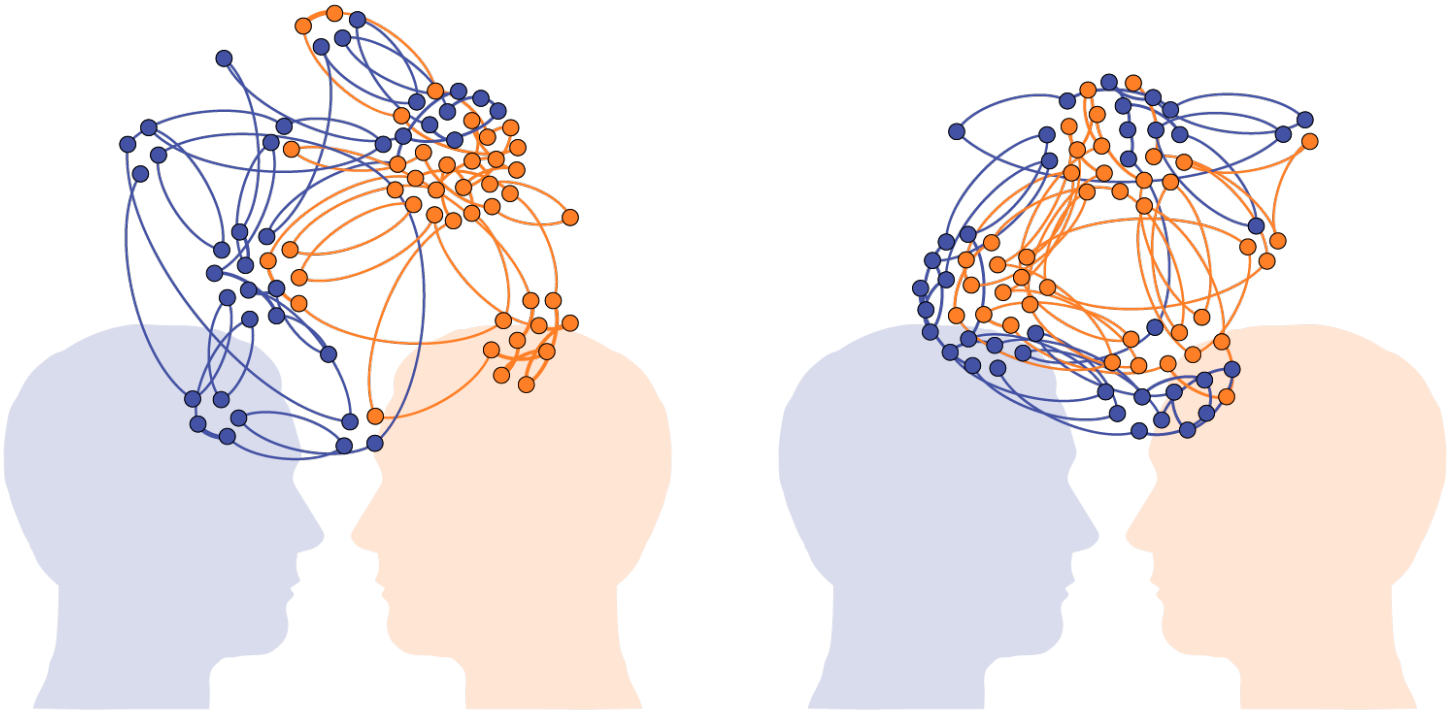
Today's question

What do we share?

Shared Conceptual Spaces II



Today's docket

1. Neuroscientific evidence

   Dual-fMRI

2. Interpersonal synchrony

   Brain to brain coupling, fundamental communicative obstacles

4 predictions of neural activity supporting shared conceptual spaces

1. Achieving mutual understanding should evoke neural activity reflecting flexible conceptual processes, in regions known to support conceptual knowledge
2. There should be shared patterns of neural activity during communicative production and comprehension given that these processes relate to the same conversational context
3. The timing of this shared neural pattern should lead, not follow, the occurrence of a communicative signal, given that the conceptual space is defined by the ongoing communicative interaction rather than by the signal itself
4. The temporal dynamics of the shared neural pattern should reflect the communicators' adjustments of their shared conceptual space

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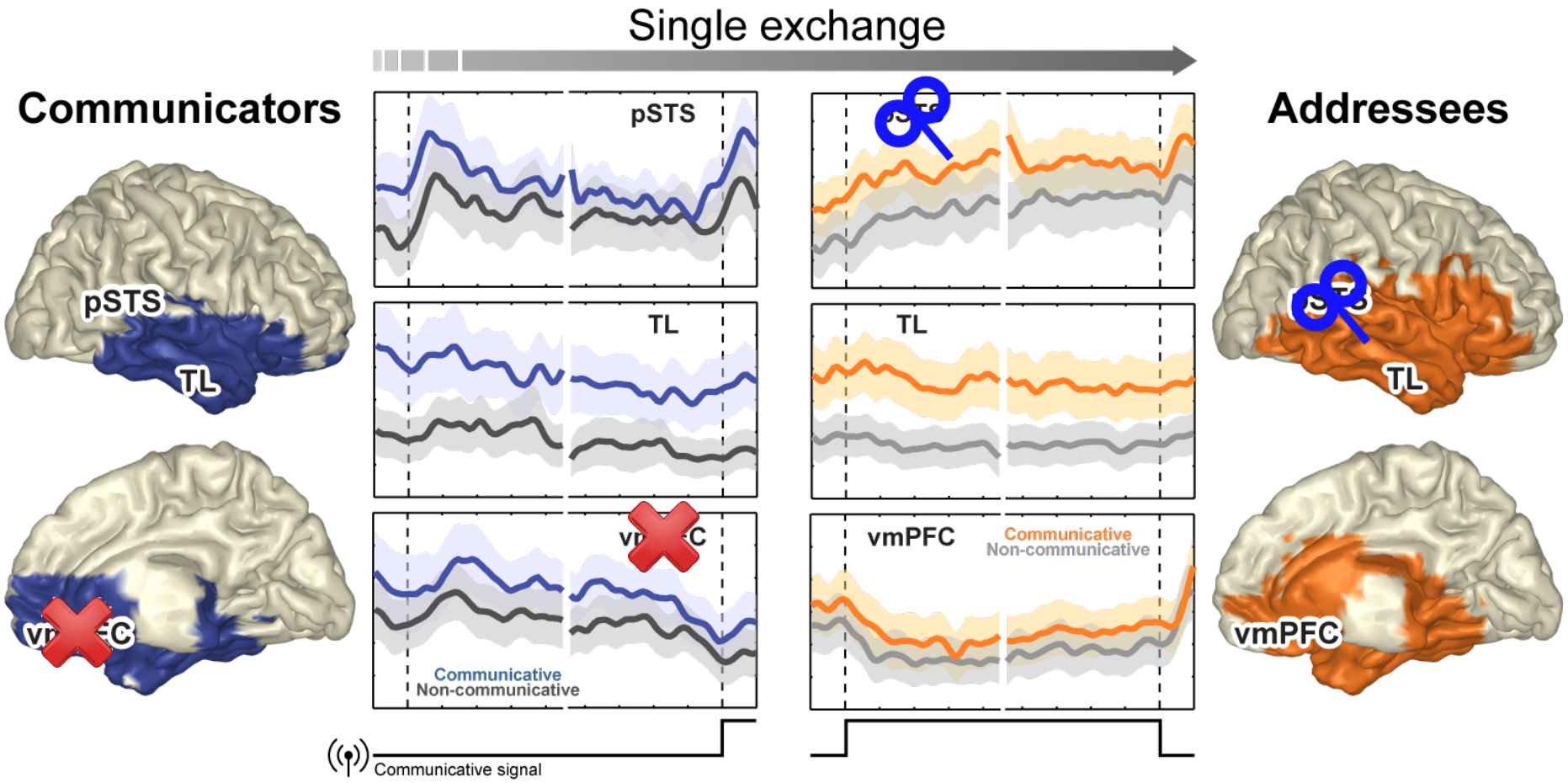

The same brain regions in communicators and addressees are upregulated already before a communicative behavior is produced or observed

4 predictions of neural activity supporting shared conceptual spaces

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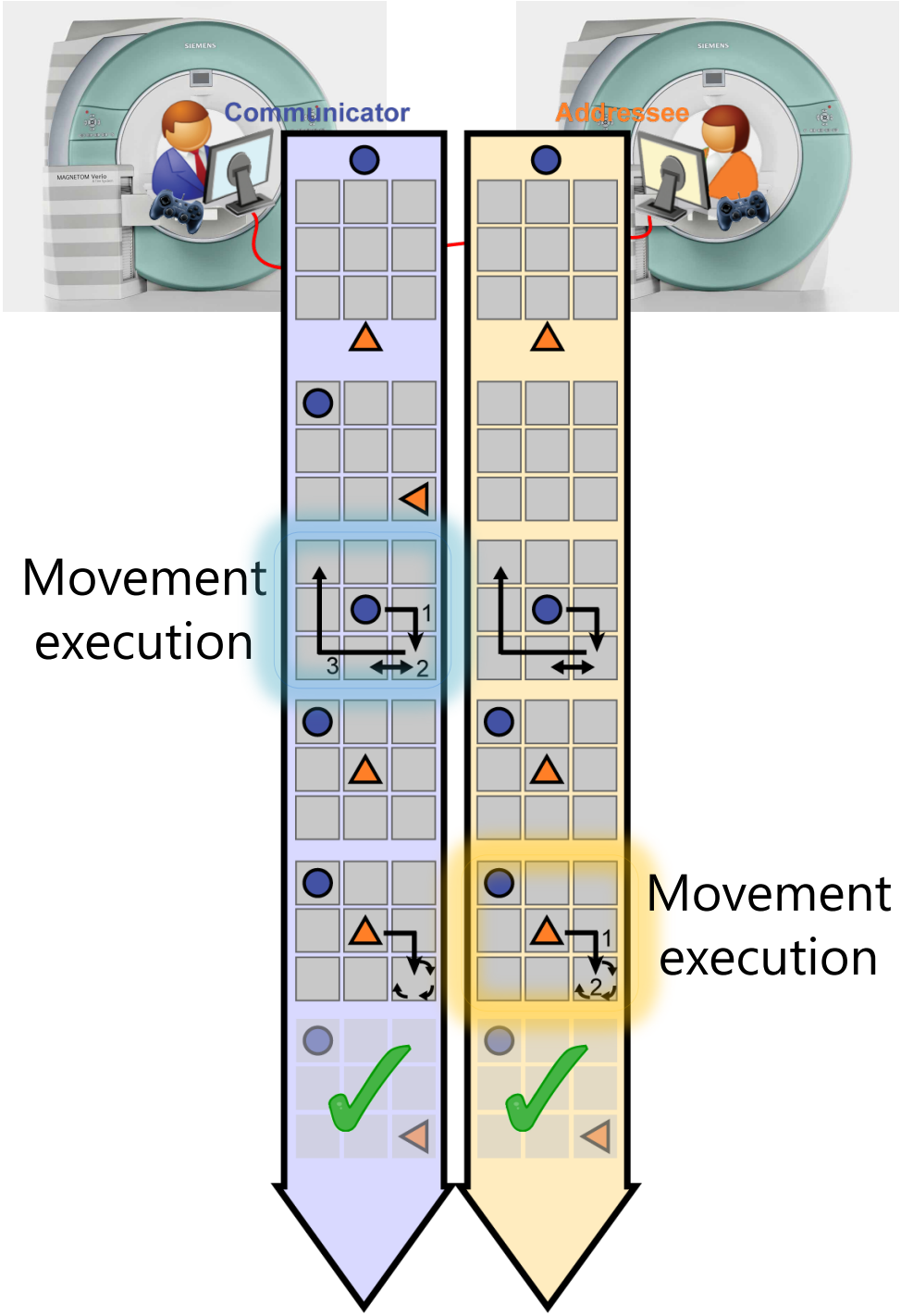
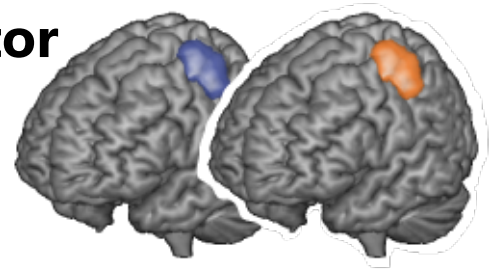
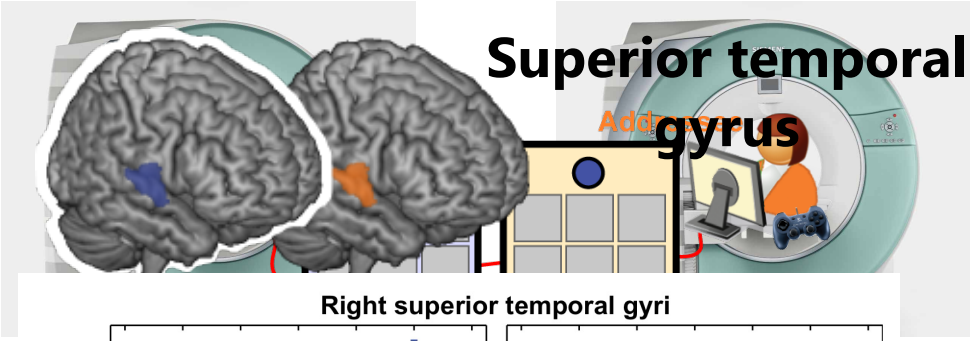


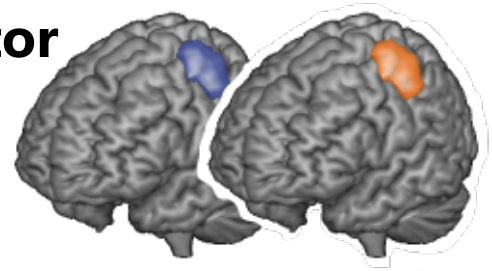
Sensorimotor cortex (control)

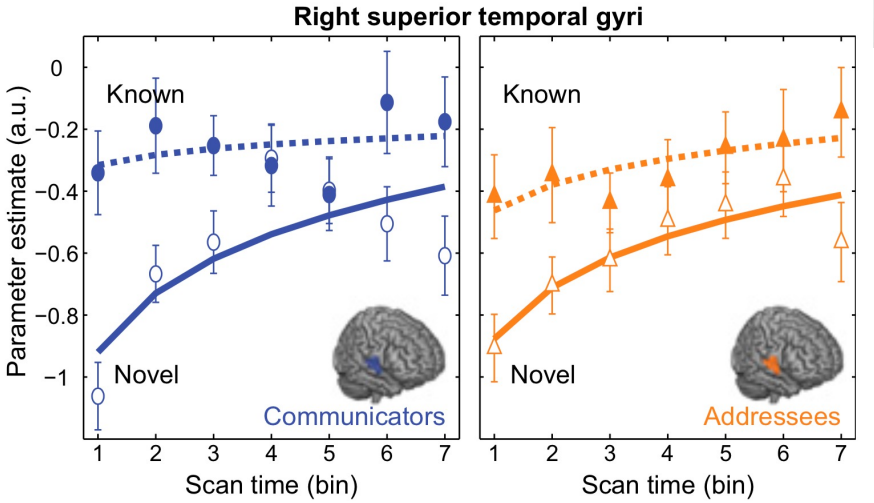


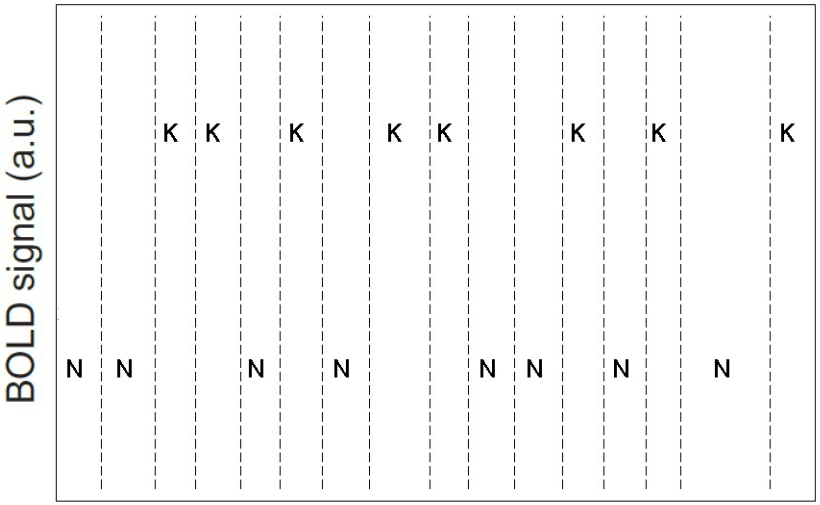
Cerebral coherence between communicators marks the emergence of meaning

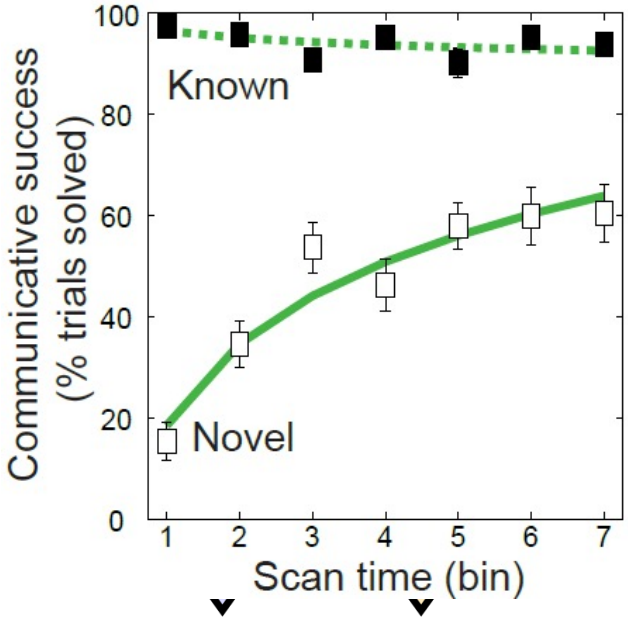
Arjen Stolk[a,1,2], Matthijs L. Noordzij[b,1], Lennart Verhagen[a,c], Inge Volman[a,d], Jan-Mathijs Schoffelen[a,e], Robert Oostenveld[a], Peter Hagoort[a,e], and Ivan Toni[a]











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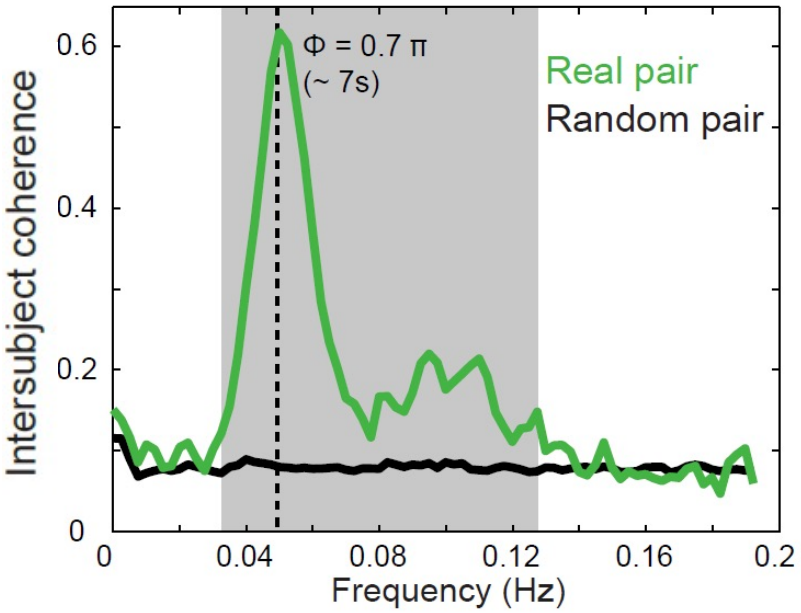
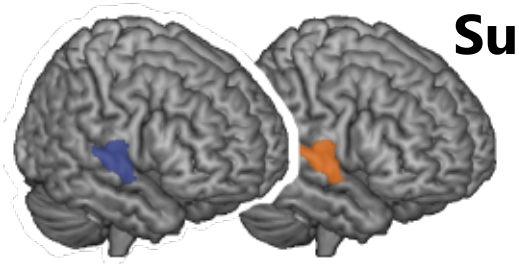
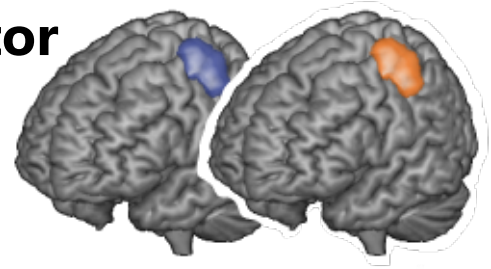
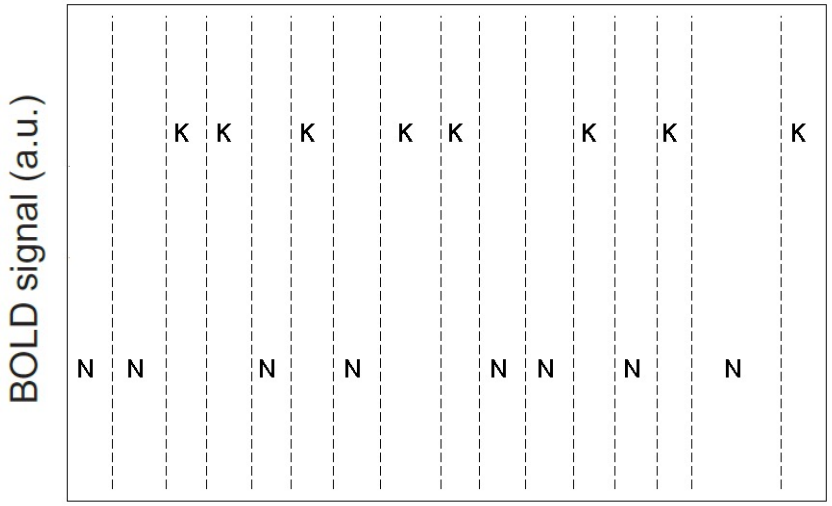


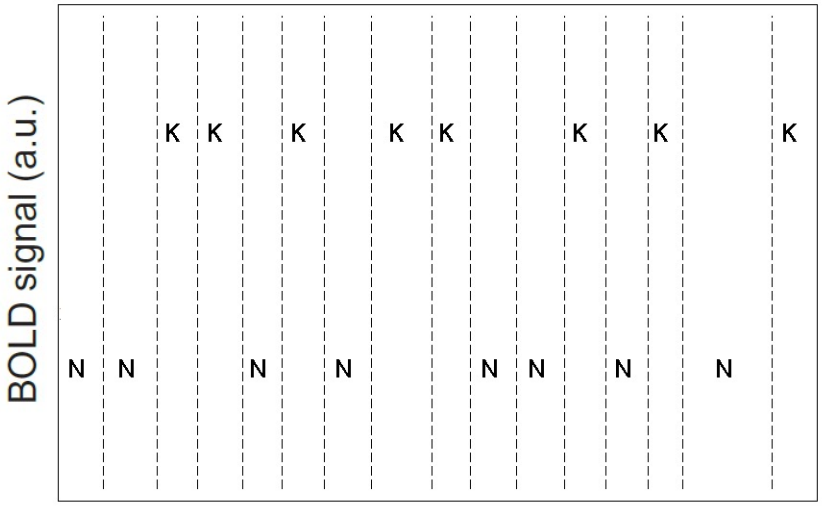


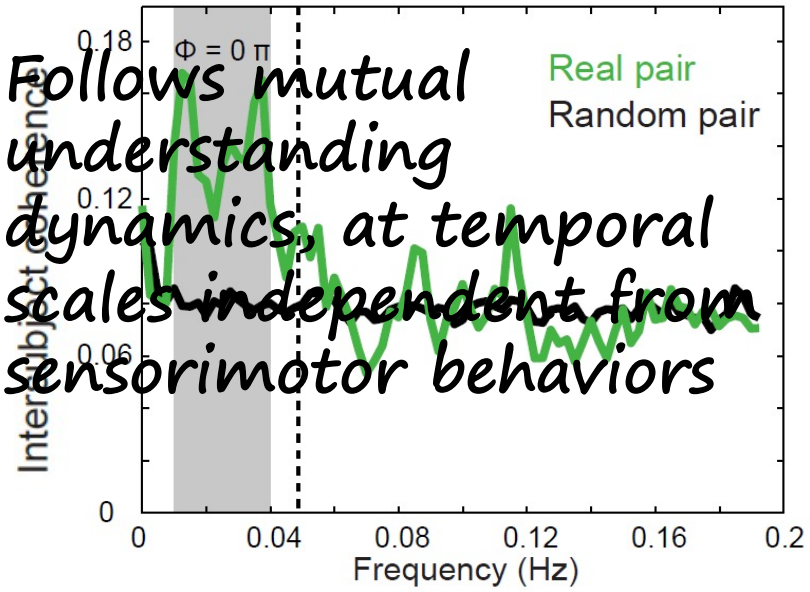
Superior temporal gyrus

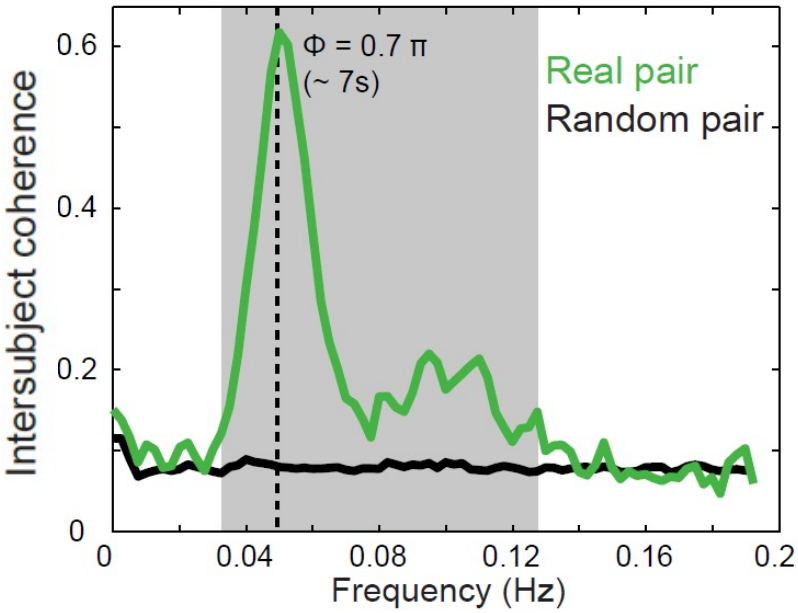
Sensorimotor cortex (control)



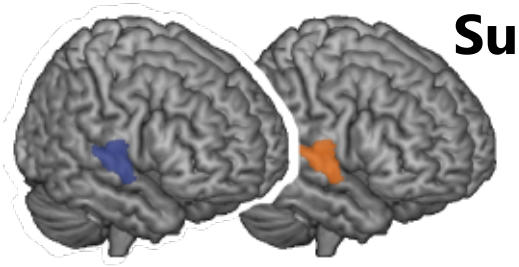








Follows mutual understanding dynamics, at temporal scales independent from sensorimotor behaviors



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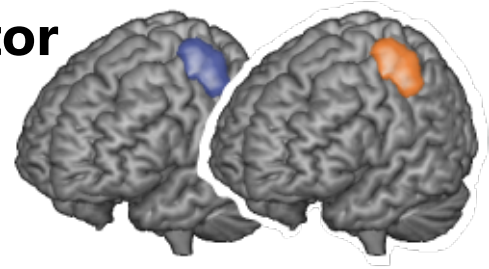
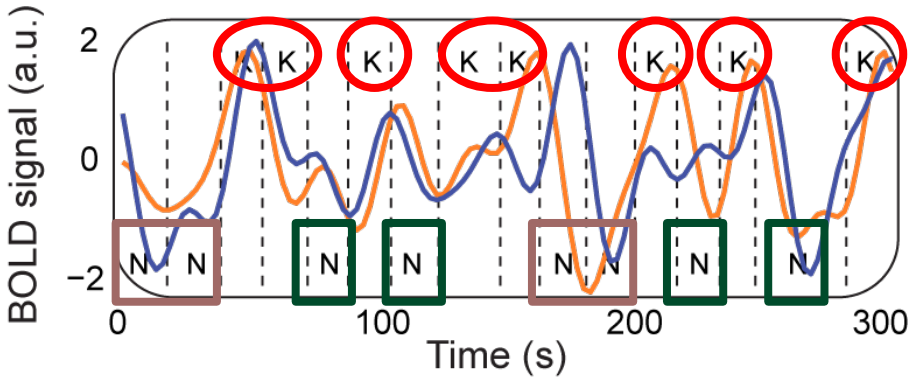
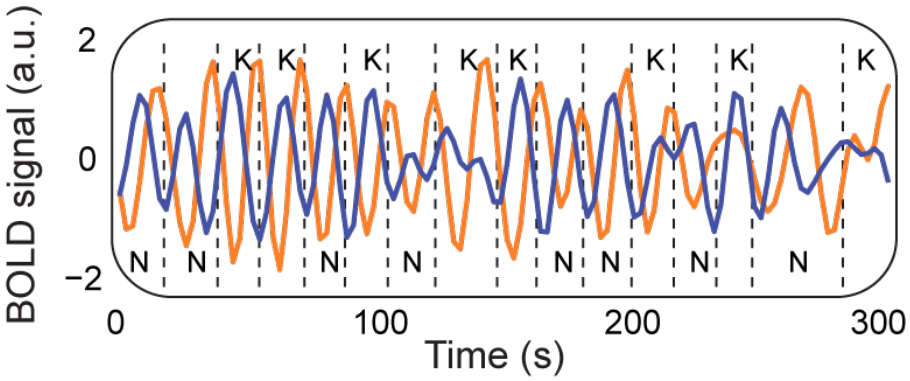
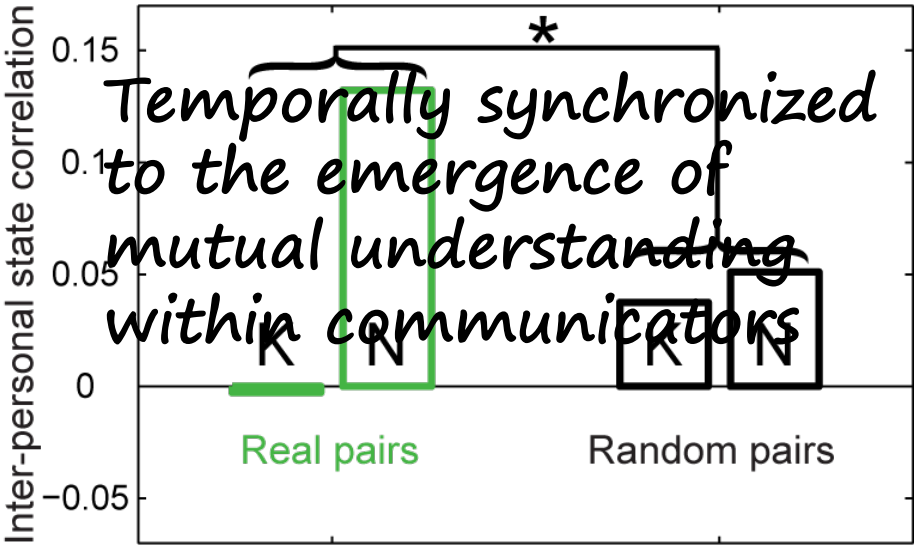




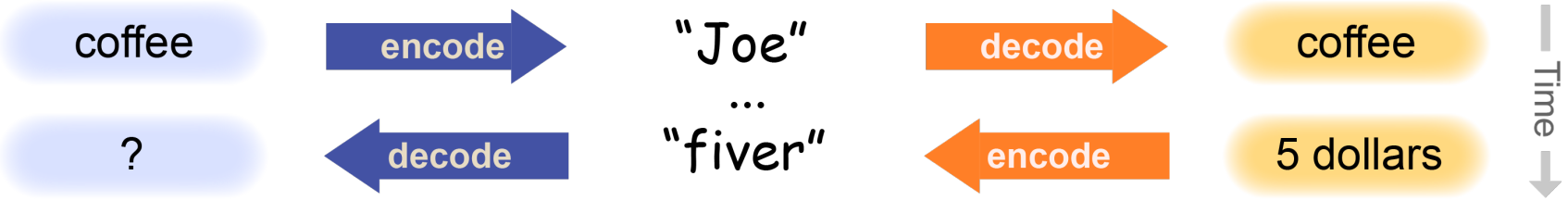




Temporally synchronized to the emergence of mutual understanding within communicators

Signal-centered frameworks

Meaning is a property of the signal



Conceptual alignment framework

Meaning is a property of a mutually coordinated conceptual space

Customer concept space

Communicative signal

Barman concept space

Today's docket

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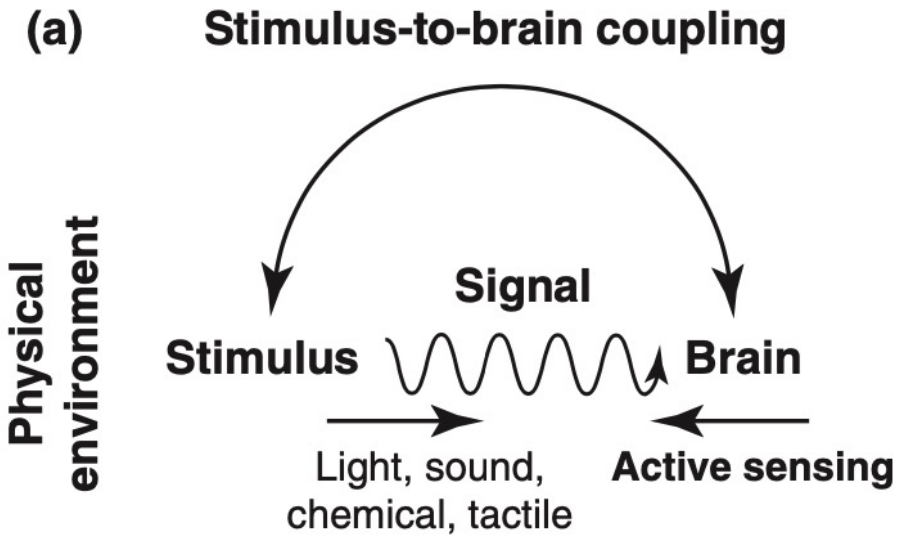
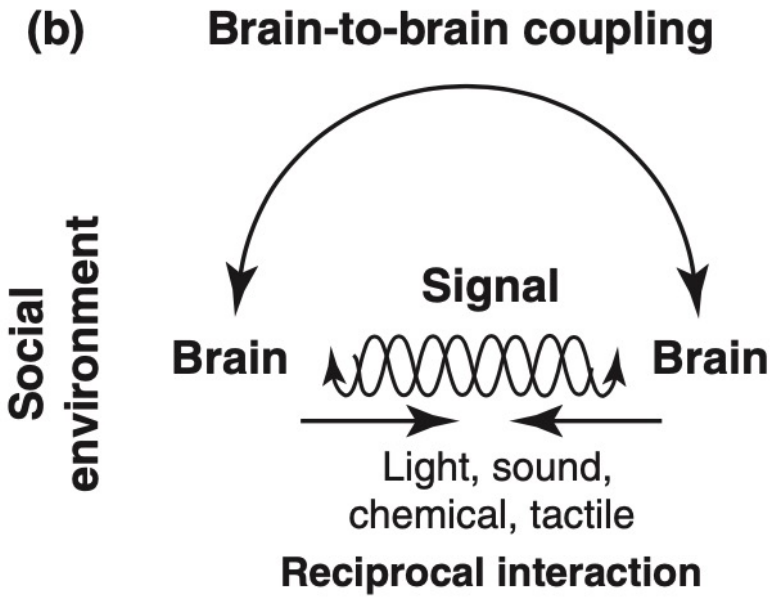
   Dual-fMRI

2. Interpersonal synchrony

   Brain to brain coupling, fundamental communicative obstacles

Interactive alignment meets mirror neurons





Brain-to-brain coupling: a mechanism for creating and sharing a social world

Uri Hasson[1,2], Asif A. Ghazanfar[1,2], Bruno Galantucci[3,4], Simon Garrod[5,6] and Christian Keysers[7,8]

Presupposes wirelessly coupled brains that are exact copies of one another

Interpersonal synchrony

Achieving synchrony is slow and requires mechanical causality in a system

Fundamental communicative obstacles

- Interpersonal asymmetry

  No two people have exactly the same experience and expertise

- Signal ambiguity

  A communicative signal contains a multiplicity of functions and referents

- Typological inadequacy

  Even for highly conventional signals, communicators always needs to consider how their signals will be interpreted in the current context

Synchrony is at best a marker of mutual understanding, not a mechanism

Take-home concepts

- Brains may become synchronized due to the accumulation of shared contextual knowledge at a scale independent from individual communicative behaviors
- Interpersonal synchrony is at best a marker of mutual understanding, not a mechanism
- Human communication is best thought of as a solution to a *conceptual alignment* challenge

Next up

- Lab 4: Scientific Review
- *Paper Review due tonight*
- *Exam Questions due Friday night*