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Inner Speech with your own or someone else's voice: cerebral correlates assessed with fMRI

Grandchamp, R.^{1,2}, Rapin, L.³, Lœvenbruck, H.^{1,2}, Perrone-Bertolotti, M.^{1,2}, Pichat, C.^{1,2}, Lachaux, J.P.⁴, Baciou, M.^{1,2}

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Introduction

Inner speech plays a central role in human consciousness as an interplay between language and thinking (Morin, 2005).

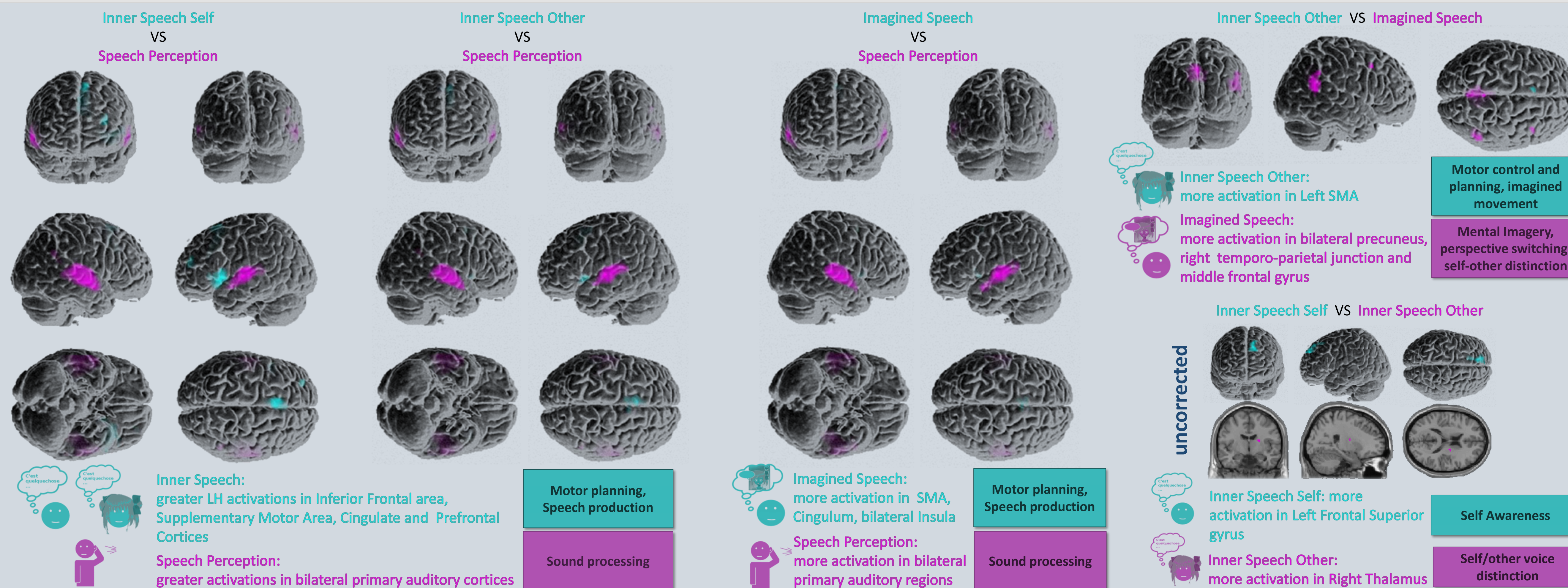
- **Motor View:** inner speech is a motor action, a mental simulation of speech production (e.g. Jones & Fernyhough, 2007).
- **Sensory View:** inner speech has sensory qualities, involves memorized speech percepts (e.g. Kosslyn et al., 2001)

➔ **First question:** what is the nature of inner speech: is it motor? sensory? sensorimotor?

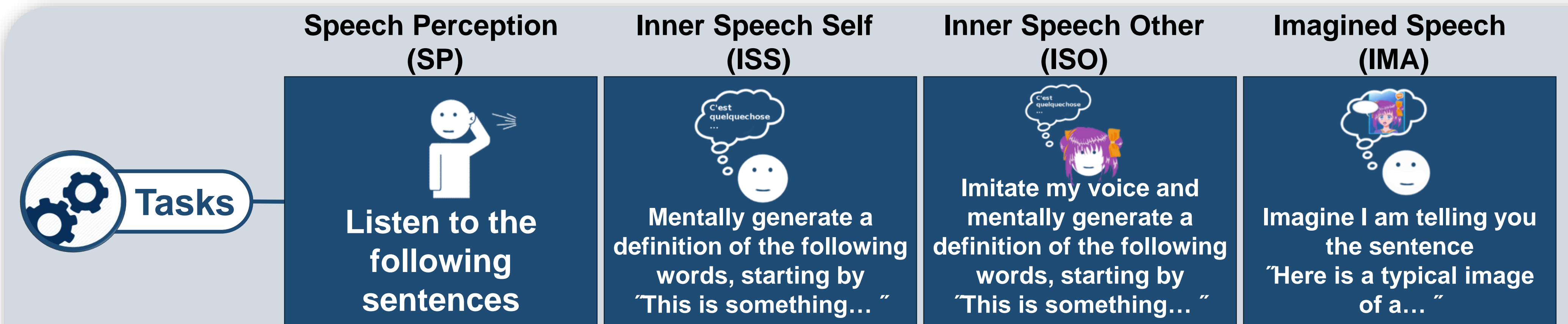
- **Agency:** we can imitate someone else's voice (self as agent) and we can imagine someone speaking to us (other as agent)

➔ **Second question:** what cerebral mechanisms allow us to mentally generate different voices with different agentic perspectives ?

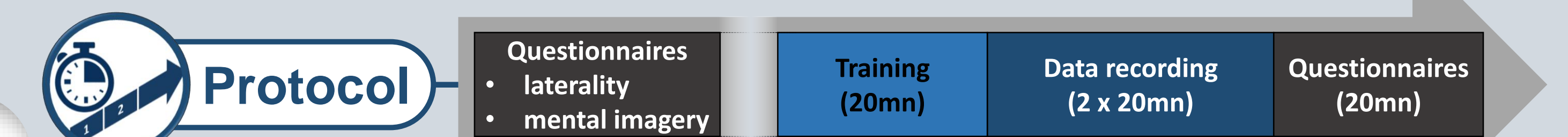
Results



Methods



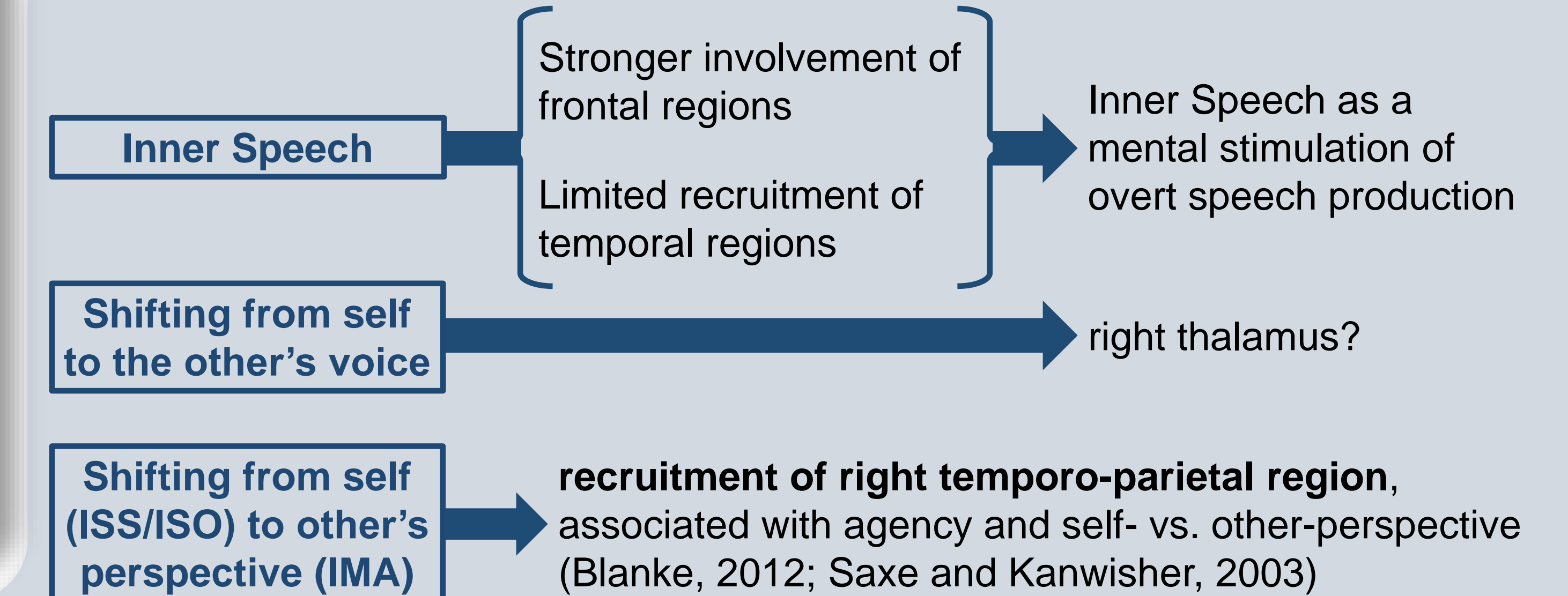
Participants 24 right handed healthy participants (10 males, 29 years old ±10) native French speakers.



- Whole body 3T MR scanner
- Gradient-echo/T2* weighted EPI
- Block design
- 2 runs
- 30 trials per task

Analysis GLM for block design, 1 regressor / task, pairwise contrasts

Conclusions



Acknowledgments: ANR project ANR-13-BSH2-0003-01 M. Dohen, M. Garnier, P. Perrier, A. Vilain (Gipsa-Lab)

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Overall, our results suggest that inner speech is a sensorimotor process involving both articulatory and sensory representations. Inner imitation of someone else's voice would additionally recruit the right thalamus. Imagining someone addressing oneself seems to additionally involve the right temporo-parietal region.