



# When Red Bull gives you wings: Placebo effects of cognitive enhancers on incentive motivation.

September 2016

Liane Schmidt

# Agenda

## Overall Aim:

Give you an intuition on the approaches used in Psychology and Cognitive Neurosciences to obtain a better scientific understanding of the human mind.

- I. Ethical considerations
- II. Behavioral study: When Red Bull gives you wings.
- III. Best places to test behavior in Paris

# I. Ethical considerations

- Research in Psychology faces major ethical issues :
  - Power of the experimenter
  - Power of the participants
  - Use of data
- Ethical codes were not always followed :

## **John Hopkins University 1920**

Experiment on fear conditioning and generalization (Little Albert experiment)

## **University of Minnesota 1924**

Facial expressions experiment

## **Yale University 1975**

Willingness to obey authority (Milgram Study)

## **Stanford University 1971**

Group dynamics and sadism

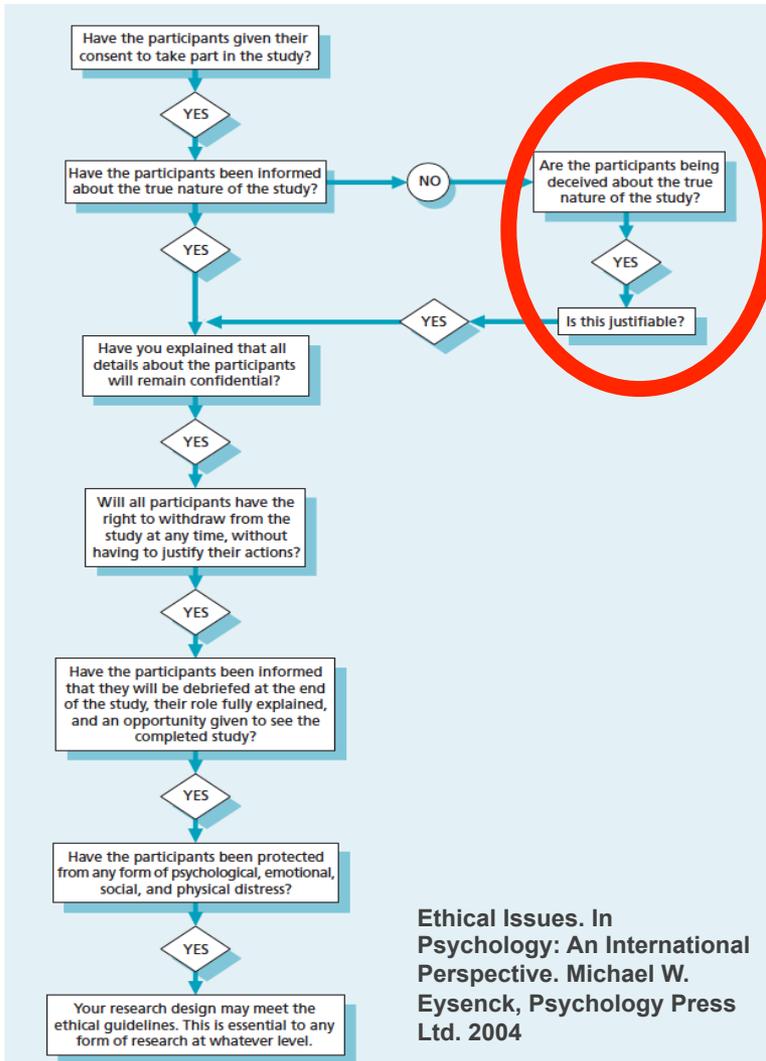
(Stanford prison experiment)



# Guidelines

- In France: Declaration of Helsinki (INSERM, CNRS)
- In the US and at INSEAD: Belmont Report (American Psychology Association)
- General guideline (from Belmont report):
  - Respect for persons: respect for patient autonomy
  - Beneficence: maximize benefits and minimize harm
  - Justice: Equitable selection of participants
- Human subject testing should involve:
  - Institutional review Board (IRB)
  - Written and informed consent
  - Right to withdraw without prejudice
  - Debriefing
  - Confidentiality of data

# Ethical checklist



## What is deception ?

- ✓ Intentional effort to mislead
- ✓ Misrepresentation of study purpose
- ✓ False statements
- ✓ Omitance of details that might affect willingness to participate

## Severe deception:

mood inductions, procedures intended to influence perception of health risks, false feedback regarding a participant's behavior, character or empathy level, manipulation of moral obligations, anxiety induction

**How to decide if deception is morally justified ?**

# II. Behavioral study: When Red Bull gives you wings.



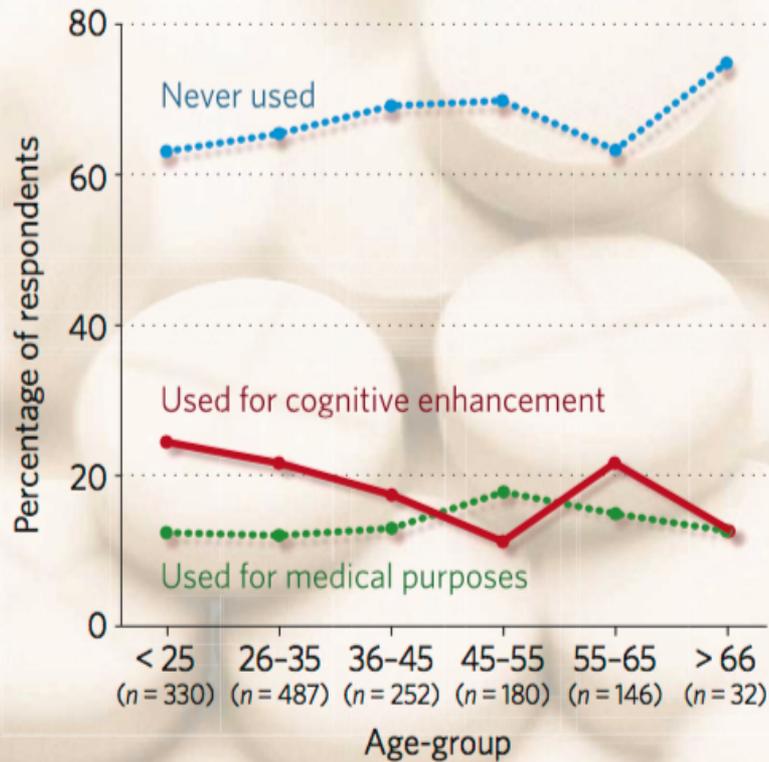
At the Sorbonne-Universités INSEAD Behavioural laboratory.



The image cannot be displayed because your computer does not have enough memory to open the image. If the red x still appears, you may have to delete the image and then insert it again.

# Academic doping

## TRENDS IN USE OF NEUROENHANCERS



Maher Nature 2008

Full text access provided to Ecole Normale Supérieure by Biologie

journal of science

Search  go Advanced search

doi:10.1038/4501157a; Pt

Morein-Zamir<sup>1</sup>  
 Morein-Zamir are at the University of  
 Behavioural and Clinical N

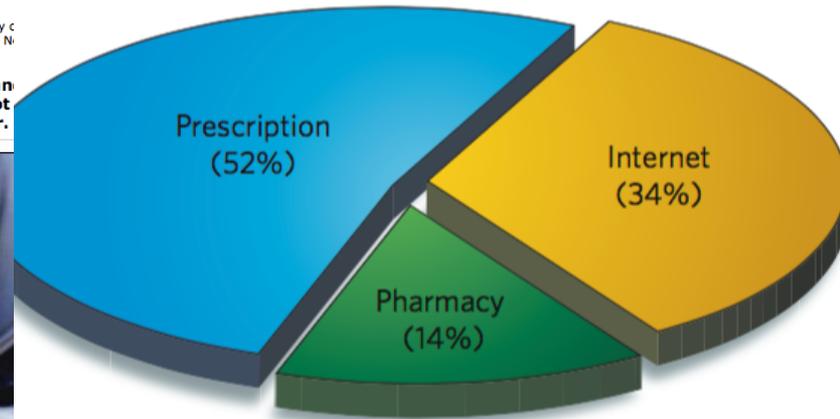
Drugs by both ill an  
 ns that should not  
 ron Morein-Zamir.



stay alert become as widely acceptable as coffee?

## DRUG SOURCES

Answered question: 201  
 Skipped question: 1,227



- + Competing financial interests
- + Figures and tables

### SEE ALSO

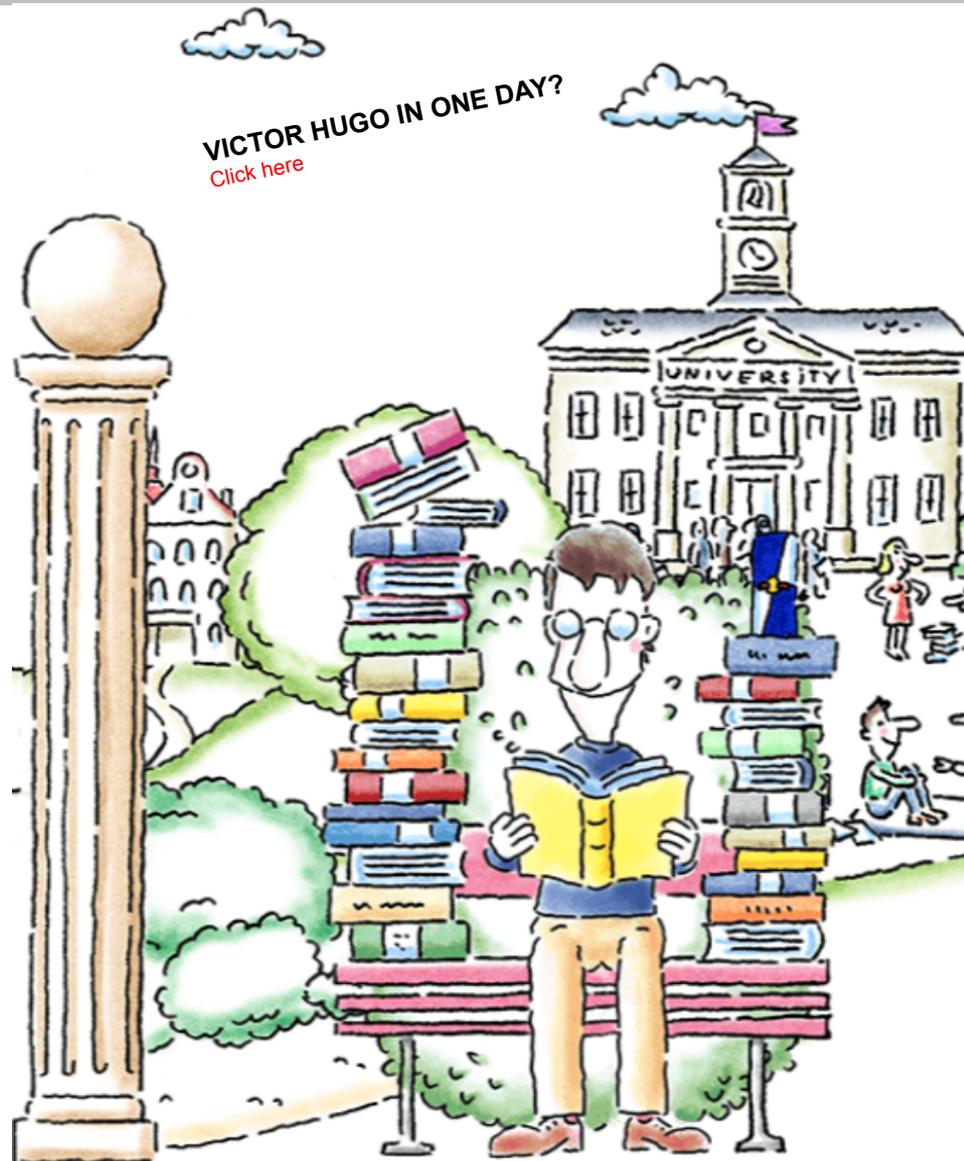
- + Editor's Summary

The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Effects of energy drinks on performance

- Empirical evidence for positive effects of ingredients (i.e., caffeine, glucose) of EnD on:
  - ✓ subjective ratings (i.e., mental fatigue, alertness)  
*Alford 2001, Kennedy 2004, Howard 2010*
  - ✓ physical performance (i.e., aerobic endurance, reaction times)  
*Alford 2001, Howard 2010*
  - ✓ cognitive performance (i.e., memory, attention, information processing)  
*Scholey 2004, Howard 2010, Kennedy 2004*
- Yet, most studies used a double blind design, which does not disentangle effects of beliefs about the efficacy of EnD from actual consumption.

# Marketing actions create beliefs about efficacy



The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Why should we care ?



European Parliament  
**News**

Newsroom

Top stories

Contacts and Services

Newsroom

Press releases

Background notes

Weekly agenda

Plenary sessions

National angles

## Parliament vetoes energy drink “alertness” claims

**PLENARY SESSION** Press release - **Public health** – 07-07-2016 - 12:55

EU Commission plans to allow claims that sugary drinks and energy drinks containing caffeine boost “alertness” or “concentration” were vetoed by the European Parliament on Thursday. Displaying these claims on drinks cans would have led to higher sugar consumption among adolescents, who are the largest group of energy drink consumers, said MEPs in their resolution.

# Research Questions and Hypotheses

**Do effects of energy drinks stem from a placebo effect linked to beliefs in their efficacy?**

If so, these beliefs should mediate the effect of EnD label on cognitive performances.

**How can beliefs enhance cognitive performance?**

We suggest, that EnD label enhances **incentive motivation** leading to stronger effects of beliefs on performances when incentives are high.

# Experimental design

Between subjects cross-over design:

<b>label: Sprite, drink: Sprite</b>	<b>label: Red Bull, drink: Sprite</b>
 <p>e.g. Control N=22</p>	 <p>e.g. Placebo N=22</p>
<b>label: Sprite, drink: Red Bull</b>	<b>label: Red Bull, drink: Red Bull</b>
 <p>e.g. Hidden energy drink N=22</p>	 <p>e.g. Open energy drink N=22</p>

 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.



*Red Bull improves performance, concentration, so you increase endurance, enjoy the more important*

Bull contains natural and healthy ingredients. Taurine is a natural substance produced by the body during physical effort.

in the morning. In the afternoon, that 10 minutes of rest in your blood stream increases, and the substance – it increases



# Inducing beliefs about efficacy



*Red Bull improves performance and concentration, so you can tackle everything from physics to workouts. It also increases endurance, which means you can enjoy the more important things afterward.*

Performance per 25 cl:

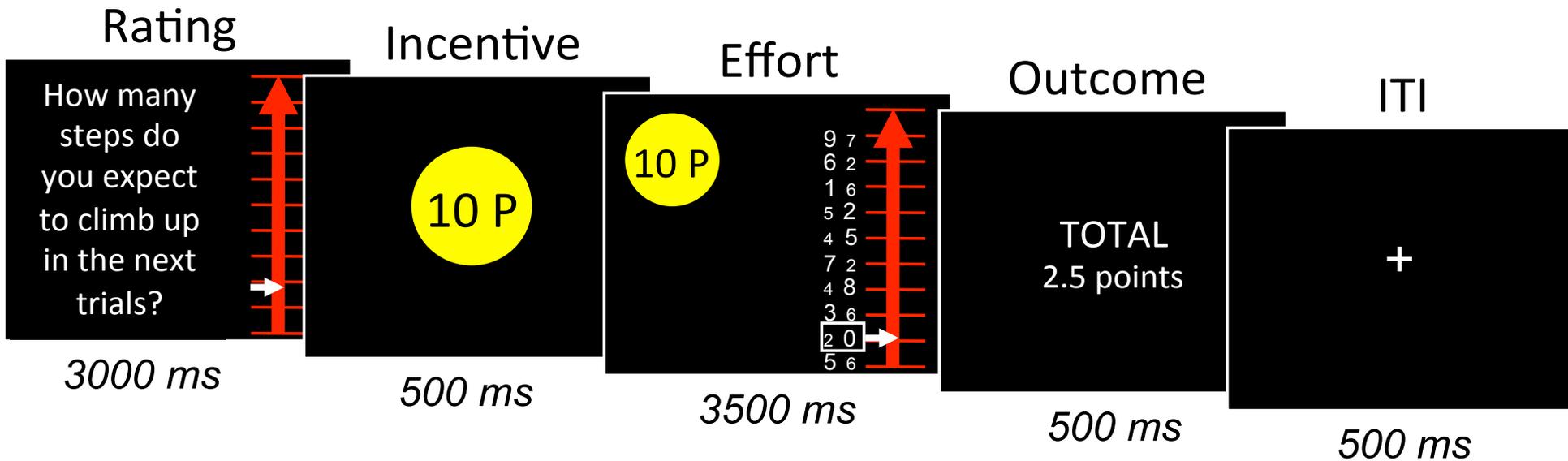


A can of Red Bull contains natural and healthy ingredients like taurine, vitamin B and caffeine. Taurine is a natural substance produced by the body under stress, and mental or physical effort.

A scientific study from 2001 published in the European journal *Amino Acids* has found that 10 minutes after consumption of Red Bull, taurine and caffeine peak in your blood stream. Your cardiac rhythm gets faster, your blood pressure increases, and you feel awake as the stimulant kicks in.

Moreover, caffeine is an ergogenic substance—it increases performance and wakefulness—via stimulation of the central nervous system. This is beneficial for mental effort during exams.

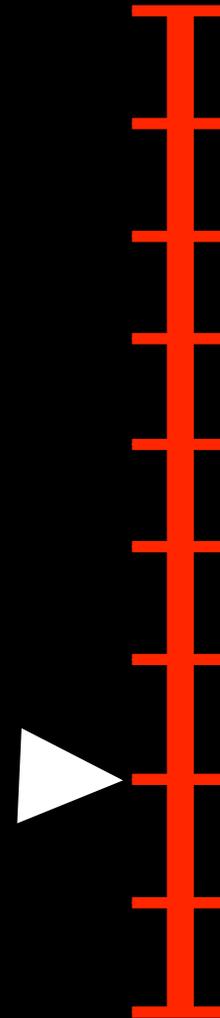
# Mental effort task



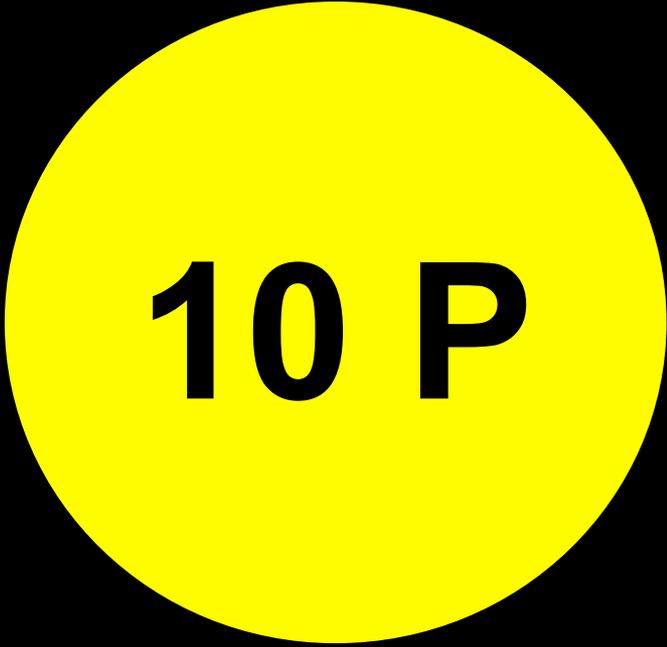
 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Expected performance (i.e. belief)

How many  
steps do you  
expect to  
climb up in  
the next  
trials?



# Incentive (1, 5 or 10-points to earn)



**10 P**

 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Effort

10 P

9 7  
6 2  
1 6  
5 2  
4 5  
7 2  
4 8  
3 6  
2 0  
5 6



 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

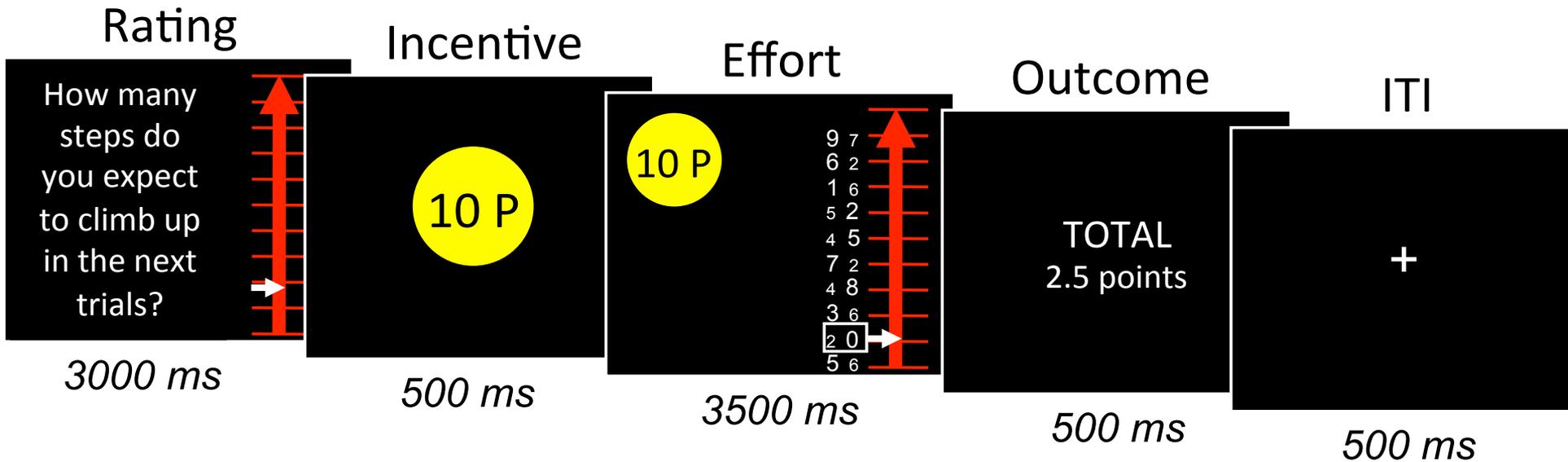
# Cumulative Total

TOTAL

2.5 points

 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Mental effort task



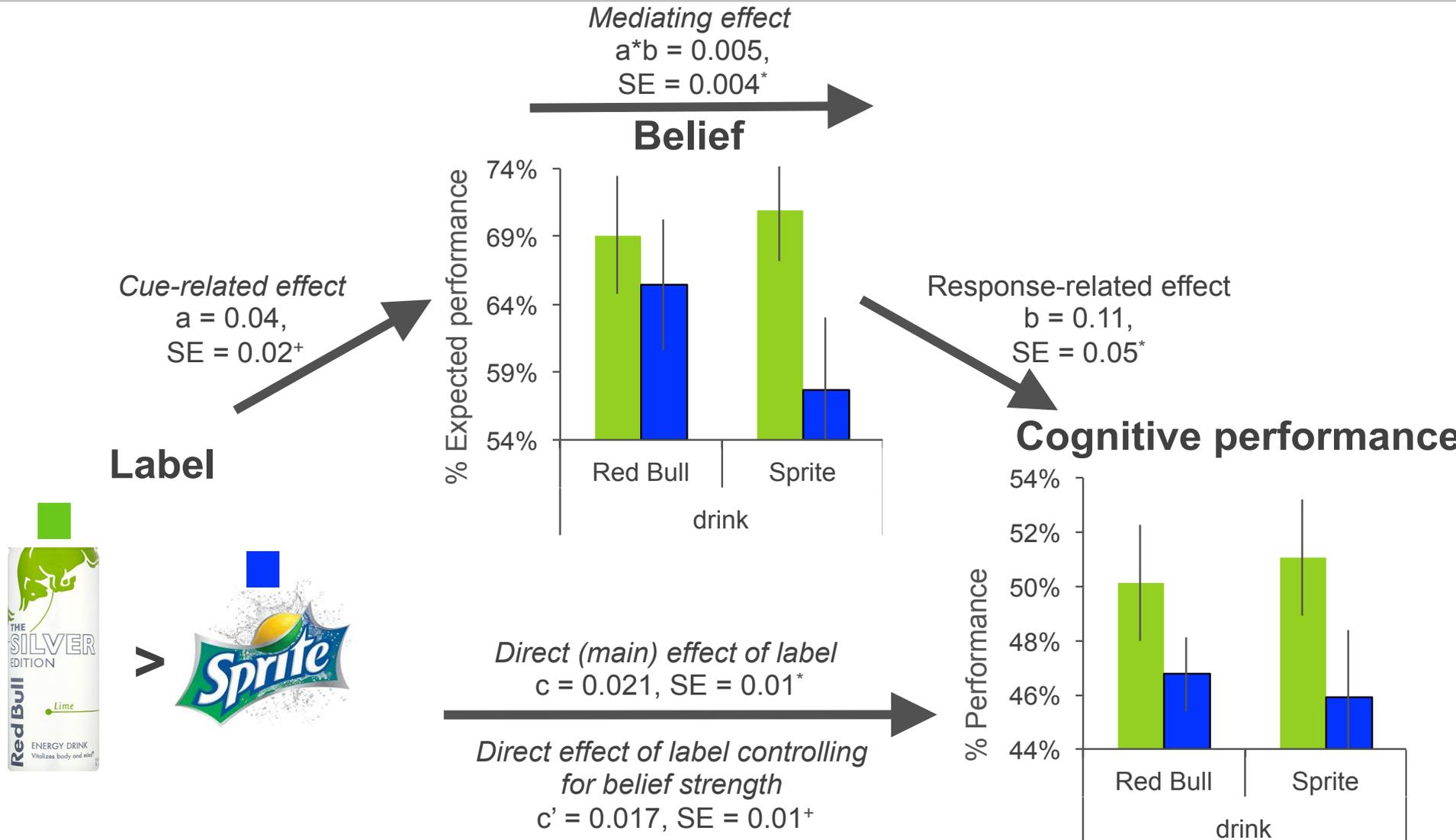
## Dependent variables:

Cognitive performance: % of steps reached on each trial

Incentive motivation: performance as a function of incentives

Anticipated performance: % of steps expected to be reach

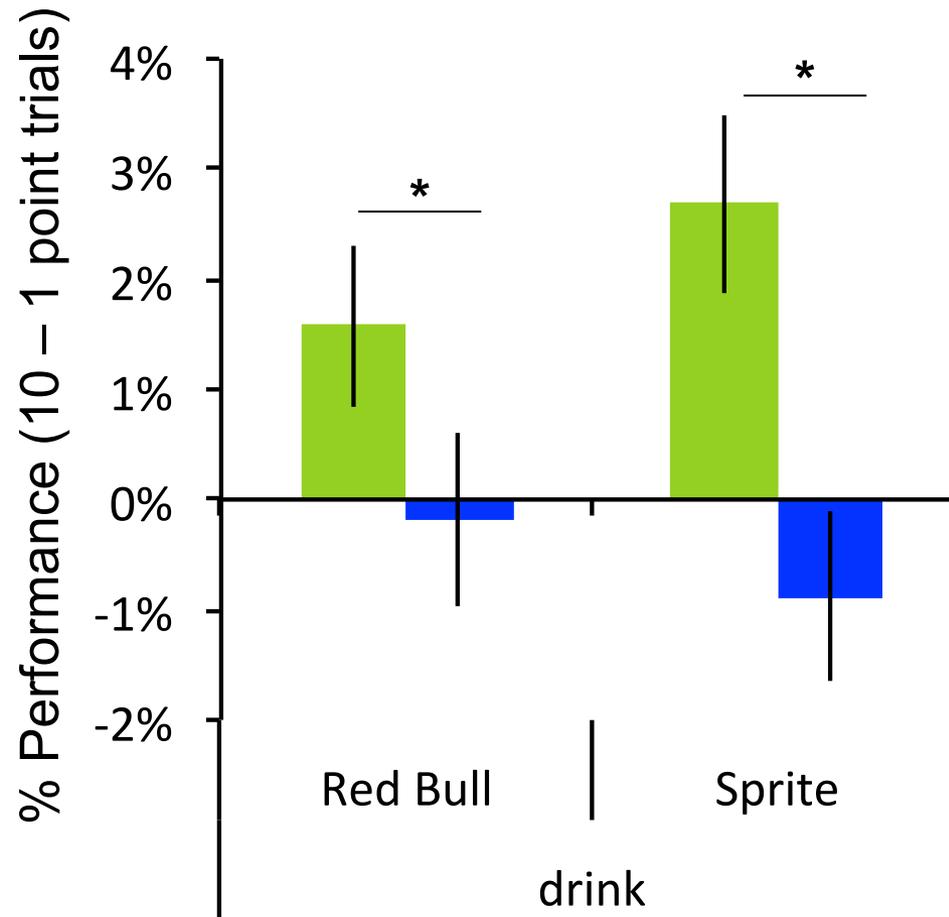
# Belief mediates the effect of label on cognitive performance



The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

\*  $P < 0.05$  two-tailed, +  $P < 0.05$  one-tailed

# Label enhances incentive motivation ...

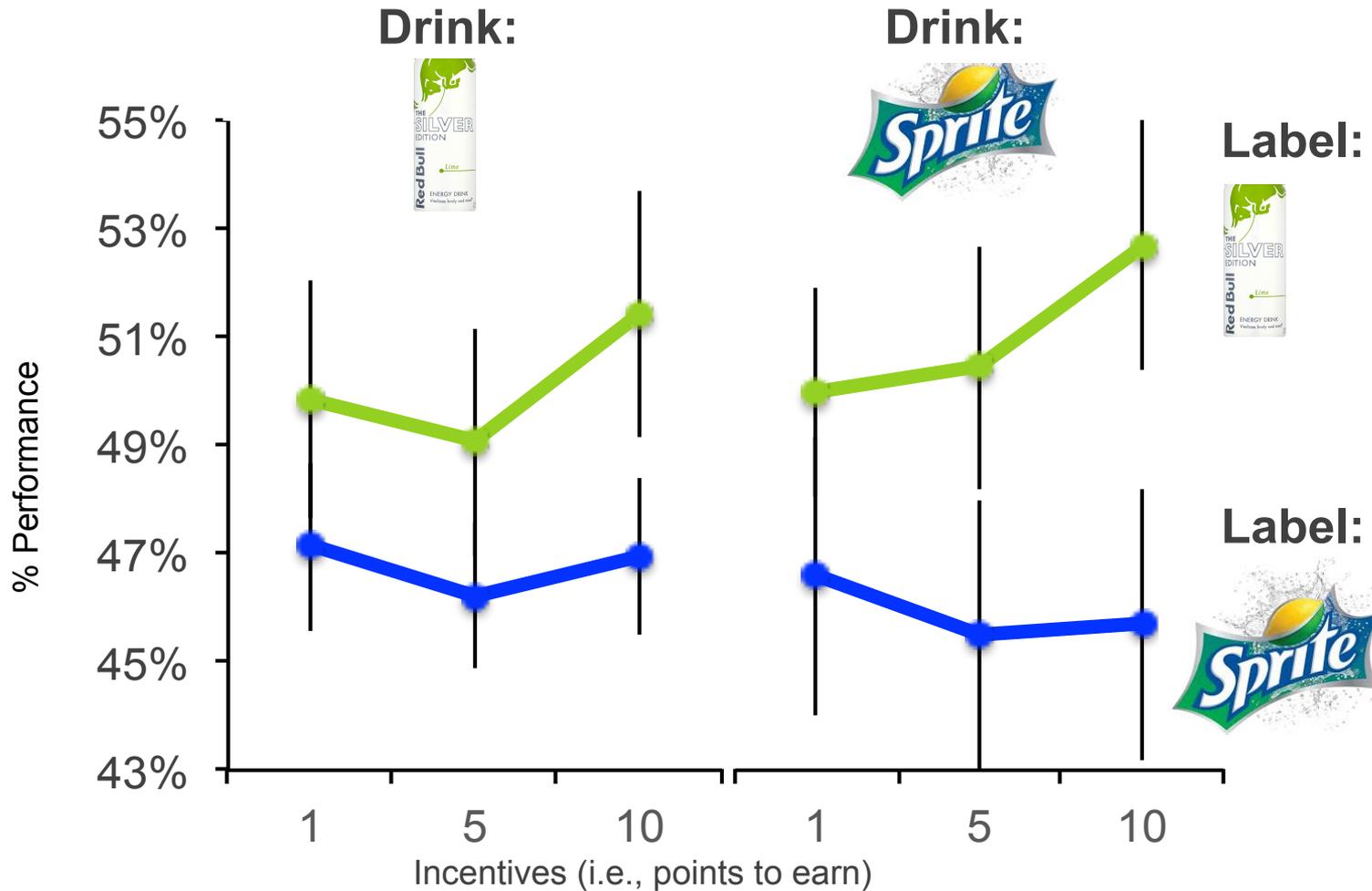


Label



\*  $p < 0.05$

# ... and through it increases performances



The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

# Study Conclusions

- Our results provide direct **behavioral evidence** for a key role of motivational processes for placebo effects to occur.
- They are in line with findings from neuroscience suggesting the recruitment of neural pathways linked to reward and motivation for placebo effects.
- It could be a dopaminergic effect as the neurotransmitter dopamine plays a key role for incentive motivation in similar motor effort tasks and underpins placebo effects in pain and disease.

# III. Best places to catch the mind in Paris



## Site

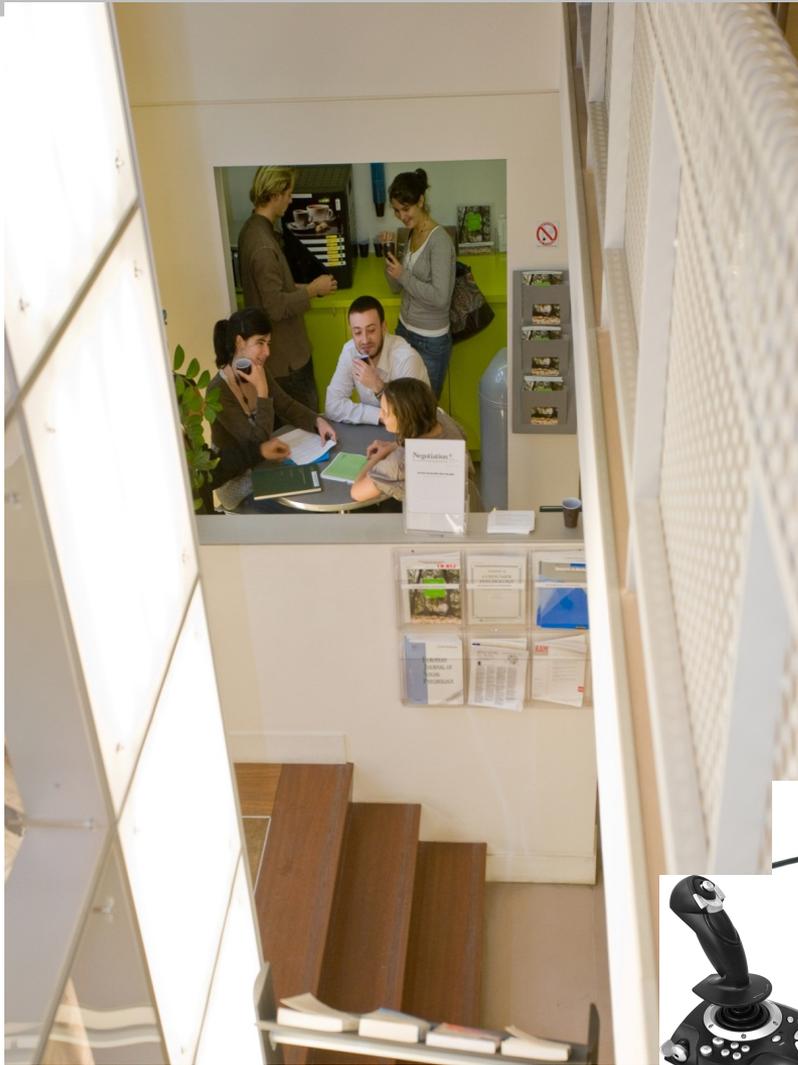
180 m<sup>2</sup> custom-designed for experimental research.

6 rue Victor Cousin, opposite main Sorbonne entrance.

## Access to study participants

We have 2000+ emails in database, mostly students, paid €10/h.

# How the lab can help



**Study design and validation**

Mandatory ethical check.

Translation, programming,  
participant processing, and  
payment.

Data collection, entry and  
analysis, accounting.



 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

## Setup for individual studies



Computer-based stimuli and data collection for surveys, simple experiments.

## Setup for group studies

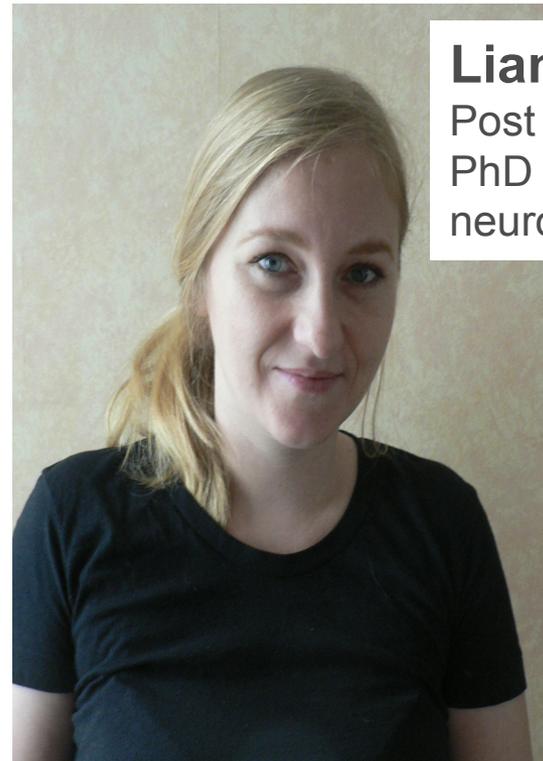


For negotiation, group decision making, in-depth interviews

# Staff



**Liselott Pettersson**  
Manager  
MA in behavioural  
sciences  
University of Stockholm



**Liane Schmidt**  
Post Doctoral Fellow  
PhD in cognitive  
neurosciences UPMC

# Staff



A portrait of Hoai Huong Ngo, a woman with long dark hair and bangs, wearing a grey cardigan over a dark top. She is smiling and standing in a room with a staircase and a potted plant in the background.

## Hoai Huong Ngo

Research Associate  
PhD student in social  
psychology  
University of Paris Nanterre



A portrait of Nicolas Manoharan, a man with dark curly hair and a beard, wearing glasses, a blue collared shirt, and a dark sweater. He is looking directly at the camera in an indoor setting.

## Nicolas Manoharan

Research Associate  
MA in social psychology  
University of Paris Nanterre

---

# Thanks for your attention !

 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.