The Cold Control theory of Hypnosis

Zoltán Dienes

Hypnosis is intrinsically about metacognition

What makes responding hypnotic versus "normal" is a change in metacognition (and nothing else)

1. Metacognition, higher order thoughts and cold control

2. Implementing cold control

3. Contrasting low and high metacognition: Hypnosis versus meditation

4. Behavioural tests of cold control theory

1. Metacognition, higher order thoughts, and cold control

Higher order thought theory

(Rosenthal 1986)

First order mental state is about the world (‘The tree is green’)

A high order mental state is about other mental states (‘I see that the tree is green’)

Perceiving that the tree is green does not make the perceiving conscious; one must be aware of the perceiving (with a higher order mental state)

Similarly for intentions:

First order mental state:

“**Lift the arm**!”

This is unconscious unless you are aware of having that intention by having suitable second order content:

“**I intend to lift my arm**”

Note:

"Executive control" (e.g. overcoming habit) can be unconscious on HOT theory

Because could have an intention producing the control in principle without having an HOT about having that intention

(Contradicts a common assumption in the literature)

Cold control theory of hypnosis (Dienes & Perner, 2007):

Hypnotic response:

form an intention (in the executive system) to perform the behavioural or cognitive action

without forming accurate higher order thoughts about intending that action

but rather forming inaccurate higher order thoughts to the effect that one did not intend the action.

Cold control picks out a common mechanism in the opposing camps of

Dissociation approaches (Hilgard)
Socio-cognitive approaches (Spanos)

(while contradicting some theories within those camps, e.g. Woody, Kirsch)

2. How is cold control implemented?

If hypnotic responding involves the strategic relinquishment of metacognition, does disrupting parts of the brain responsible for metacognition facilitate hypnotic response?

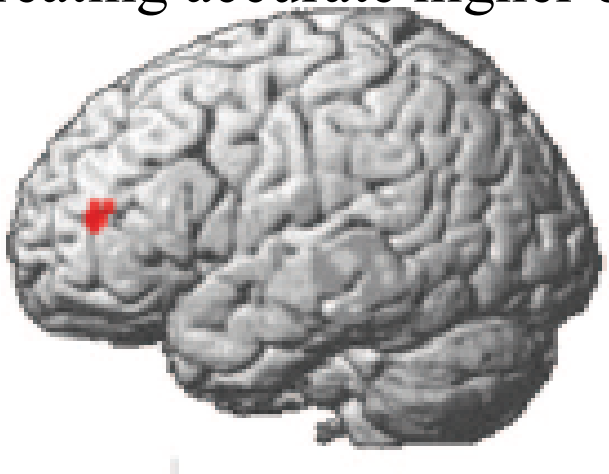
What brain region might be involved in producing hypnotic responses?

Lau and Passingham 2006:

Two conditions: Visual discrimination task with same level of objective performance but different probability of thinking one saw the stimulus

Mid dorsolateral prefrontal cortex:

'HOT box' responsible for creating accurate higher order thoughts?



3. How is cold control implemented

If disrupt HOT box with rTMS

=> Harder to create accurate HOTs

=> Easier to form intentions without knowing one has

⇒Easier to experience hypnotic suggestions??

Cf Rounis et al 2010; Bor; Kanai

3. How is cold control implemented

Dienes & Hutton (in press)

24 Mediums (4- 8 on Waterloo)

Five minutes 1HZ rTMS to:

a) Left Dorsolateral prefrontal cortex (F3 in the 10-20 system)

b) Vertex

In counterbalanced order

Hypnotist blind to site stimulated

3. How is cold control implemented

Suggestions:

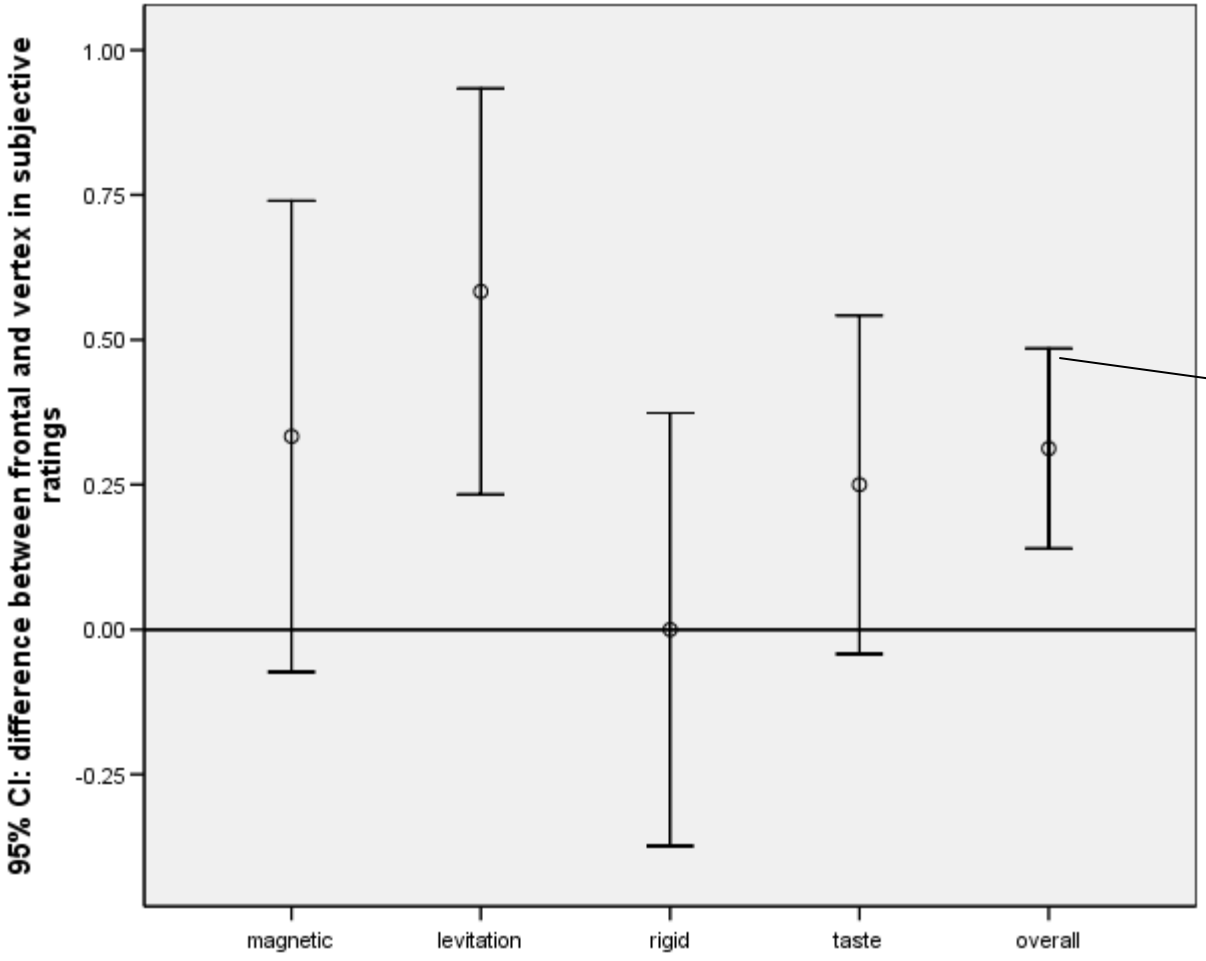
Magnetic hands	(easy motor)
Arm levitation	(hard motor)
Rigid arm	(challenge)
Sweet /sour taste	(cognitive)

Subjects rated:

Subjective experience (0-5)

3. How is cold control implemented

Subjective ratings:



Stimulation at left DLPFC rather than vertex increases subjective experience overall

Effect remains after partialling out expectancy

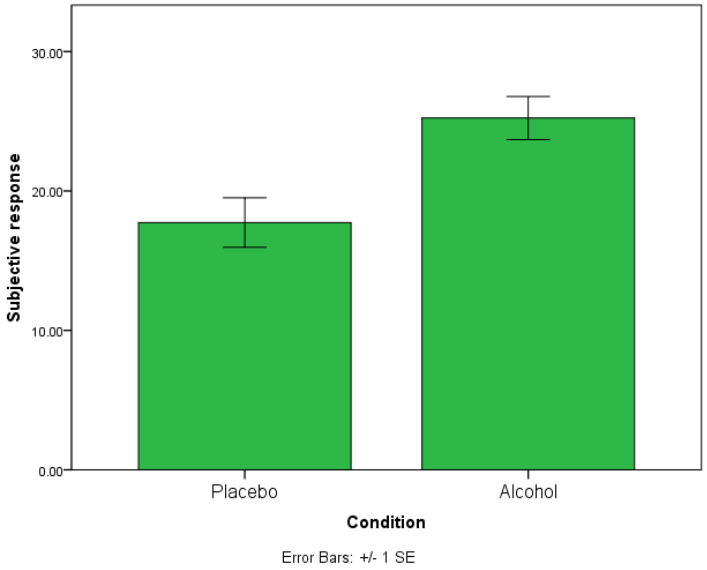
3. How is cold control implemented

Alcohol also effects DLPFC

Semmens-Wheeler, Dienes, and Duka (submitted)

32 mediums drunk alcohol ⇔ 2.5 pints of beer in 30 minutes
OR placebo

Given 9 hypnotic suggestions (from Waterloo), Ss rated their response



Effect for all of motor, challenge and cognitive suggestions

3. How is cold control implemented

Disrupting frontal regions including DLPFC

Increases hypnotic suggestibility

Hypothesis: Frontal regions subserve metacognition; hypnosis is intrinsically metacognitive

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Most generally, results support some form of hypofrontality in hypnotic responding and speak against hypnosis intrinsically involving especially good inhibition/attention

3. Hypnosis versus meditation

Mindfulness meditation: Practice of observing (and controlling) mental states
i.e. it is a type of metacognitive exercise

If it achieves its aim, HOTs should be accurate
Hypnotic responding requires an inaccurate HOT

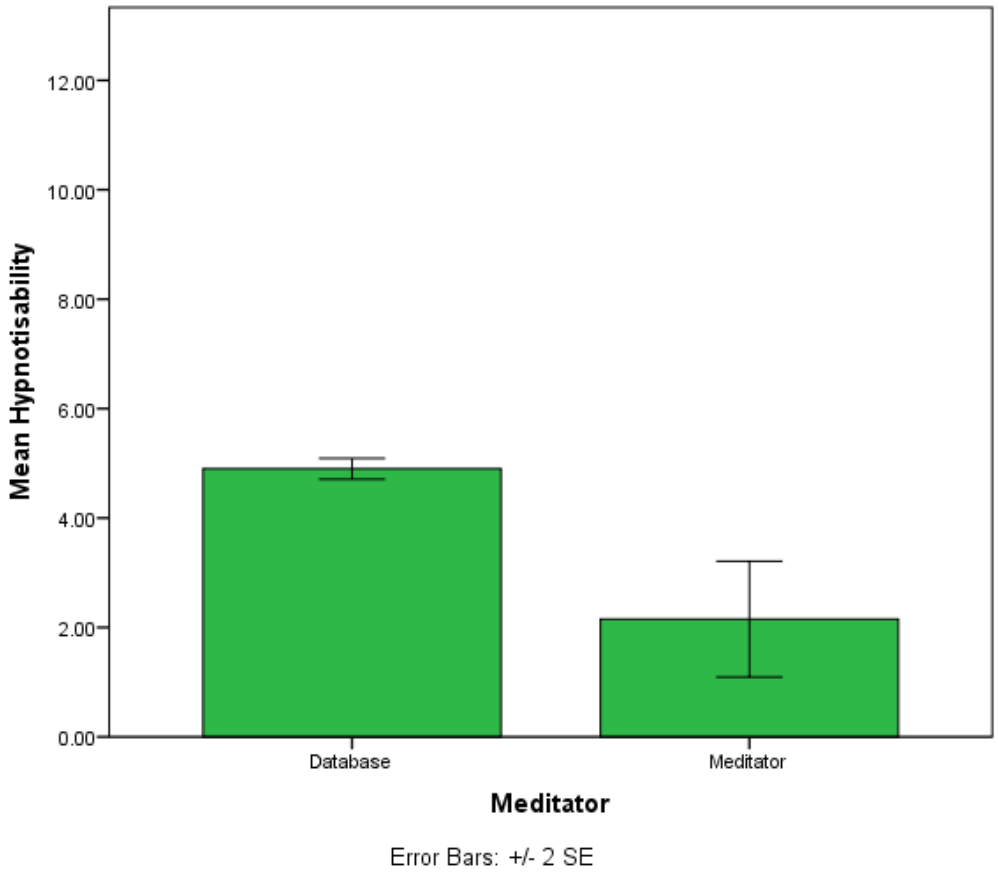
=> Meditation and hypnosis are opposites, when their aims are achieved

3. Hypnosis vs meditation

Semmens-Wheeler & Dienes, 2012

13 meditators
(16 years Buddhist meditation practice)

Hypnotisability
(Waterloo)



Difference not explained by: age, gender, expectations and attitudes towards hypnosis

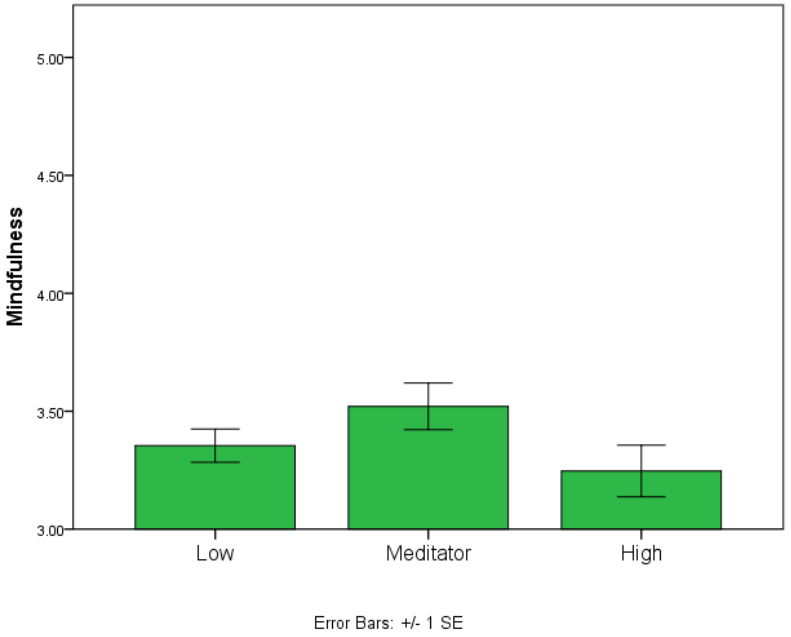
Mindfulness: paying non-judgmental attention to the present

Mindfulness questionnaire (KIMS MAAS):

"I find myself doing things without paying attention"

"When I'm walking, I deliberately notice the sensations of my body moving"

1 = very rarely true, 5 = almost always true



Highs less mindful than meditators

Different types of "Highs":

High vs low dissociators
Terhune et al 2011; Marcusson-Clavertz et al 2012

Low dissociators may have more executive control and less prone to mind wander when placed in Ganzfeldt

Conjecture:
High dissociator highs: Low "HOT coupling"
Low dissociator highs: High "HOT control"

The results discussed so far simply illustrate the high dissociative pathway?

4. Behavioural predictions of cold control:

I. Anything that can be done outside of hypnosis can be done as a hypnotic suggestion

e.g. executive tasks: contrast theories that hypnosis feels automatic because it is not frontally controlled (consistent with TMS and alcohol results)

II. One cannot do anything as a hypnotic suggestion one cannot do otherwise

(the difference is just in whether it felt involuntary)

I. Can hypnotic suggestions involve executive function tasks (exclusion)?

Suggestion to forget the number "four": "1,2,3,5,6,.." – overcoming habit but person claims ignorance of what has been excluded => unconscious executive control

In general, virtually any arbitrary behaviour can be hypnotically suggested despite the fact that such behaviour might be novel to the person, and many hypnotic suggestions require the person ignore some salient aspect of the situation (e.g. amnesia or analgesia suggestion)

=> many hypnotic responses are under executive control.

II One cannot do anything as a hypnotic suggestion one cannot do otherwise

Pain control?

Claims either way are controversial:

Dissociation theorists claim dissociation is a special pain control mechanism that is distinctively hypnotic;

Sociocognitive theorists argue people just use strategies available to them anyway but make it feel involuntary

Hilgard:
If use more sensitive within-subjects design, highs show more pain relief from hypnotic rather than non-hypnotic suggestion

Spanos:
But if highs know they are being tested in hypnotic and non-hypnotic contexts, they “hold back” in the non-hypnotic context (demand characteristics). When non-hypnotic given first and subjects do not know a hypnotic condition will follow, there is no difference.

True, hypnotic suggestions can achieve remarkable things

Consider Stroop effect:

Congruent: BLUE

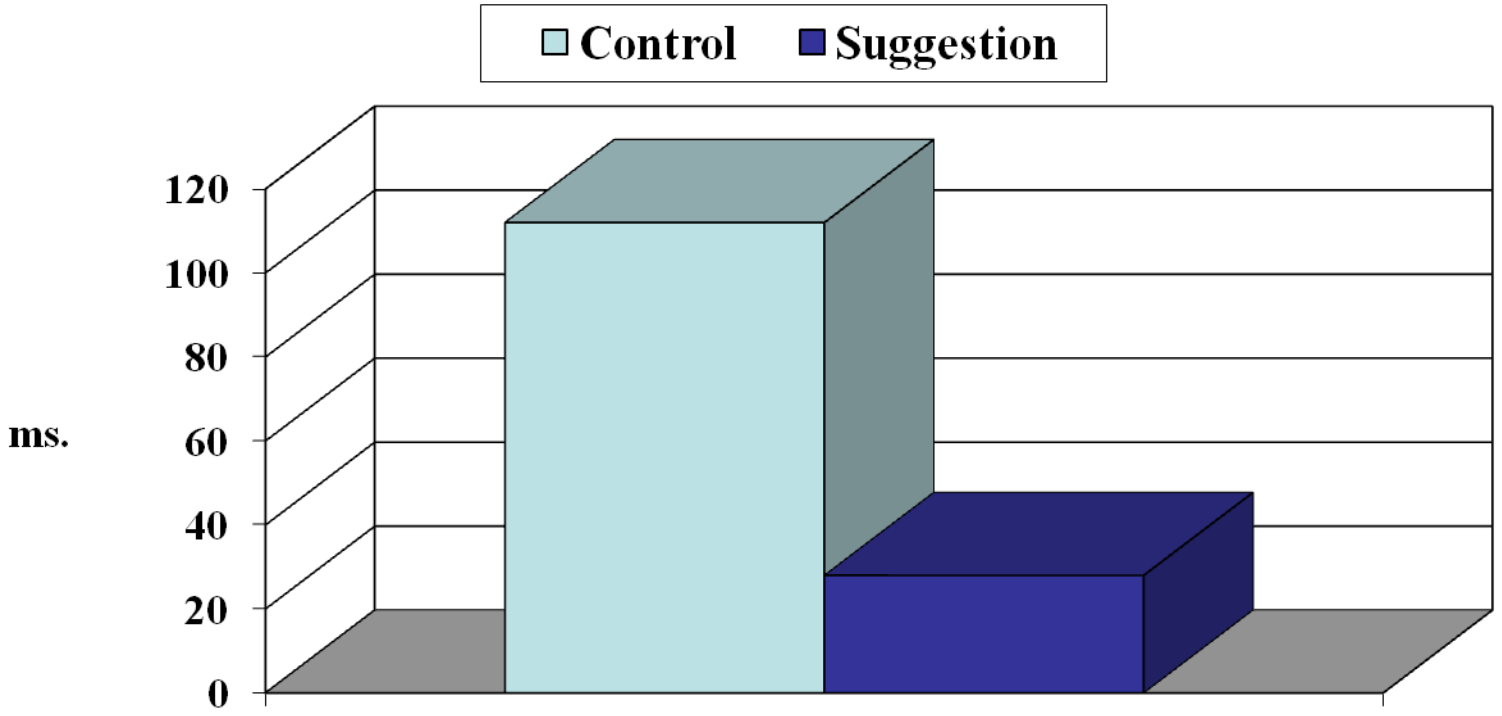
Incongruent: GREEN

Neutral: LAMP

Raz, Shapiro, Fan & Posner (2002)

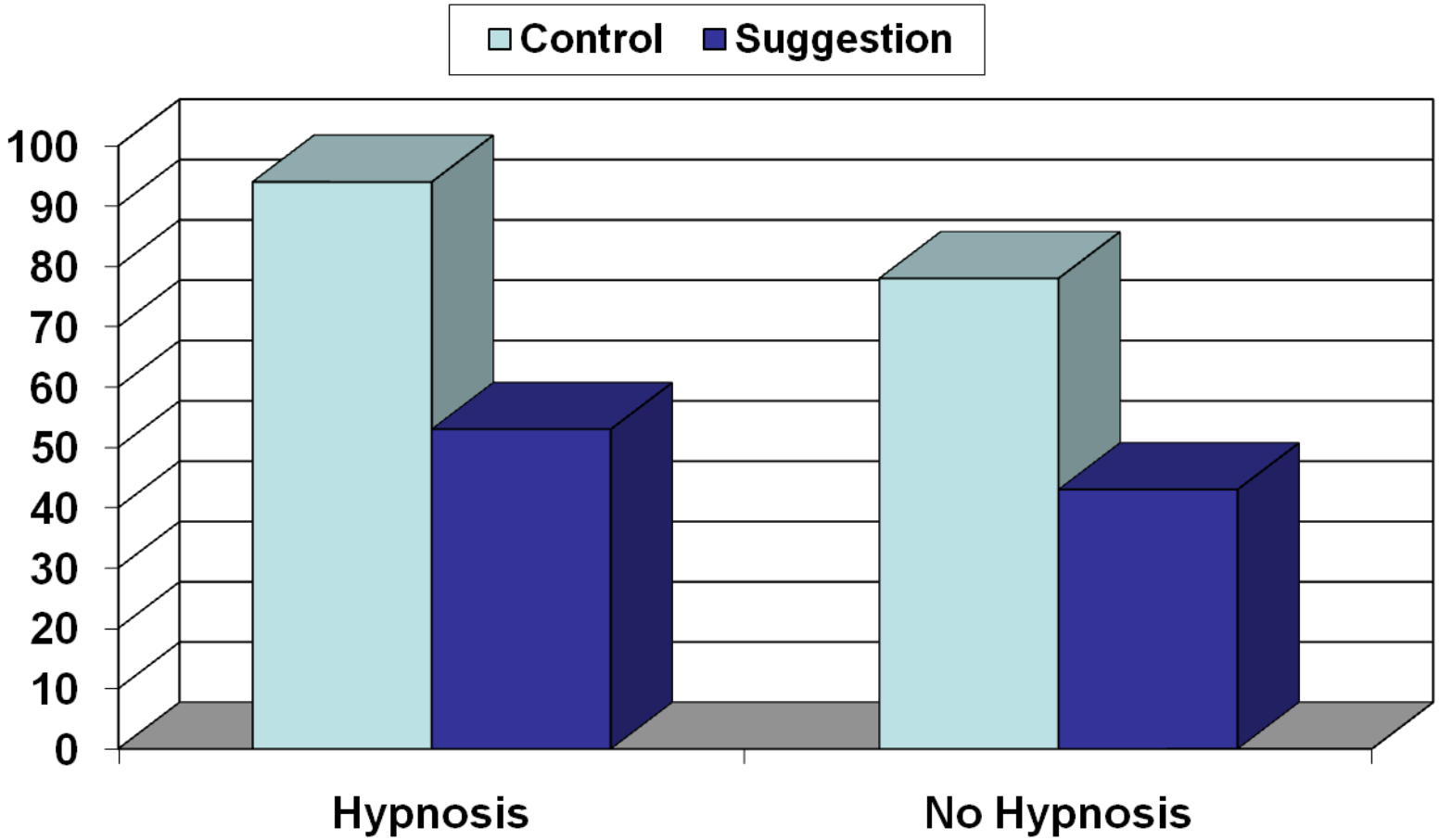
- When I clap my hands, meaningless symbols will appear in the middle of the screen.
- They will feel like characters of a foreign language that you do not know, and you will not attempt to attribute any meaning to them.
- This gibberish will be printed in one of 4 ink colours: red, blue, green or yellow.
- Although you will only be able to attend to the symbols' ink color, you will look straight at the scrambled signs and crisply see all of them.

Stroop Interference
Incongruent – Neutral
(Raz et al., 2002)



The hypnotic suggestion that the subject cannot read the words reduced Stroop!

Stroop Interference (Raz et al 2006)



But a hypnotic induction adds nothing!

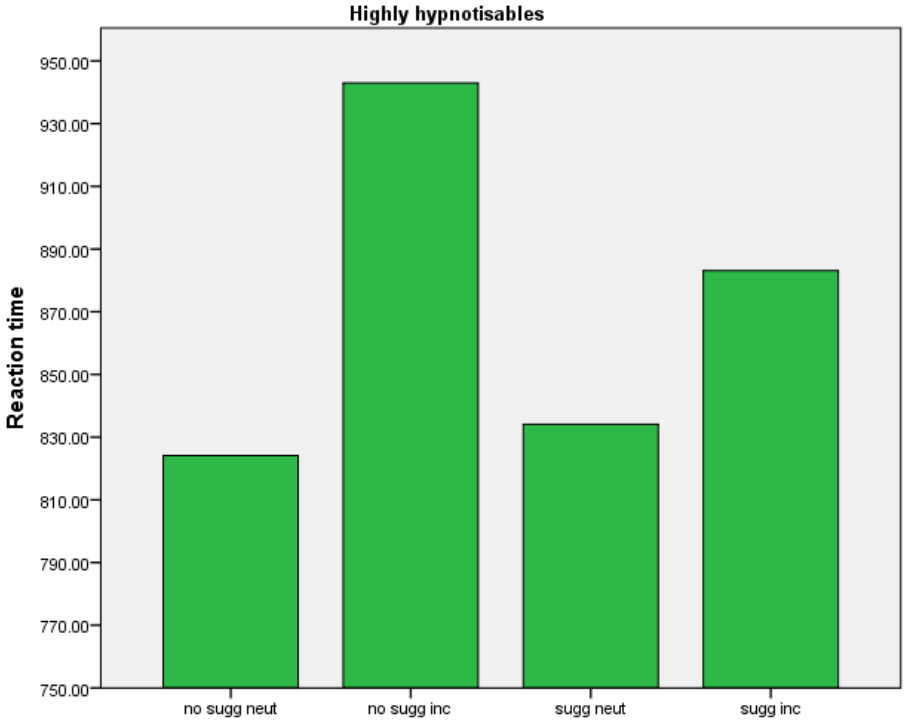
Parris & Dienes submitted

Subjects tested in “imagination” conditions, hypnosis not mentioned.

Can we replicate Raz et al 2006 that induction is irrelevant for highs??
How do lows do in a non-hypnotic context?

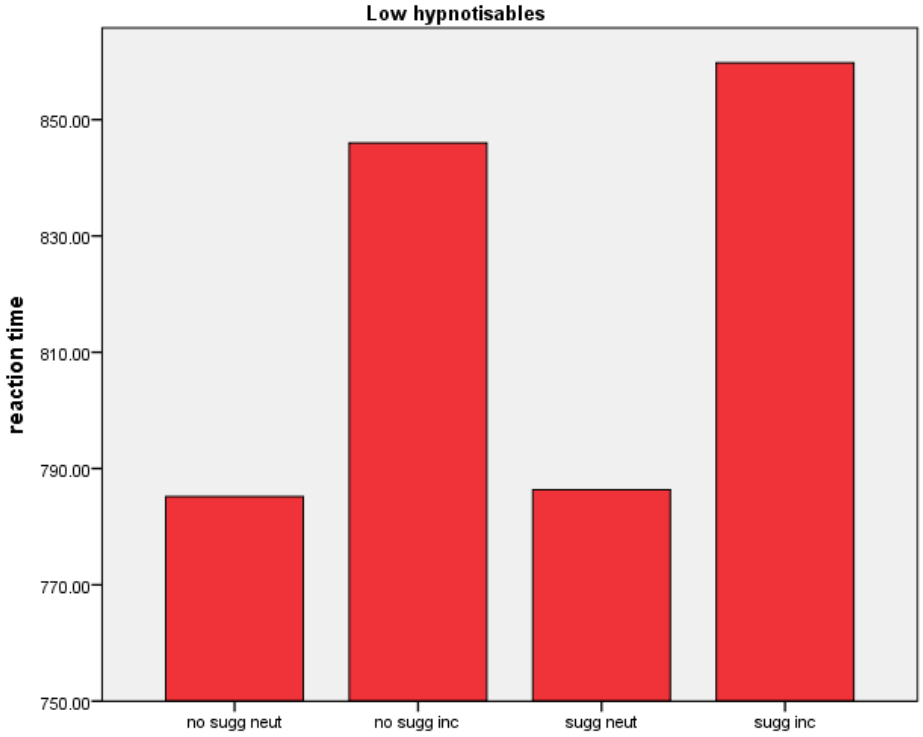
4. Predictions and tests of cold control

Highs



No sugg Suggestion

Lows



No sugg Suggestion

Highs show equivalent reduction in Stroop interference as previously with hypnotic induction
Lows show none

Does lack of relevance of induction mean that highs achieve the effect non-hypnotically? Does this support cold control?

Distinguish two uses of “hypnotic”

With versus without a hypnotic induction

Normal action or perception vs altered sense of volition or reality in accord with situational requirements

Distinguish two uses of “hypnotic”

With versus without a hypnotic induction

Normal action or perception vs altered sense of volition or reality in accord with situational requirements

BUT altered feelings of volition and reality can be produced whether or not an induction is used.

THUS the claim by cold control that whatever can be done hypnotically can be done non-hypnotically is not fully tested by induction vs no-induction

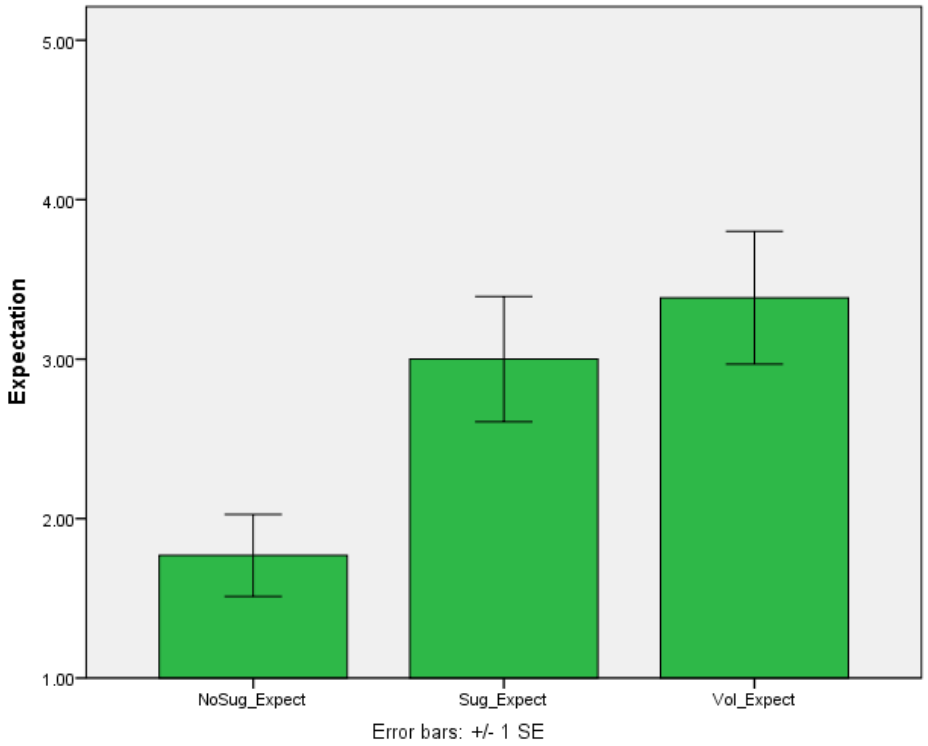
Emily Laurence
Vasundhara Singh
Sasha Watson

Volition condition:

"You can voluntarily create the experience of the script being meaningless, and you can experience the script being meaningless as your imagination which is under your control"

Subjects rated:
How strongly they expected to experience the script as meaningless;
The extent to which they experienced the script as meaningless;
How much control they had over that experience;

4. Predictions and tests of cold control

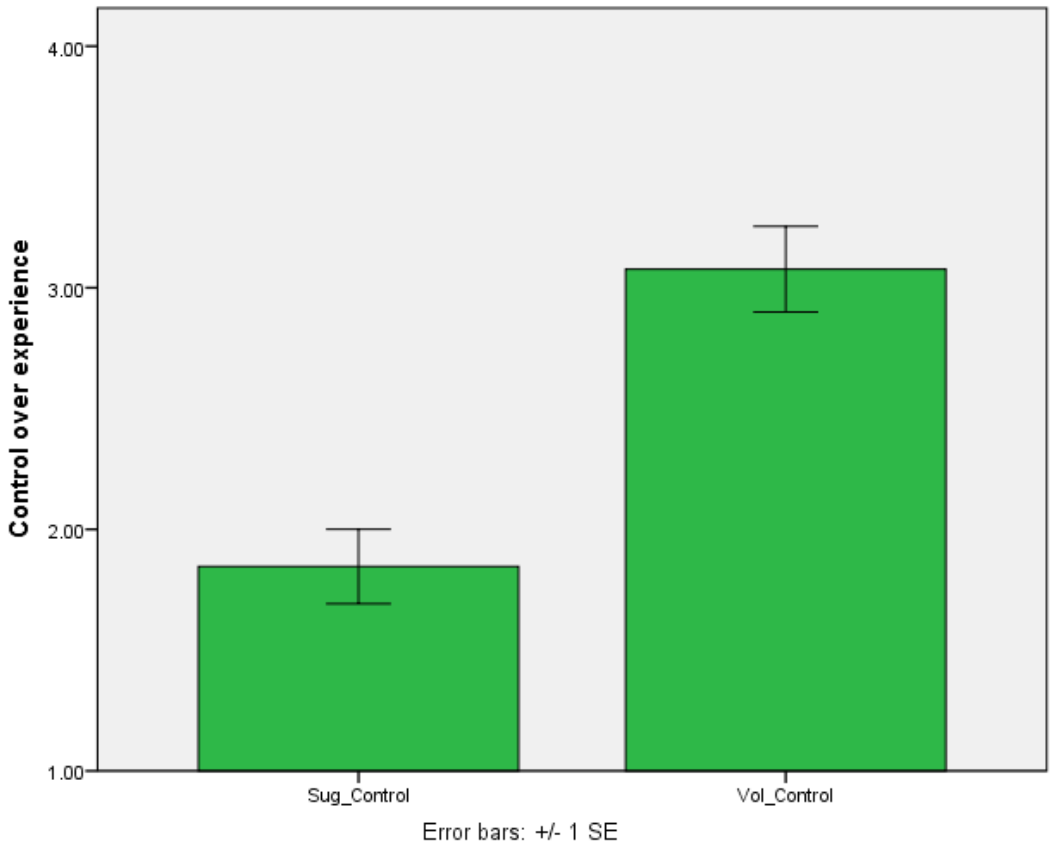


No Sugg Sugg Volition

Equal expectation for experiencing the script as meaningless in hypnotic and voluntary conditions

4. Predictions and tests of cold control

Complete control over whether words meaningful



No control over whether words meaningful

Sugg Volition

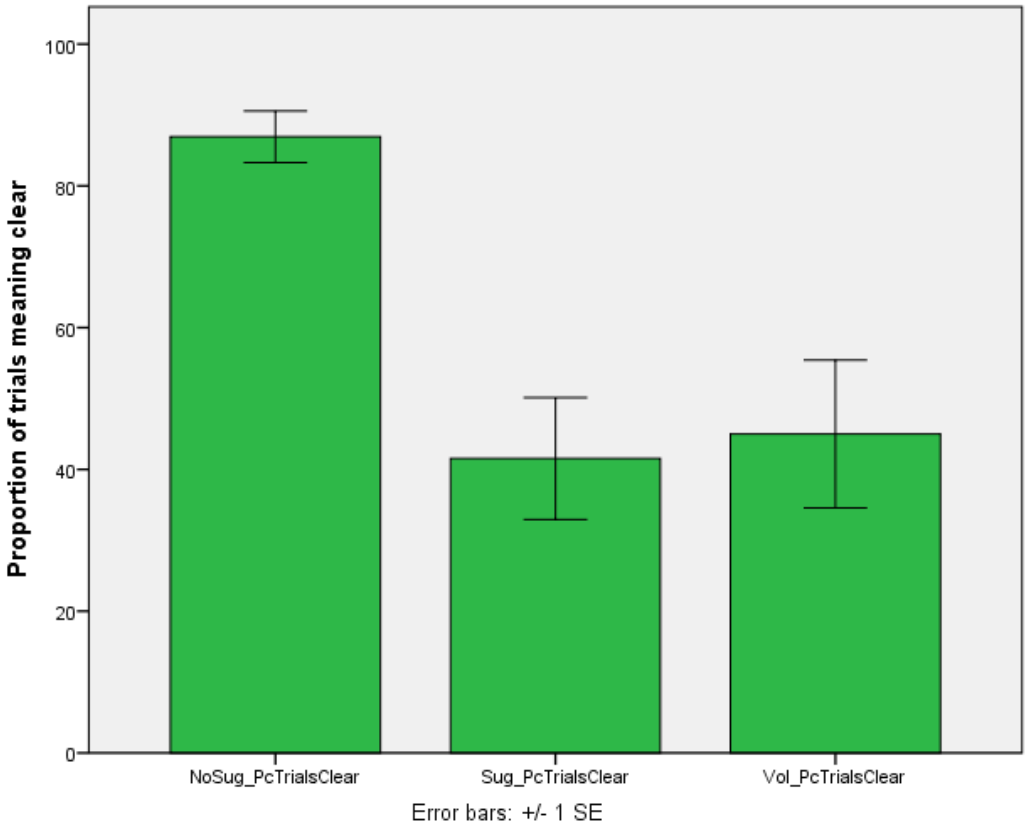
Conditions differed in experienced control

We have established conditions for testing cold control:

If cold control is right, subjects will be able to experience the script just as meaningless in the Volition condition as in the Hypnotic suggestion condition

If they cannot get the same effect in both conditions, cold control theory is wrong. There is more to hypnosis than metacognition (being unaware of one's intentions)

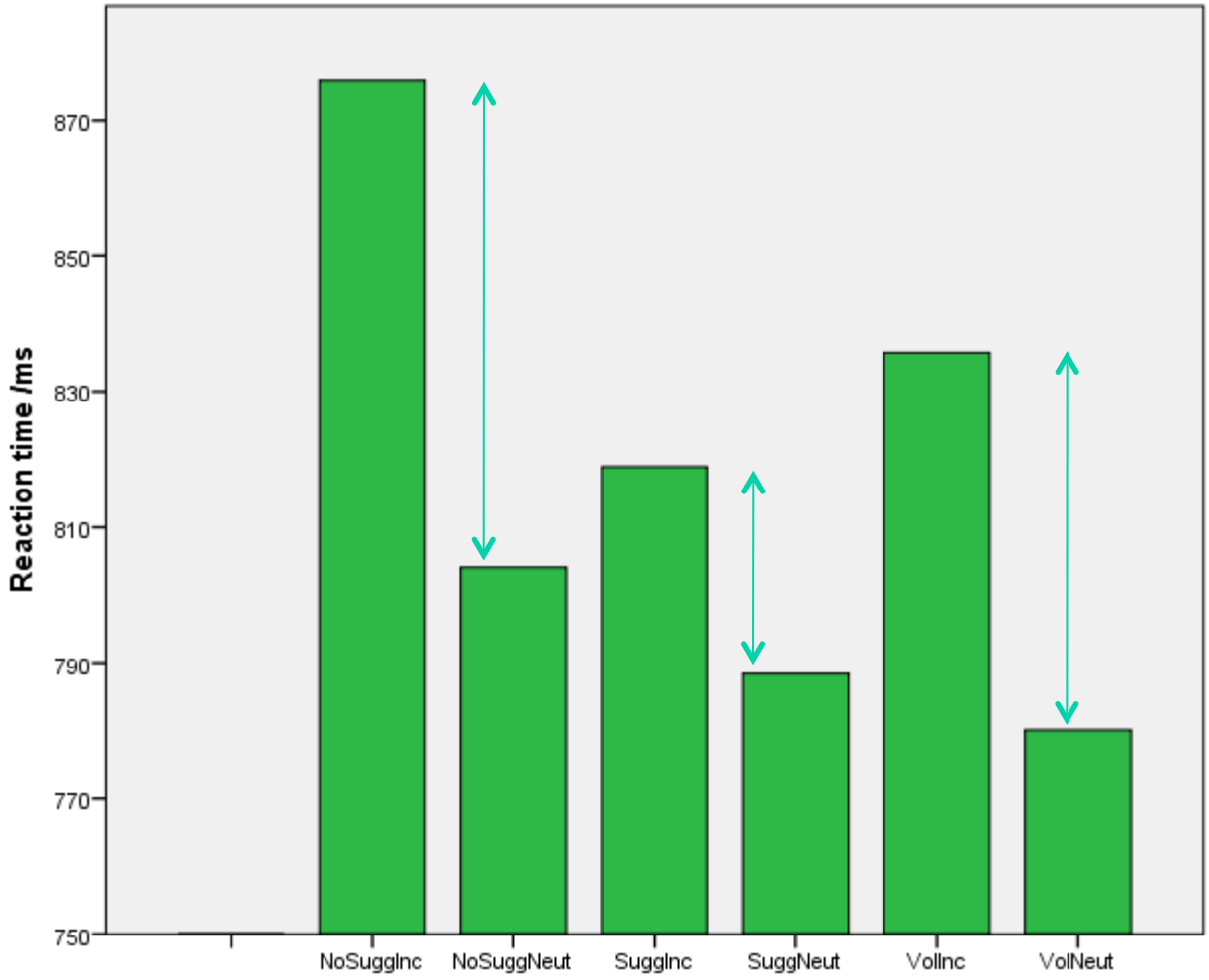
Proportion of trials word meaning was clear



No Sugg Sugg Volition

Similar subjective response between hypnotic and volitional suggestion conditions

4. Predictions and tests of cold control



No Sugg Sugg Volition

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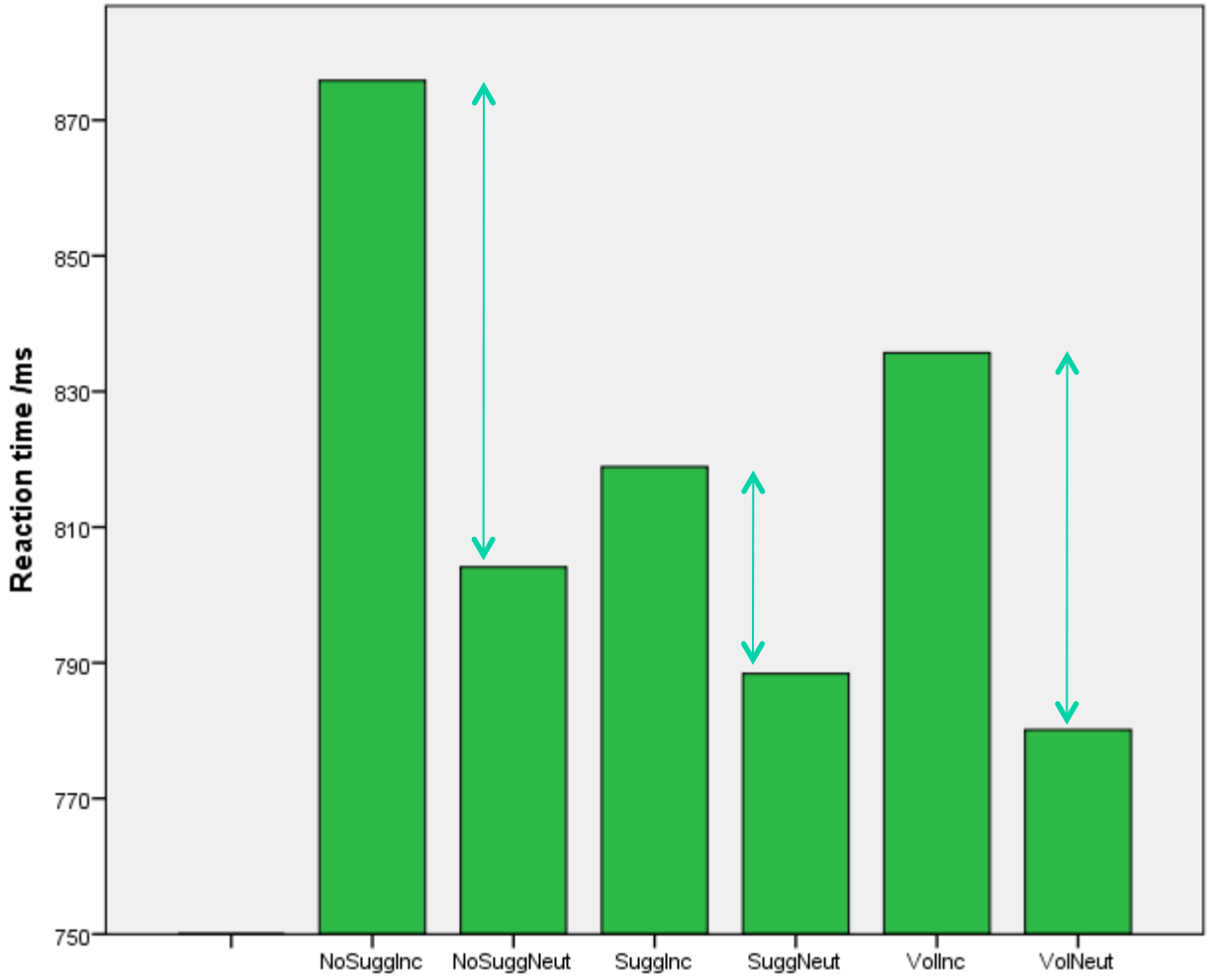


No Sugg Sugg Volition

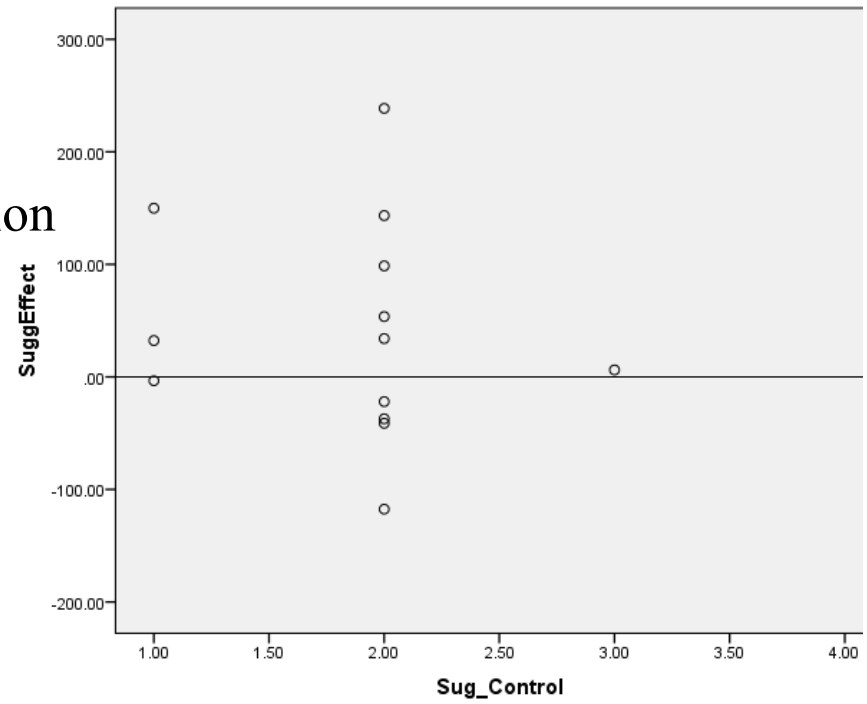
Interference effect for volition non-sig different from each of hypnotic and no-suggestion conditions: Need more data!

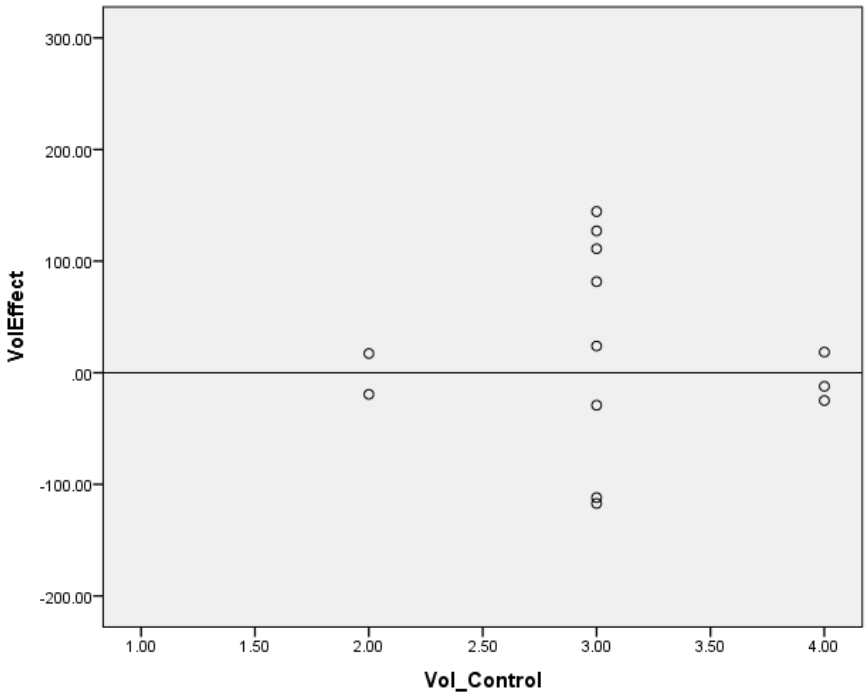
4. Predictions and tests of cold control

Hypnotic suggestion

Volition

Stroop reduction





Rated degree of control

B = -24 ms/unit p = .64

B = -6 ms/unit p = .87

No relation detected between size of Stroop reduction and felt control (consistent with cold control theory)

– but data are insensitive

Summary.

- Disrupting brain areas subserving metacognition facilitates hypnotic responding

- Meditators (who practice metacognitive skills) have low hypnotisability

⇒Link between hypnosis and metacognition?

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- Disrupting brain areas subserving metacognition facilitates hypnotic responding

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Highs can remove the Stroop effect hypnotically – is hypnosis adding more than inaccurate HOTs about intentions?

Whether people can remove the Stroop effect in a way that feels voluntary remains to be established – and the fate of cold control hangs in the balance!

Thank you

Alcohol study

Suggestion	Placebo (SEM)	Alcohol (SEM)	
Rigid arm	2.53 (.41)	3.82 (.31)	$t(30) = 2.53$, $p = .017$
Posthypnotic suggestion	0.73 (.25)	2.06 (.47)	$t(30) = 2.42$, $p = .022$
Negative hallucination	0.40 (.16)	1.71 (.50)	$t(30) = 2.36$, $p = .025$
Heavy arm	3.73 (.37)	4.53 (.15)	$t(30) = 2.08$, $p = .047$
Arm immobilisation	2.60 (.34)	3.41 (.24)	$t(30) = 1.99$, $p = .056$
Sour taste	1.67 (.35)	2.41 (.31)	$t(30) = 1.61$, $p = .119$
Magnetic hands	3.27 (.32)	4.00 (.24)	$t(30) = 1.87$, $p = .172$
Posthypnotic amnesia	1.67 (.39)	2.24 (.32)	$t(30) = 1.15$, $p = .259$
Mosquito hallucination	1.07 (.36)	1.12 (.27)	$t(30) = 0.12$, $p = .91$

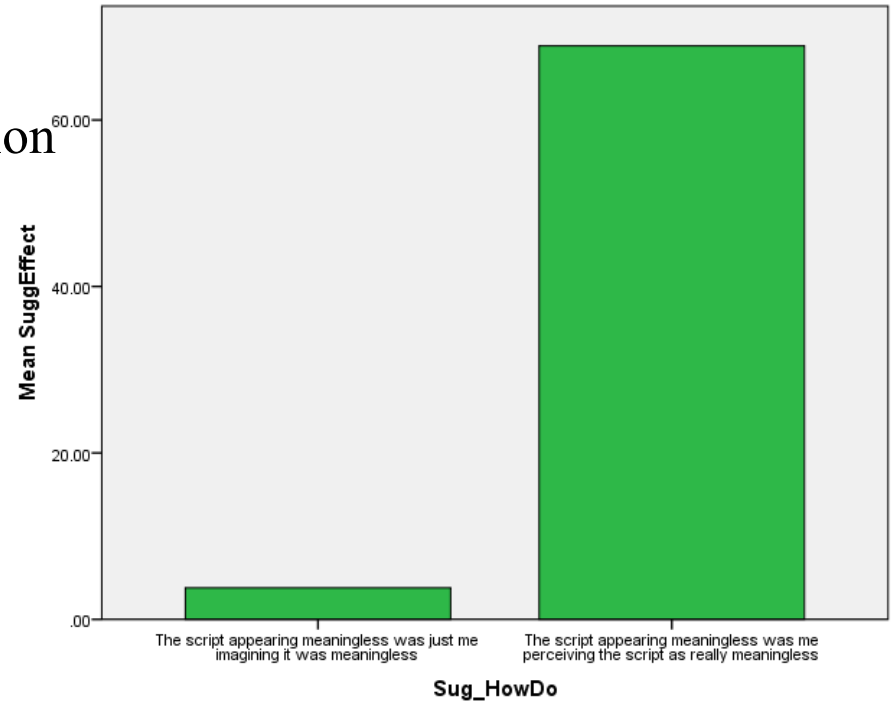
The script appearing meaningless was me:	Suggestion	Volition
imagining it was meaningless	5	6
perceiving the script as really meaningless	7	7

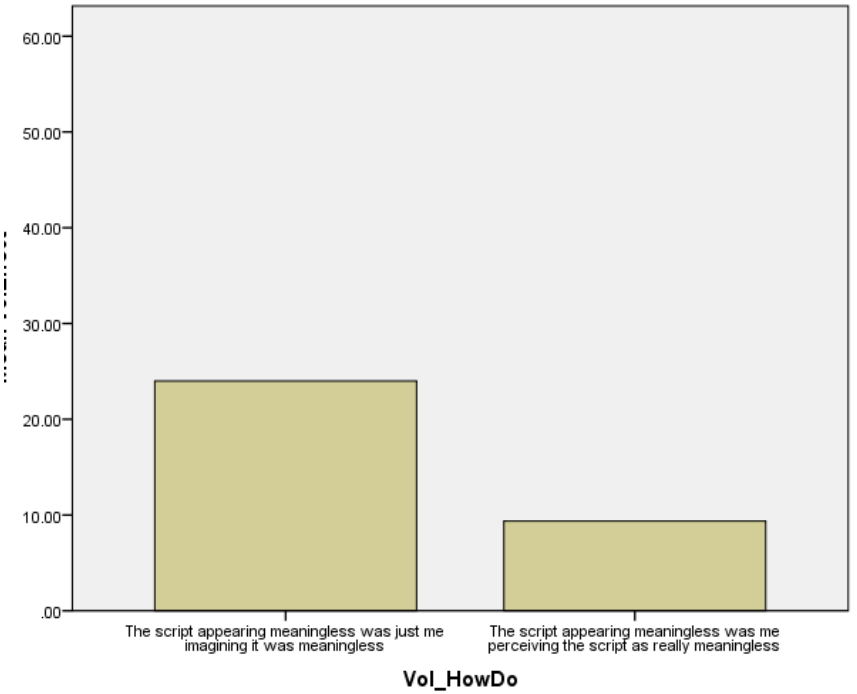
Non-sig difference between conditions in experience of effect as imagination versus perception – we need stronger instructions?

Hypnotic

Volition

Stroop reduction





t(10) = 1.1

t(11) = .31

Hypnotic and Volitional conditions achieved differently? (All non-sig though)