UNIVERSITÉ LIBRE DE BRUXELLES

ULB

UNIVERSITÉ D'EUROPE

WP7

Mechanisms of awareness: Learning to be conscious

axel cleeremans, with Brass, Rossion, Haggard & Dienes

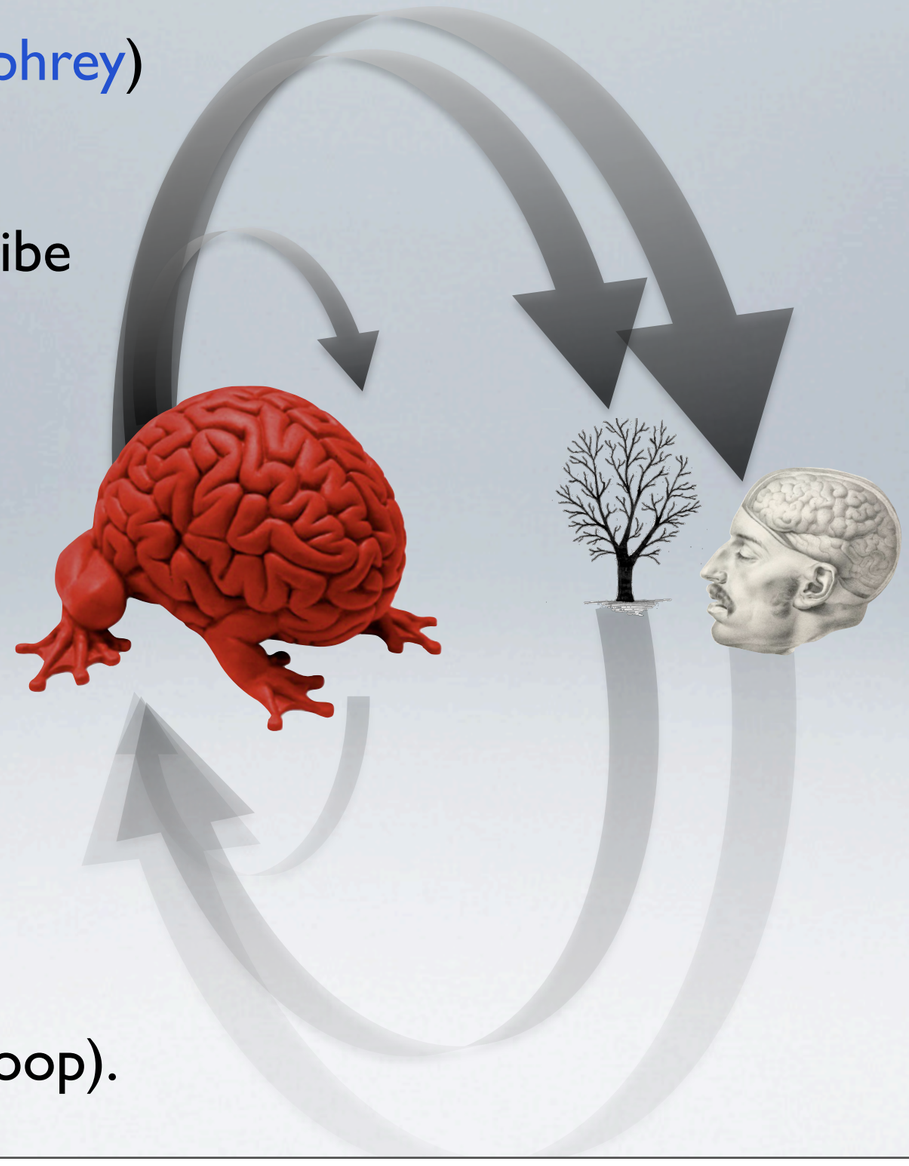
THE RADICAL PLASTICITY THESIS

THE RADICAL PLASTICITY THESIS

In the beginning is action (Humphrey)

The brain continuously and unconsciously learns to redescribe its own activity to itself by assessing (Clark & Karmiloff-Smith) the consequences of action in the brain itself (the inner loop), on behaviour (the action loop), and on the behaviour of others (the mind loop).

The three loops depend on each other, forming a tangled hierarchy (Hofstader's strange loop).

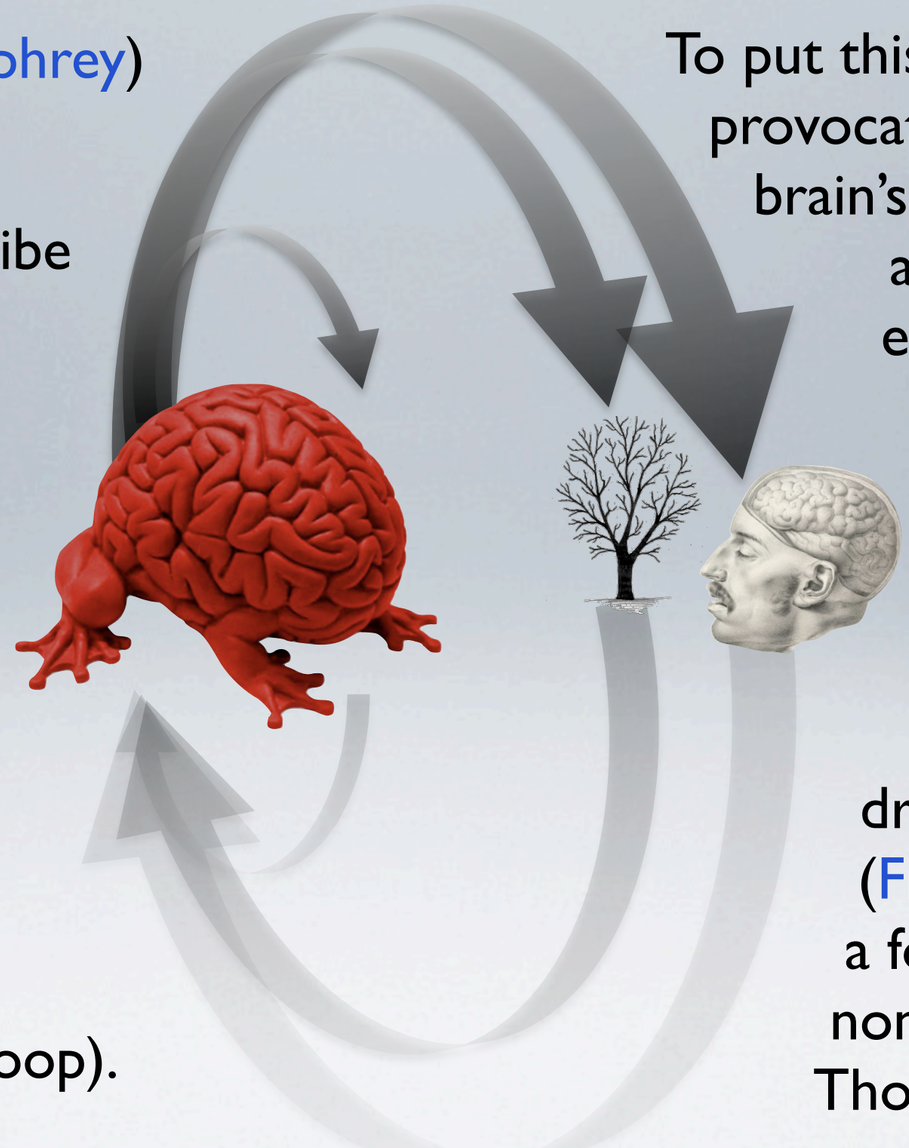


THE RADICAL PLASTICITY THESIS

In the beginning is action (Humphrey)

The brain continuously and unconsciously learns to redescribe its own activity to itself by assessing (Clark & Karmiloff-Smith) the consequences of action in the brain itself (the inner loop), on behaviour (the action loop), and on the behaviour of others (the mind loop).

The three loops depend on each other, forming a tangled hierarchy (Hofstader's strange loop).



To put this claim even more provocatively: Consciousness is the brain's (non-conceptual) theory about itself, gained through experience interacting with itself, with the world and with other people.

Consciousness depends on the operation of unconscious prediction-driven learning mechanisms (Friston's predictive coding) — a form of enactive (O'Regan), non-conceptual Higher-Order Thought Theory (Rosenthal)

FOUR KEY POINTS FOCUSED ON THE SHAPE OF CHANGE

- **Quality of Representation:** Availability to consciousness is graded and depends on quality of representation. Very strong representations exert their effects automatically.

- **Metarepresentation:** A representation is a conscious representation iff it is the target of a metarepresentation (HOT theory & variations: HOP, HOGS). Metarepresentations can become automatized themselves.

- **Radical plasticity:** The brain continuously and unconsciously learns such metarepresentations by assessing the consequences of action (activity) in the brain itself, on behaviour, and on the behaviour of others

- **(Theory of mind:** Learning about other people's mental states may be crucial in developing metarepresentational redescriptions and hence, self-awareness (Mead, Bem, Carruthers)**)**

- **Three parts:**

  - **WP7a:** Quality of representation: Expertise studies (with Bruno and with Guillermo & Philippe) &causal learning/associative learning studies (**Esti**, with Jan & Tom)

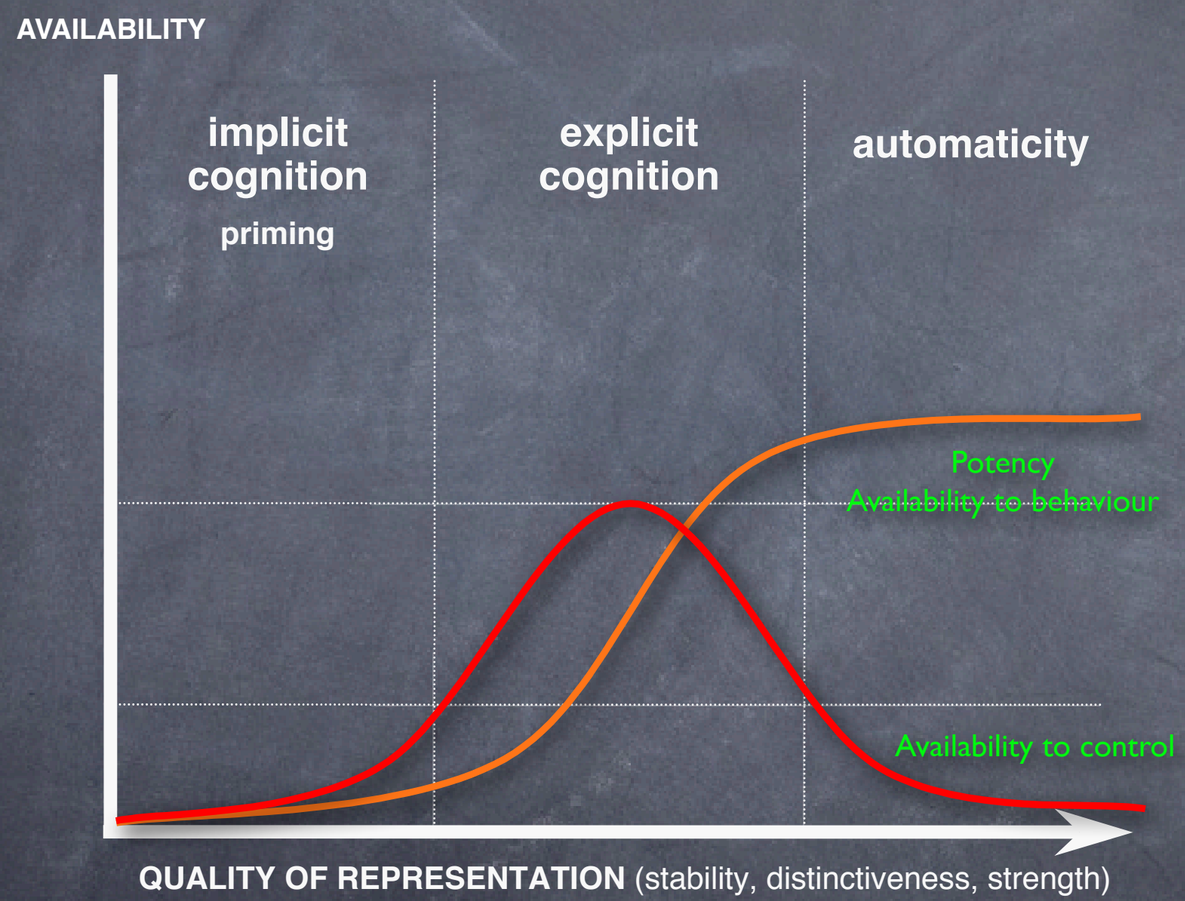
  - **WP7b:** Metarepresentation: Metacognition, hypnosis, suggestion, TMS (with Zoltan)

  - **WP7c:** Learning & consciousness: Externalizing the inner loop (**Emilie**, with Patrick)

WPZa

Quality of representation

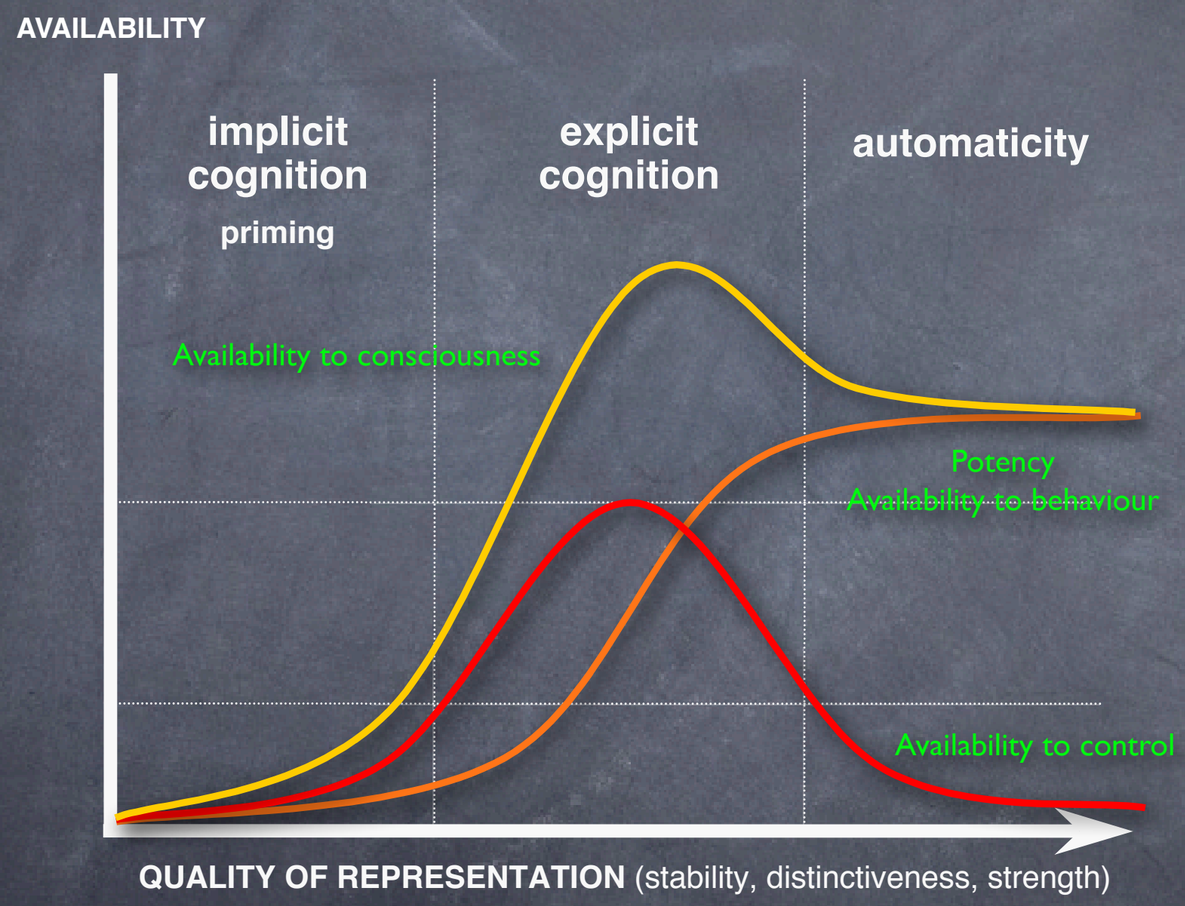
CONTENTS OF CONSCIOUSNESS



- Availability to phenomenal consciousness depends on both potency & availability to control
- "Implicit" representations are only weakly available to C ("the fringe")
- "Explicit" representations constitute the dominant focus of consciousness
- "Automatic" representations constitute the "background" of C

Cleeremans & Jiménez, 2002

CONTENTS OF CONSCIOUSNESS



- Availability to phenomenal consciousness depends on both potency & availability to control
- "Implicit" representations are only weakly available to C ("the fringe")
- "Explicit" representations constitute the dominant focus of consciousness
- "Automatic" representations constitute the "background" of C

Cleeremans & Jiménez, 2002

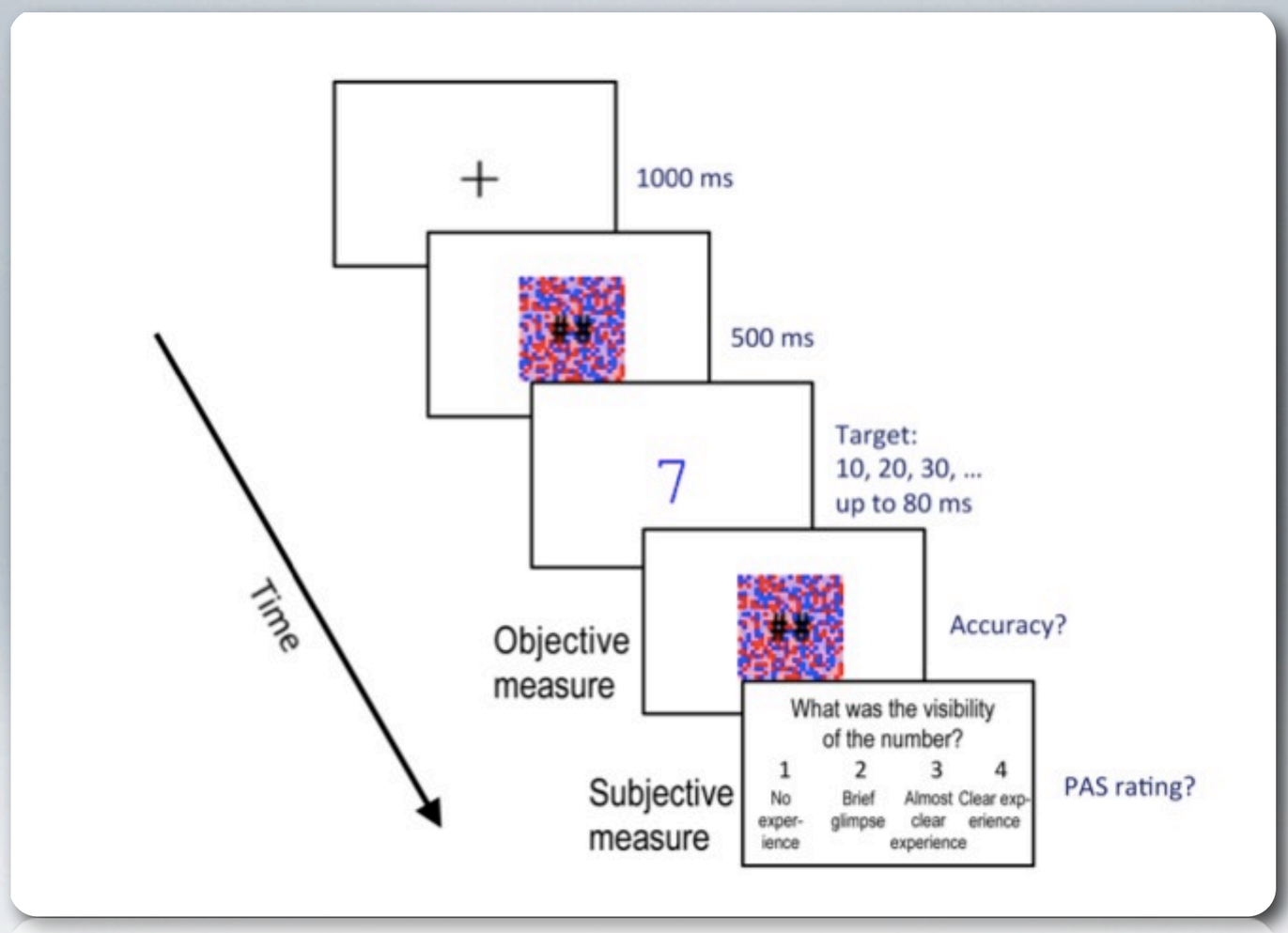
Some predictions

- consciousness is graded (vs. dichotomous)
- more quality always results in more awareness
- awareness goes up, then down with expertise

Some predictions

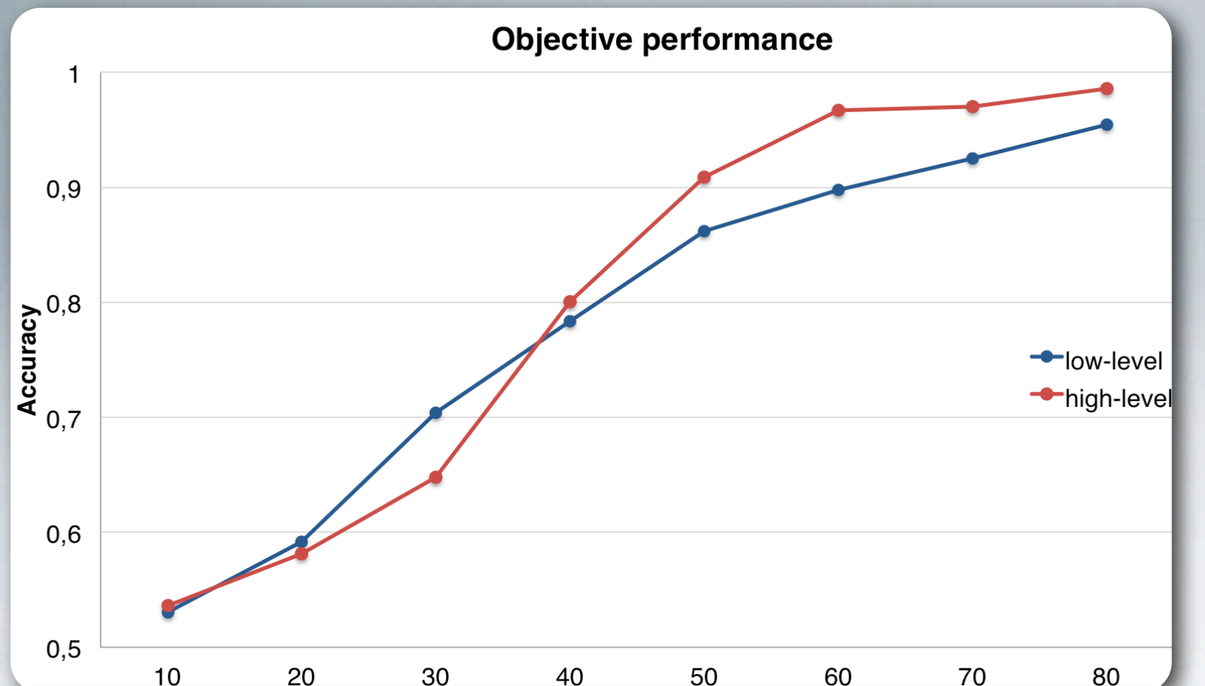
- graded vs. dichotomous character of C
- more quality always results in more awareness
- awareness goes up, then down with expertise

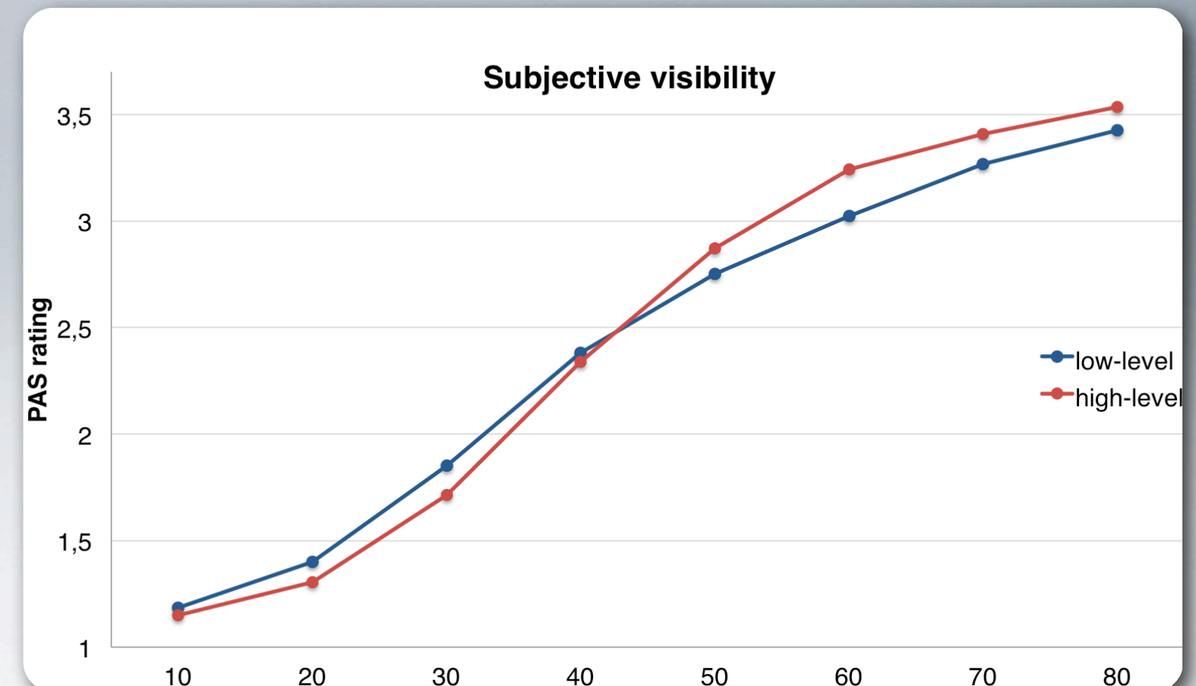
IS C GRADED OR DICHOTOMOUS?



IS C GRADED OR DICHOTOMOUS?

4 7 35





Windet, Gevers & Cleeremans (submitted)

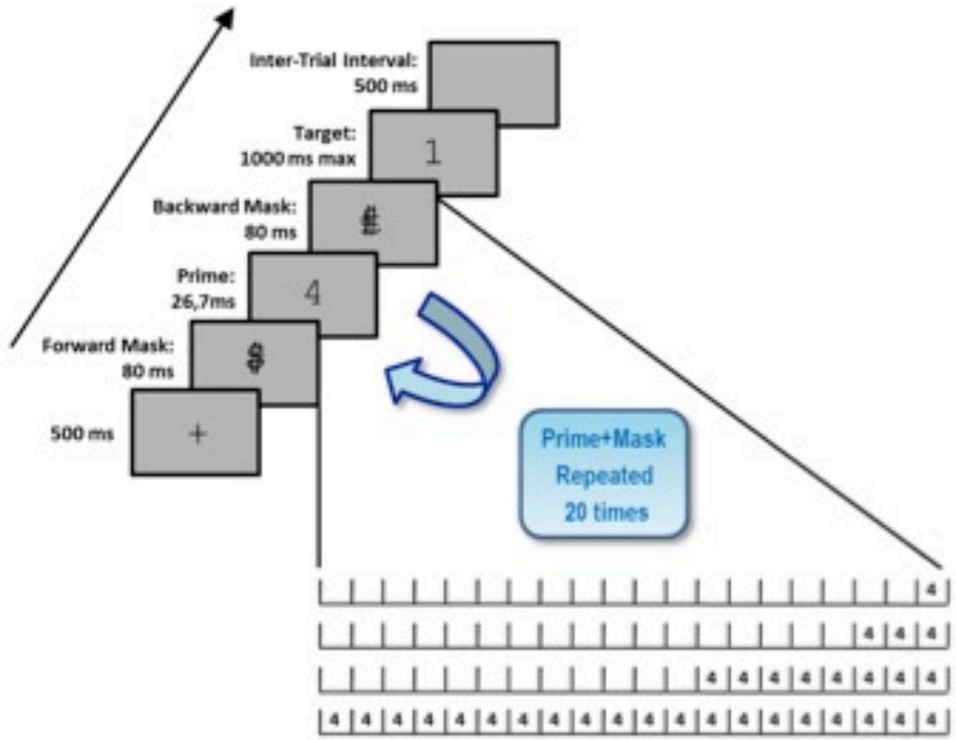
Some predictions

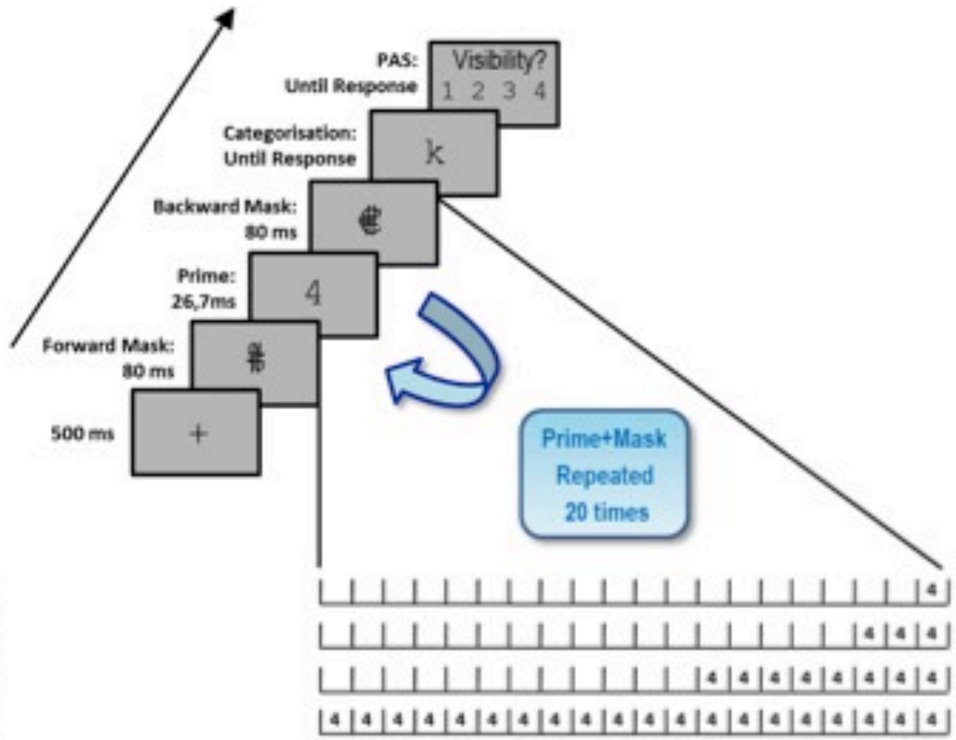
- consciousness is graded (vs. dichotomous)
- more quality always results in more awareness
- awareness goes up, then down with expertise

Training awareness

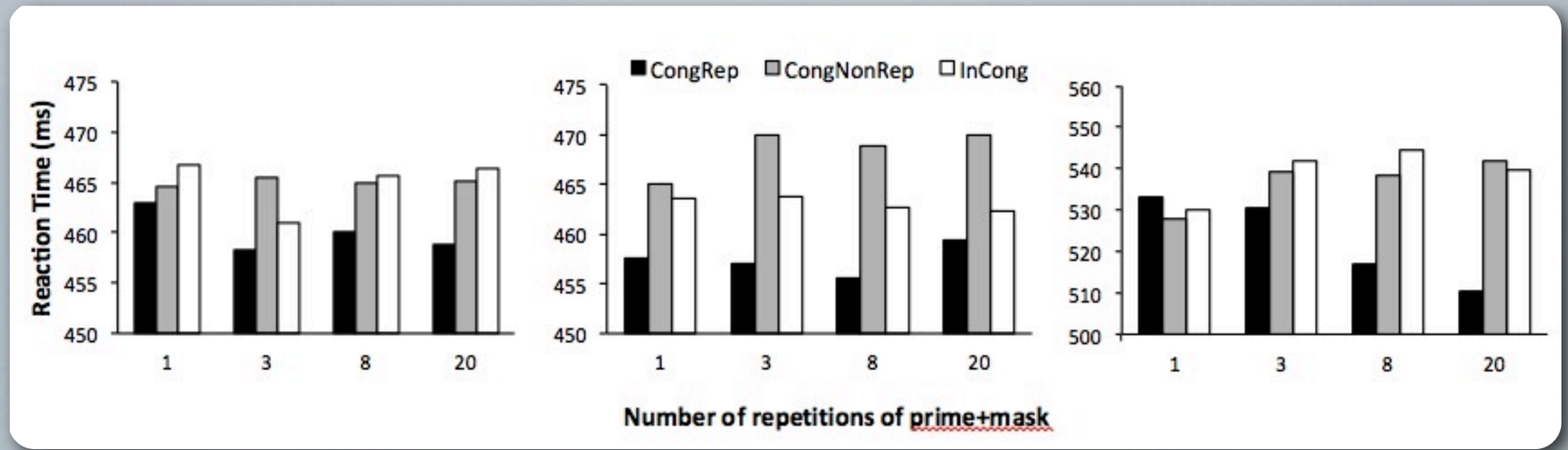
- Subliminal perception experts can always see their stimuli...
- How do we vary strength independently of visibility?
  - repetition priming
  - gaze contingent crowding

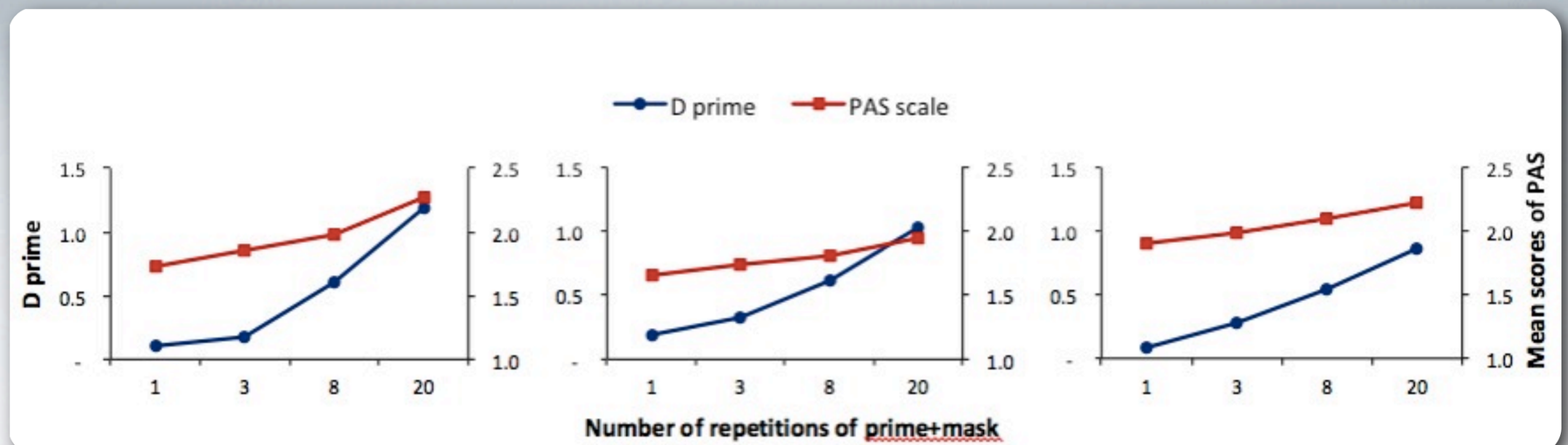
MARCEL (1983)

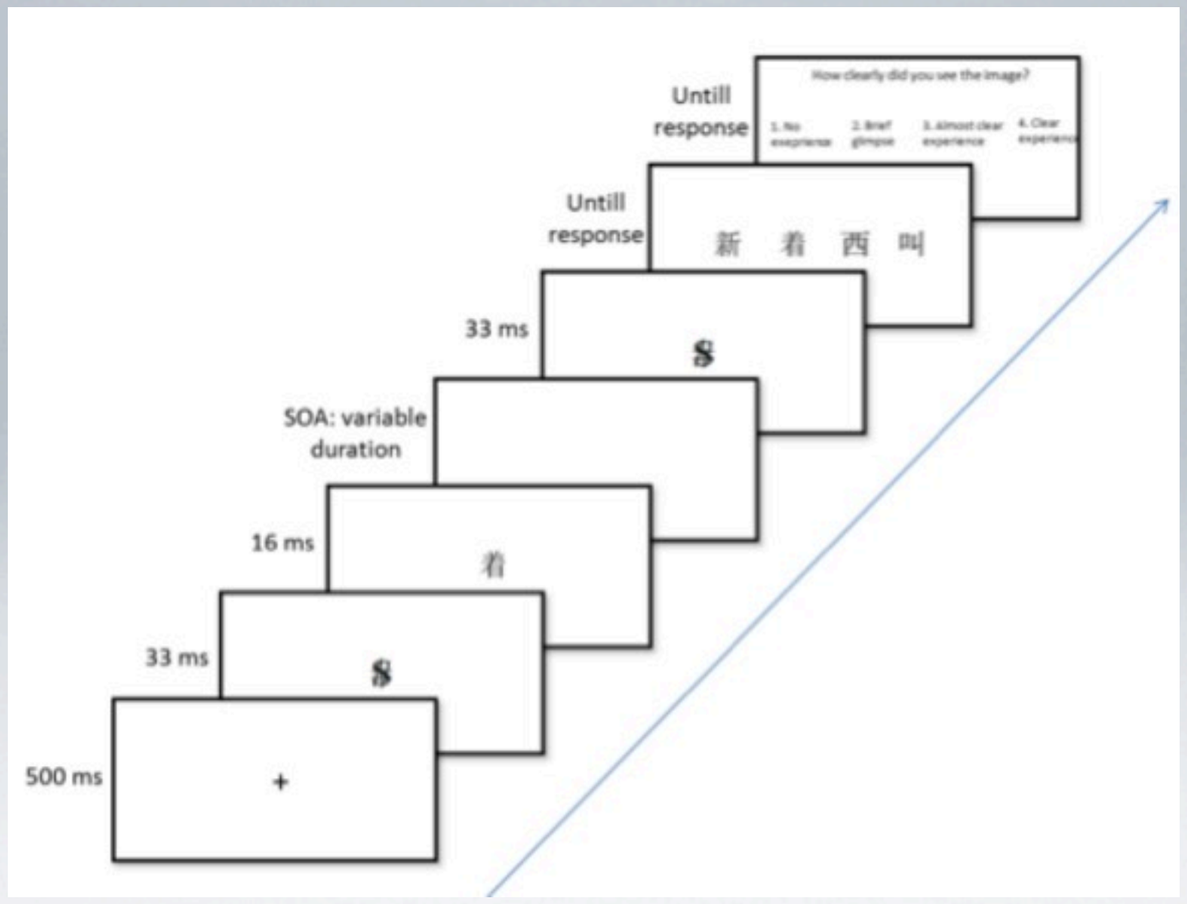

Inter-Trial Interval:
500 ms
Target:
1000 ms max
1
Backward Mask:
80 ms
Prime:
26,7ms
4
Forward Mask:
80 ms
500 ms
+
Prime+Mask
Repeated
20 times

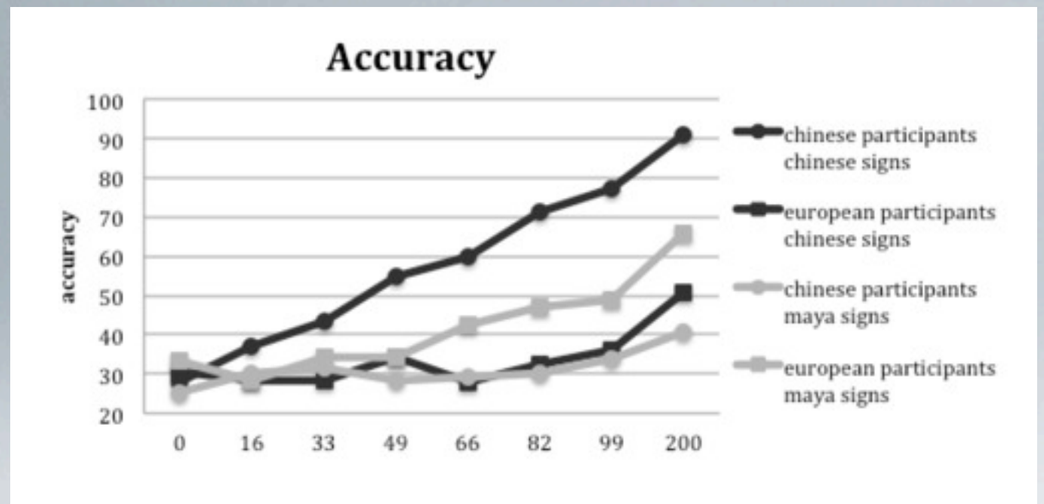

PAS:
Until Response
Visibility?
1 2 3 4
Categorisation:
Until Response
k
Backward Mask:
80 ms
Prime:
26,7ms
4
Forward Mask:
80 ms
500 ms
+
Prime+Mask
Repeated
20 times

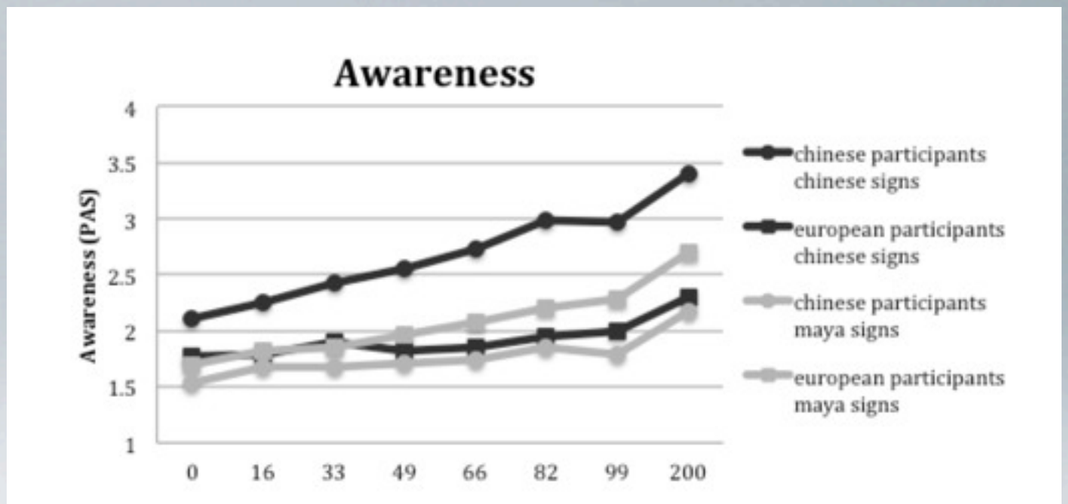
RESULTS


CongRep
CongNonRep
InCong
Reaction Time (ms)
475
470
465
460
455
450
560
550
540
530
520
510
500
1
3
8
20
Number of repetitions of prime+mask


D prime
PAS scale
D prime
Mean scores of PAS
1.5
1.0
0.5
-
2.5
2.0
1.5
1.0
1
3
8
20
Number of repetitions of prime+mask


How clearly did you see the image?
1. No experience
2. Brief glimpse
3. Almost clear experience
4. Clear experience
Untill response
新 着 西 叫
Untill response
33 ms
SOA: variable duration
16 ms
33 ms
500 ms
+


Accuracy
accuracy
100
90
80
70
60
50
40
30
20
0
16
33
49
66
82
99
200
chinese participants chinese signs
european participants chinese signs
chinese participants maya signs
european participants maya signs


Awareness
Awareness (PAS)
4
3.5
3
2.5
2
1.5
1
0
16
33
49
66
82
99
200
chinese participants chinese signs
european participants chinese signs
chinese participants maya signs
european participants maya signs

Some predictions

- consciousness is graded (vs. dichotomous)
- more quality always results in more awareness
- awareness goes up, then down with expertise

Learning can both create & eliminate conscious contents

Learning can both create & eliminate conscious contents

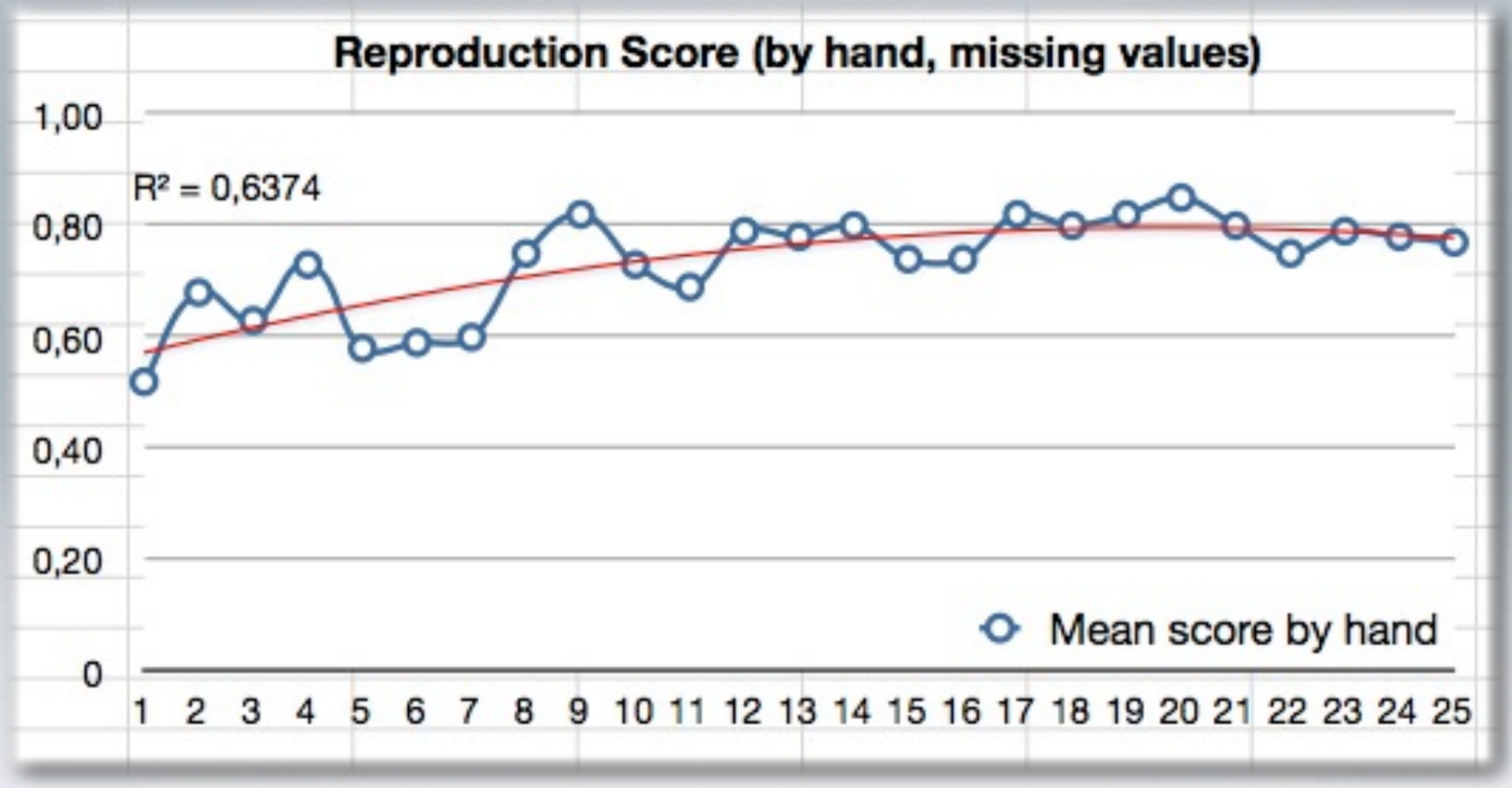
Learning can both create & eliminate conscious contents

Finished files are the result of years of scientific study combined with the experience of years

SEIBEL(1963)'S 1023-CHOICE RT TASK

SEIBEL'S 1023-CHOICE RT TASK

SEIBEL'S 1023-CHOICE RT TASK



General goals of the project

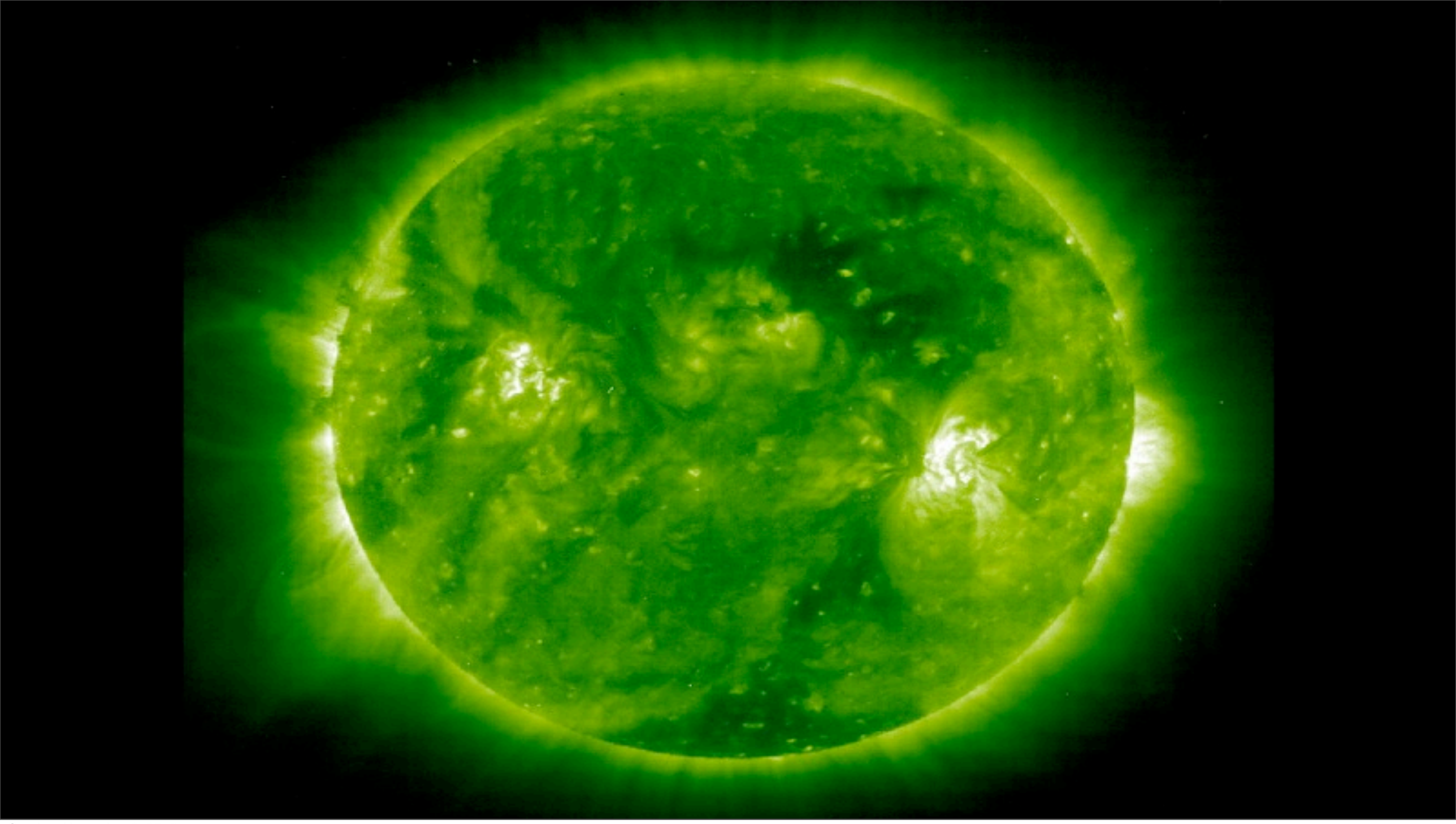
- The goals:
  - (1) to study possible dissociations between the behavioral expression of causal learning and its accessibility to awareness (metaknowledge)
  - (2) to study the evolution of these two components throughout learning.

Experiment 1 a. Specific Goals

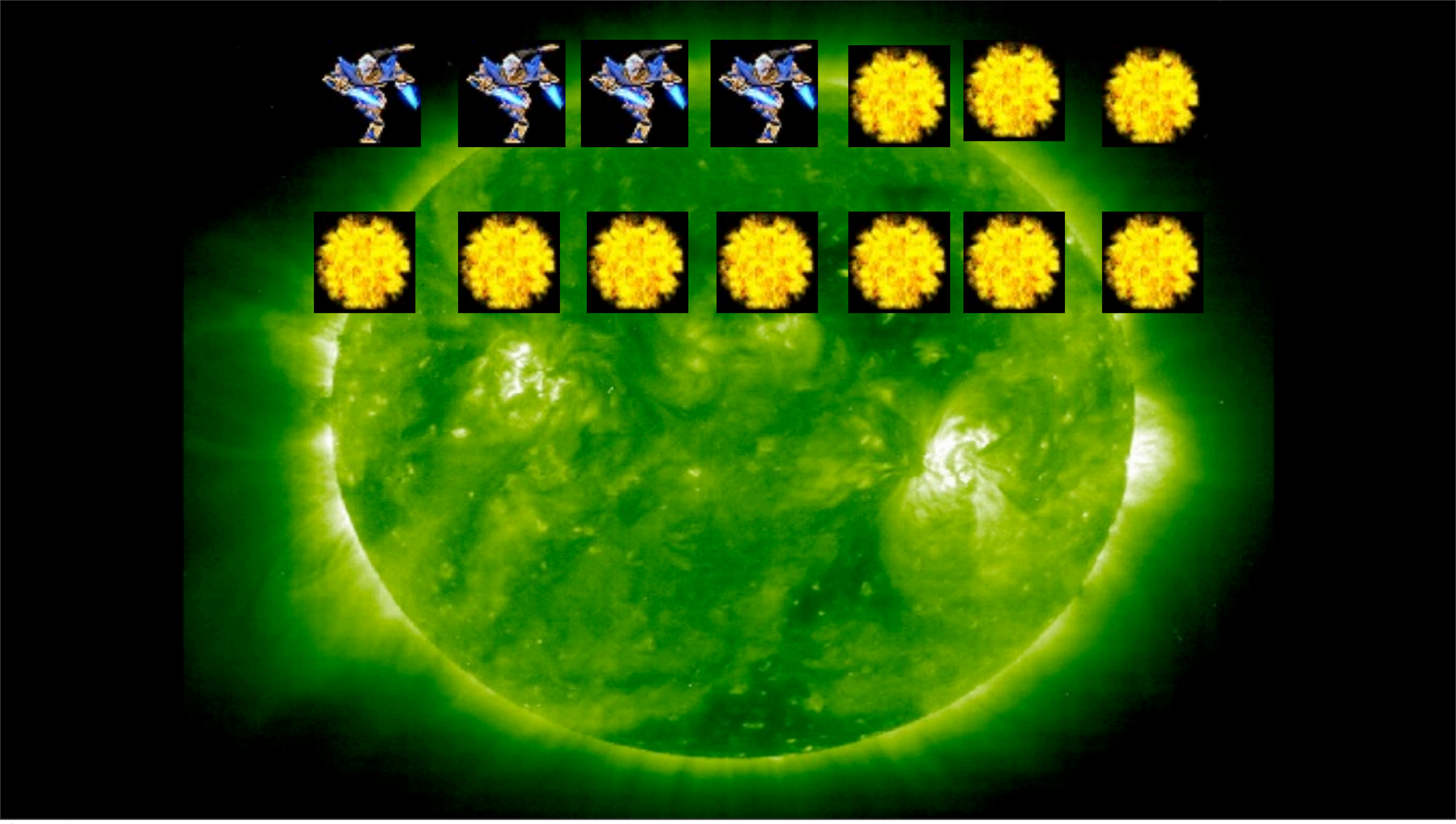
- (a)To find dissociations between the behavioral component and subjective metaknowledge in a predictive / causal learning task.

- (b) To study the evolution of this dissociation along training.

- (c) If we find the dissociation, to see if it can be observed in cue competition phenomena (e.g. blocking) that some argue that can only be solved via application of propositional rules.



Sunday, November 3, 2013



Sunday, November 3, 2013

SHIELD!!

Continue barpressing?

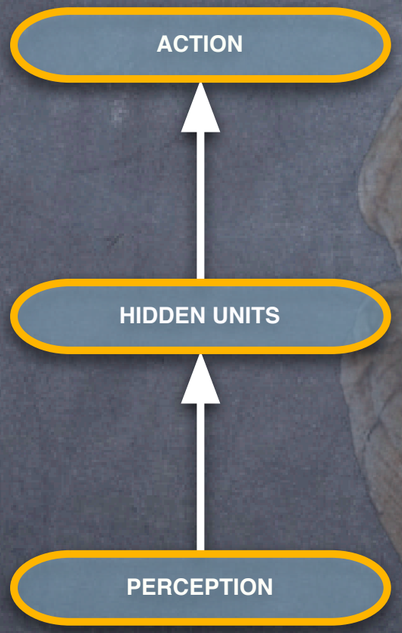
YES: INVASION

NO: nothing

WP7b

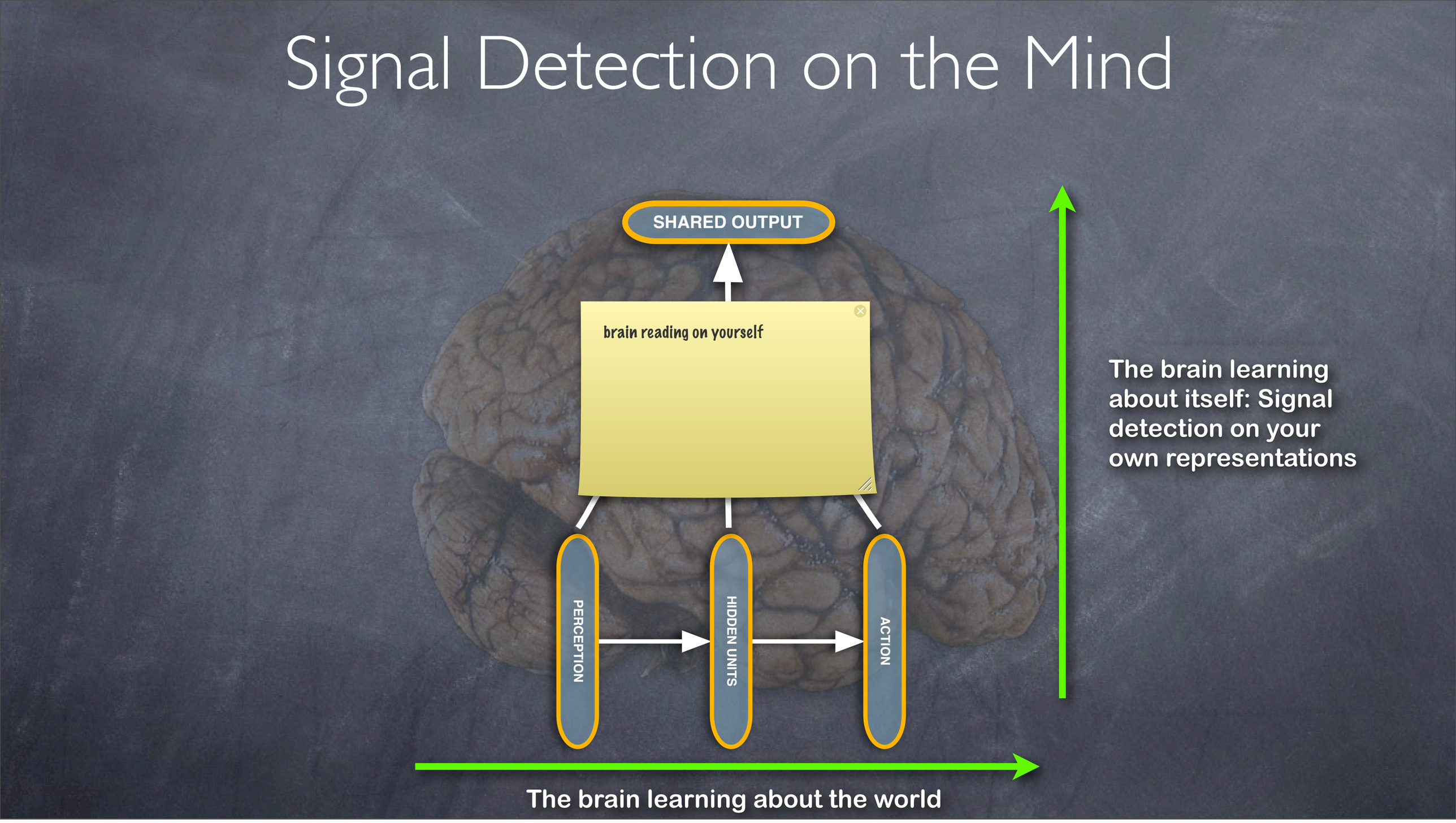
Metarepresentation

Signal Detection on the Mind

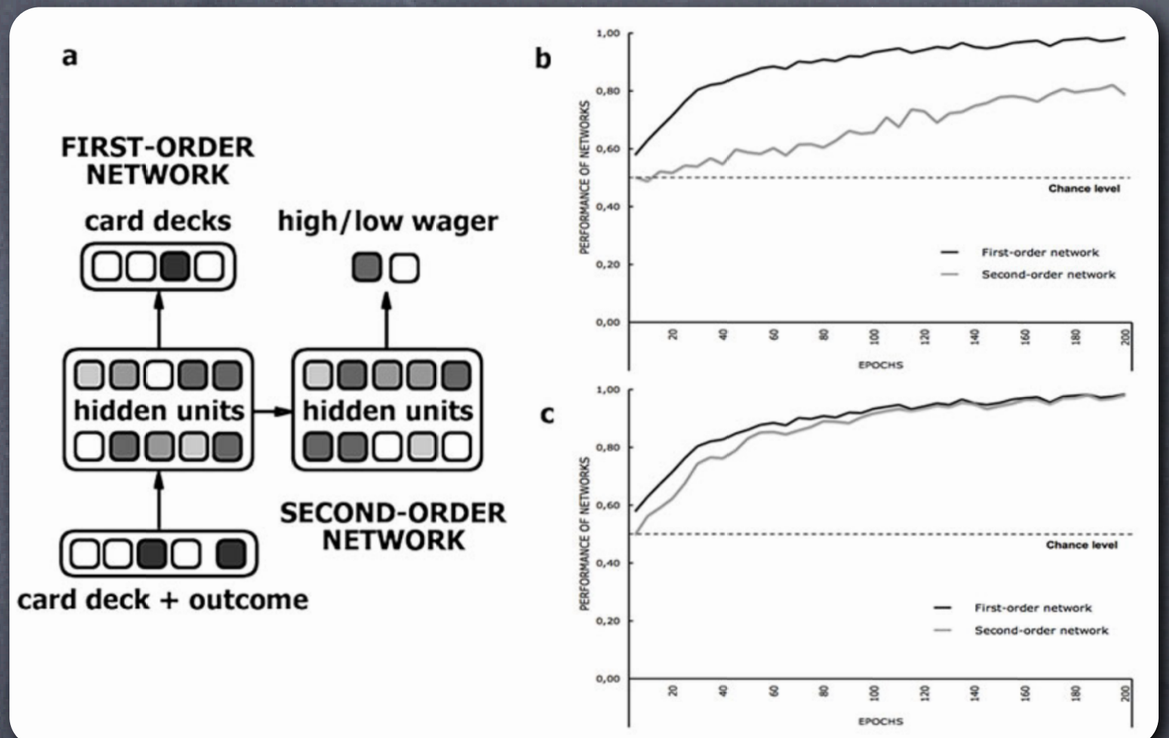


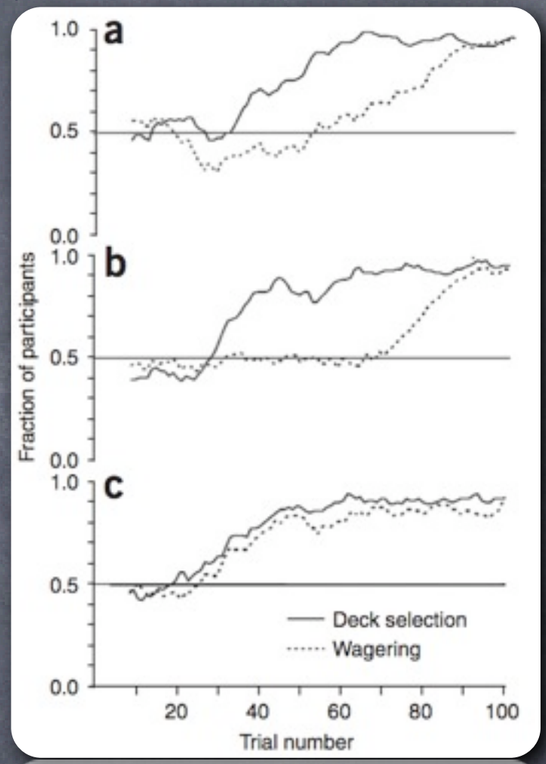
brain reading on yourself

Signal Detection on the Mind



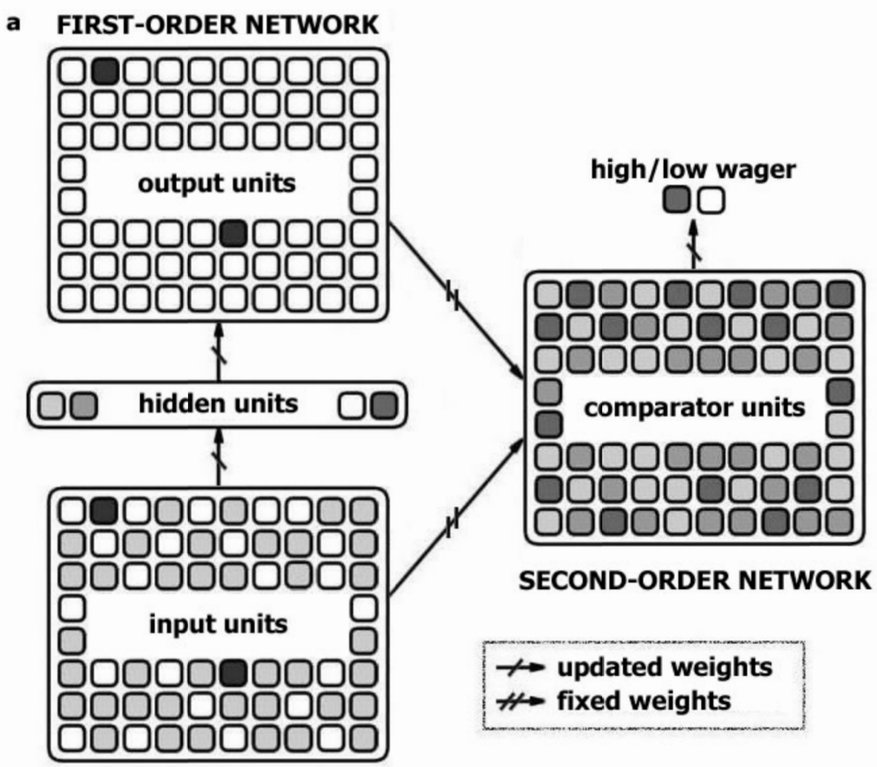
The Iowa Gambling Task





Blindsight and Artificial Grammar Learning

a



b

Blindsight (noisy vision)	Correct	Incorrect	Total
High Wager	29,10	1,77	30,87
Low Wager	49,63	19,50	69,13
Total	78,73	21,27	100,00
Normal vision	**Correct**	**Incorrect**	**Total**
High Wager	50,57	4,67	55,23
Low Wager	29,43	15,33	44,77
Total	80,00	20,00	100,00

c

Incidental learning	Correct	Incorrect	Total
High Wager	36,33	8,78	45,11
Low Wager	35,44	19,44	54,89
Total	71,78	28,22	100,00
Explicit learning	**Correct**	**Incorrect**	**Total**
High Wager	63,44	0,33	63,78
Low Wager	34,78	1,44	36,22
Total	98,22	1,78	100,00

- hypnosis vs. placebo vs. suggestion
- TMS studies inspired from the designs of Lau
- Perruchet effect

WP7c

Learning to be conscious

- rubber hand

- BCI & neurofeedback:

  - If awareness depends on learning, then we should observe a change in the temporal gap between RP and W judgement in a Libet design involving learning to control a BCI to move an artificial effector

  - We should likewise observe effects of making (real or fake) EEG activity available to people as they perform the Libet task

DISCUSSION

DISCUSSION