

LIEGE université
GIGA CONSCIOUSNESS
SENSATION & PERCEPTION RESEARCH GROUP

COMA
SCIENCE GROUP

CHU de Liège

fnrs
FREEDOM TO RESEARCH

IP

fondation benoit

FUNDAÇÃO **Bdad**

Fondation **Léon Fredericq**

Fondation **contre le Cancer**

televie

La conscience dans tous ses états

Consciousness in all its states

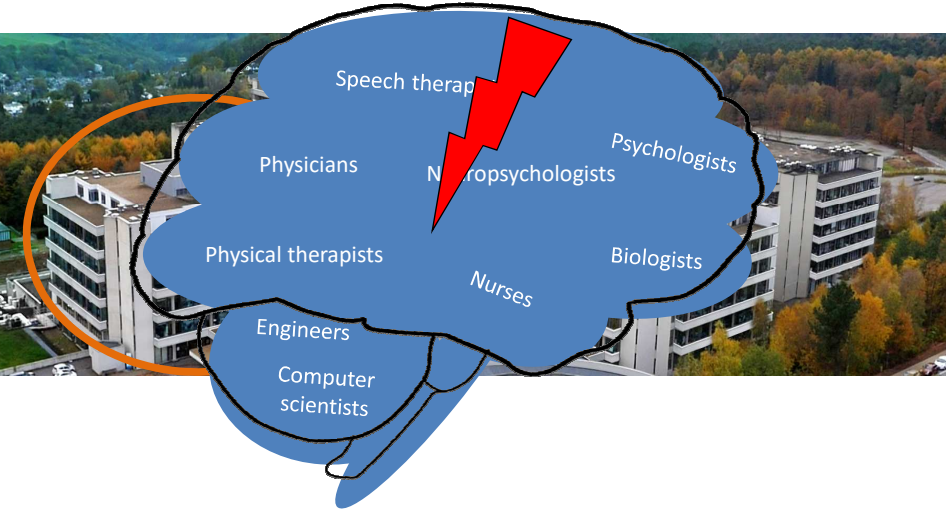


Olivia Gosseries, PhD
Audrey Vanhauzenhuyse, PhD
Nolwenn Marie, MSc
GIGA Consciousness
Université de Liège

PhD day - ReD ULiège
1er Octobre 2021
Université de Liège

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GIGA-Consciousness



Speech therapists

Physicians

Physical therapists

Engineers


Computer scientists





Neuro-psychologists

Nurses

Psychologists

Biologists

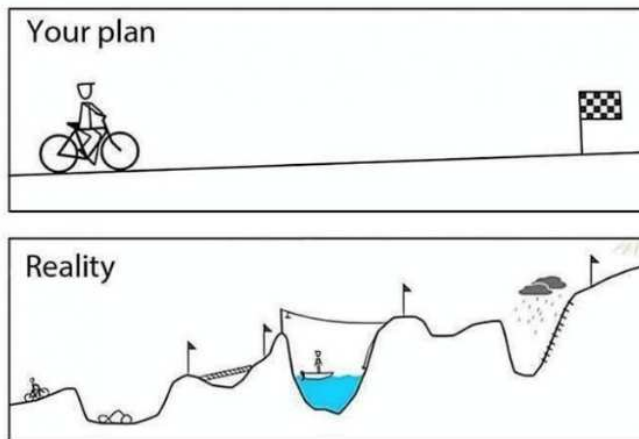
 **GIGA-Consciousness : 4 labos**

Coma Science Group	Sensation and Perception Research Group
	
Physiology of Cognition	Anesthesia and intensive care
	

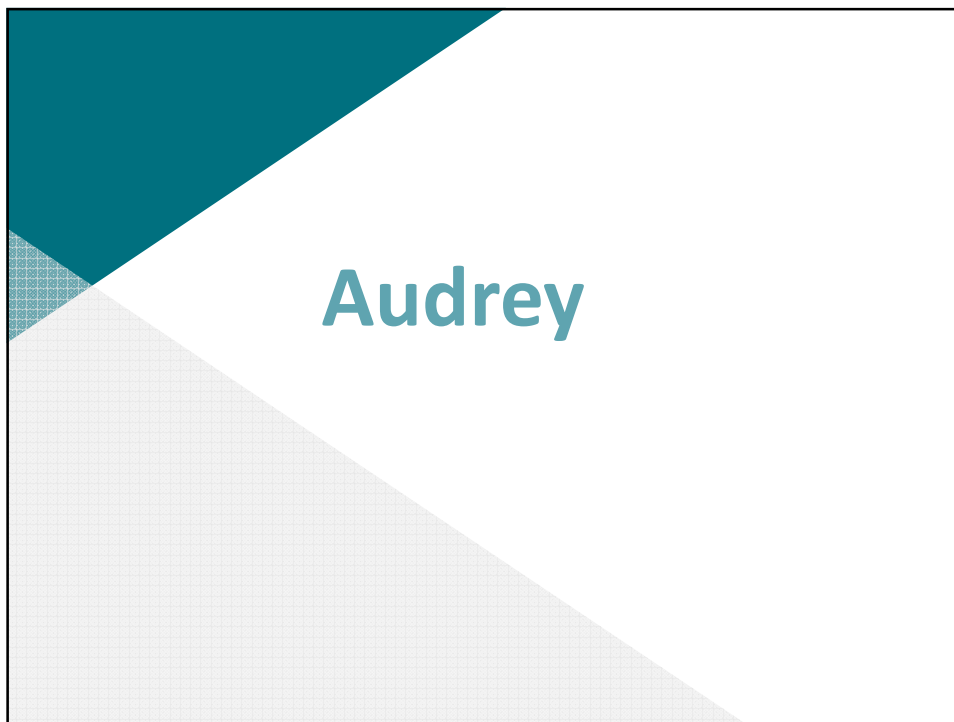
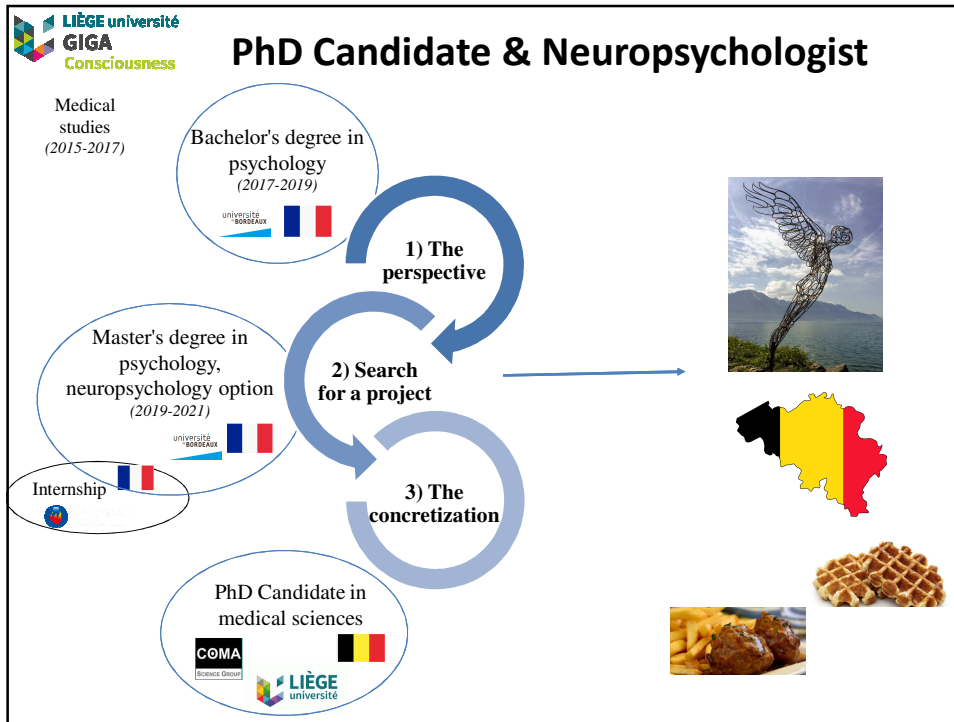
Plan

- PART I : professional background**
 - Nolwenn
 - Audrey
 - Olivia
- PART II : altered states of consciousness**
 - Consciousness
 - Coma and related states
 - Sleep and anesthesia
- PART III : modified states of consciousness**
 - Hypnosis
 - Trance
- PART IV**
 - Clinical application in oncology

Part I Parcours



Nolwenn



Chercheuse-Clinicienne

2005
Undergrad & internships
UMONS universit  Lumiere LYON 2

2006
PhD co-tutelle
COMA Science Group
LIEGE universit  Psychologie, Logop die & Sciences de l'Education
LIEGE universit  M decine

2009
Internship
Maastricht University

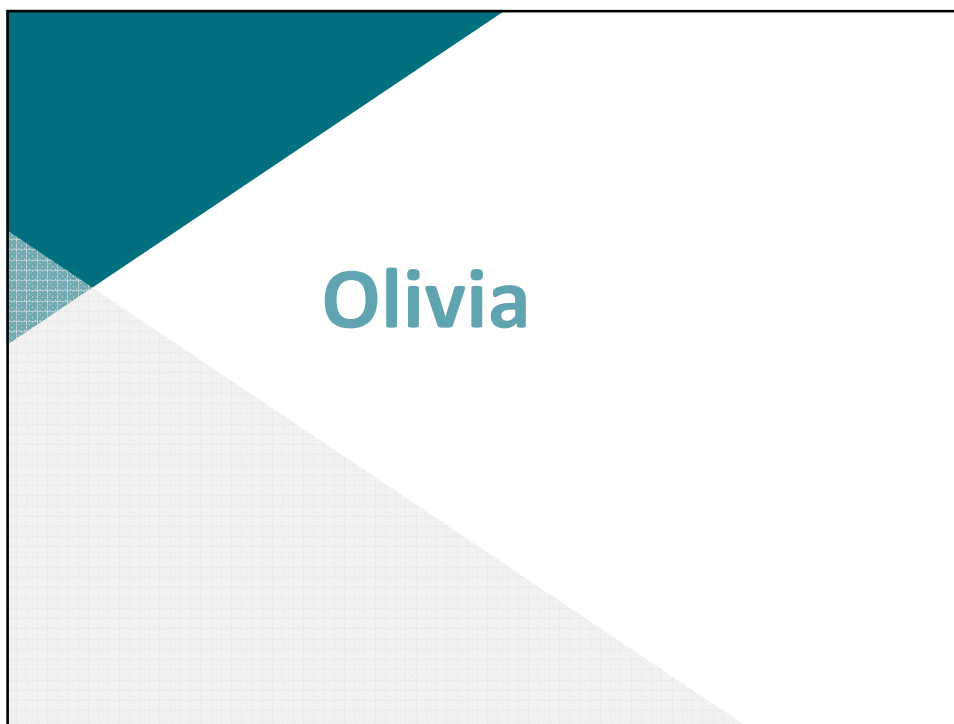
Centre Interdisciplinaire d'Algie
CHU de Li ge

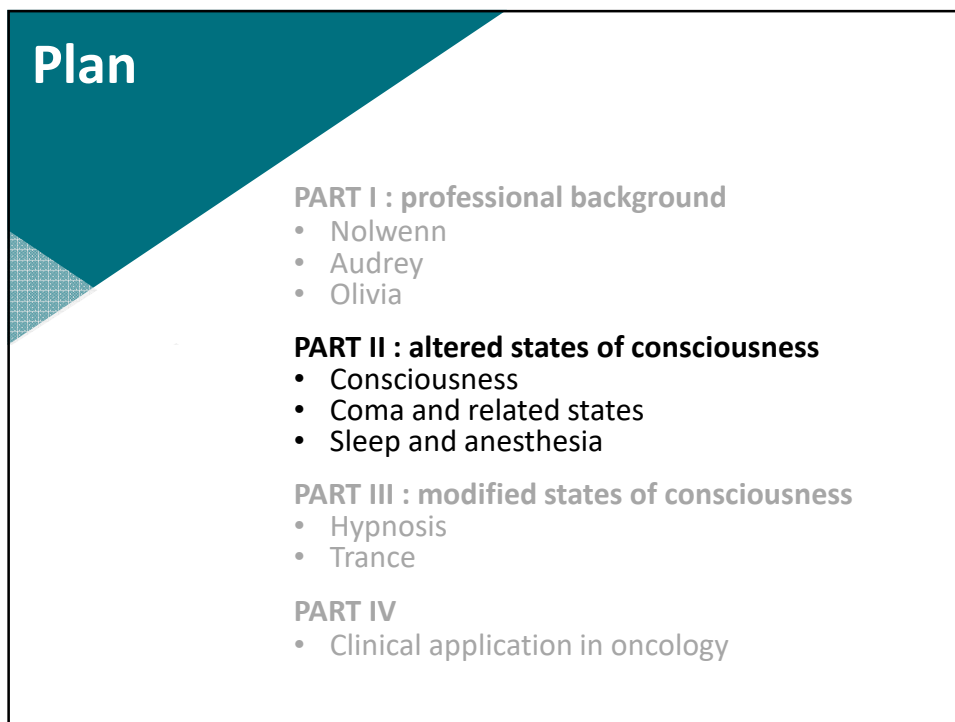
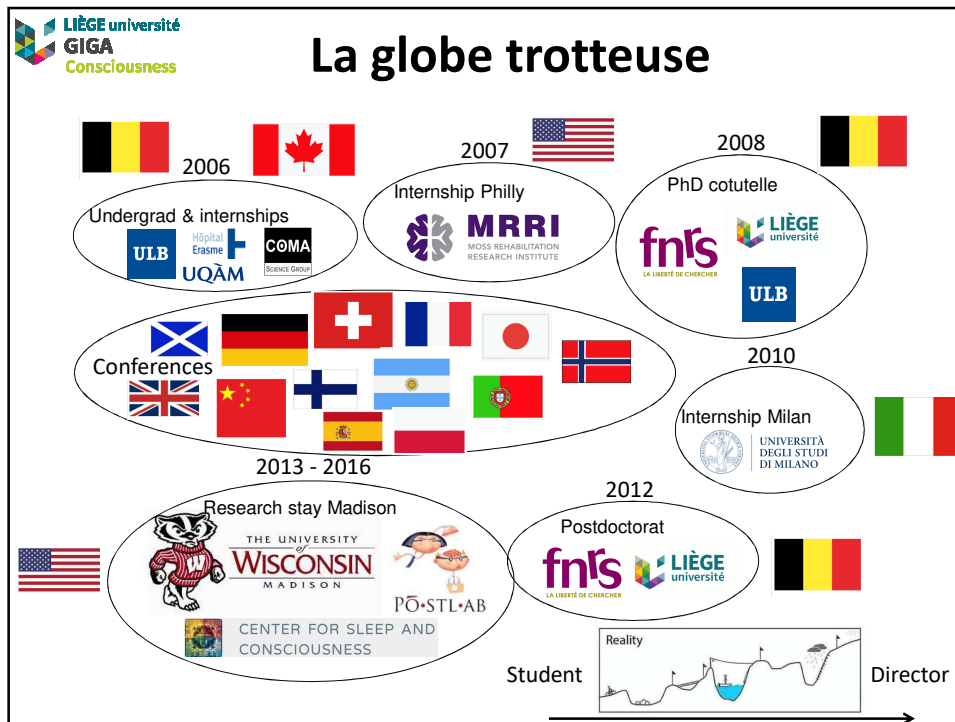
Pratique clinique ↔ **Recherche**

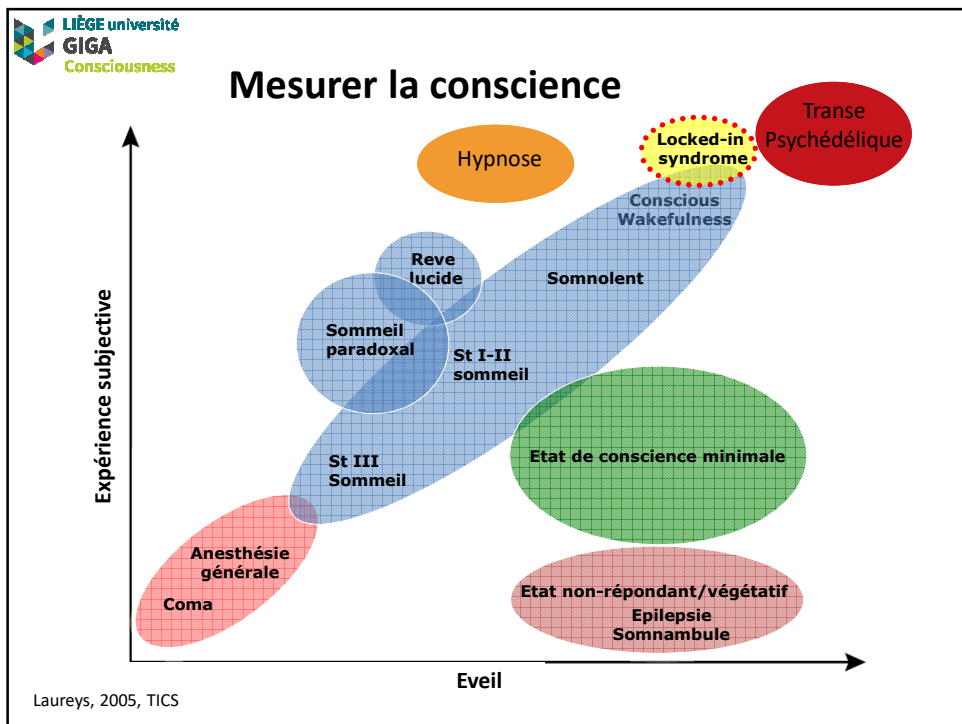
Sensation & Perception Research Group
LIEGE universit 
ORCA CONSCIOUSNESS

Conferences

Networks:
- Centre Interdisciplinaire d'Algie: Neurologie, Centre Interdisciplinaire d'Algie, Sciences de la sant /Fond, Anesth sie-R animation, ORL, Centre des br les, Neurologie, Centre du cerveau, Psychologie clinique et sociale, Oncologie, Neurobiologie.
- Sensation & Perception Research Group: Centre de la m moire, Facult  de M decine, Centre de Recherche Clinique, Anesth sie & soins intensifs, R habiliteuse, Soins palliatifs, Physiologie et cognition, Etudes de psychologie, Neurologie et sciences de l'education, CHU de Li ge, Optima.








**Part II
Coma &
autres états**



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Différentes entités

Evaluation clinique

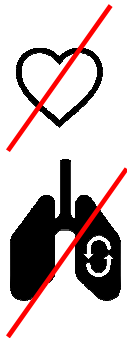
Coma →
Yeux fermés
Réflexes

Bodart, Gosseries & Laureys, *Semin Neurol*, 2013

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Redéfinition de la mort

Mort clinique




≠

Mort cérébrale



Ventilation
mécanique



Bjørn Ibsen – Copenhagen 1952

Brenat, *Arch Neurol*, 1992

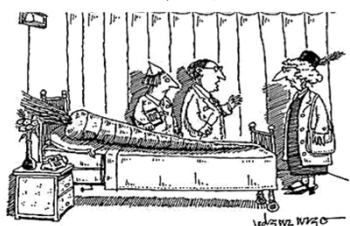
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Différentes entités

Evaluation clinique

<p>Coma</p> <p>Yeux fermés Réflexes</p>	→	<p>Eveil non répondant</p> <p>Yeux ouverts Réflexes</p>
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Etat végétatif
Laureys et al., 2010



"There's nothing we can do... he'll always be a vegetable."

Bodart, Gosseries & Laureys, *Semin Neurol*, 2013

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Différentes entités

Evaluation clinique

Coma → Eveil non répondant → Etat de conscience minimale

Yeux fermés Yeux ouverts
Réflexes Réflexes

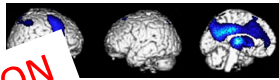
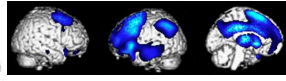
+
Compréhension langagière
(ex. réponse à la commande)

↑

↓

-
Pas de compréhension
(ex. poursuite visuelle)

PAS DE COMMUNICATION

Bodart, Gosseries & Laureys, *Semin Neurol*, 2013

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Différentes entités

Evaluation clinique

Coma → Eveil non répondant → Etat de conscience minimale → Emergence

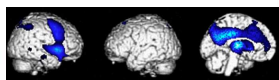
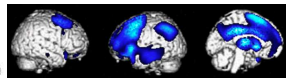
Yeux fermés Yeux ouverts Yeux ouverts Communication fonctionnelle
Réflexes Réflexes Non reflexes, signes de conscience Utilisation fonctionnelle d'objets

+
Compréhension langagière
(ex. réponse à la commande)

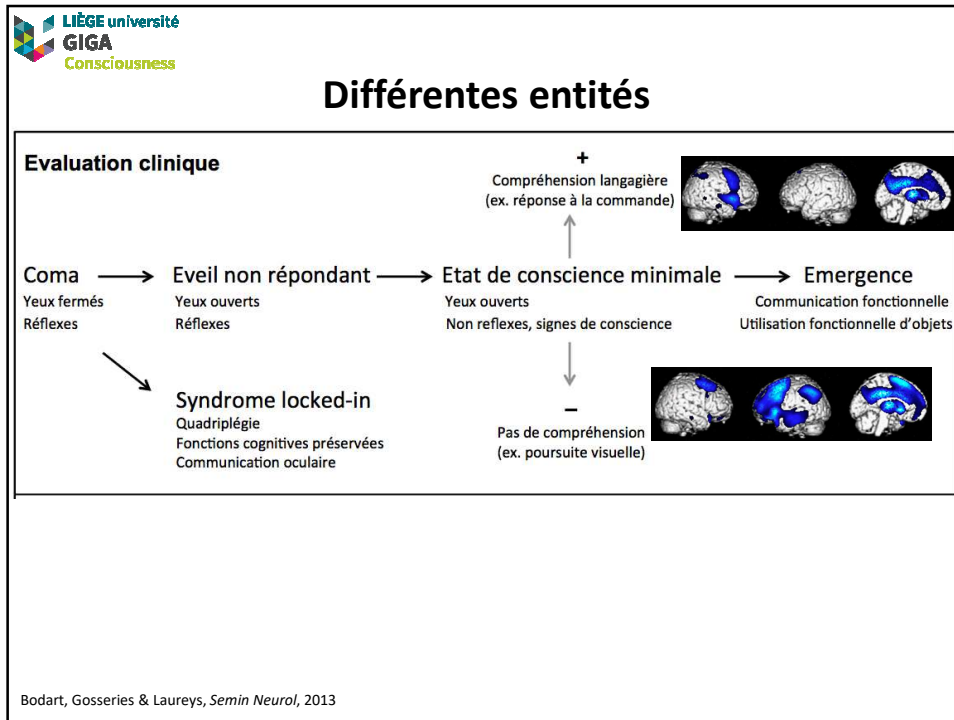
↑

↓

-
Pas de compréhension
(ex. poursuite visuelle)







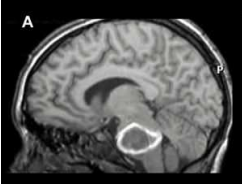
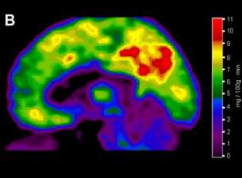
Bodart, Gosseries & Laureys, *Semin Neurol*, 2013



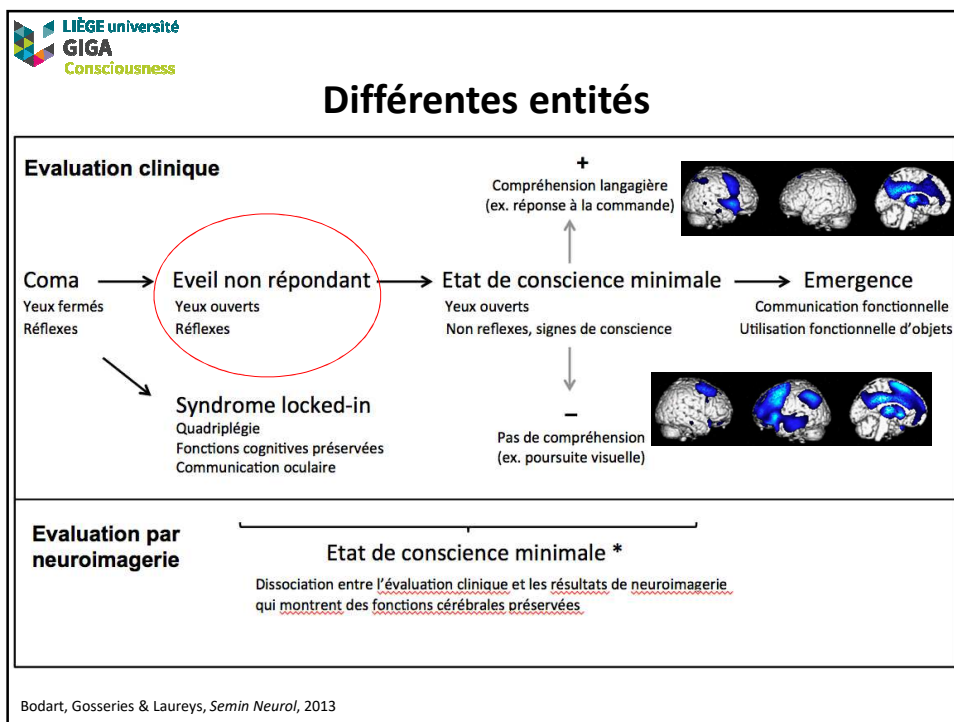
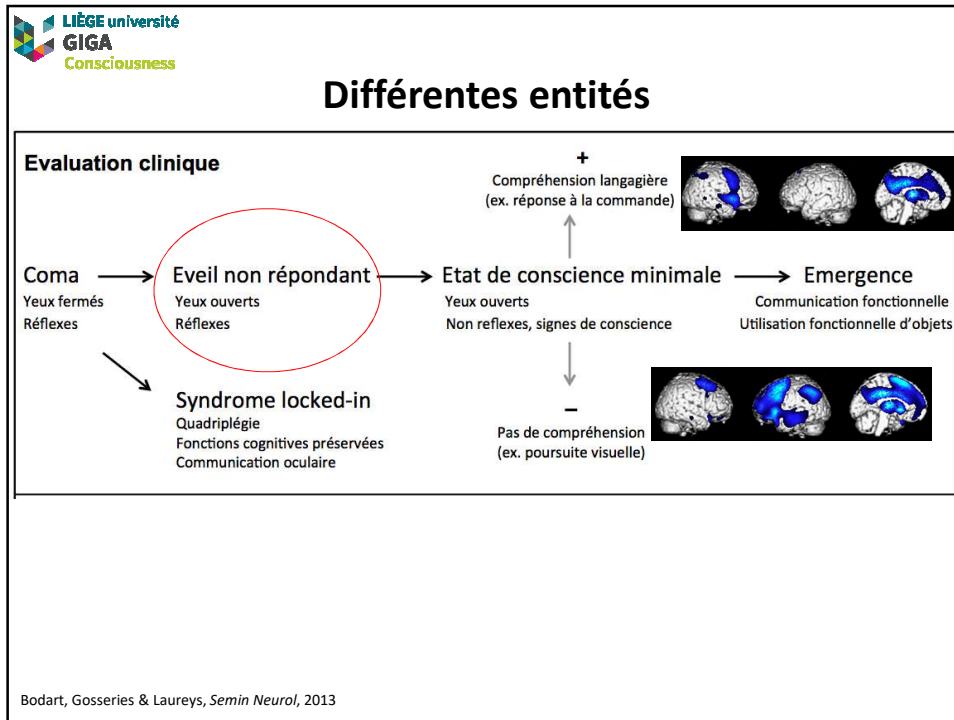
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Le syndrome locked-in

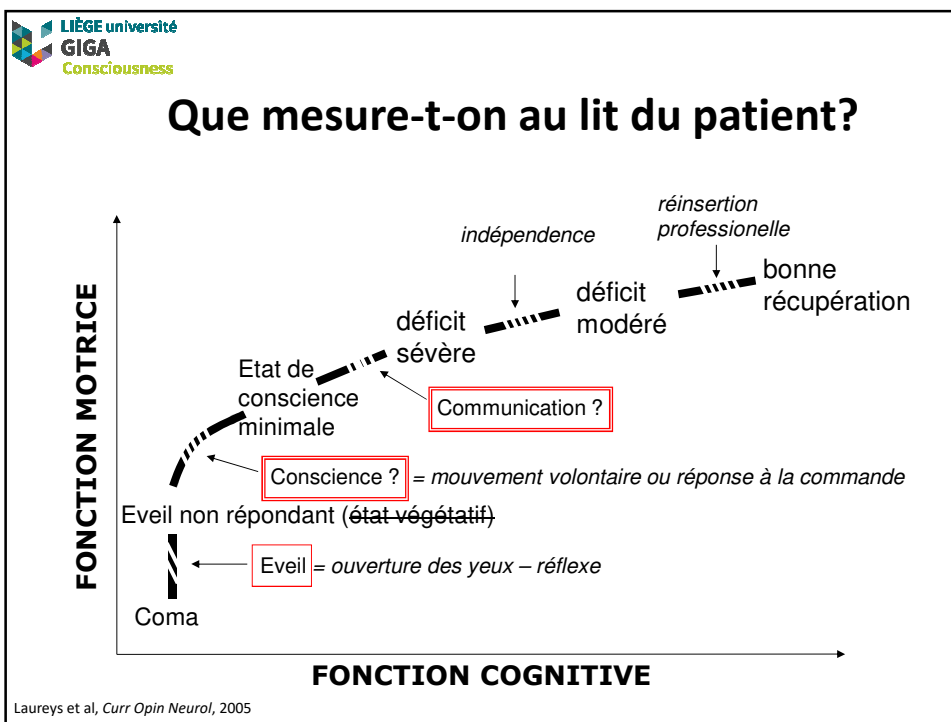




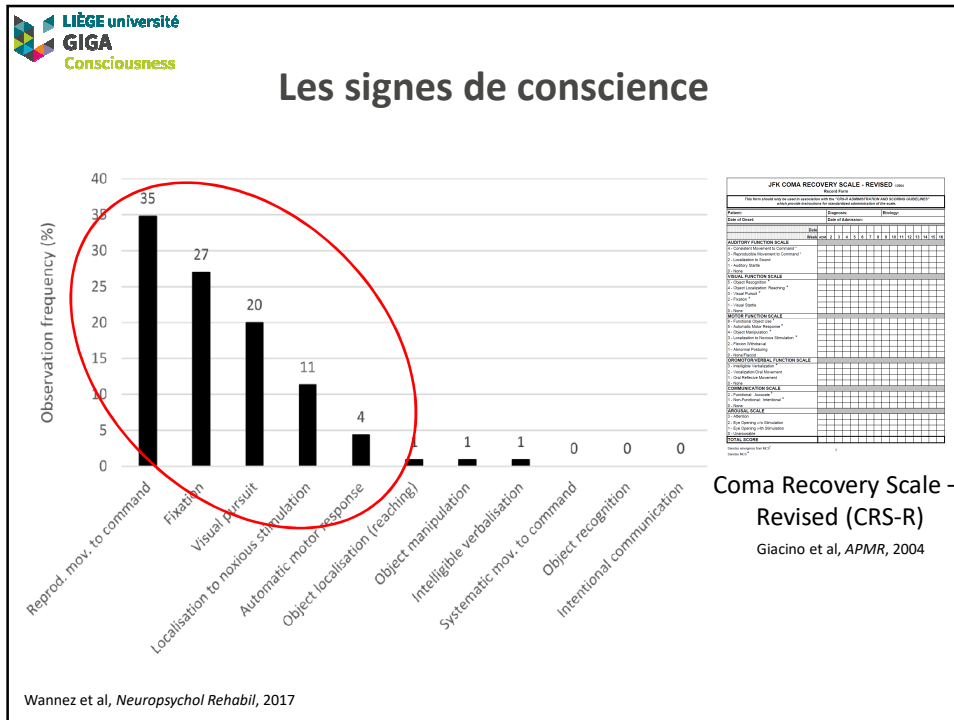



Laureys et al, *Prog Brain Res*, 2005



Evaluation clinique





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Autres signes de conscience?

Résistance ouverture des yeux

van Ommen et al, *J Neurology*, 2018

Alimentation orale

Melotte et al, *J Neurology*, 2018
Melotte et al, *APRM*, 2020

Localisation auditive

Carrière et al, *under revision*

Habituation réflexe auditif

Hermann et al, *Brain*, 2020

Olfaction

Arzi et al, *Nature*, 2020

Réflexe clignement menace

Vanhaudenhuyse et al, *Neurology*, 2008


Croiser jambes?

Rémi et al, *Neurology*, 2011

Grimaces?

Chatelle et al, *APMR*, 2018

Chatouilleusement?



Erreur de diagnostic après un coma

N=126 patients post-coma

- 51 diagnostiqués en éveil non répondant par consensus clinique
- 18 montrent des signes de conscience (échelle de récupération du coma – révisée)

↘ 30-40% erreur de diagnostic

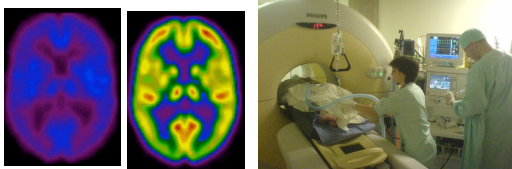
Schnakers et al, *BMC Neurology*, 2009
Stender & Gosseries et al, *Lancet*, 2014

ÉCHELLE DE RÉCUPÉRATION DU COMA VERSION REVUE FRANÇAISE 0208 Formulaire de rapport	
Patient :	Date atteinte cérébrale :
Etiologie :	Date admission :
Diagnostic initial :	Date :
Examineur:	
FONCTION AUDITIVE	
4 – Mouvement systématique sur demande*	
3 – Mouvement reproducible sur demande*	
2 – Localisation de sons	
1 – Réflexe de sursaut au bruit	
0 – Néant	
FONCTION VISUELLE	
5 – Reconnaissance des objets*	
4 – Localisation des objets : atteinte*	
3 – Poursuite visuelle*	
2 – Fixation*	
1 – Réflexe de clignement à la menace	
0 – Néant	
FONCTION MOTRICE	
6 – Utilisation fonctionnelle des objets*	
5 – Réaction motrice automatique*	
4 – Manipulation d'objets*	
3 – Localisation des stimulations nociceptives*	
2 – Fixation en retrait	
1 – Posture anormale stéréotypée	
0 – Néant / Flaccidité	
FONCTION ORCOTRICEVERBALE	
3 – Production verbale intelligible*	
2 – Production vocale / Mouvements oraux	
1 – Réflexes oraux	
0 – Néant	
COMMUNICATION	
2 – Fonctionnelle : exacte*	
1 – Non fonctionnelle : intentionnelle*	
0 – Néant	
ÉVEIL	
3 – Attention	
2 – Ouverture des yeux sans stimulation	
1 – Ouverture des yeux avec stimulation	
0 – Aucun éveil	
SCORE TOTAL	

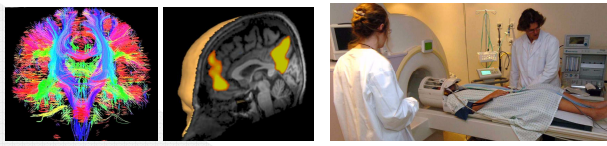
Indique l'émergence de l'état de conscience minimale *
Indique un état de conscience minimale *

Neuroimagerie


Tomographie par émission de positons (TEP)




Imagerie par résonance magnétique (IRM)

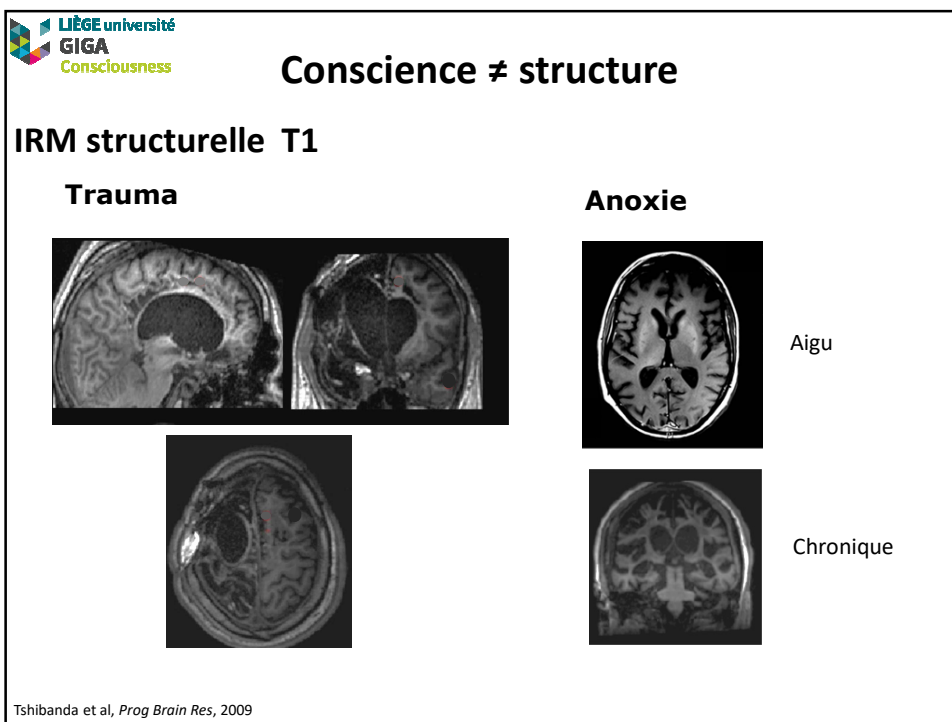
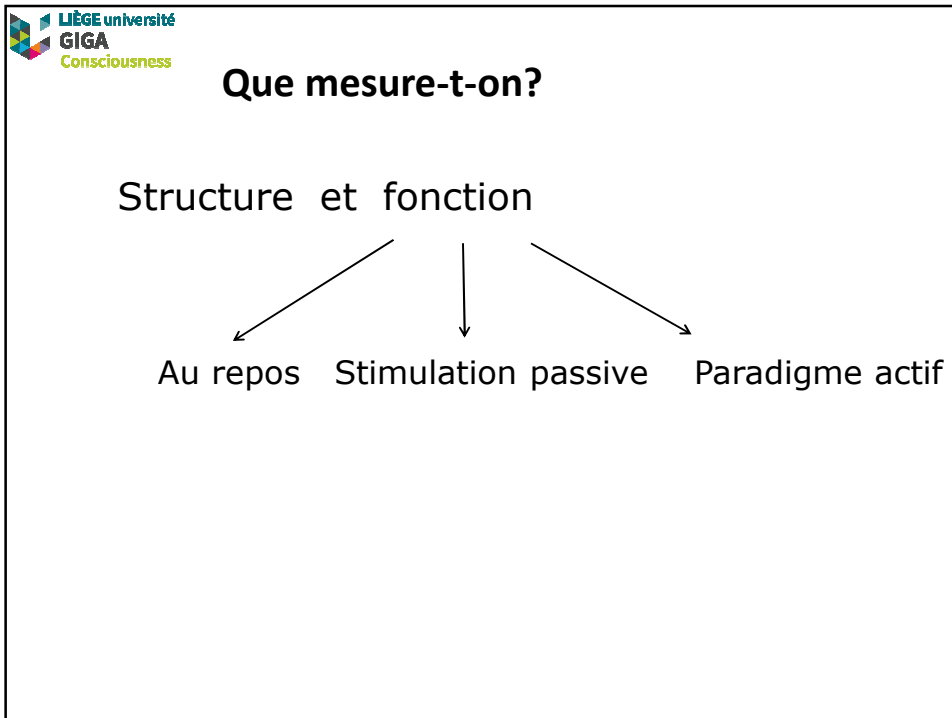


Stimulation magnétique transcrânienne et EEG



Electroencéphalographie (EEG)





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Conscience ≠ comportement

Lali

Lila

Non répondante
↓
Discussion de fin de vie

MCS*
↓
Stimulation

MCS* = non-behavioral minimally conscious state

Gosseries et al, *Brain Injury*, 2014
Gosseries et al, *Ann Rev Neurosc*, 2014

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Conscience ≈ complexité

Conscience

0 ms

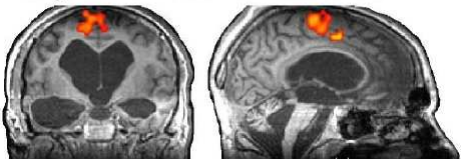
Massimini et al, *Science*, 2005

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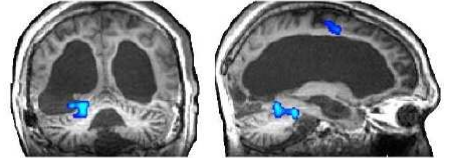
Paradigme actif en IRM ≈ réponse à la commande

Imagine **Tennis** to answer 'YES'
Imagine **Navigating** to answer 'NO'

Is your father's name Alexander ?



Is your father's name Thomas ?



Monti & Vanhaudenhuyse et al, *New England J Med*, 2010
Horki et al, *Front Hum Neurosci*.2014
Edlow et al, *Brain*, 2017;
Bodien et al, *Front Neurol*, 2017
Haugg et al, *Front Neurol*, 2018

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Qualité de vie



Période de la vie	Nombre de patients en syndrome locked-in
-5	0
-4	0
-3	0
-2	0
-1	0
0	0
+1	0
+2	1
+3	0
+4	0
+5	0

Pire période de ma vie Meilleure période de ma vie



Bruno et al, *BMJ Open*, 2011

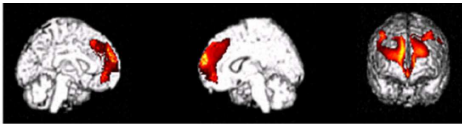


ALIS
Association du Locked-in Syndrome

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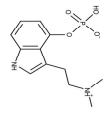


Zolpidem

Chatelle et al, 2014, Thonnard et al, 2014

5% répondeurs (Whyte et al, *APMR*, 2014)
Signes d'éveil sans conscience
(Machado et al, *Curr Pharm Des*, 2014)

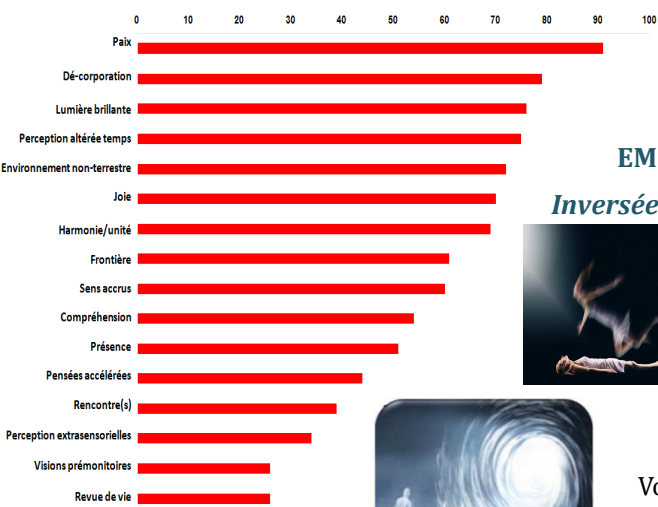




Psychédéliques


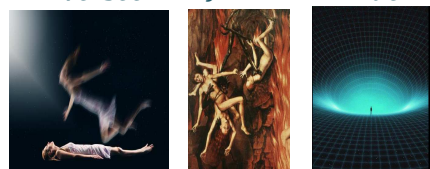
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Expériences de mort imminente



EMI NEGATIVES (14%)

Inversée Infernale Vide

Vos témoignages nous intéressent !
nde@uliege.be

Charland et al, *Front Hum Neurosci*, 2014
Cassol et al, *Memory*, 2019

CONCLUSION PART II



- ✓ **Diagnostic clinique**
 - *Mort clinique ≠ mort cérébrale*
 - *Différentes entités cliniques : impossible de rester dans le coma pendant 10 ans!*
 - *Signes de conscience*
- ✓ **Neuroimagerie**
 - *≠ réponse comportementale*
 - *≈ région frontopariétale*
 - *≈ complexité*
- ✓ **Traitements**
 - *Le meilleur est à venir*

Part II Sommeil & anesthésie

Anesthésie



Rêve lucide



Plan

PART I : professional background

- Nolwenn
- Audrey
- Olivia

PART II : altered states of consciousness

- Consciousness
- Coma and related states
- Sleep and anesthesia

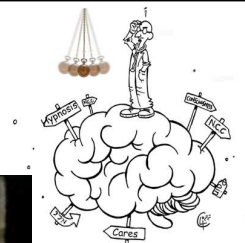
PART III : modified states of consciousness

- Hypnosis
- Trance

PART IV

- Clinical application in oncology

Part III Hypnose & Transe

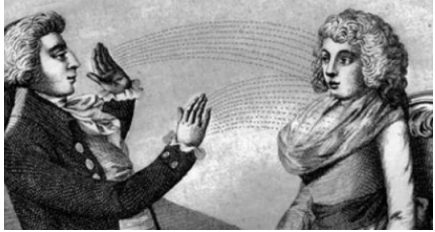
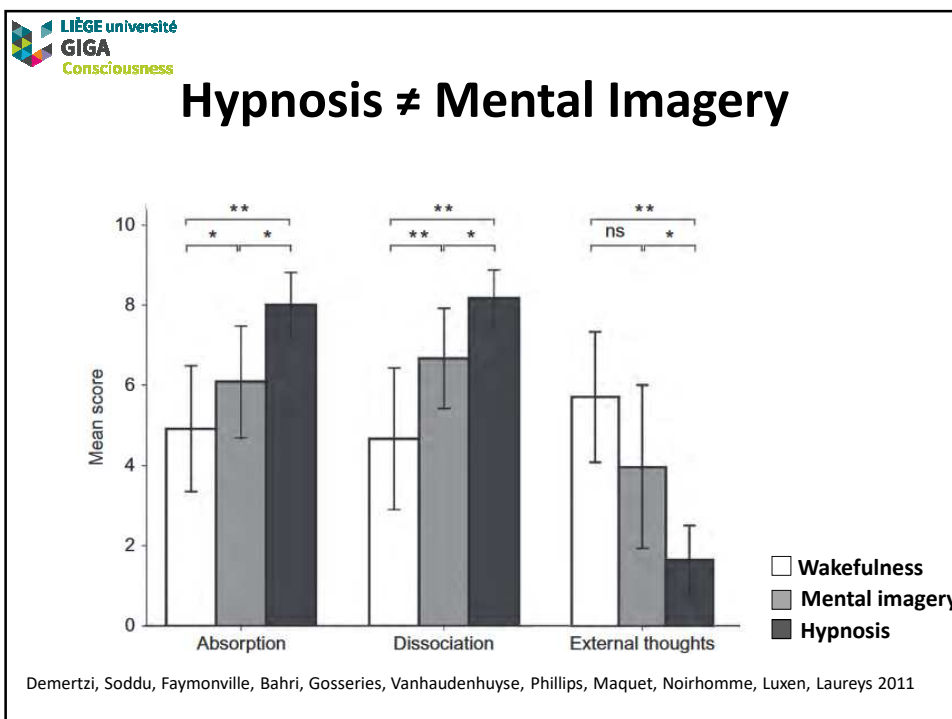


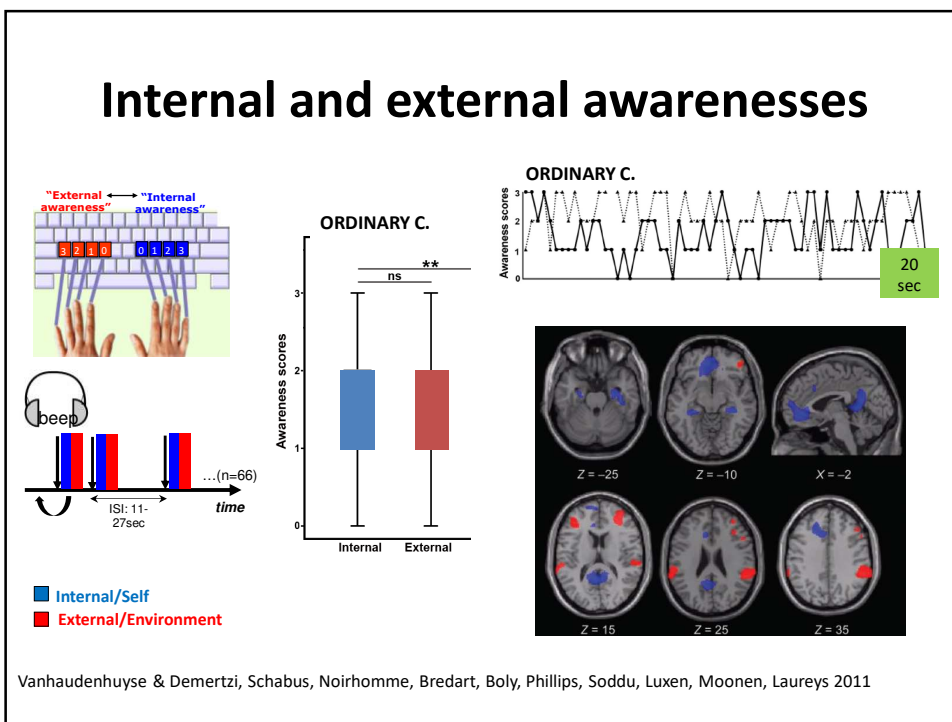
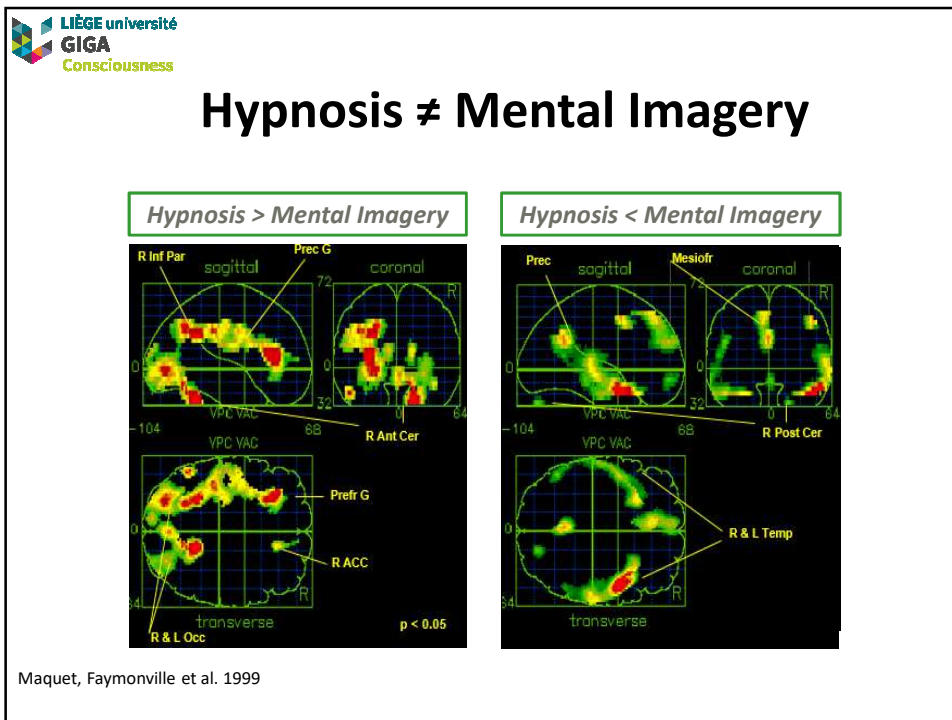
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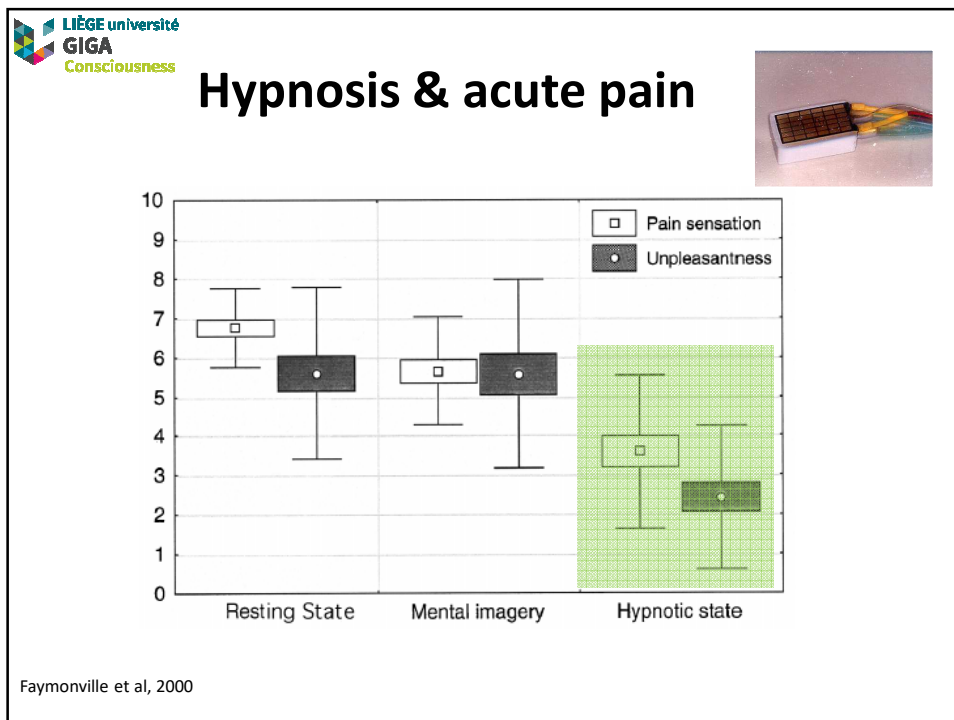
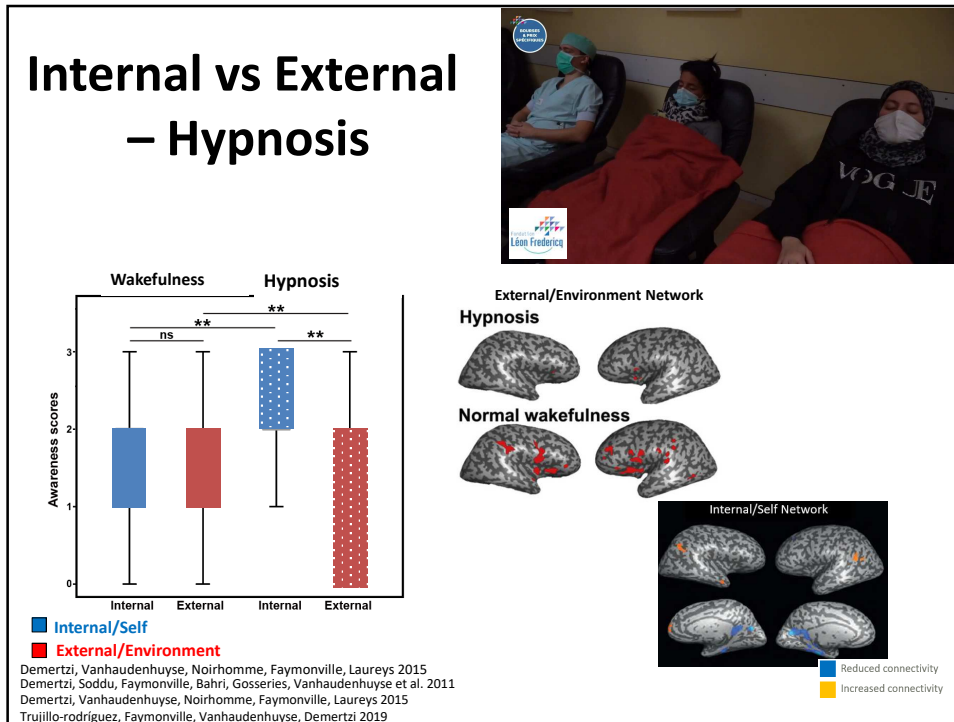
What hypnosis is?

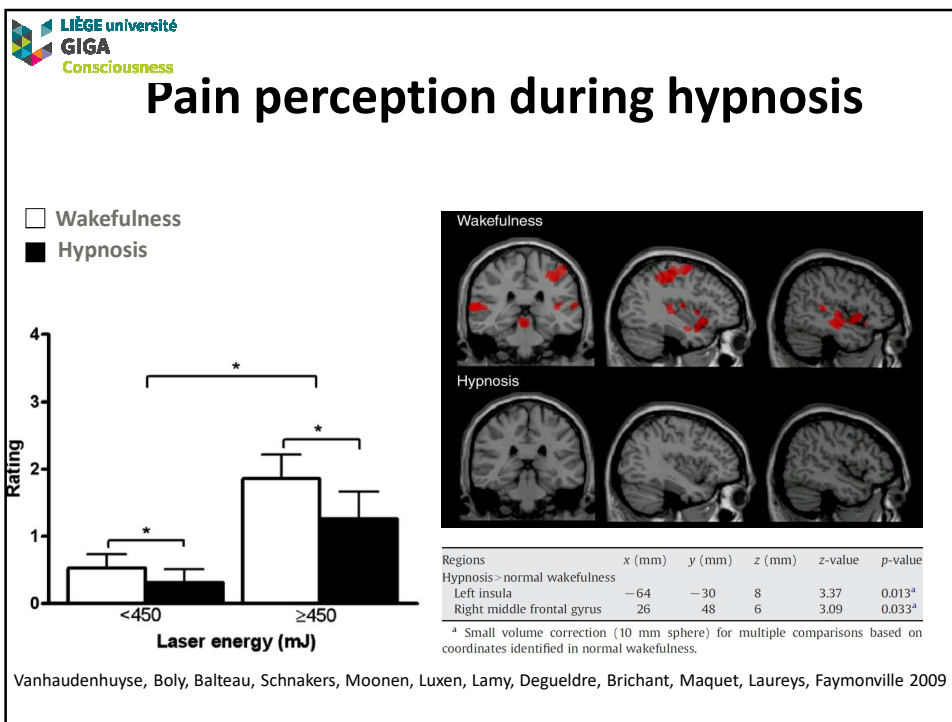
“A state of consciousness involving focused attention and decreased peripheral awareness, characterized by an increase in the ability to respond to suggestions”
(American Psychological Association 2013)

- Hypnosis = **natural gift**
- Subject goes **himself** in the process
- **Reasoning and critical analysis** are decreased
- **Time perception** modification
- **Memory access** modification









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Hypnosédation


Pr. M-E. Faymonville

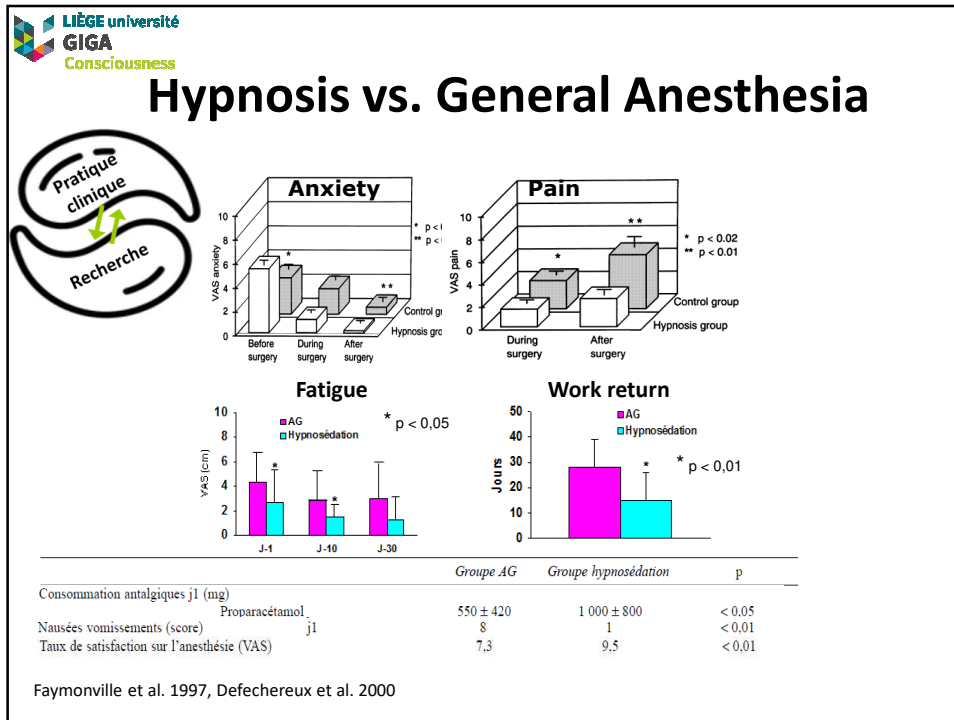



Combinaison

hypnosis – conscious
sedation – local anesthesia

>10000 patients since
1992 – CHU Liège





Randomized controlled trial

Rodrigo Montenegro | **BIO WIN** | Aminata Bicego

Volunteers Recruitment!
French speaking

© Oncomfort.

Rousseaux, Faymonville, Nyssen, Dardenne, Ledoux, Massion, Vanhauzenhuysse, 2020, 2021

100 patients
Cardiovascular surgery


```

    graph TD
      A[Assessment for eligibility] --> B[Randomisation]
      A --> C[Exclusions and refusal to participate]
      B --> D[Control]
      B --> E[Hypnosis]
      B --> F[Virtual Reality]
      B --> G[Virtual Reality Hypnosis]
      D --> H[Day -1 T0-T1]
      E --> H
      F --> H
      G --> H
      H --> I[Day 0 Surgery]
      I --> J[Day +1 T2-T3]
  
```

Floriane Rousseaux

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« Self-Induced cognitive trance »




C. Sombrun

UN MONDE PLUS GRAND
FABIENNE BERTHAUD

Extrait de la bande annonce du film "Un monde plus grand" de F. Berthaud.


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« Self-Induced cognitive trance »

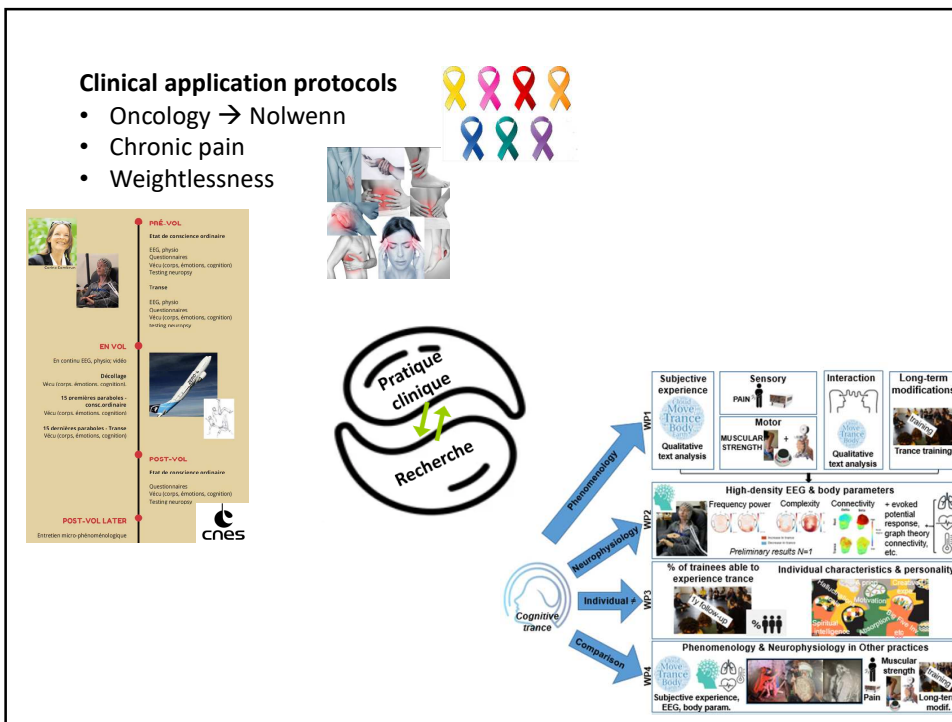
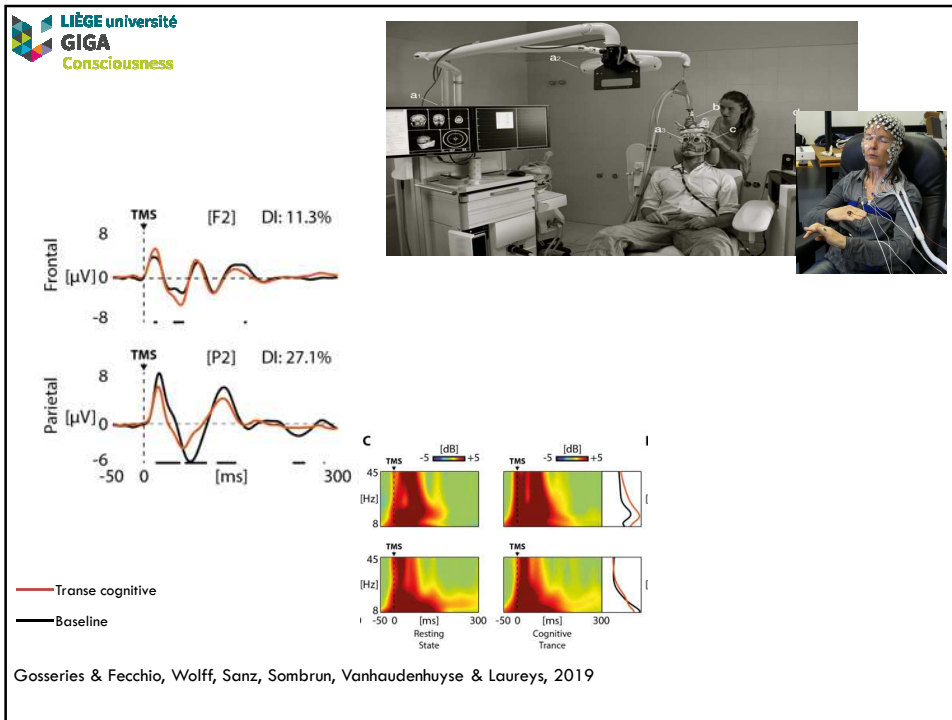


C. Sombrun

- Volitional & self-induced modified state of consciousness
- Inherited from shamanic traditional practices
- Characteristics:
 - * Lucid but narrowed awareness of environment
 - * Hyper-focused immersive experience of flow
 - * Expanded inner imagery
 - * Modified somatosensory processing
 - * Altered sense of self and time



Flor-Henry et al, 2017; Hove et al, 2016



Plan

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PART III : modified states of consciousness

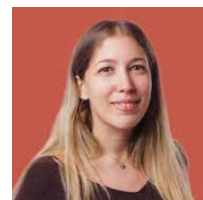
- Hypnosis
- Trance

PART IV

- Clinical application in oncology

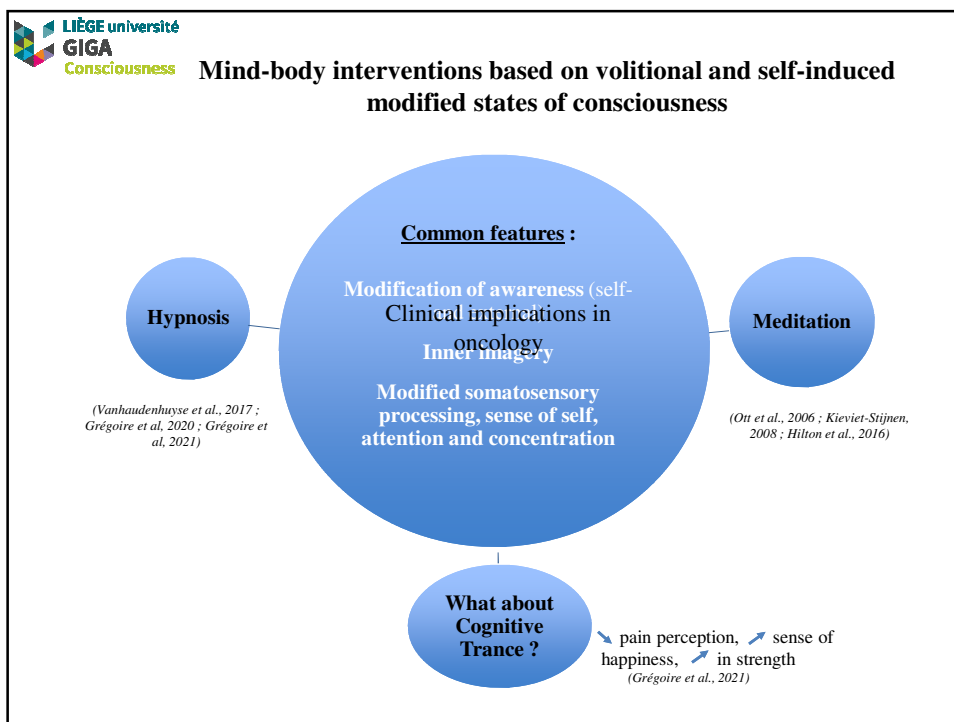
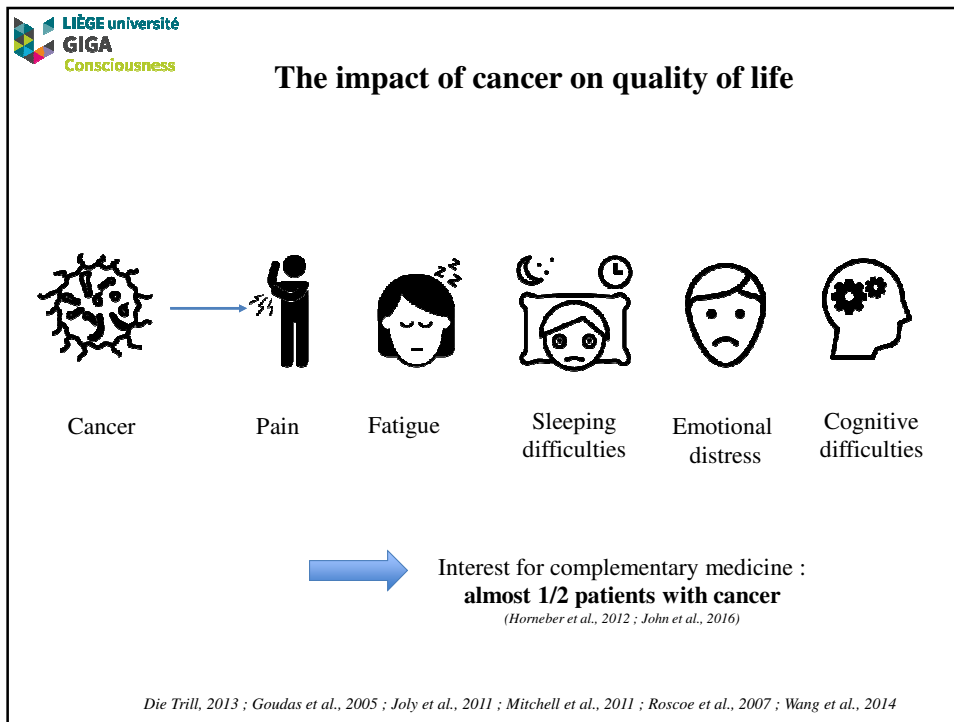
Part IV Application in oncology

Cognitive trance, hypnosis & meditation in oncology: impact on quality of life and neurophysiology



Charlotte Grégoire








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Specificities of each workshop

Biegler et al., 2009 ; Csikszentmihalyi, 1990 ; Flor-Henry et al., 2017 ; Spiegel, 1991 ; Vanhauzenhuysse et al., 2014 ; Gregoire et al., 2021

Hypnosis	Meditation	Cognitive trance
<ul style="list-style-type: none"> • Absorption (in an imaginative experience) • Dissociation (from the environment) • Suggestibility (to therapist's suggestions) 	<ul style="list-style-type: none"> • Relaxed but alert and focused state • Cultivate self-compassion, regulation of breathing, control over thoughts and feelings 	<ul style="list-style-type: none"> • Inherited from shamanic traditional practices • Induction via body movements and/or vocalizations. • Increased strength and self-understanding • Sense of harmony, oneness

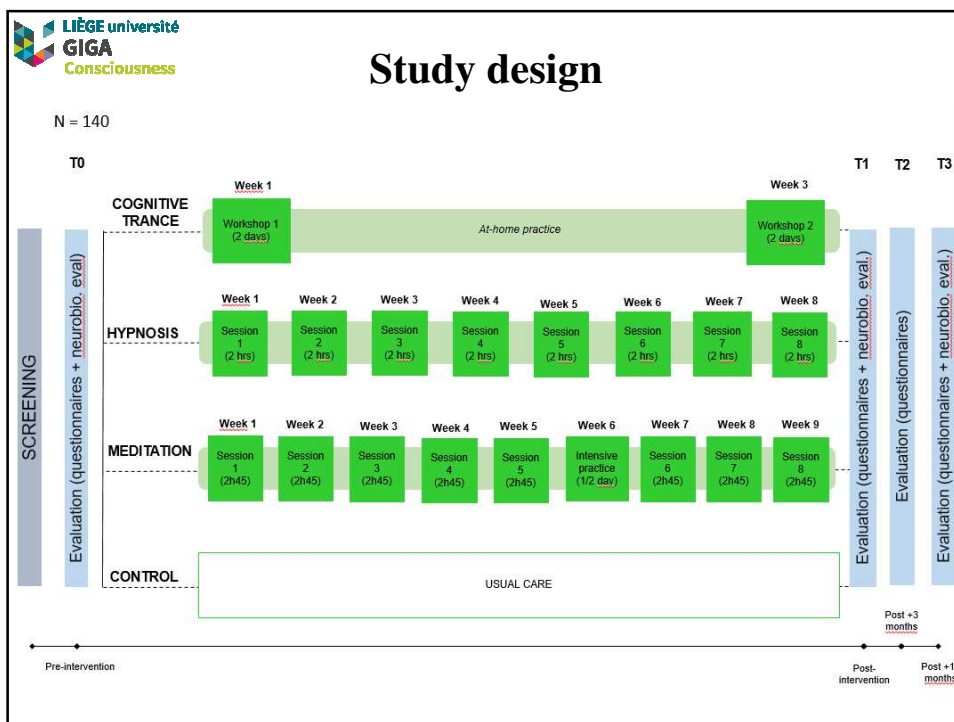
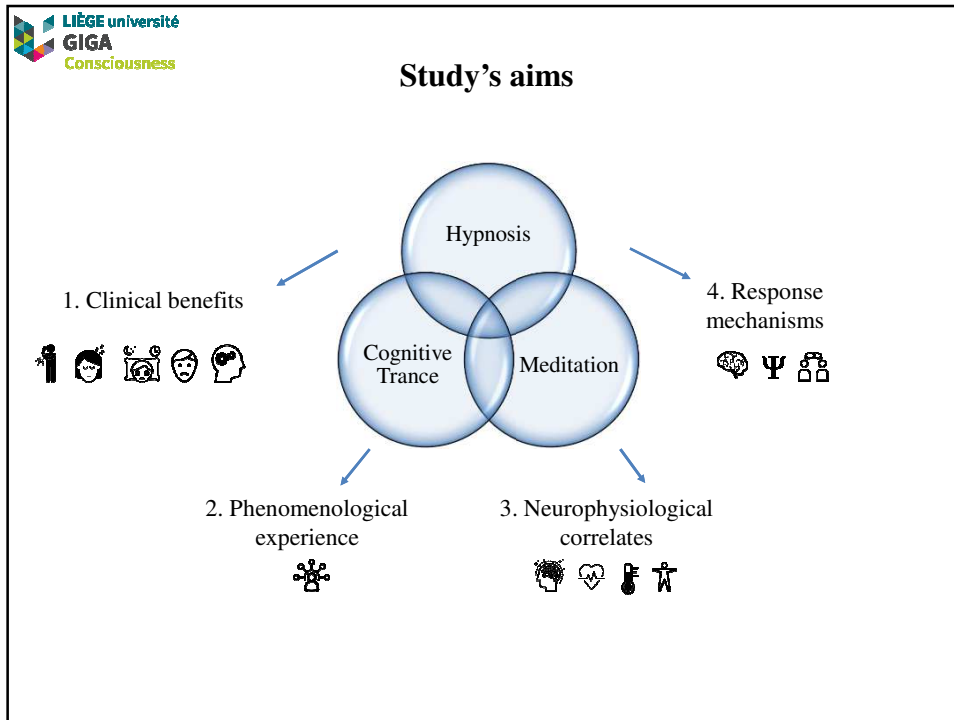
→ Preference-based trial

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Video promoting the study made by the team

<https://www.youtube.com/watch?v=IRhs8jK-RCE>



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Hypotheses

-  Positive overall benefits on quality of life, with increased effects over time.
-  Differences in phenomenological experiences (over time, and between interventions)
-  Differences in neurophysiological correlates (over time, and between interventions)
-  Investigation of trance and meditation responsiveness mechanisms according to this model the biopsychosocial model of hypnosis

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Take home messages

Research

The person

Clinic

Mutual contribution



- Better understanding phenomenology and neurophysiology of consciousness
- Evidence for clinical practice
- Innate potential, accessible to all of use and self-induced

→ To be applied in many ways in your daily life during the PhD ;)

... And all in movement!

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Thank you for your attention !

Patients & families

James S. McDonnell Foundation

The Neurology of Consciousness
Casper, Neuroscience and Neurophilosophy

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