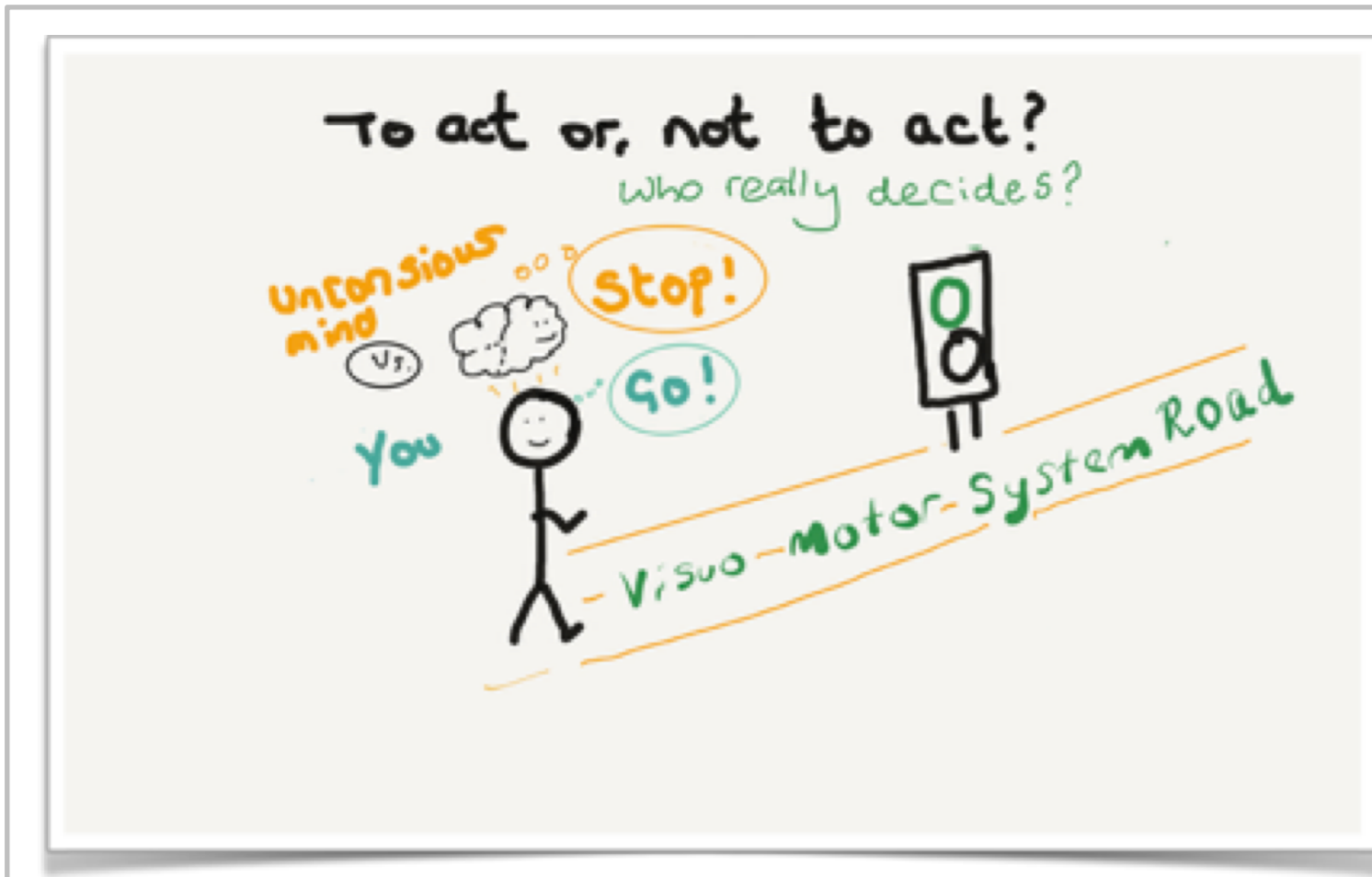


Hidden Brain Activations: You Vs. The Unconscious Mind

How The Design Of Everyday Things Affect Reactions

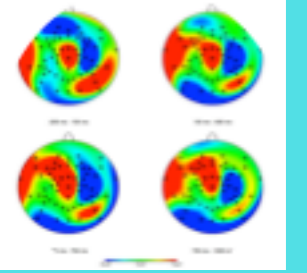


Info

The Visuomotor system has two independent systems, (Milner & Goodale, 1992):

Two-Vision Hypothesis:

- i Vision for Action
Dorsal system:
Unconscious = Fast response
- ii Vision for Perception:
Ventral system:
Conscious = Slower response



Focus of the study:
A Cognitive Psychology study which questioned, whether the design of everyday objects could stall us incorrectly



Product Designers / visual specialist:
Must think about the design, sequence and the effect that real & digital products have on people to create action



Users / People:
Bombarded & nudged with multiple stimuli, needing to react fast, or decide when not to act

The Visuomotor System

Q To act or not to act, is a question we rarely (consciously) think about when interacting with everyday objects.

React too slowly & you could lose a race, drop a cup or cause injury. The Visuomotor system rapidly processes information to aid quick reactions, but more importantly, to stop an action, through an automatic motor-process of **self-inhibition**.

1 This study investigated a paradox called the **Negative Compatibility Effect (NCE)**. Contrary to logic, it shows a performance cost and increased error rates for compatible stimuli, i.e. when a prime & target like an arrow, are both pointing the same way.

Does Negative Compatibility Effect (NCE) Matter?

If real, our **self-inhibition** system could be wrongly inhibiting the right response, leading to a cost.



Example of EEG cap

A study by Eimer & Schlaghecken (1998) using brain scanning technologies, saw a 'biphasic' or three-phased brain activation for **compatible trials** which suggested that self-inhibition was occurring in an NCE.



Illustrates a biphasic brain activation for NCE

Study Aims The study tested the **ecological validity** of the **NCE paradox** using two everyday objects. The objects all hold scientific-action properties which require little conscious thought to act, e.g.:

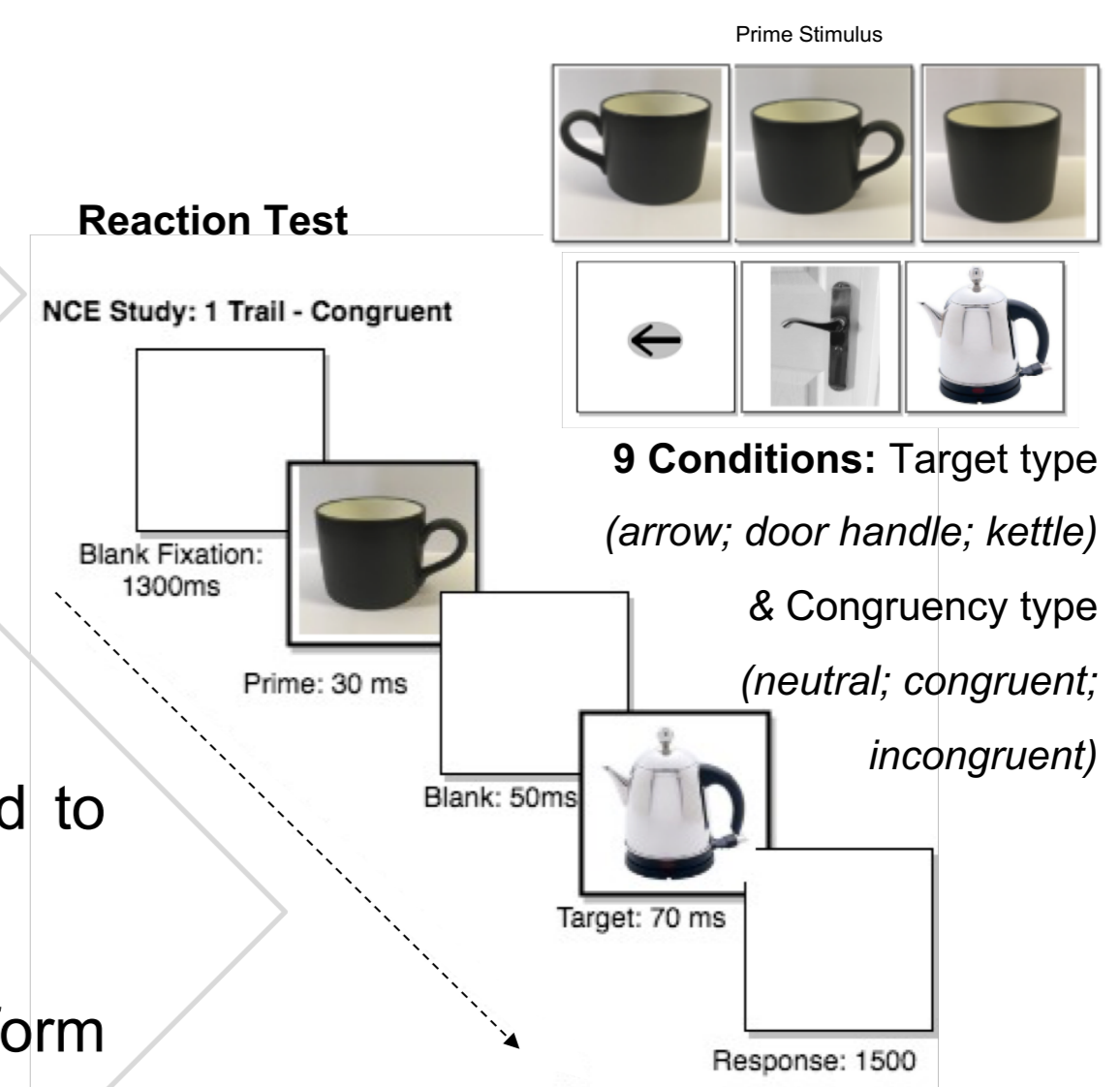
- ❑ **Object affordance** (e.g. a handle) or, have a **meaningful coupling** (e.g. cup & kettle).
- ❑ The study also asked if, **self-inhibition** could be seen in the LRP analysis recorded by a electroencephalogram (EEG).

Method

- i **Procedure**
21 participants perform a RT & brain scanned (EEG). Press right/left key= handle direction /arrow
- ii **Reaction Test (RT)**
Participants barely see the Prime (30ms); react to the target (L/R)
- iii **Motor Cortex**
LRP recorded the brain activation in the motor cortex brain region

LRP = Lateralised Readiness Potential

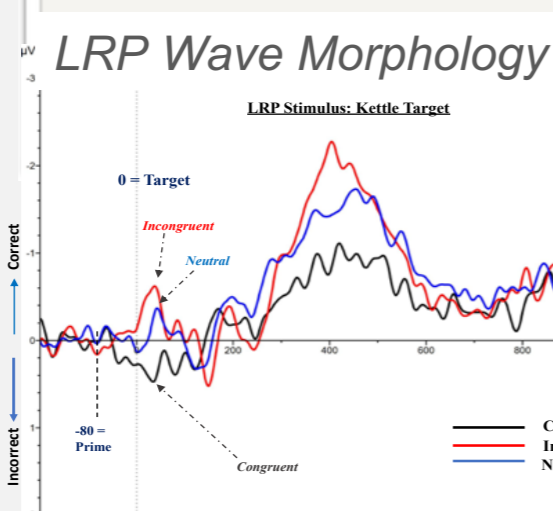
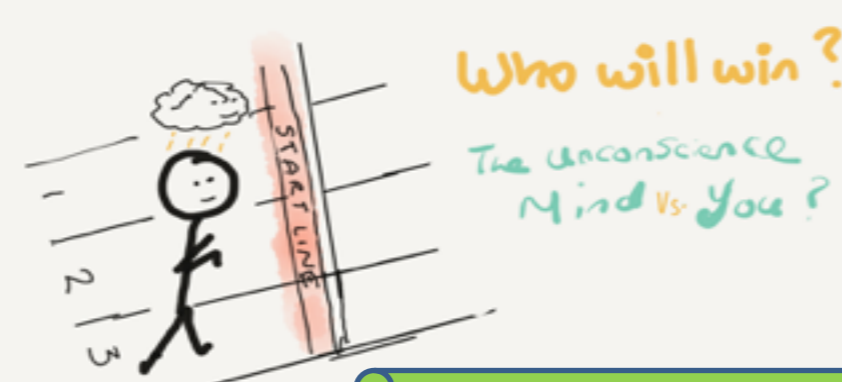
- ❑ Provides information about the preparation of the hand to be used in a future event in motor cortex
- ❑ Correct/wrong response is reflected in waveform morphology



3 Results

- ❑ **No NCE**, but the opposite effect, a positive compatibility effect (PCE)
- ❑ **A biphasic waveform** seen for incongruent & neutral kettle trials, similar to NCE self-inhibition waveform

"The behavioural data & brain activations were in opposition to each other"



Winner of RT:
Neutral & congruent arrow + mug. Simple design & little relationship

Winner of Brain Activation (amplitude):
Incongruent & neutral kettle + mug. Meaningful couplings.

Conclusions

4 The results suggest that the target's RT is dependent on the prime's perception i.e. design, duration, & relationship with the 'target', but the effect is different for both brain waves & behavioural reaction times.

- ❑ **As a product designer / visual specialist**
If RT is vital to action, KISS (keep it simple stupid) or, add a handle affordance. Prime visibility/perception, (its shade or timings) also has an impact on actions, while meaningful couplings may stall users, or get them to think.
- ❑ **As a User**
Be present, mindful & focused, so not to be nudged into unwanted actions or, incorrectly stalled.

