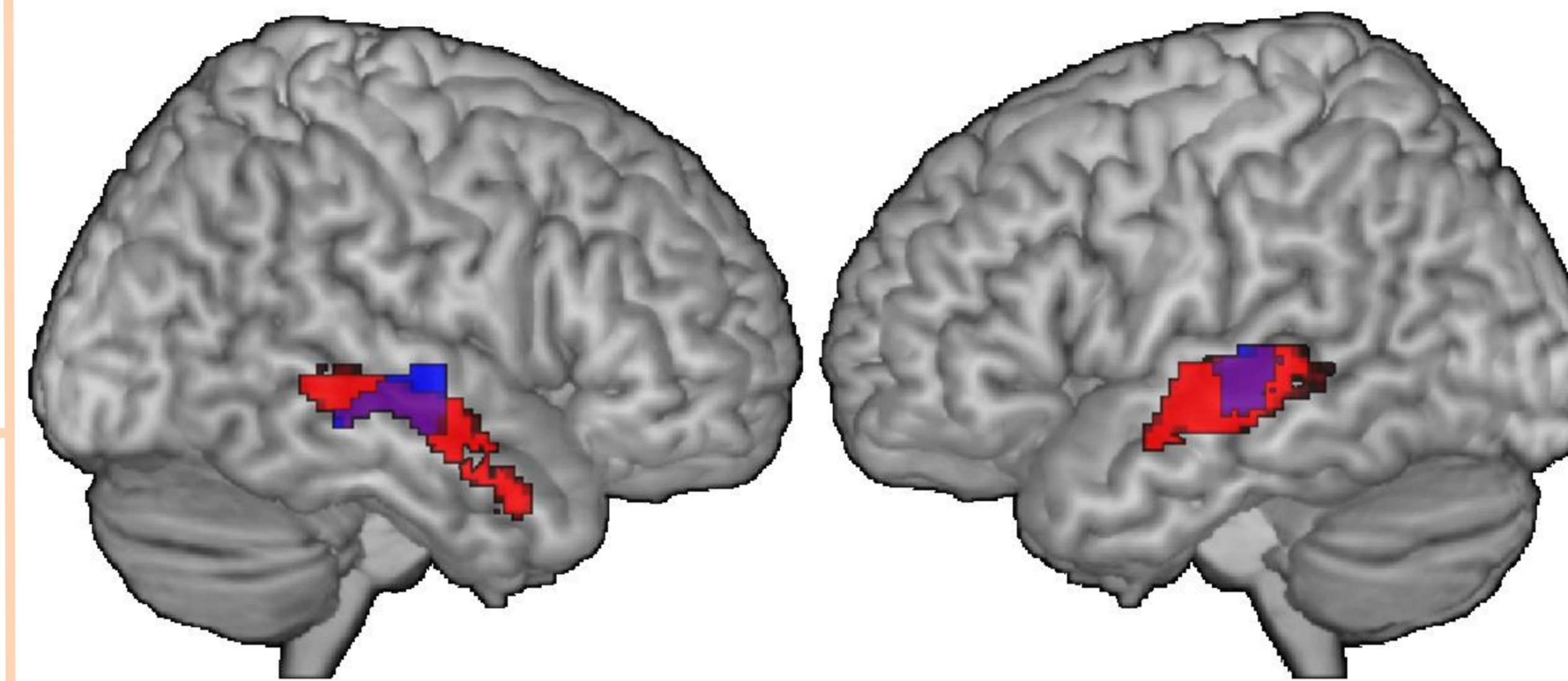
Group-level whole-volume random effects analyses.

Parametric modulation analyses to factor out emotions and acoustics.

RESULTS

1. Superior temporal sulcus (STS)

human > nonvocal dog > nonvocal
p < .05 (FWE-corrected)

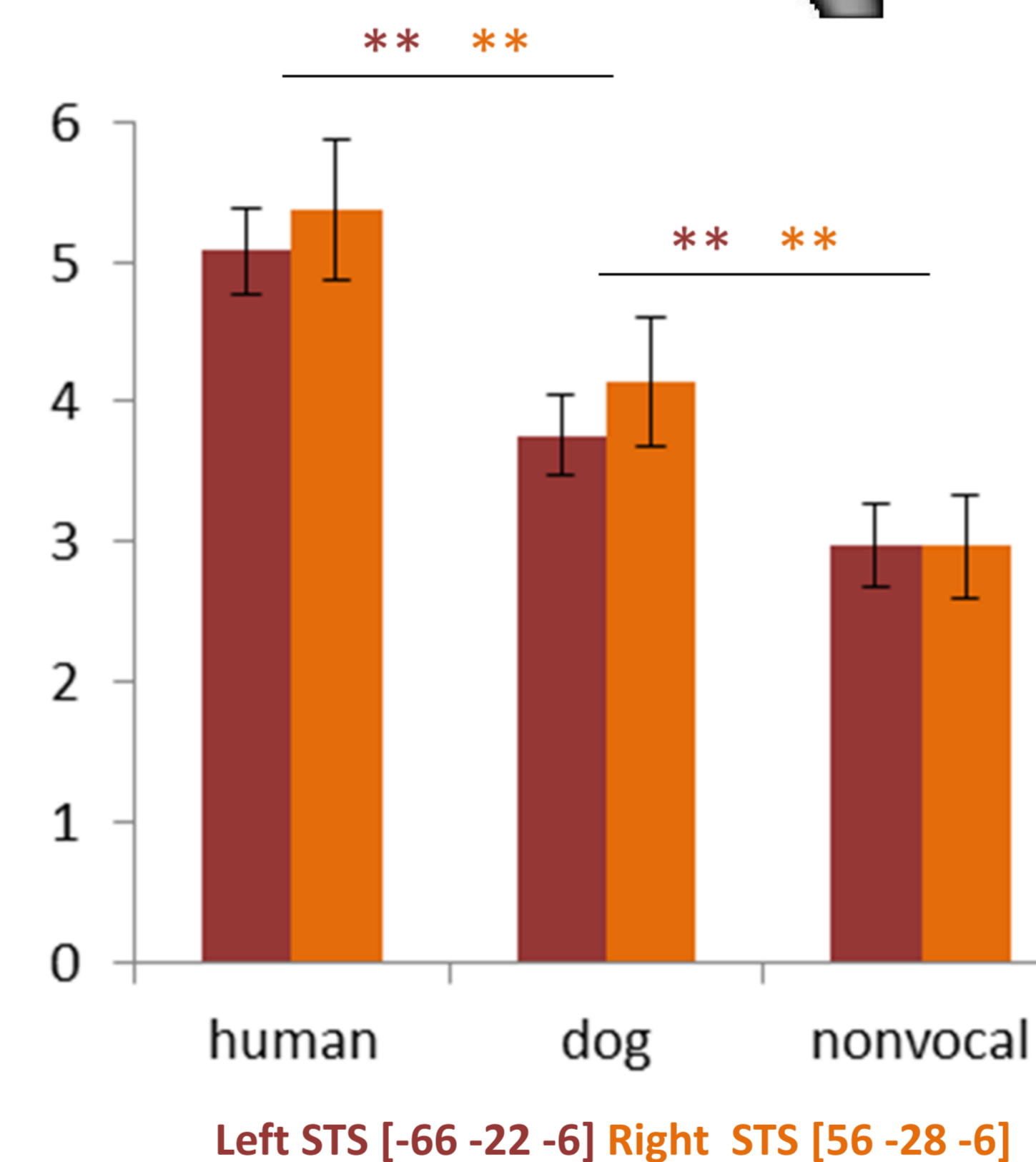


Average regional activity per sound type vs silence (beta)

Regions: spheres with a 10 mm radius around local maxima of human vs nonvocal

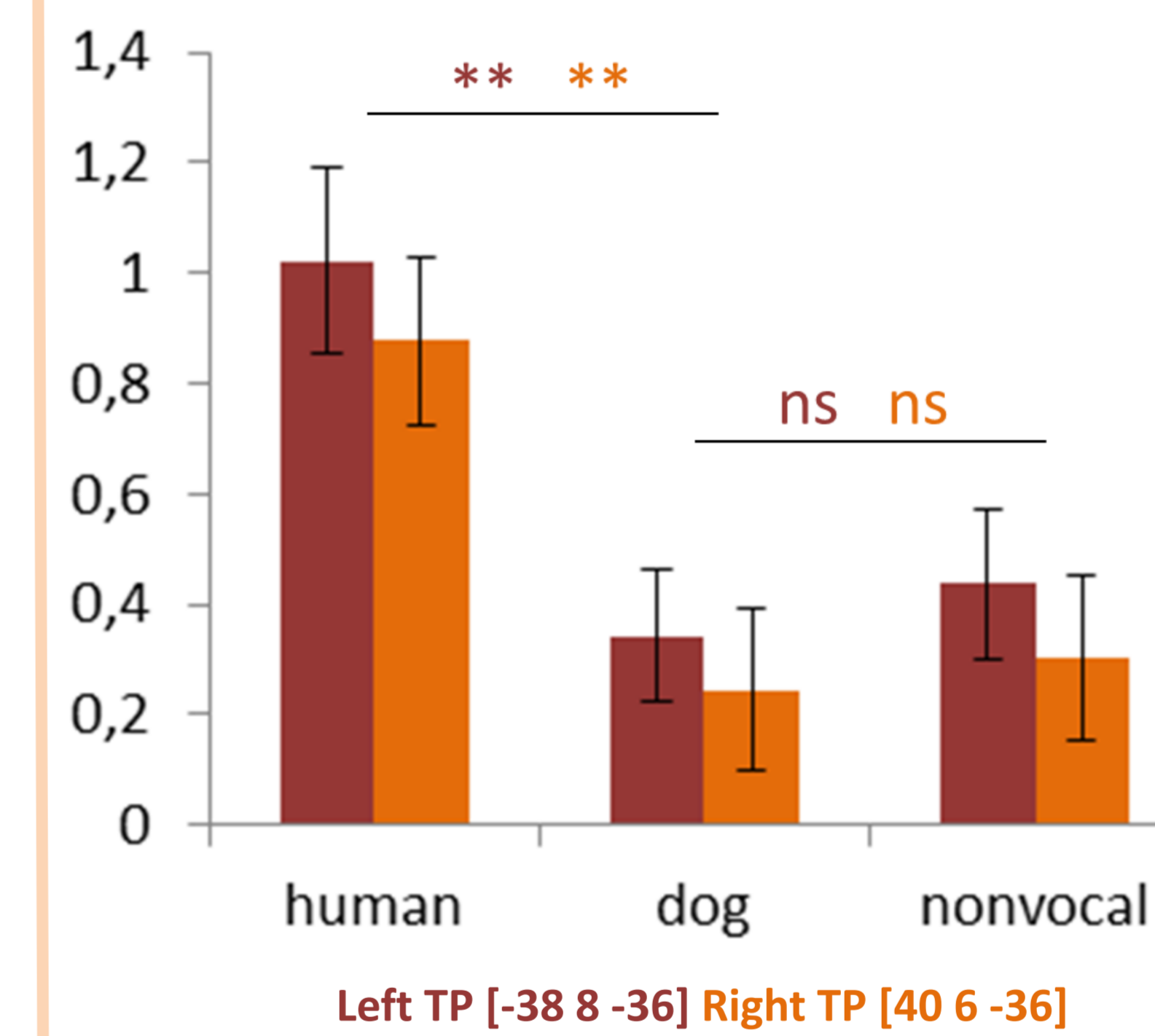
Paired t-tests within region:
**: p < .001. *: p < .05.
ns: not significant

Error bars: S.E. of mean



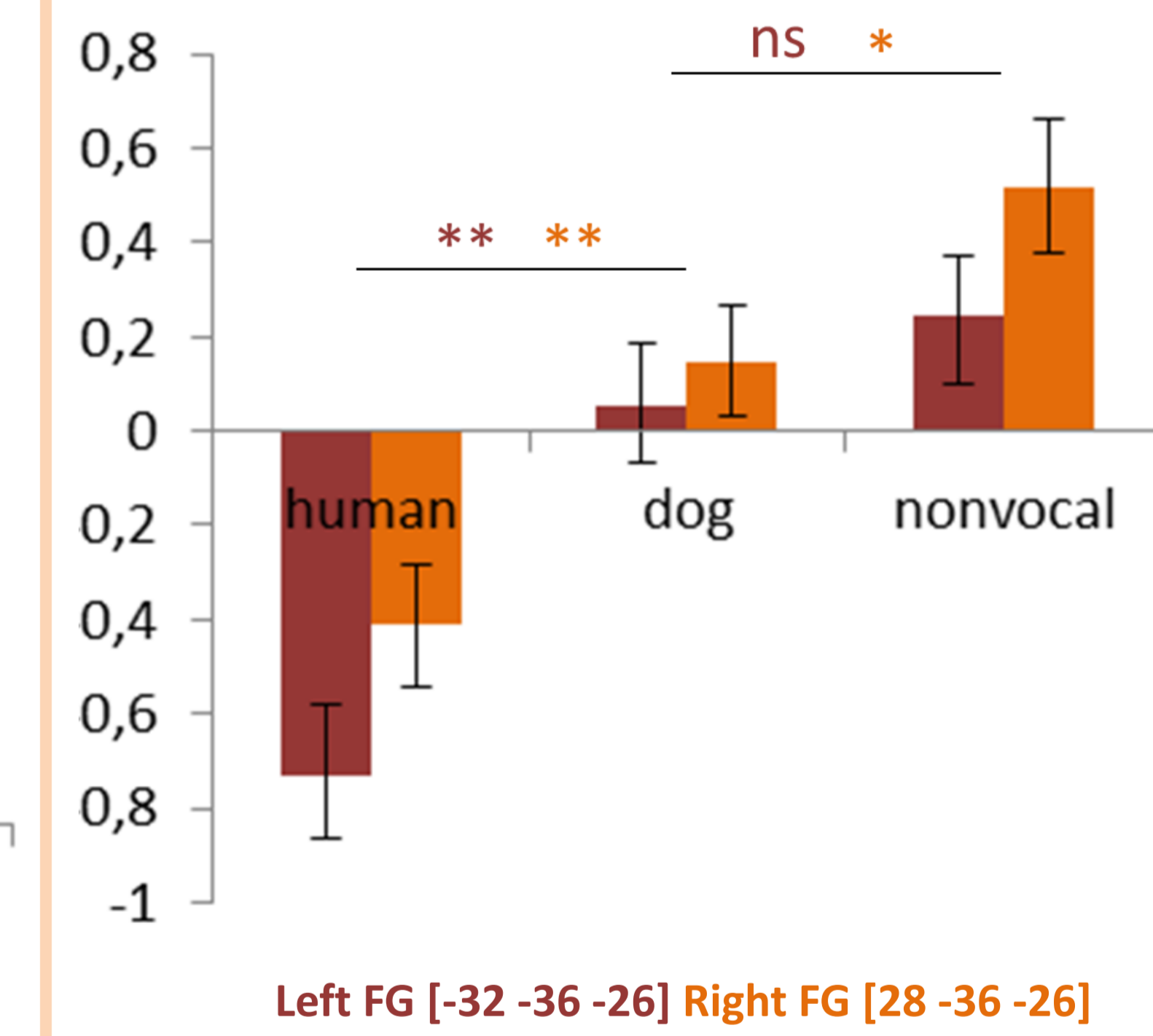
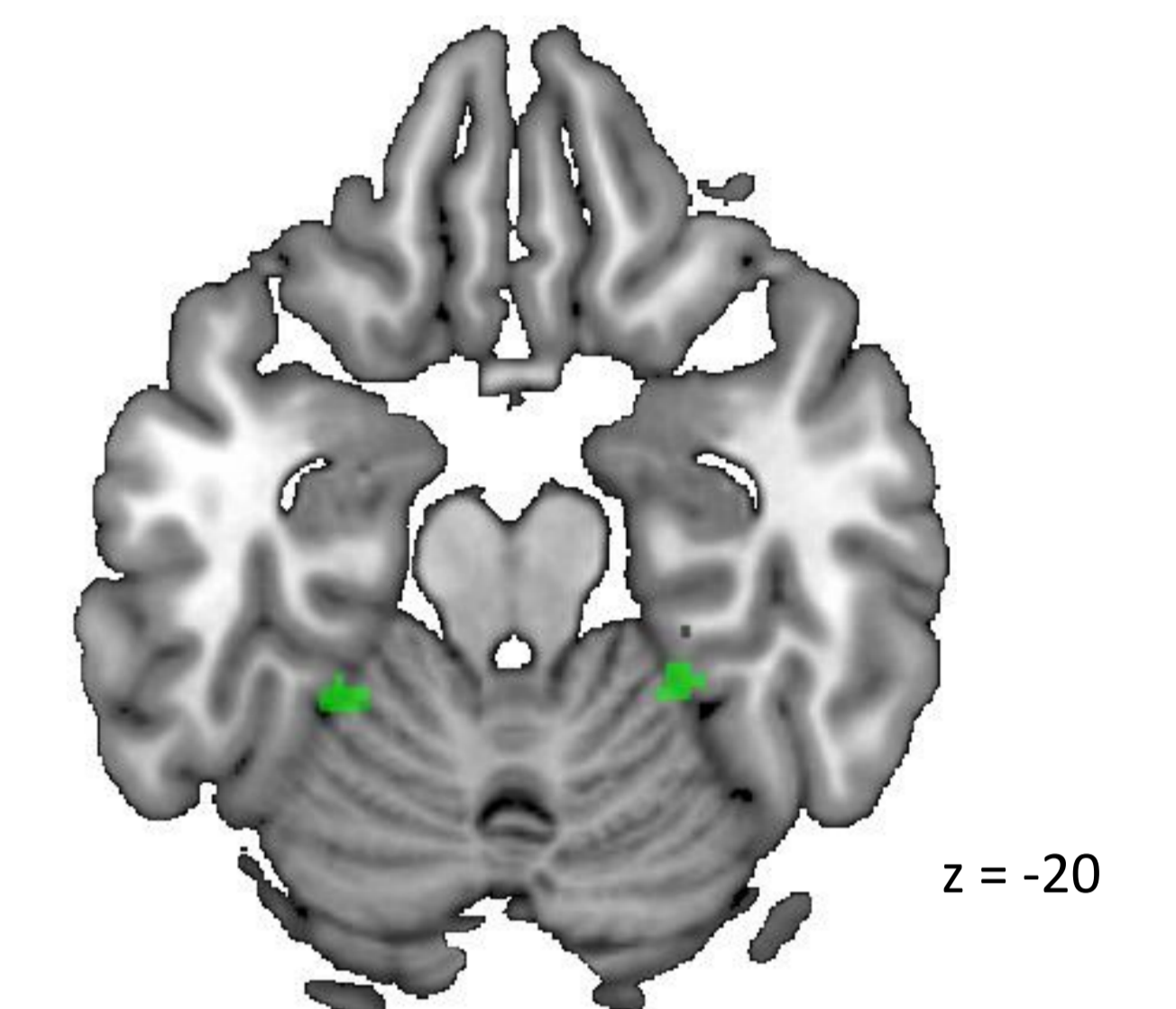
2. Temporal pole (TP)

human > dog
p < .05 (FWE-corrected)



3. Fusiform gyrus (FG)

dog > human
p < .05 (FWE-corrected)



CONCLUSIONS

- Voice regions along the STS are not conspecific-specific: STS is sensitive to both human and dog vocalizations in humans (also in non-dog owners)
- TP regions are specialized for human voices; species-specific selectivity is not driven by stimuli's perceived emotional content or acoustics
- No brain regions are specialized for dog vocalizations; stronger response to dogs in FG regions is caused by deactivation for human vocalizations

REFERENCES

Belin P, Zatorre RJ, Lafaille P, Ahad P, Pike B (2000). Voice-selective areas in human auditory cortex. *Nature* 403:309-312.
Petkov CI, Kayser C, Steudel T, Whittingstall K, Augath M, Logothetis NK (2008). A voice region in the monkey brain. *Nature Neuroscience* 11:367-374.