

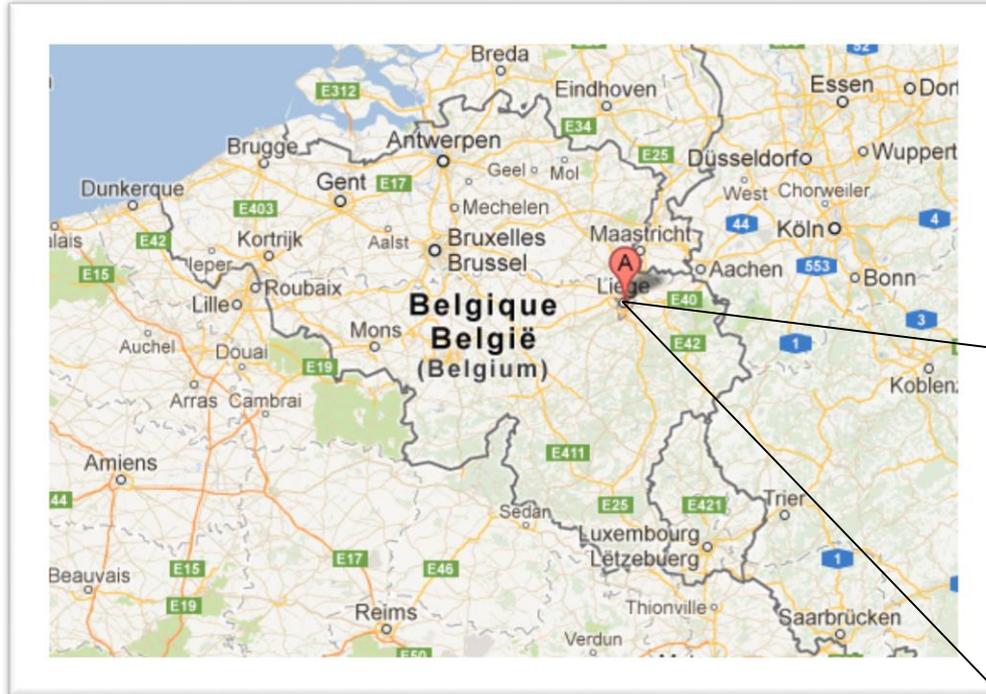
# Consciousness & near-death experiences: what is known, what is new

**Charlotte Martial**  
Neuropsychologist & PhD

31/10/2018



# Who are we?



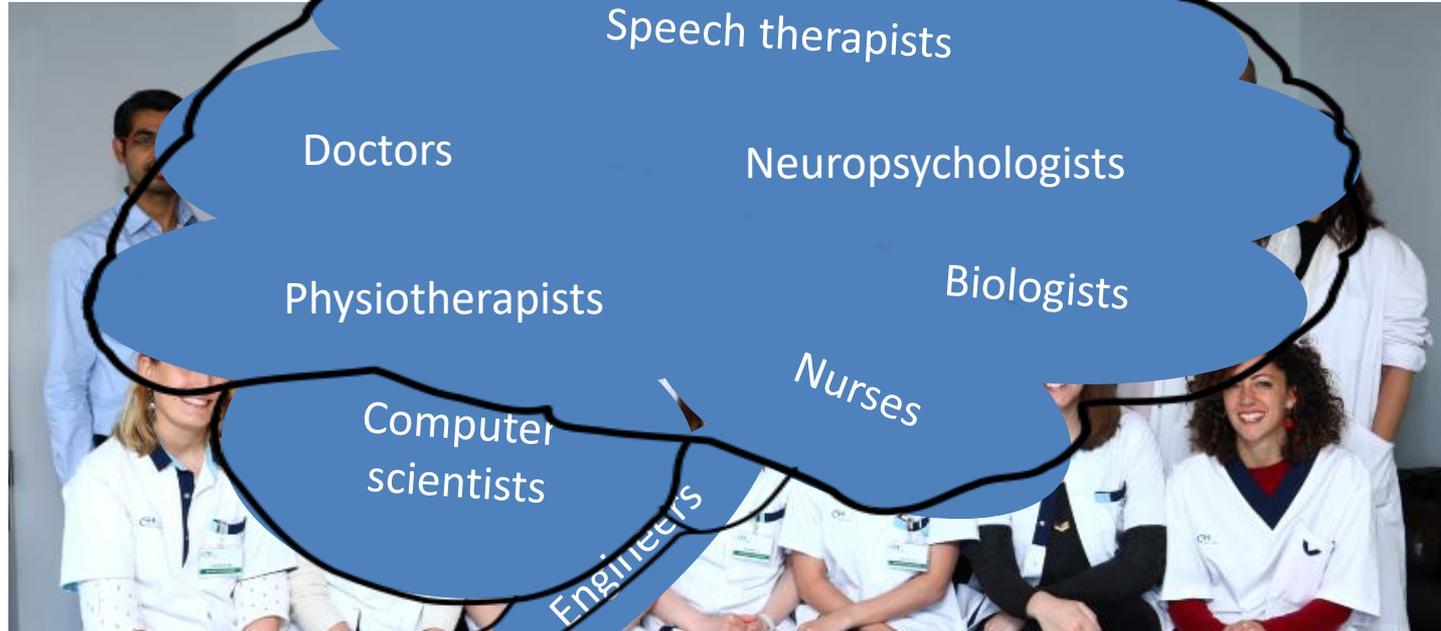
**GIGA Research Center**





# Who are we?

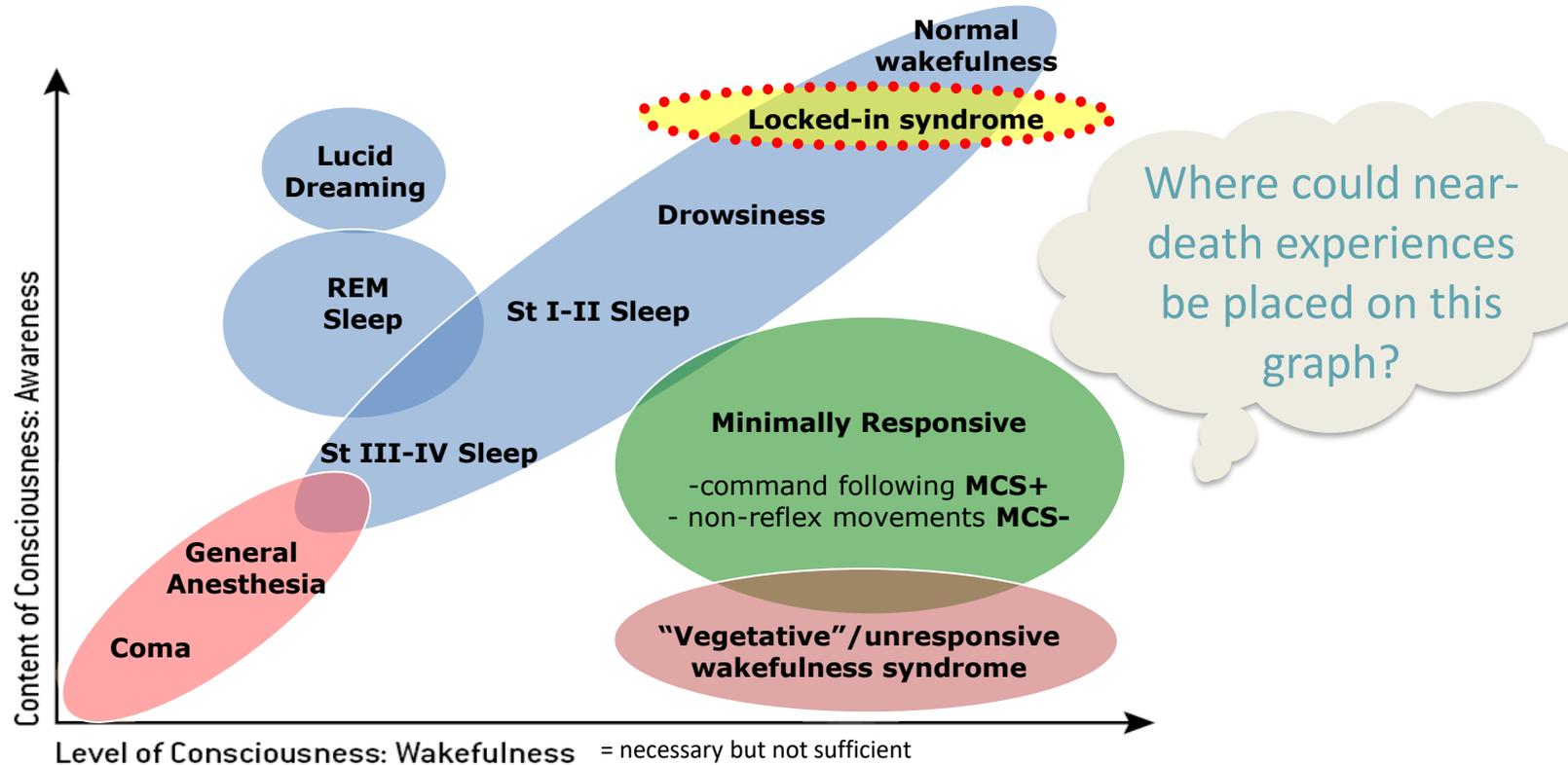
Prof. Steven Laureys, MD, PhD



**Coma Science Group – GIGA-Consciousness**



# Defining consciousness?

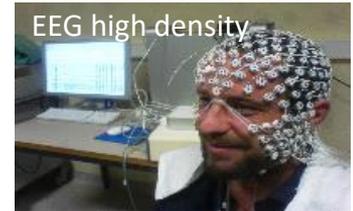
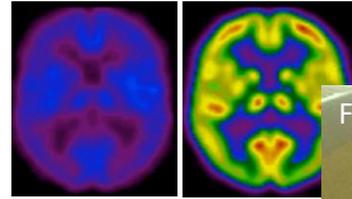




# Measuring brain activity

## ▶ Altered or modified states of consciousness

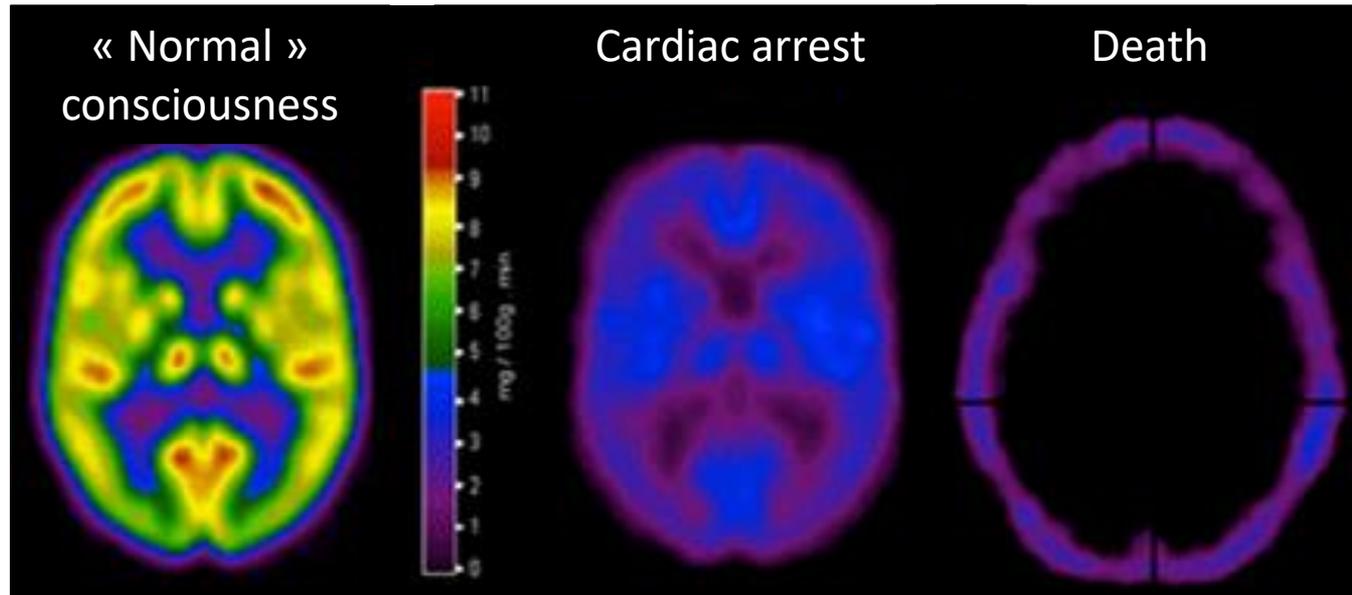
- Pathological : coma
- Pharmacological: anesthesia
- Physiological: hypnosis



Understanding consciousness remains  
one of the greatest mysteries for science to solve



# “Clinical” vs “brain” death

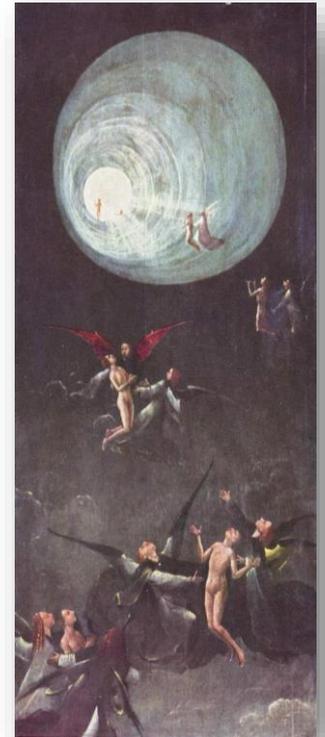


*! Remember that not a single patient who showed clinical criteria of brain death has ever recovered consciousness !*



# Near-death experiences (NDEs)

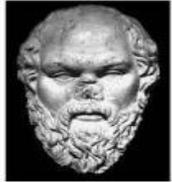
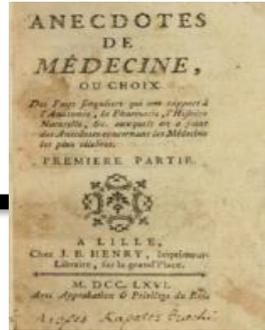
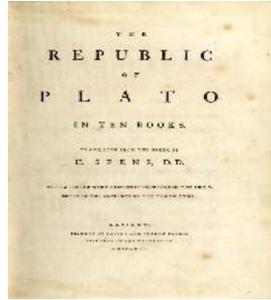
- ▶ No universally accepted definition but...
- ▶ can be defined as “*profound psychological events with transcendental & mystical elements typically occurring to individuals close to death or in situations of intense physical or emotional danger*”
- ▶ **3 main (non-mutually exclusive) explanatory models**
  - *Spiritual theories* → “dualistic” approach toward the mind–brain relationship
  - *Psychological theories* → psychological reaction to impending death
  - *Neurobiological theories* → brain mechanisms might underlie NDEs



Representation of “*Ascent of the Blessed*” from Hieronymus Bosch (1505)



# Historical background



Platon's Republic  
315 B.C.

Jerome  
Bosch  
1516

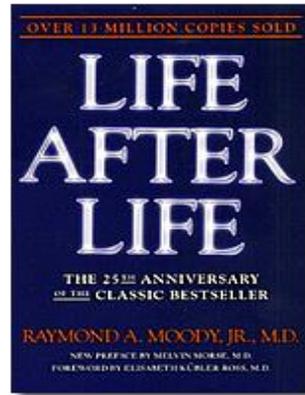
Pierre Jean du Monchaux  
1740

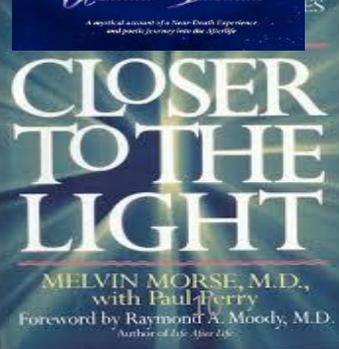
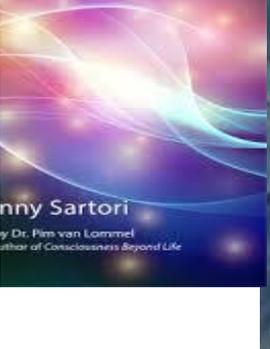
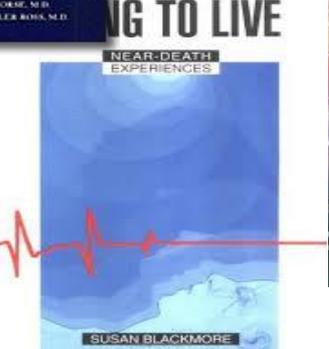
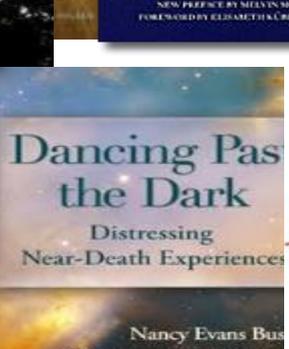
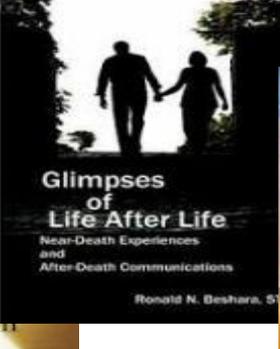
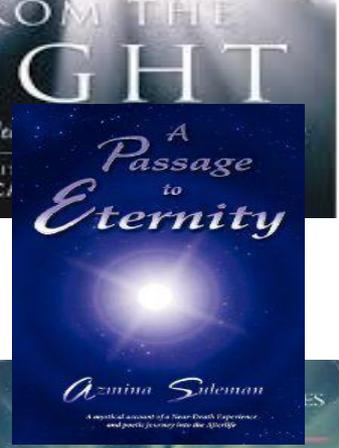
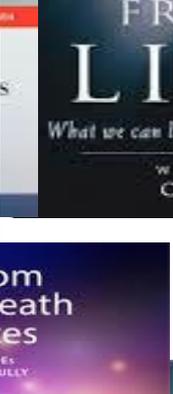
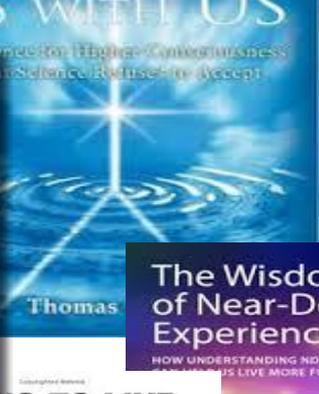
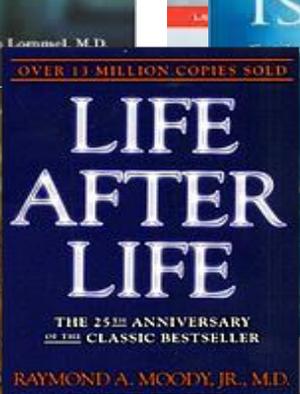
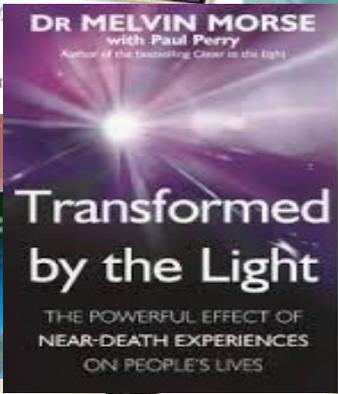
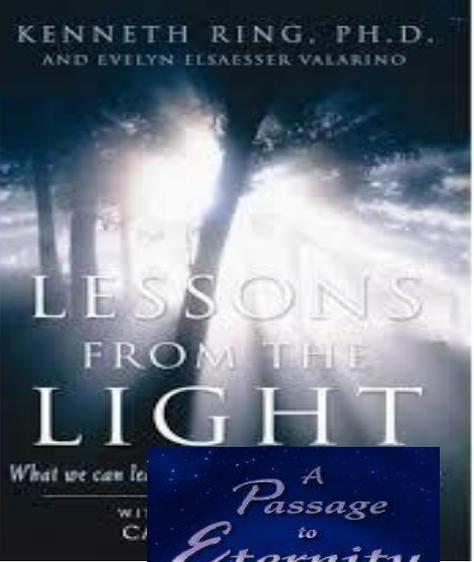
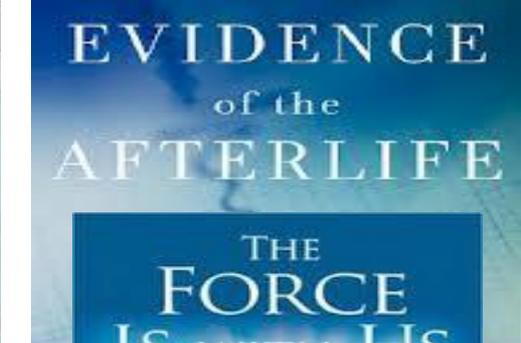
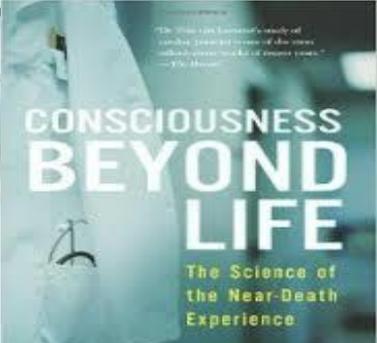
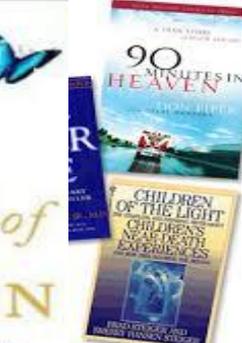
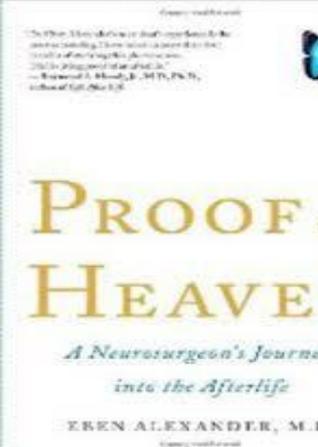
Amiral Beaufort  
1795

Albert Heim  
1892



# NDE testimonies & stories

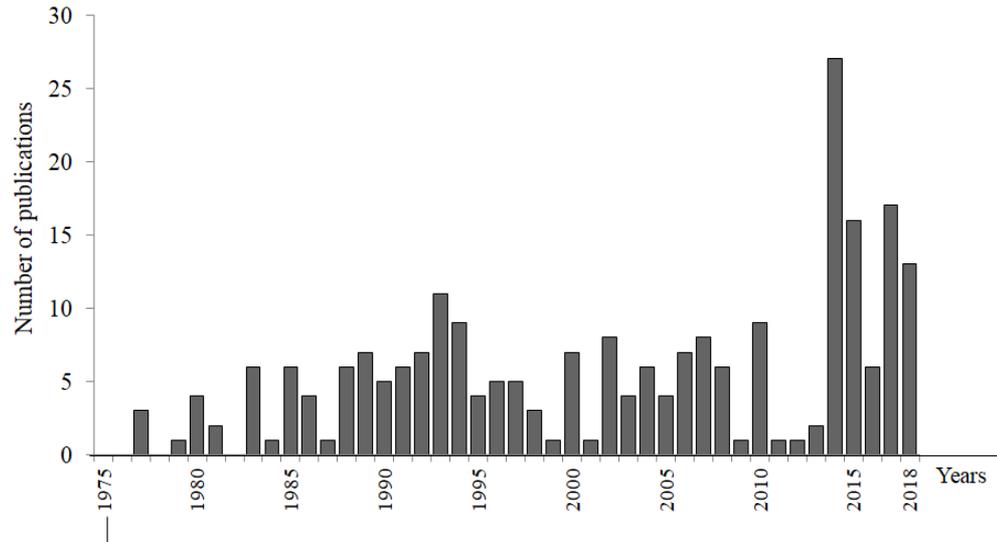






# Research on NDEs

**Number of publications per year (for a total of 295 publications):  
Medline search with the keyword '*near-death experiences*'**

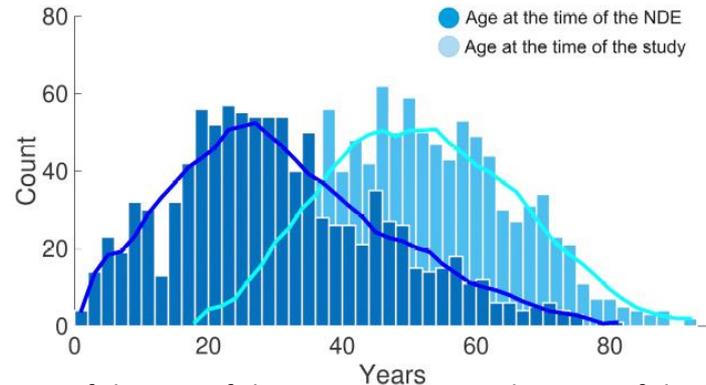


Popularization of  
the expression  
“near-death  
experience”



# NDE testimonies collection

- ▶ **Database : 1630 testimonies** → **permitting empirical studies**
- Descriptive & clinical data
- Written narratives (mainly French, Dutch & English)
- ▶ **Greyson NDE scale: total scores  $\geq 7/32$  = NDE experiencer**



Histograms of the age of the experiencers at the time of the NDE & at the time their accounts were retrospectively recollected.

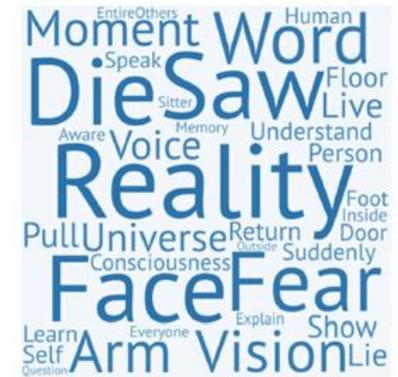
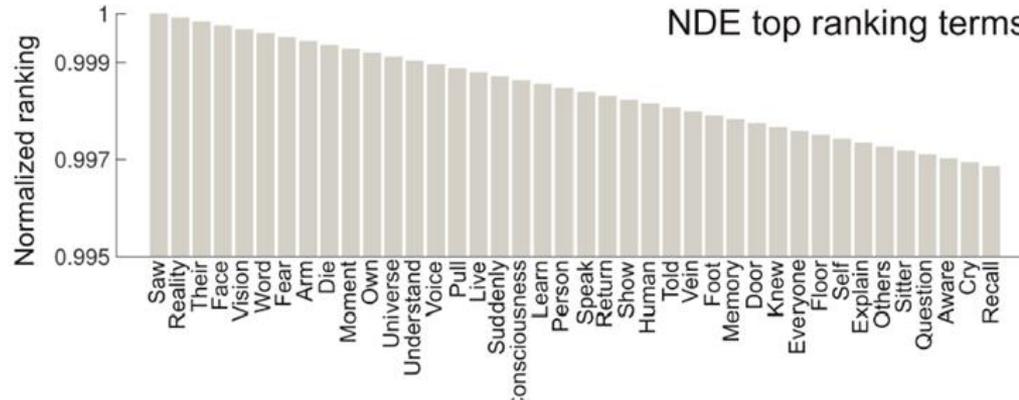


# NDE phenomenology

- ▶ Semantic analysis of written reports using natural language processing

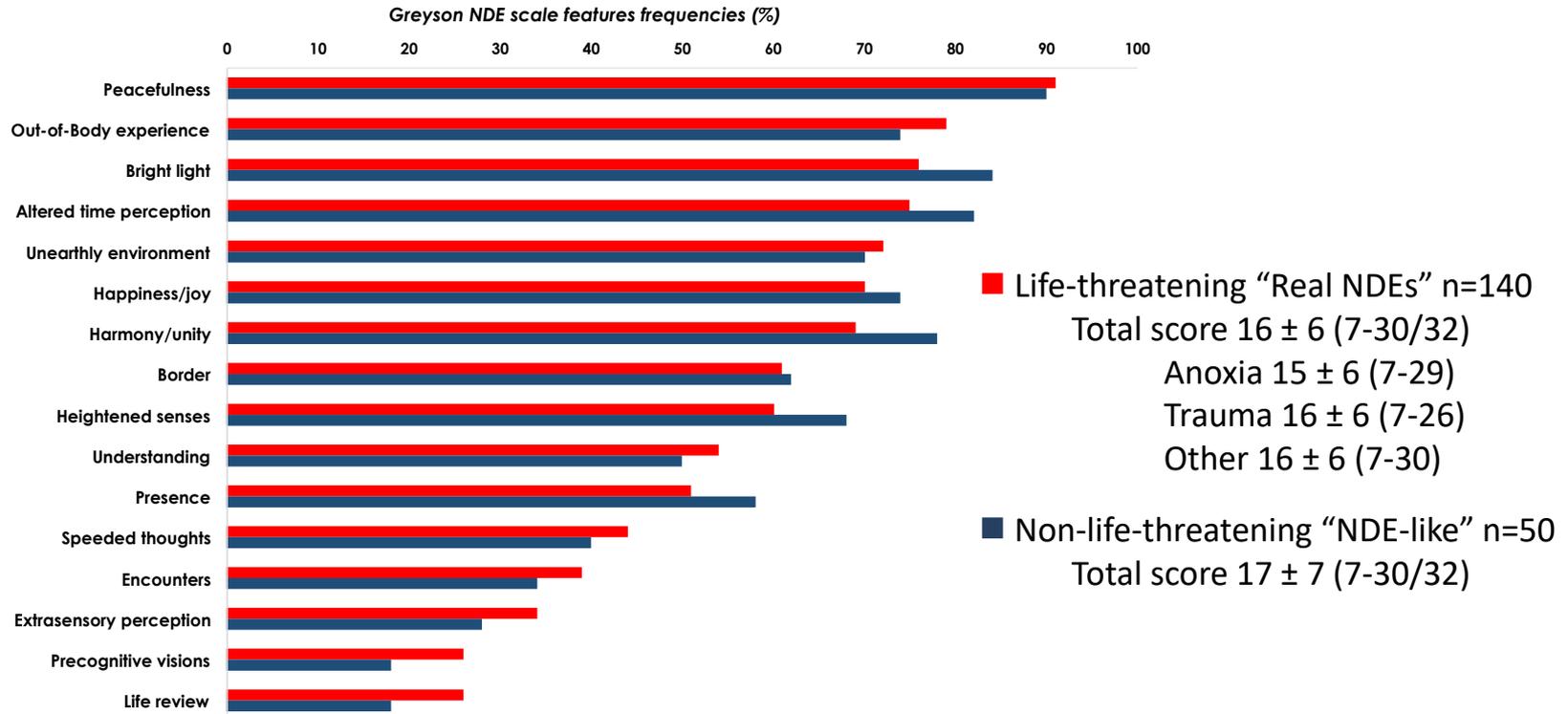


Written reports  
N=625



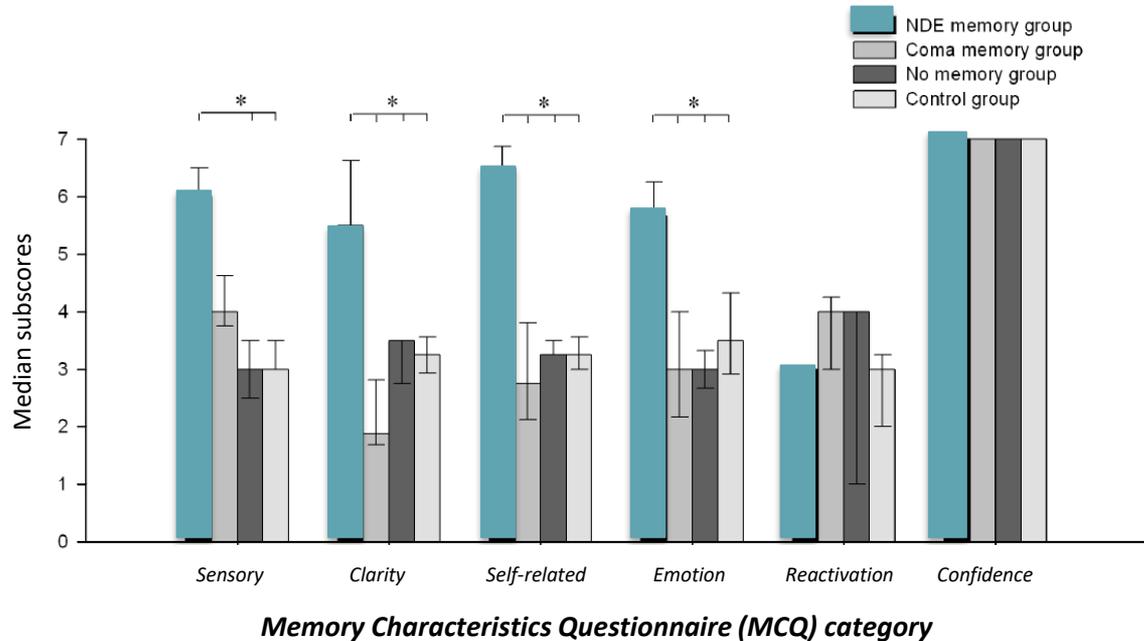


# Frequency of NDE features





# Phenomenological memory characteristics





# Semantic similarity with drug-induced experiences



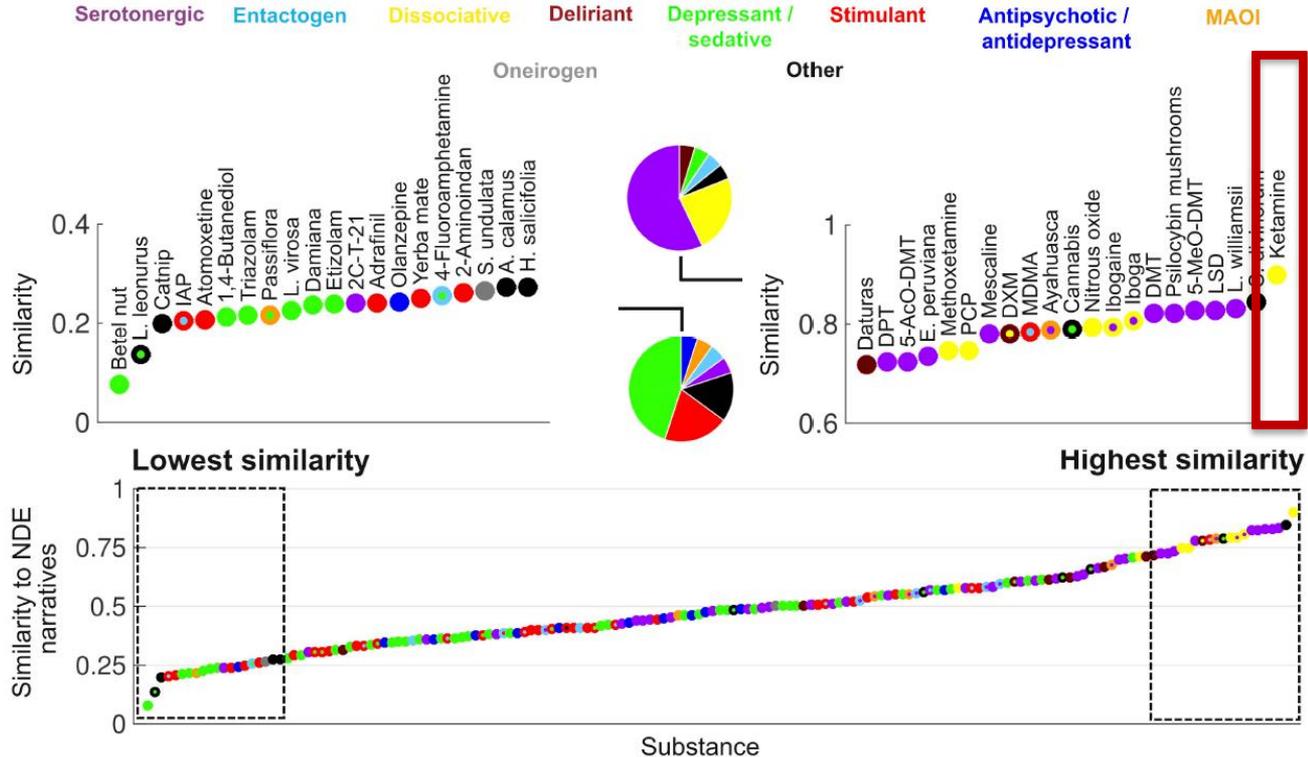
NDE written reports

N=625

VS

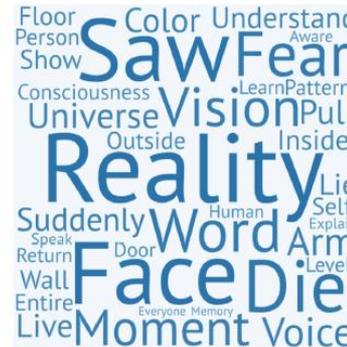
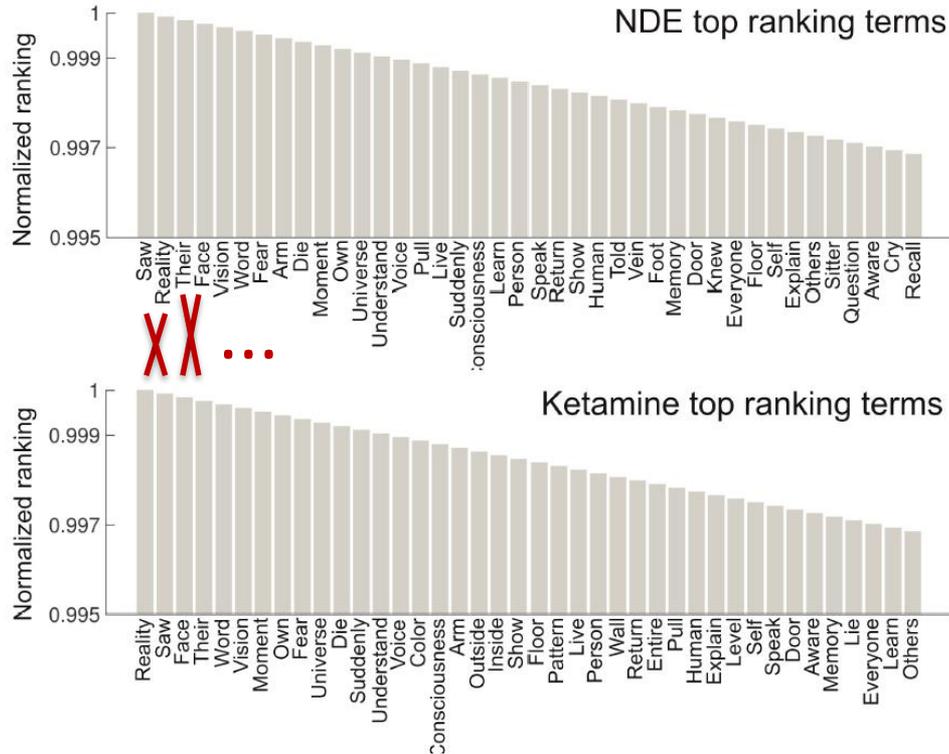
Drug-induced written reports

N=15,000





# Semantic similarity with Ketamine experiences



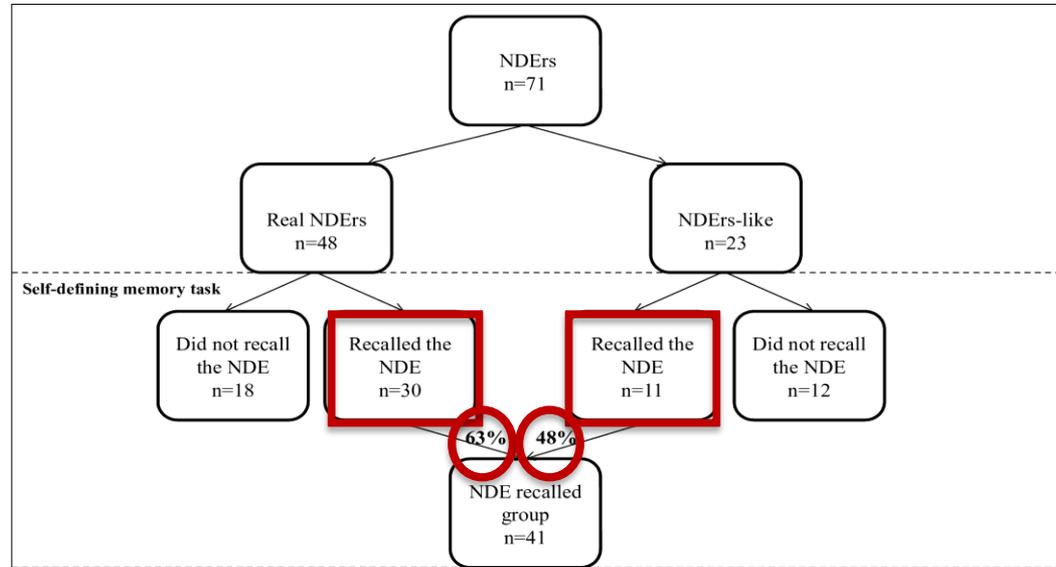


## Are NDEs self-defining?

- 71 NDE experiencers responded to a self-defining memory task
  - Describe their 2 main self-defining memories
  - Complete the Centrality of Event Scale (CES) for each memory



# Are NDEs self-defining?



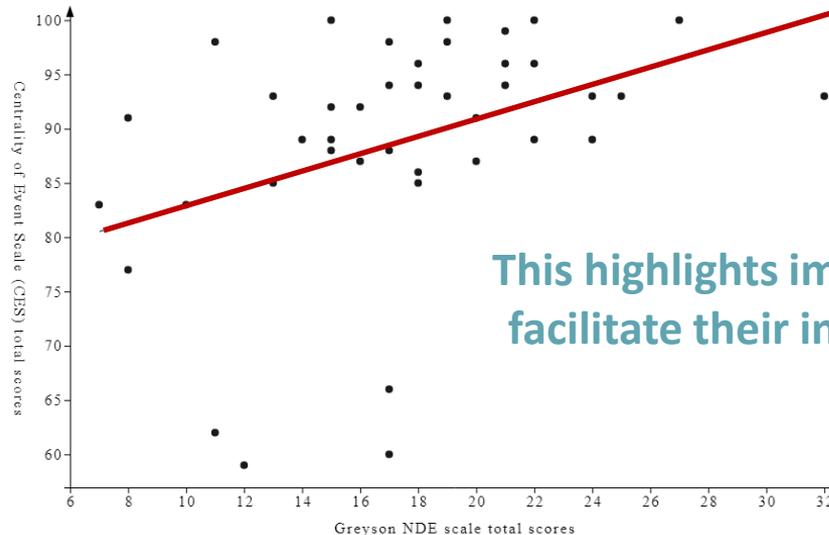
Flowchart representing the distribution of participants within the different subgroups.

**For a majority of NDE experiencers, NDE = self-defining**



# Are NDEs self-defining?

## How central is the NDE to their identity?

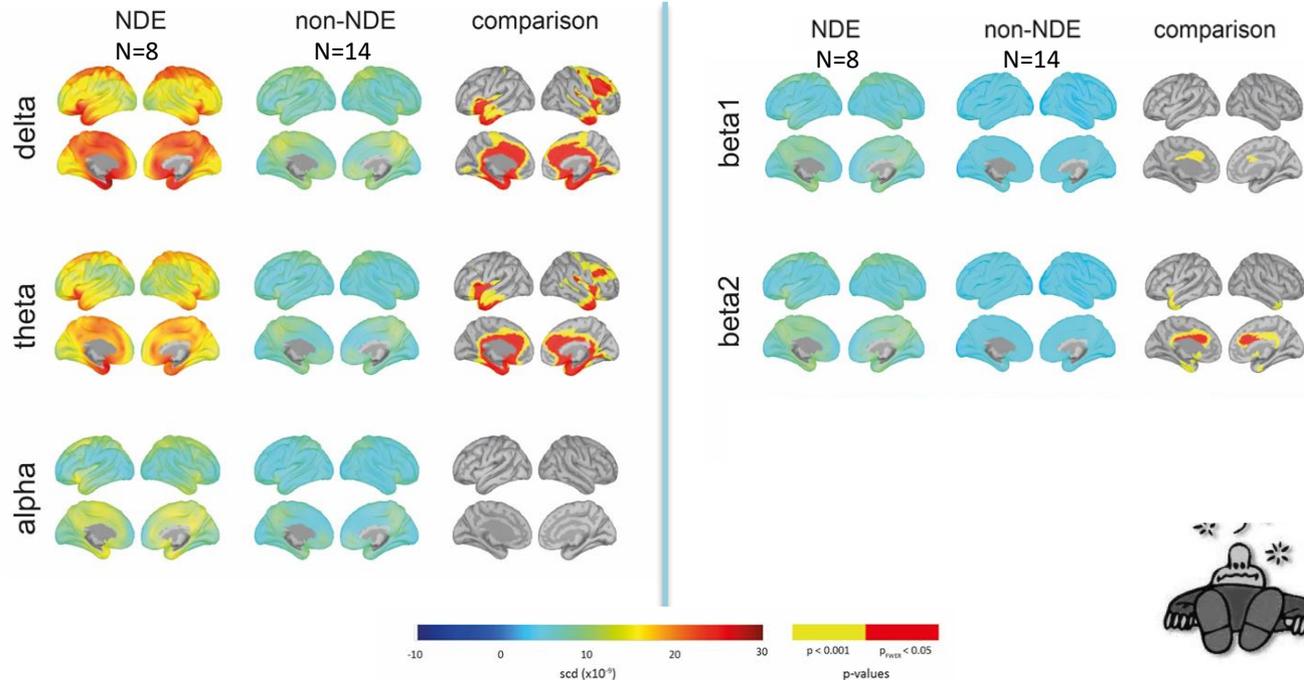


Association between CES total scores & Greyson NDE scale total scores ( $r_s = 0.48, p < 0.01$ ).



# Inducing NDE-like features in controlled laboratory

## EEG results: Cortical maps of the bands of interest





## Conclusion

- ▶ Research on NDEs is currently progressing...
- ▶ Recurrent features in NDE reports
- ▶ NDE memories contain a particular high amount of memory characteristics
- ▶ NDE phenomenology reports resemble Ketamine-induced phenomenology reports
- ▶ For a majority of NDE experiencers, NDE seems to be self-defining
- ▶ Correlations between NDE phenomenology & neural correlates



# THANK YOU



Studying Consciousness in the electrical brain

