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## Towards a protocol to find neurophysiological markers of collaborations

Juliette Meunier, Sébastien Rimbert, Arnaud Prouzeau, Fabien Lotte

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# Towards a protocol to find neurophysiological markers of collaborations

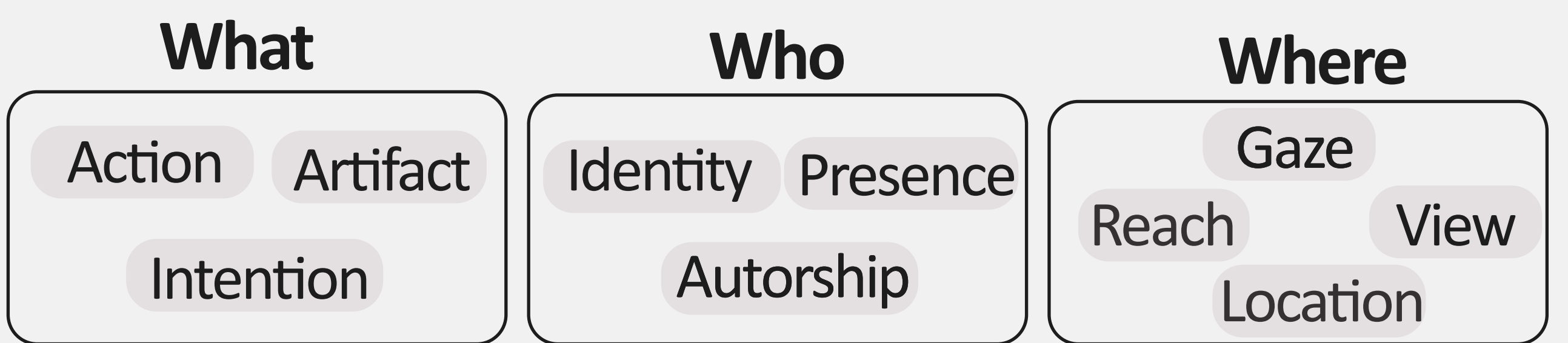
Juliette Meunier<sup>1</sup>, Sébastien Rimbart<sup>1,2</sup>, Arnaud Prouzeau<sup>3</sup> and Fabien Lotte<sup>1,2</sup>

<sup>1</sup> Inria Center at the University of Bordeaux, <sup>2</sup> LaBRI, Talence, France, <sup>3</sup> University of Paris-Saclay, CNRS, Inria

## Background

- **Workspace awareness** allows effective teamwork and decision-making [3].
- However, conventional tools do not permit understanding of the underlying process, known as **collaborative coupling** [8].
- **Hyperscanning** can be used to highlight synchrony indices in the signal [2,7,9].

## Workspace Awareness [3]



### Coupling

- Engagement level** → Are they engaged on the same task?
- Focus alignment** → Are they focused on the same part of the workspace?
- Cognitive balance** → Is the cognitive balance correctly distributed?

### Loose

E.g. individuals drawing independently

### Close

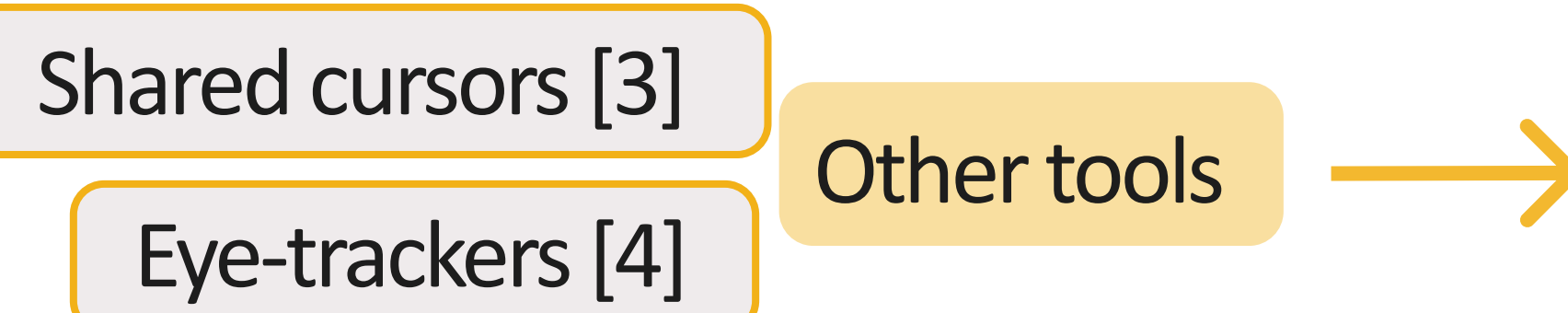
E.g. one individual follows another's drawing activity by tracing simultaneously

Different problem      Same problem, different area      Same problem, same area

## Collaborative coupling [8]

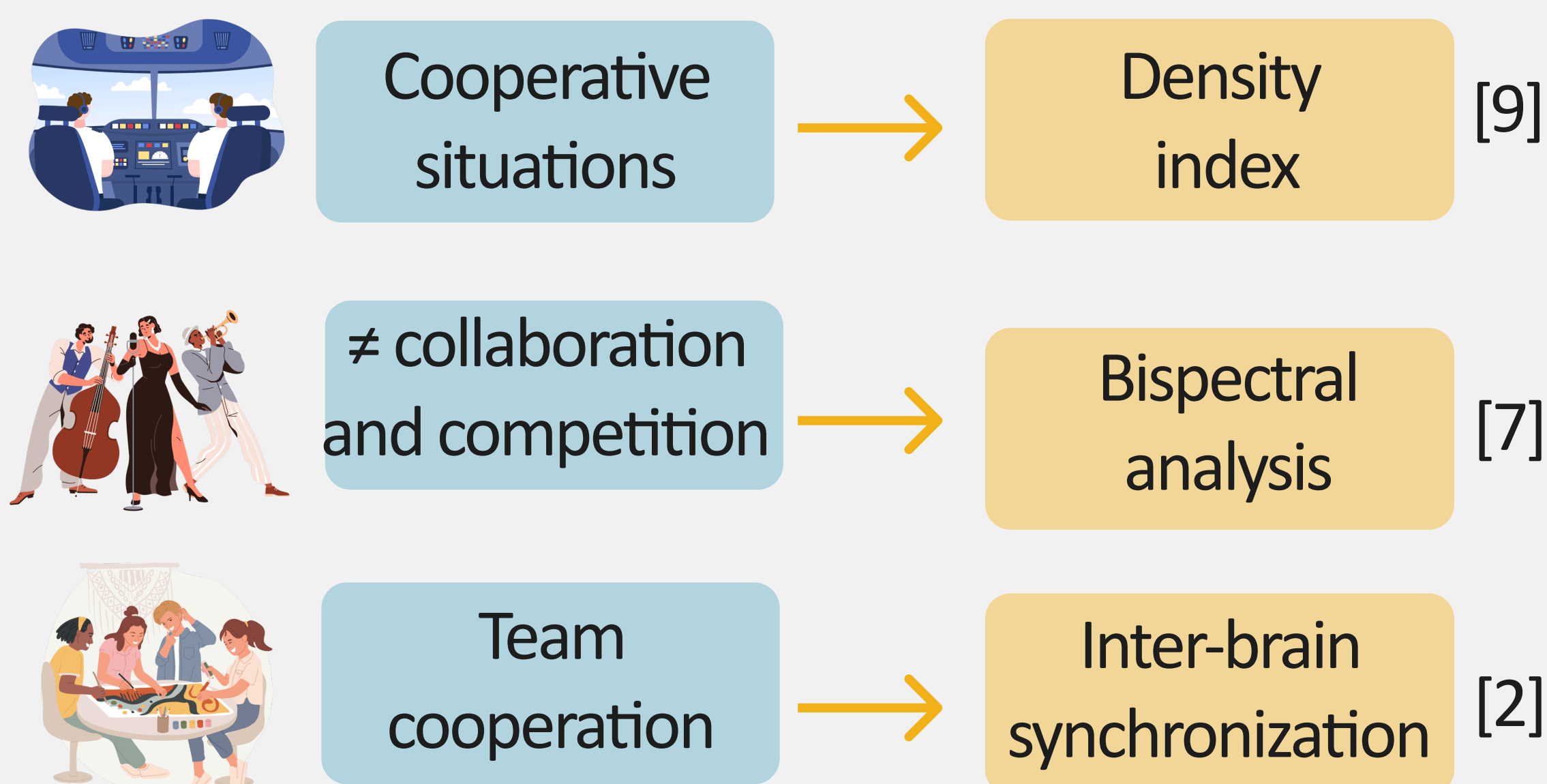
manner in which collaborators are involved and occupied with each other's work

## Tools to apprehend workspace awareness



### Index of

### How



## Hyperscanning - EEG index synchrony

Figure 1 : Enhancing workspace awareness through collaborative coupling information using EEG synchrony indices - Figure inspired by Prouzeau & Rimbart (2024) [6]

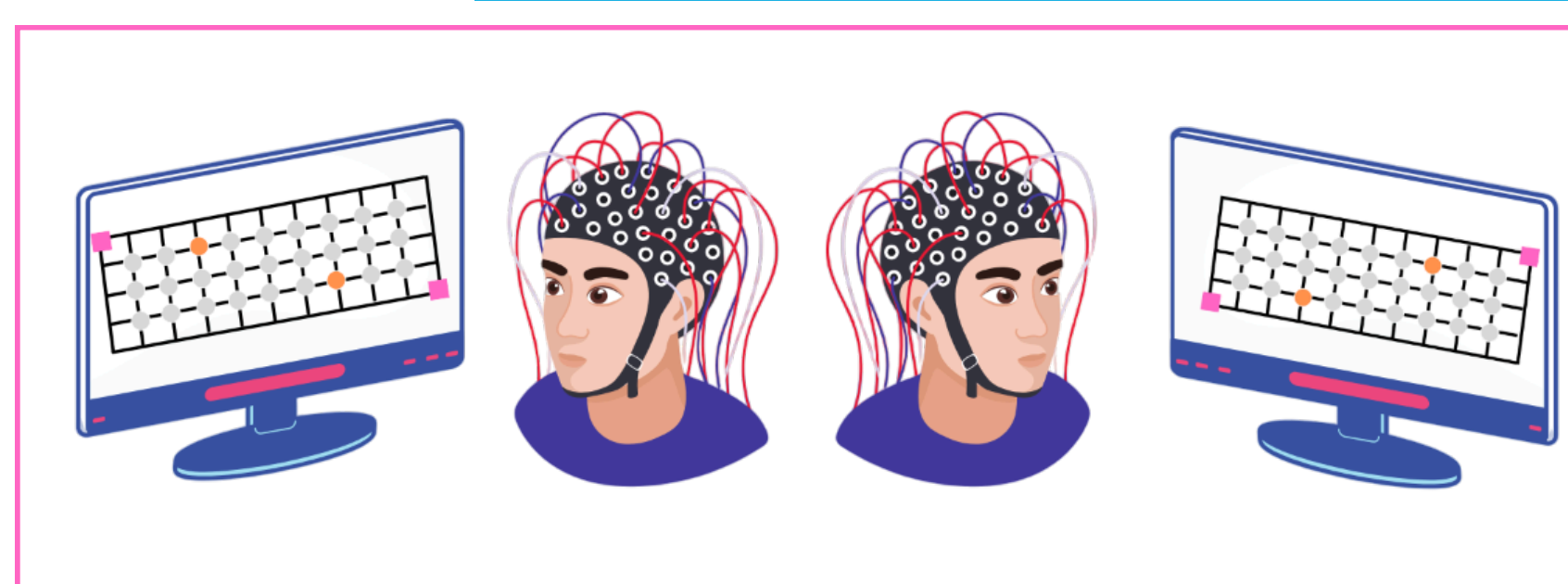
## Future protocol

### Goal

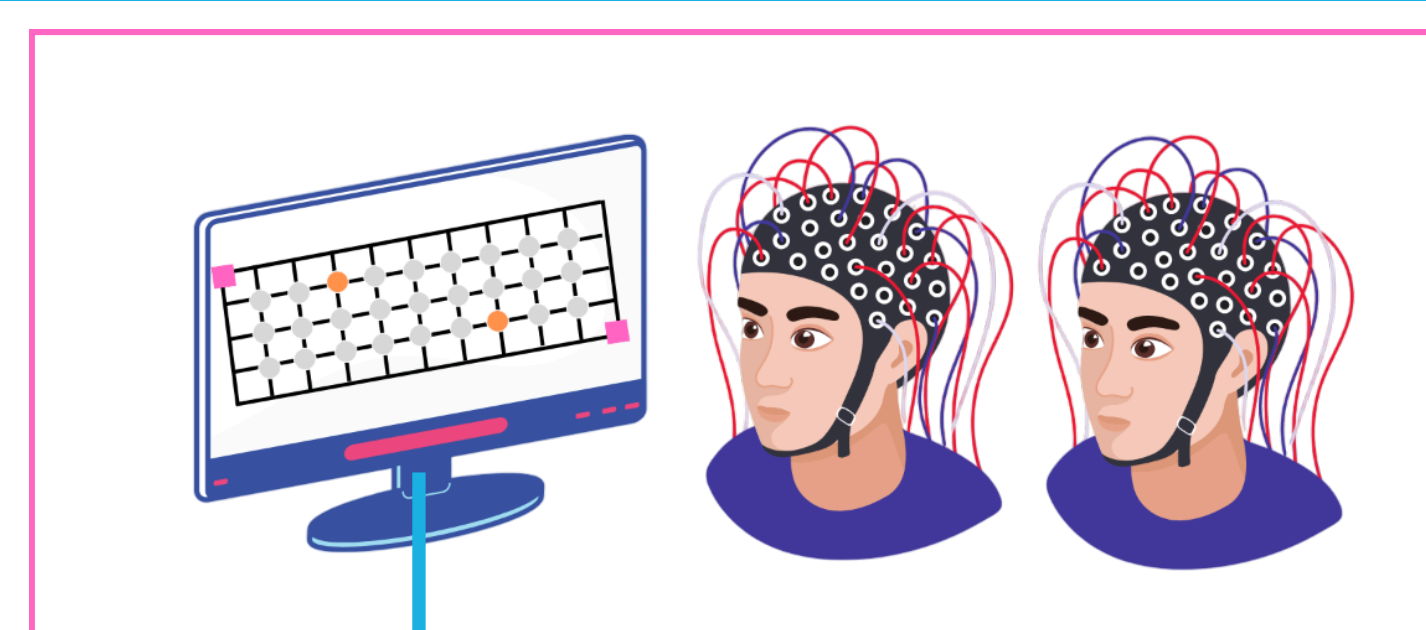
Identify neurophysiological markers specific to conditions and types of collaborative coupling to better understand coupling mechanisms.

### Hypothesis

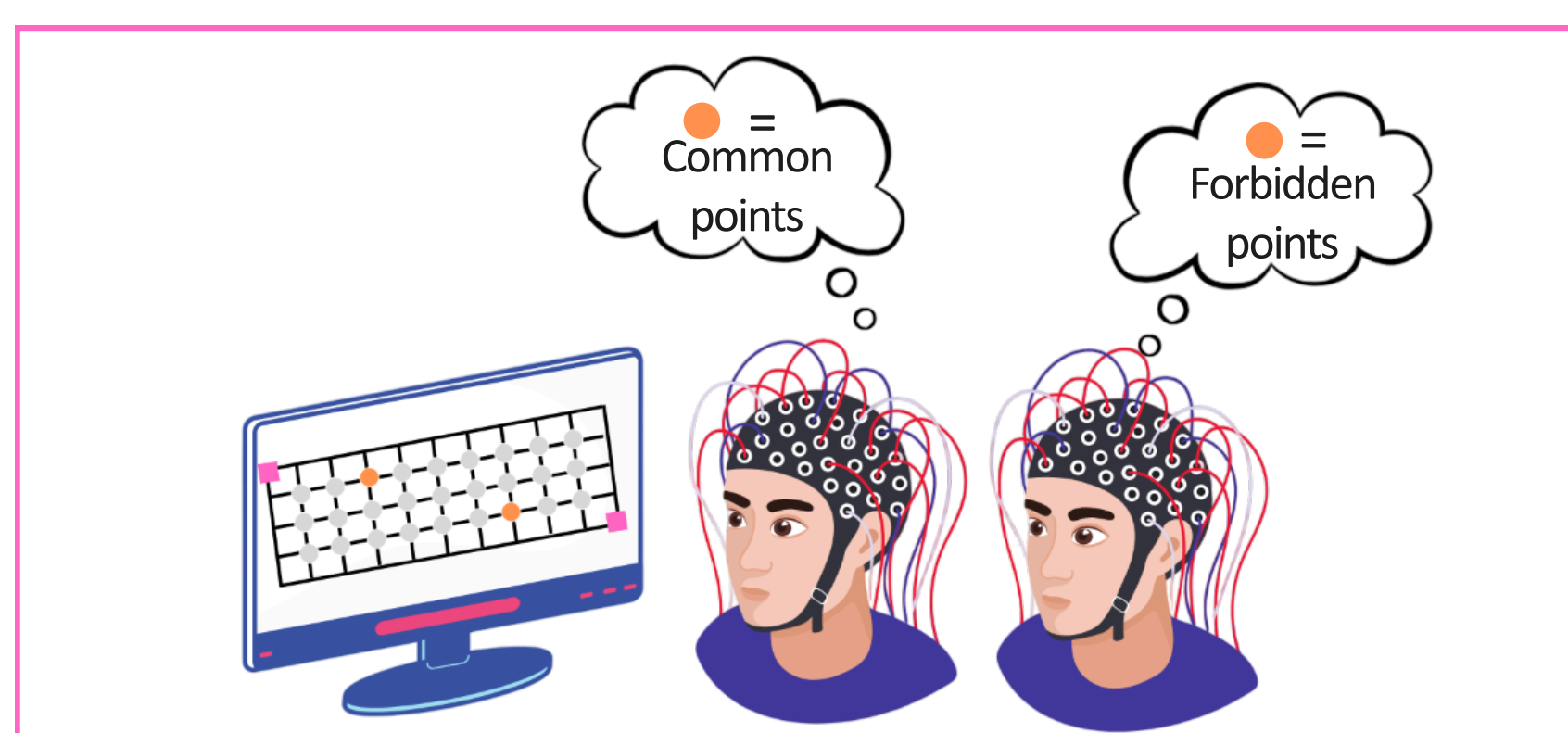
Higher inter-brain synchronization or density in high collaboration than in low. Measures in misalignment resemble those observed under low collaboration.



Low collaboration

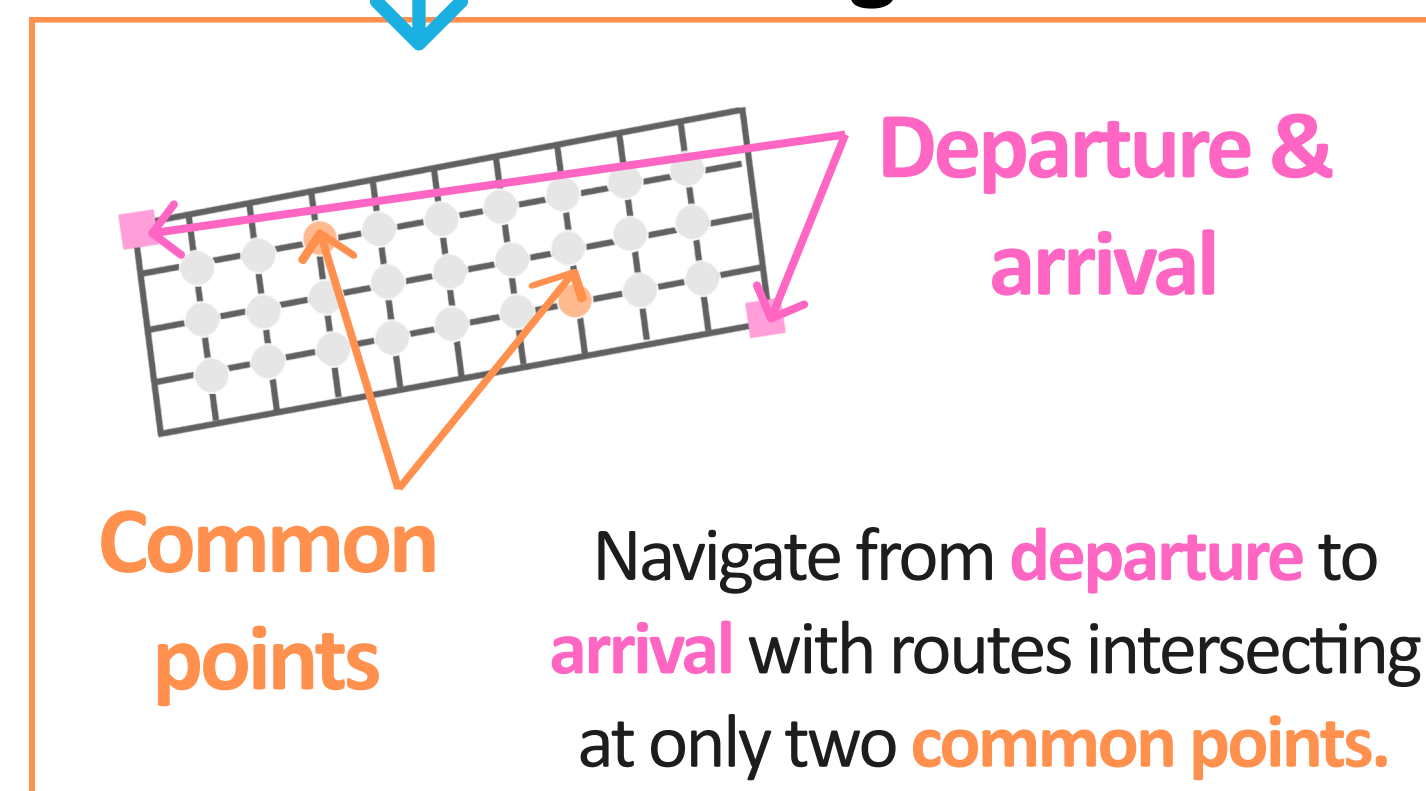


High collaboration



### Misalignment in collaboration

Introduce miscommunication, where users are unaware of a breakdown in collaboration. E.g. one sees **common points** as off-limits (**forbidden points**).



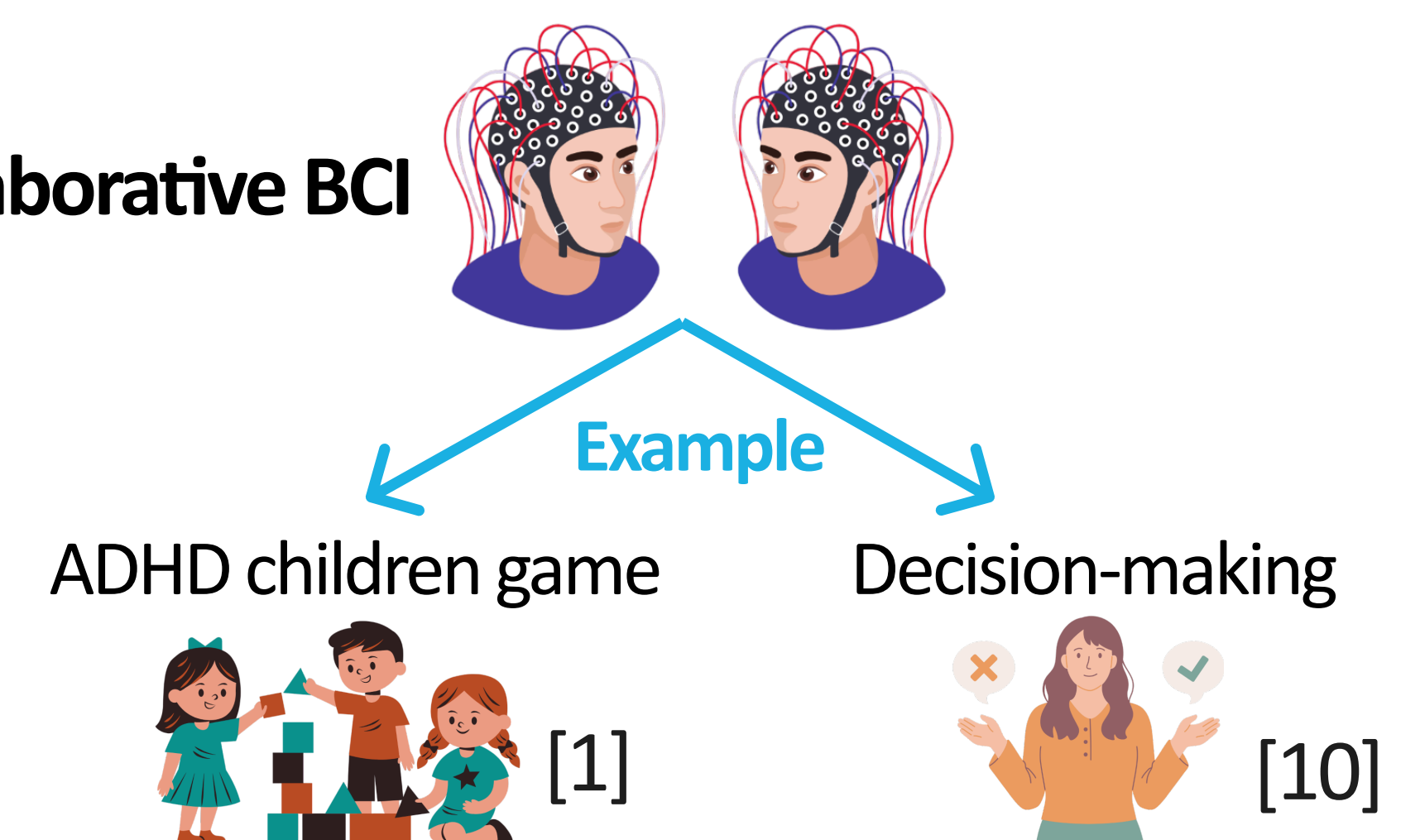
### Path-Finding task [5]

**Common points** Navigate from **departure** to **arrival** with routes intersecting at only two **common points**.

Figure 2 : Different conditions corresponding to different situations in collaborative coupling

## Next step

### Collaborative BCI



→ Compare neurophysiological markers of collaboration between a validated collaboration task and a BCI task.

## References

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