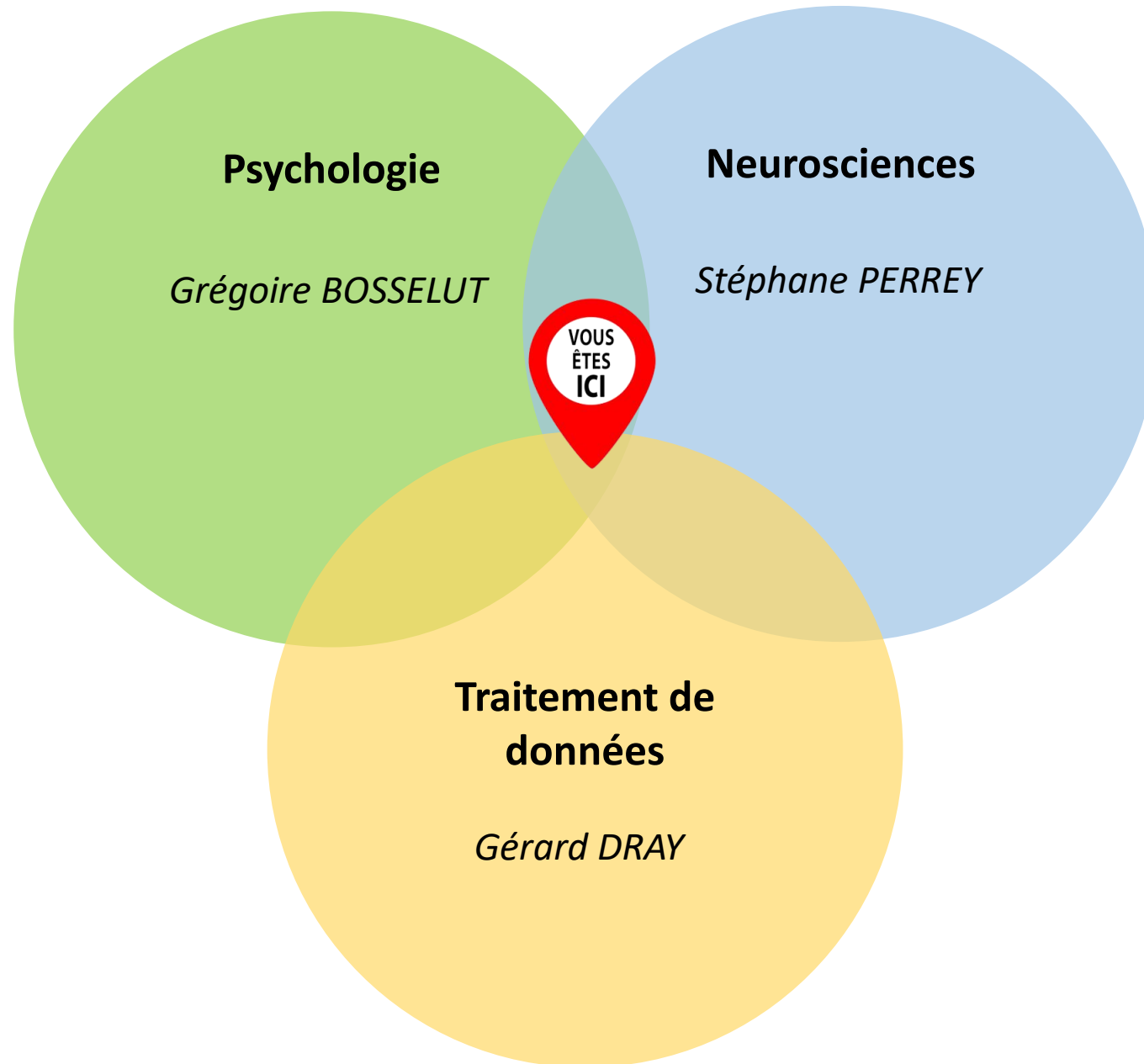




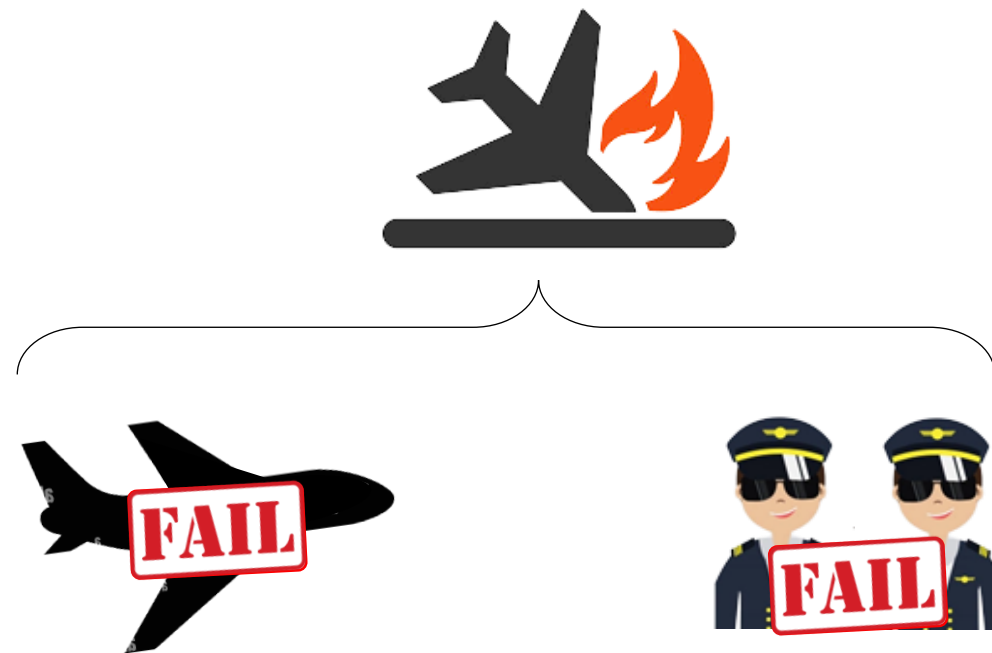
# Effet d'une perturbation sur la coordination d'une dyade : étude en hyperscanning fNIRS





24 septembre 2022

**« Rare image d'un 737 s'abreuvant dans un étang du sud de la France »**





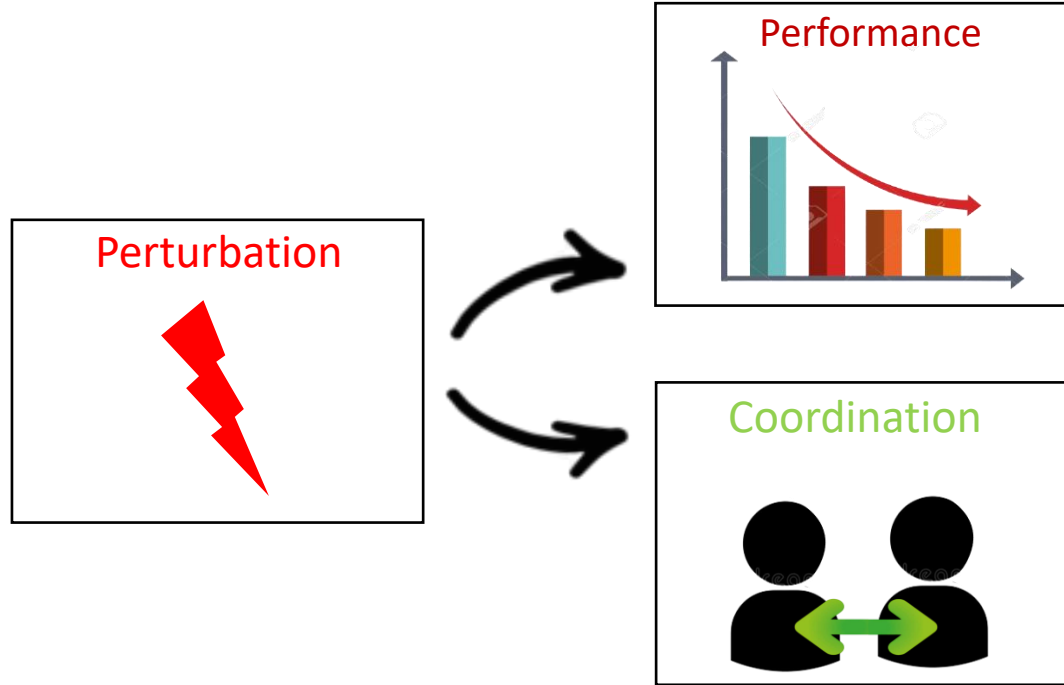
Perturbation → Coordination



Psychologie sociale



Adaptation collective  
Coordination volontaire



Psychologie sociale



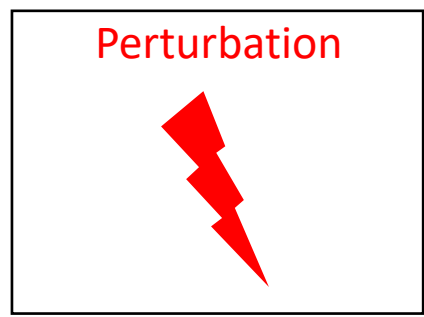
Adaptation collective  
Coordination volontaire



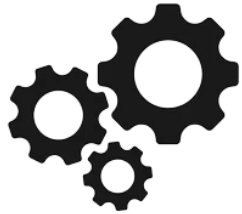
Changement de **MODE** de coordination



Changement de **NIVEAU** de coordination ?

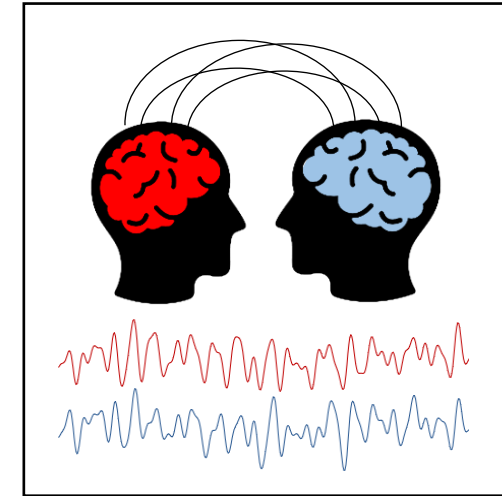
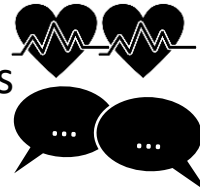


## Psychophysiology



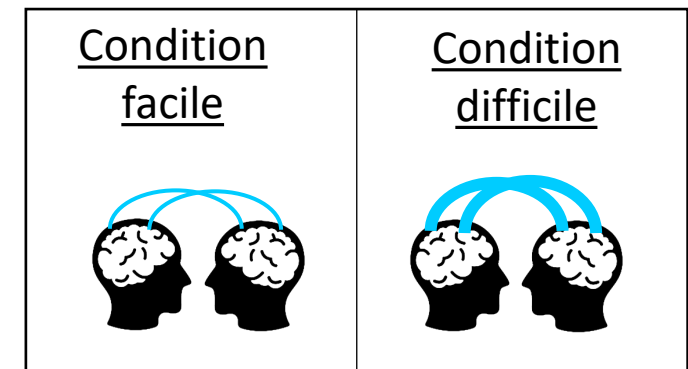
### Coordination spontanée

- Apparaît lors de coopération
- Synchronisation rythmes physiologiques



### Coordination neurophysiologique

- Hyperscanning fNIRS
- Synchronisation inter-cerveau (SIC)
- Sensible à la difficulté de la tâche

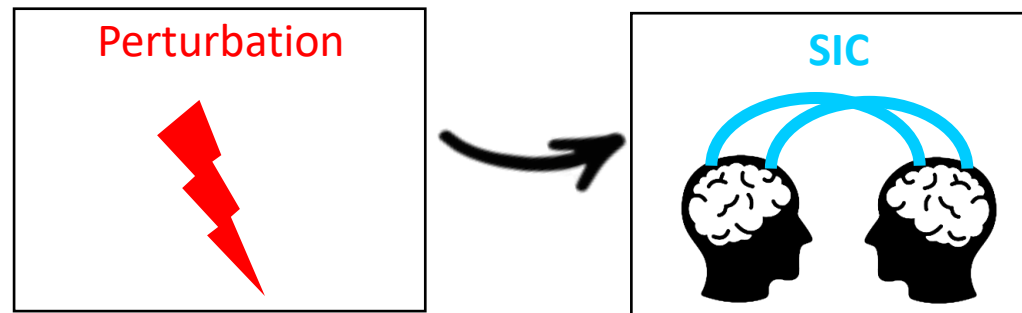


**Niveau** de coordination

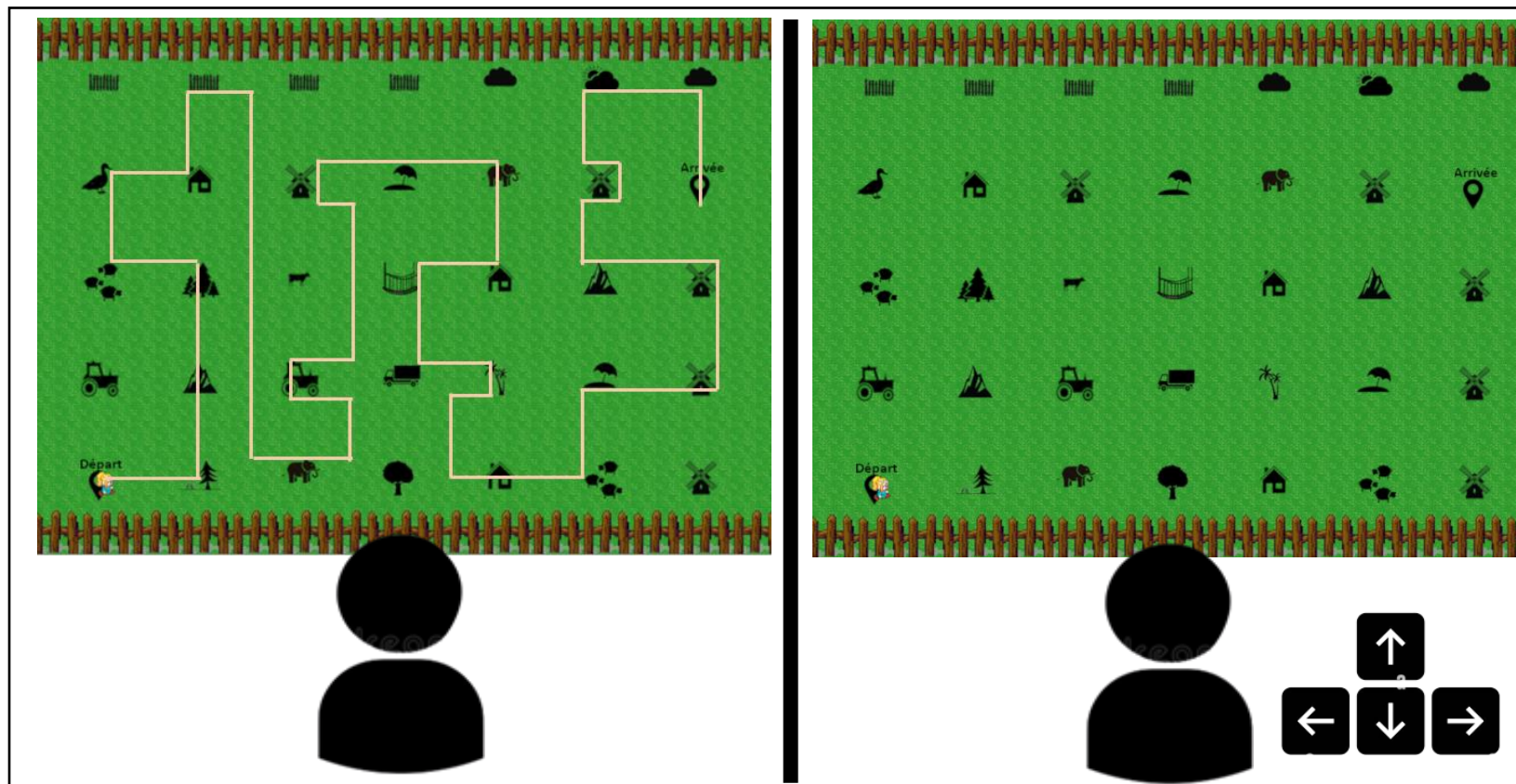



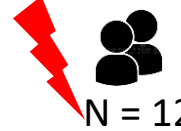
# Hypothèse

Perturbation → Augmentation de coordination neurophysiologique

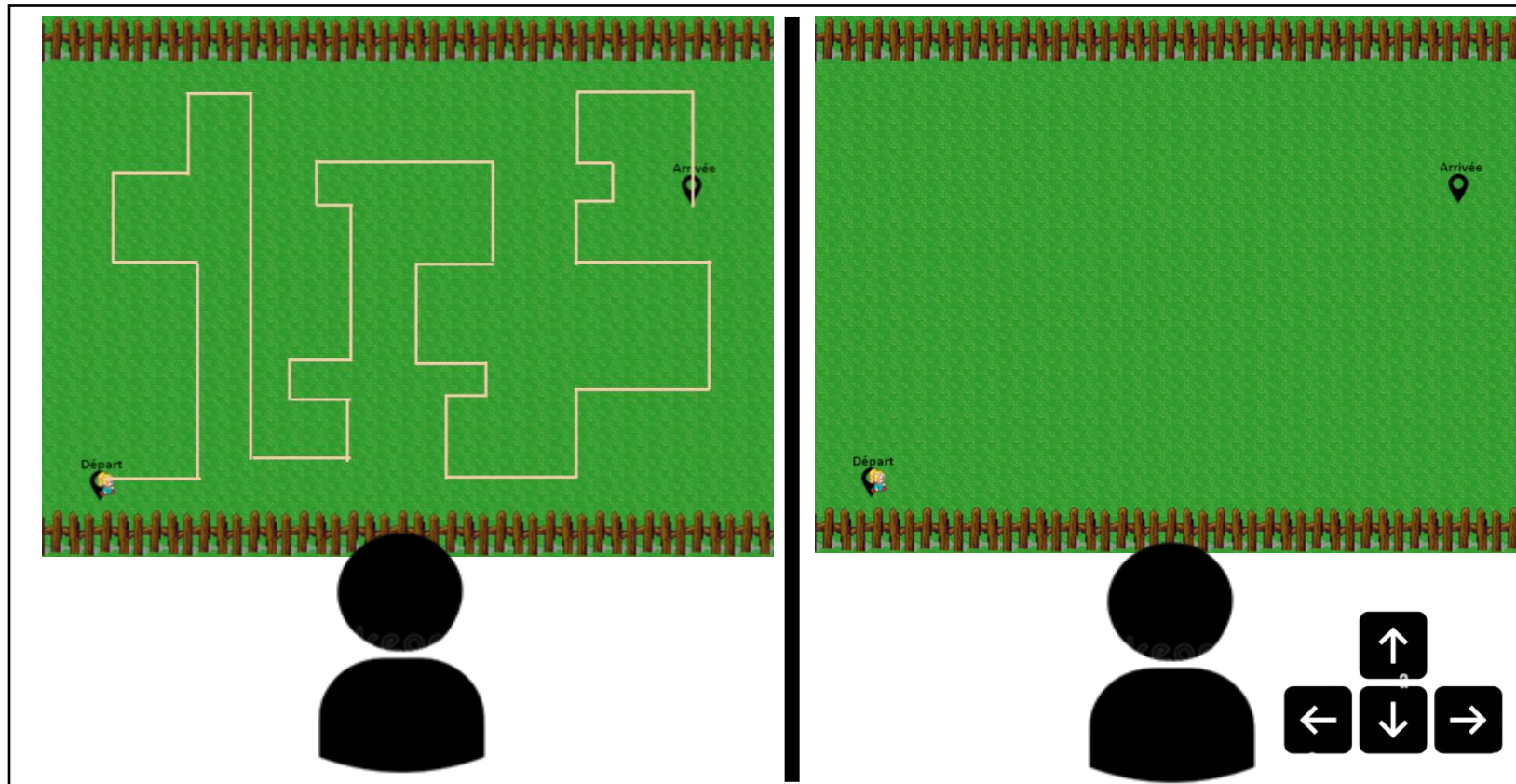



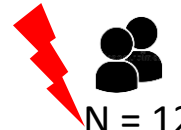
# Protocole



Contrôle	Expérimental
	
N = 9	N = 12

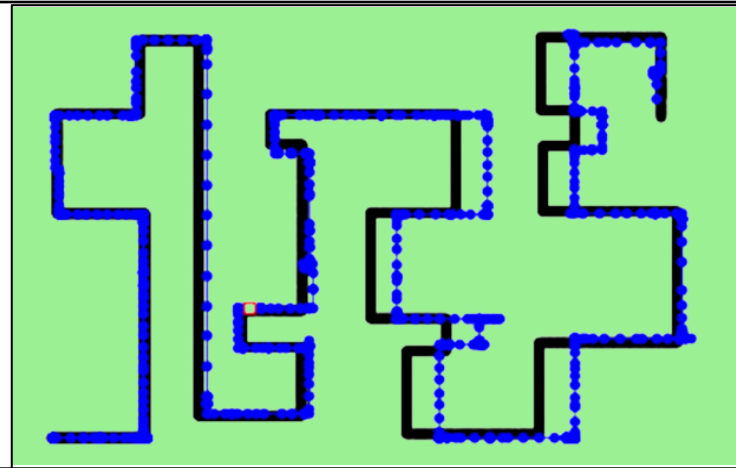
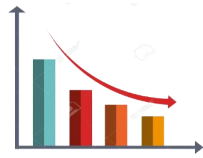
# Protocole



<p>Contrôle</p>  <p>N = 9</p>	<p>Expérimental</p>  <p>N = 12</p>
--	---

## Mesures

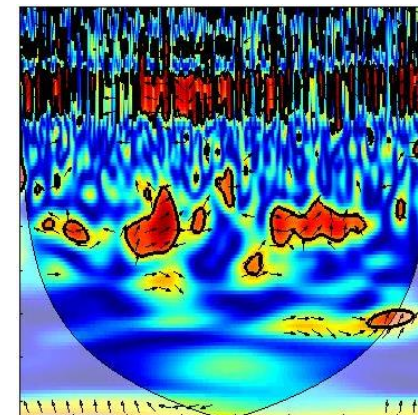
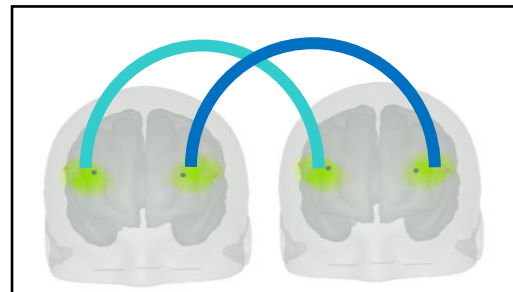
### Performance



- Précision du tracé
- Distance / tracé de référence

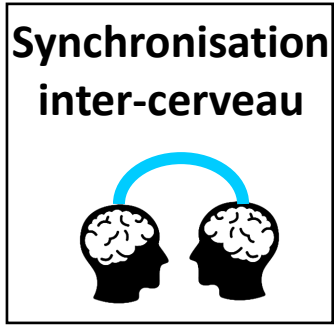
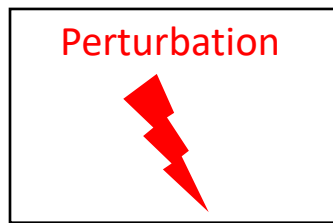
**AVANT****APRES**

### Synchronisation inter-cerveau

**fNIRS**

- Hyperscanning fNIRS
- Cortex préfrontal D et G
- 2 combinaisons
- Wavelet Transform Coherence

# Résultats



**ANOVA mixte**

Erreurs			F	p	$\eta^2p$
Groupe*Temps	1	16	6,810	0,019*	0,189

→ Perturbation → Baisse de performance



**ANOVAs mixtes**

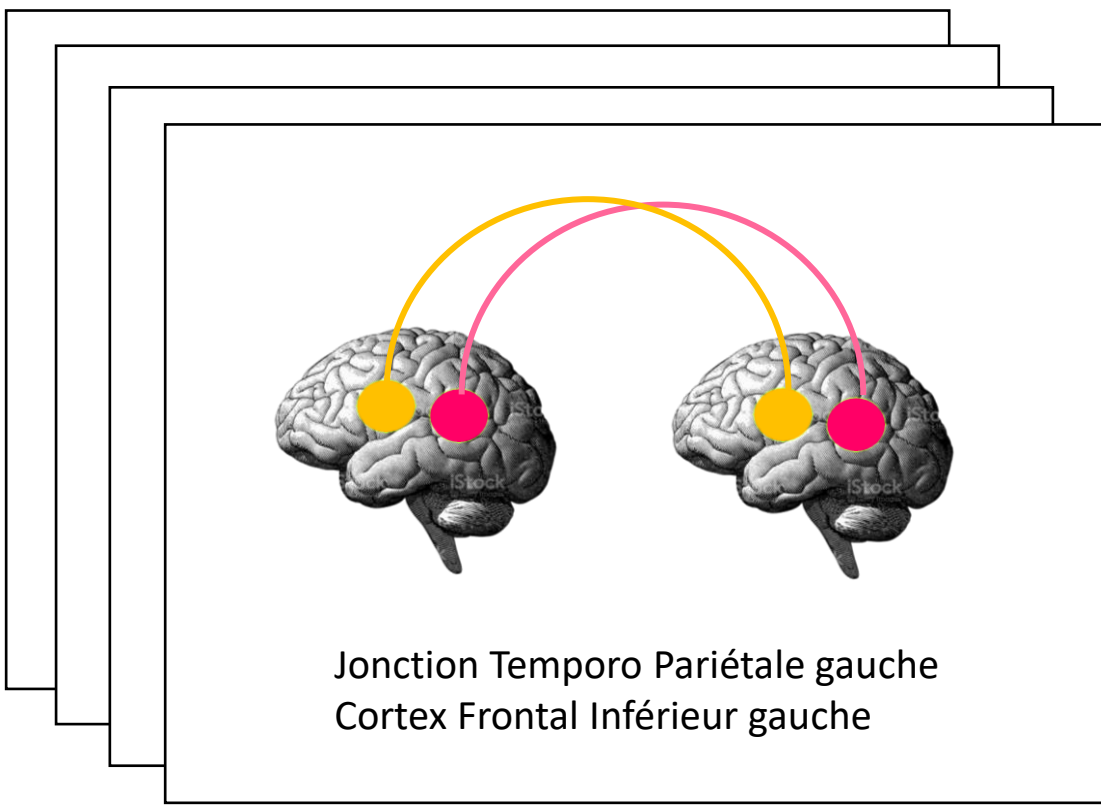
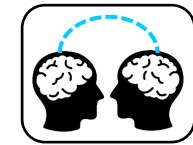
DD			F	p	$\eta^2p$
Groupe	1	13	0,679	0,425	0,050
Temps	1	13	5,610	0,034 *	0,301
Groupe*Temps	1	13	0,009	0,927	6,77 e-4

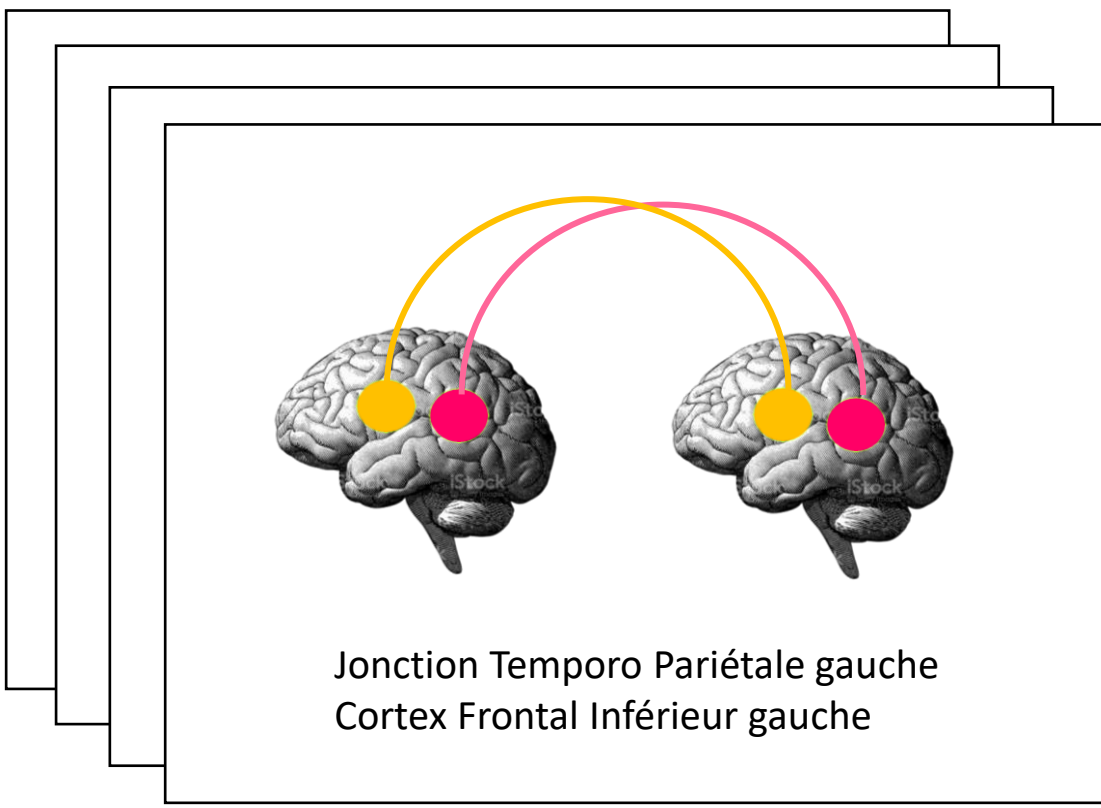
GG			F	p	$\eta^2p$
Groupe	1	13	0,325	0,578	0,024
Temps	1	13	3,752	0,075	0,224
Groupe*Temps	1	13	0,201	0,661	0,015

→ Perturbation → Augmentation de SIC

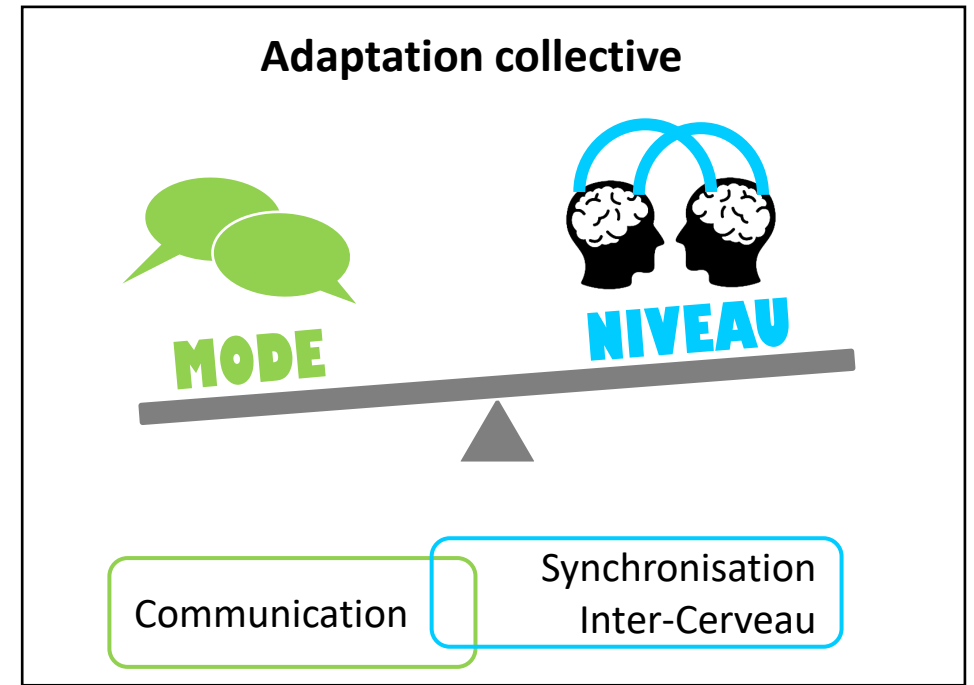
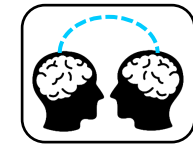




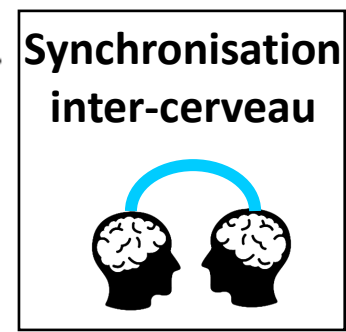
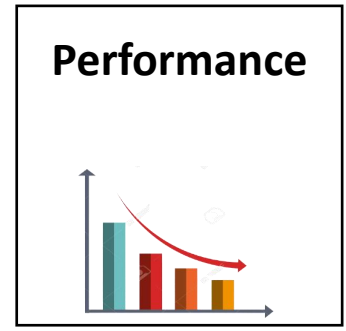
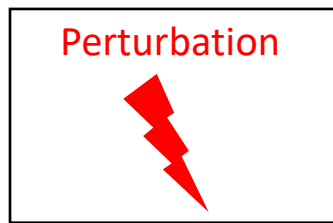




Jonction Temporo Pariétale gauche  
Cortex Frontal Inférieur gauche



## Résultats



**ANOVA mixte**

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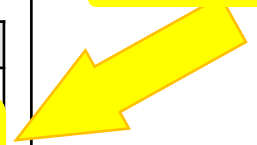
**ANOVAs mixtes**

DD			F	p	$\eta^2p$
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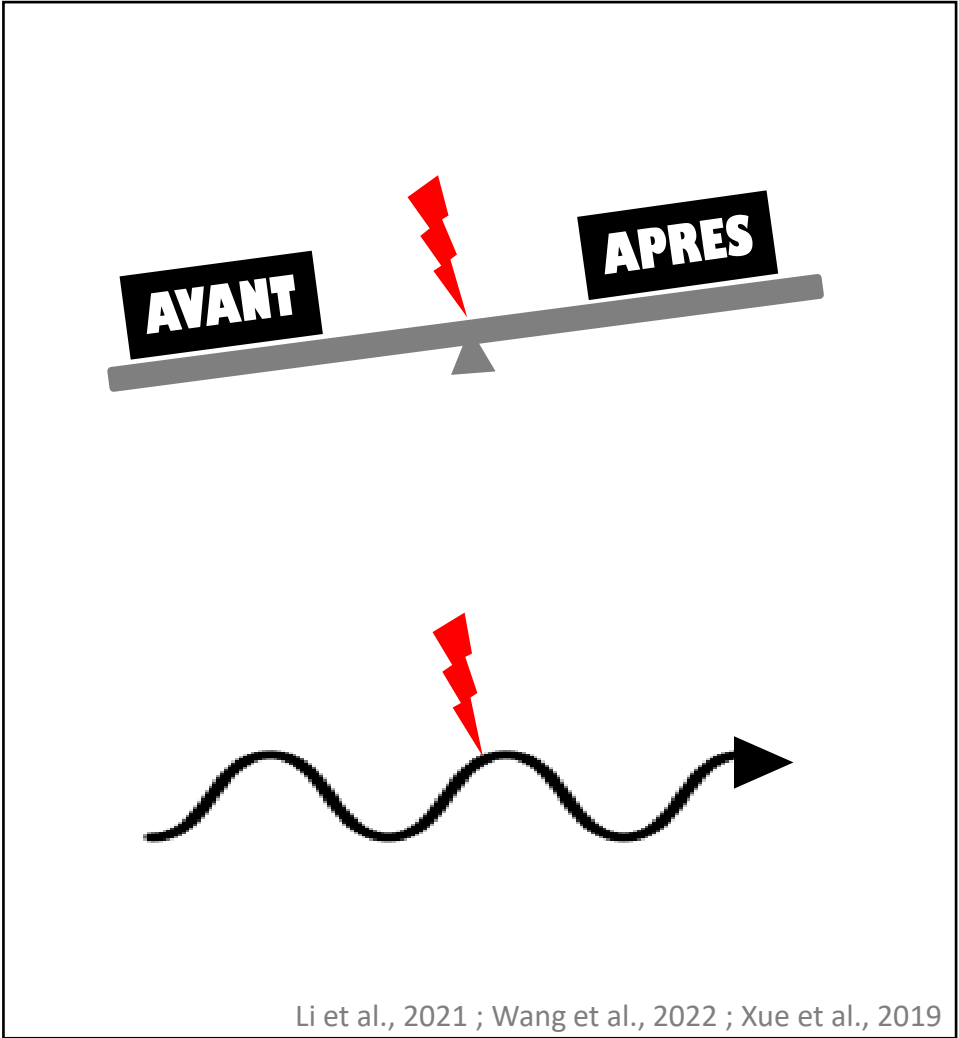
  

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→ Perturbation → Augmentation de SIC







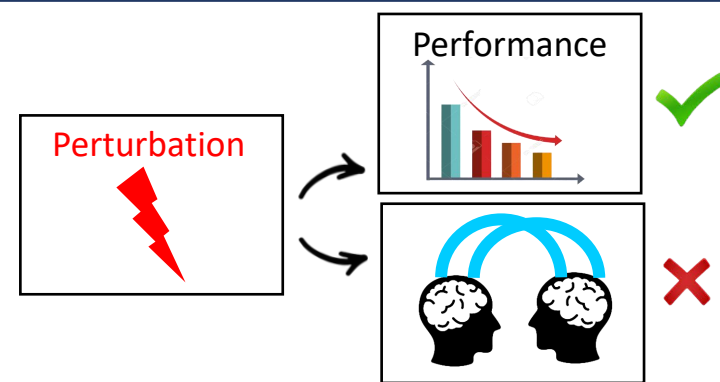
Li et al., 2021 ; Wang et al., 2022 ; Xue et al., 2019

# Merci de votre attention

## Mots clés

- Hyperscanning fNIRS
- Coordination neurophysiologique
- Synchronisation Inter-Cerveau
- Wavelet Transform Coherence

## Principaux résultats



Réveillé C. , Bosselut G., Belda G., Dray G., Perrey S. (accepted) *Inter-brain synchronization during a cooperative task with complementary roles following an unexpected perturbation: a fNIRS hyperscanning study* [Conference]. Neuroergonomics and NYC Neuromodulation Conferences, New-York City