UNCONSCIOUS REWARD SPEEDS CONSCIOUS ACCESS WITHOUT CONSCIOUS PREFERENCE

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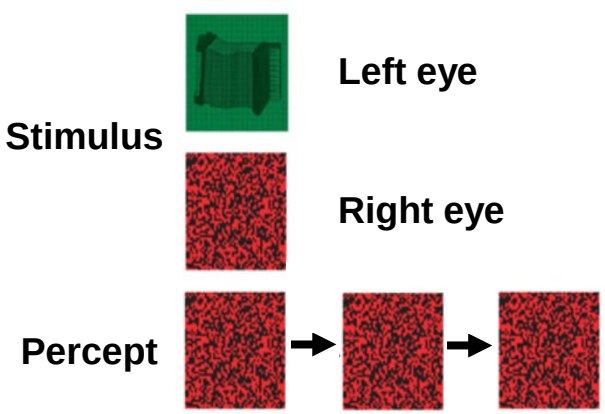
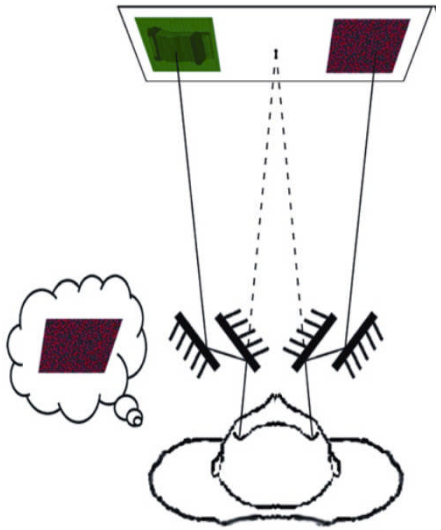
Continuous Flash Suppression (CFS)

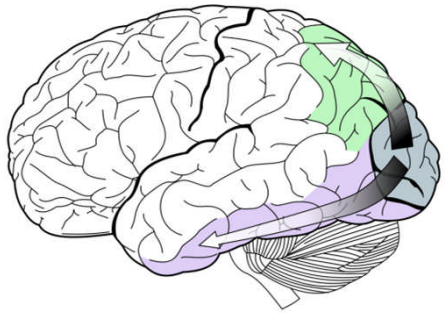
Tsuchiya & Koch (2005) Introduced CFS permitting extended unconscious exposure





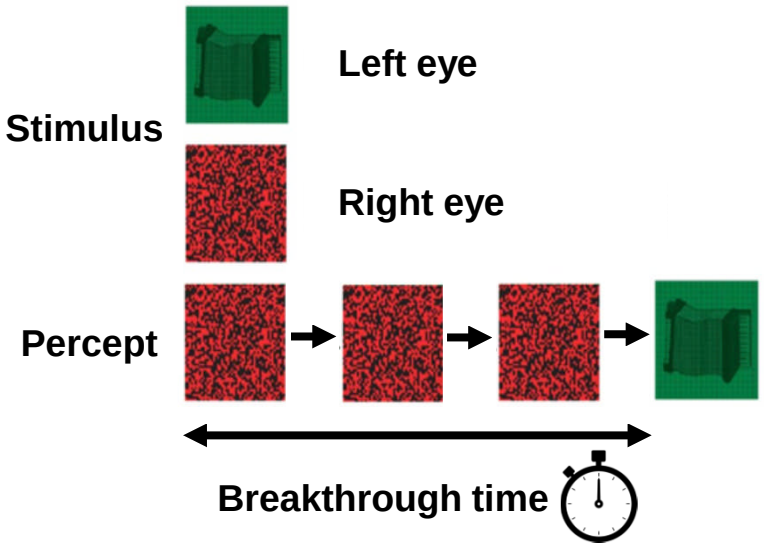
If anything CFS was found to be too effective at suppressing unconscious processing for use in typical priming studies

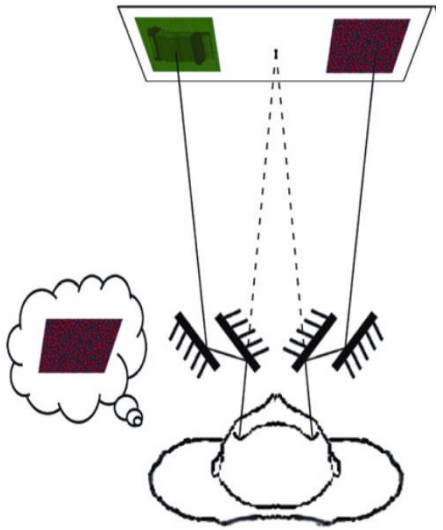
Fang & He (2005) showed it to largely eliminates visual processing via the ventral stream



Breakthrough CFS (b-CFS)

Jiang et al (2007) introduced breakthrough CFS (b-CFS)





Several subsequent studies demonstrate apparently high-level properties processed unconsciously e.g. Mudrik et al (2011)

(Though see Gayet, Van der Stigchel & Paffen, 2014)

Salience and Continuous Flash Suppression

Loosely defined, the *salience* of the image or image feature appears to play a central role.

Familiar over unfamiliar faces

(Gobbini et al, 2013)

Faces orientated towards over averted

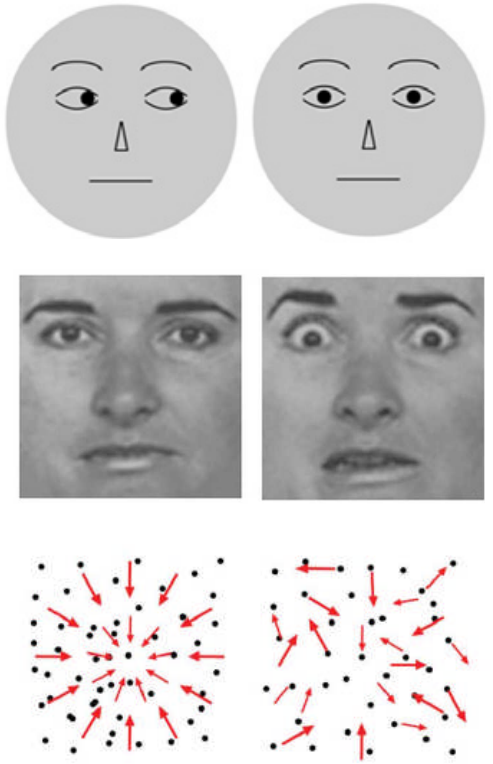
(Chen & Yeh, 2012)

Fearful faces over neutral

(Yang et al., 2007)

Coherent over random motion

(Kaunitz et al., 2013)

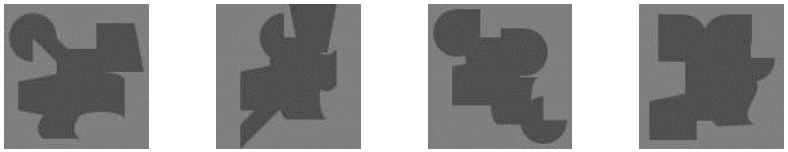


Question

Can a *novel*, *neutral* stimulus acquire salience without ever being consciously perceived?

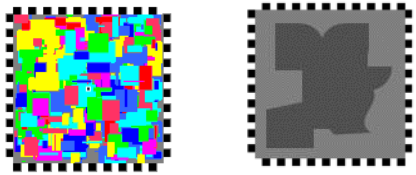
Experimental Approach

- **Employ completely novel and neutral stimuli**



- **Attempt to influence their salience by unconsciously pairing them with reward**

- **Then examine the relative speed with which they breakthrough CFS**



Stimuli

Set 1

Set 2

Set 3

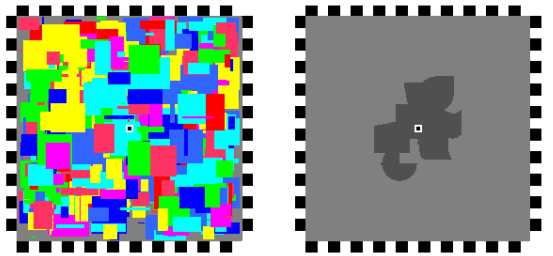
Set 4

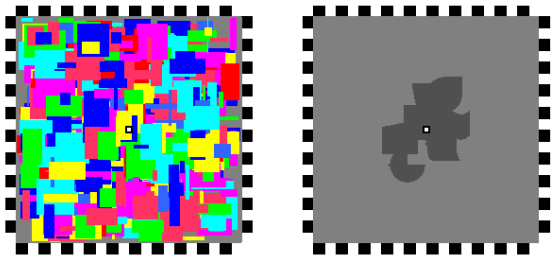
One of each set of three is randomly assigned to be:

- **Unconsciously paired with reward**
- **Unconsciously paired with non-reward**
- **Not given any unconscious exposure**

Unconscious Exposure Trials

Unrewarded Trial





Shape appears under CFS

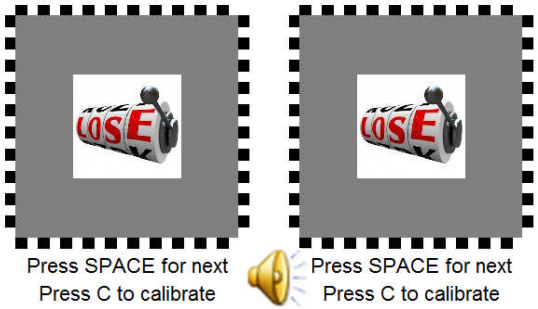
(total 1000 ms)

Fixation dot changes colour

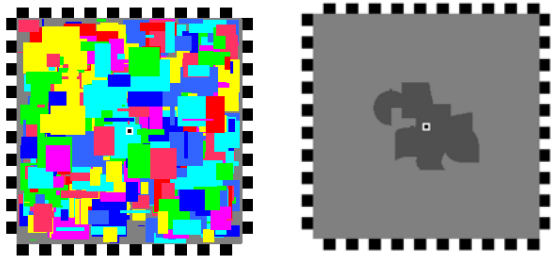
(500 ms after shape appears

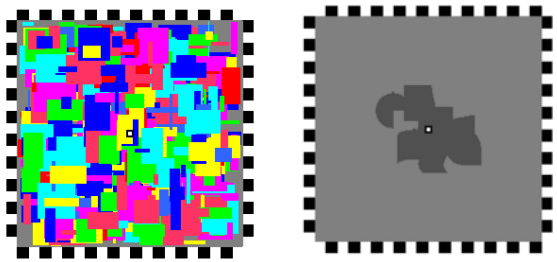
Participant presses Space Key

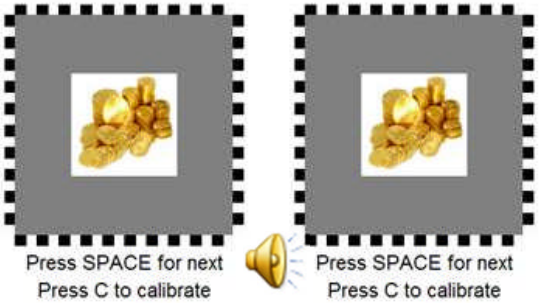
Win or Lose is signalled



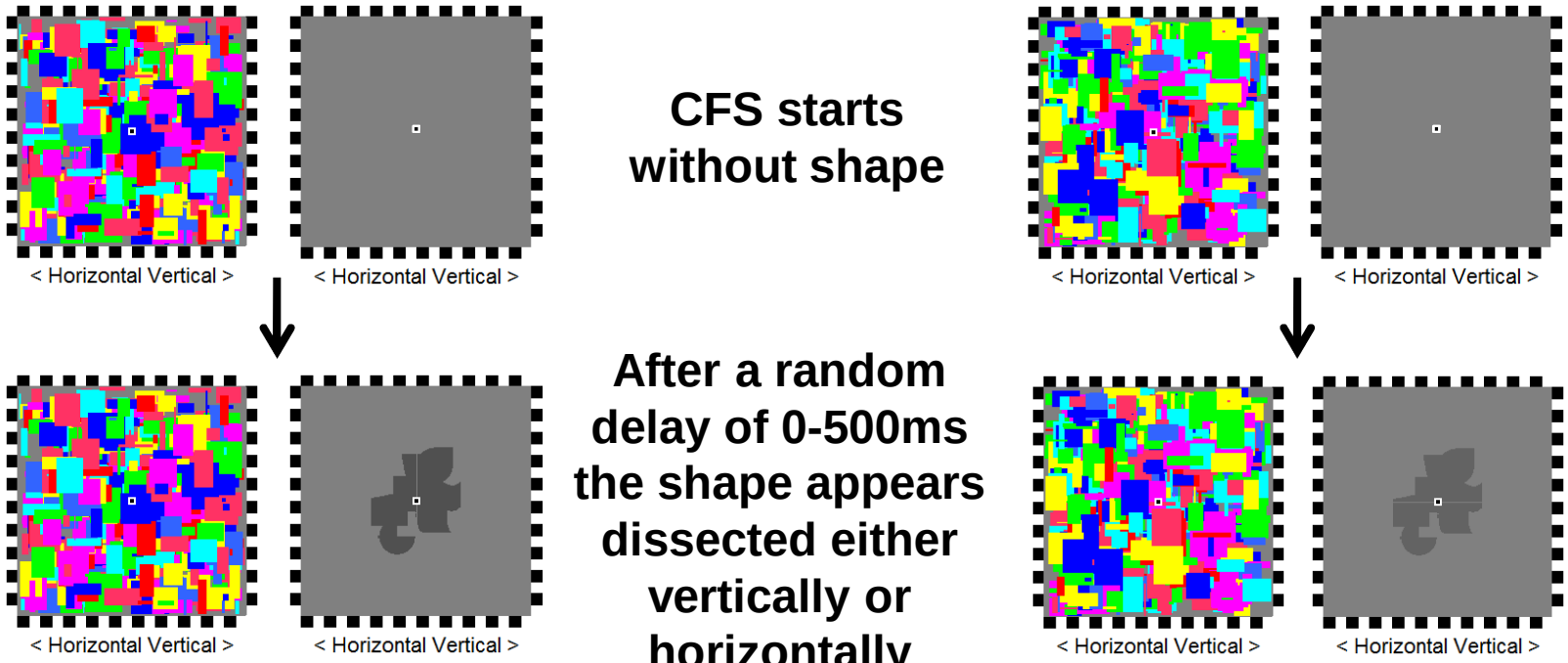
Rewarded Trial







Breakthrough Trials



Participants respond using the arrow keys to indicate the orientation of the line once the shape breaks through.

Breakthrough takes on average of 4.4 seconds

Pleasantness Ratings

Each of the 4 shapes in each of the 3 different orientations is presented in random order and rated on a visual analogue scale

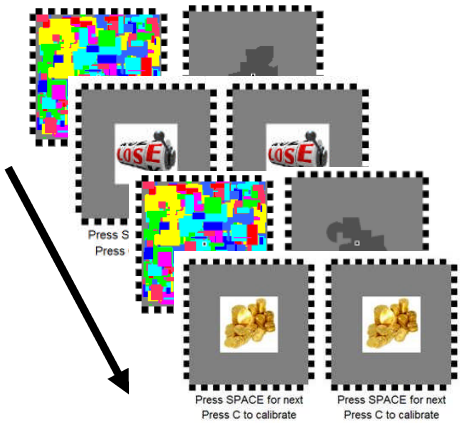
How pleasant do you find this image?

Not at all ——————————————— **Extremely**

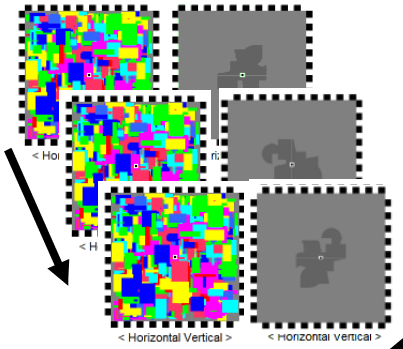
Method Summary

4 Blocks
1 for each shape

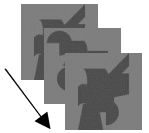
60 Unconscious Exposure Trials
1 orientation rewarded, 1 not



3 breakthrough trials
1 for each orientation



12 VAS ratings
1 for each shape x orientation



Not at all ——— Extremely

EXCLUSION CRITERIA

Participants

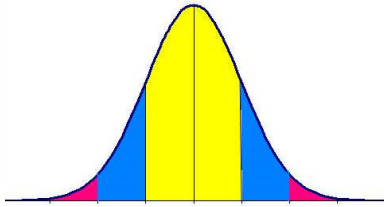
Participants were excluded if they failed to correctly classify the line orientation on the breakthrough trials on greater than 60% of trials (*N* = 5).

If they weren't getting this right most of the time then we can't trust that they were waiting until the shape had actually broken through.

The mean percentage of errors for those not excluded was just 9%.

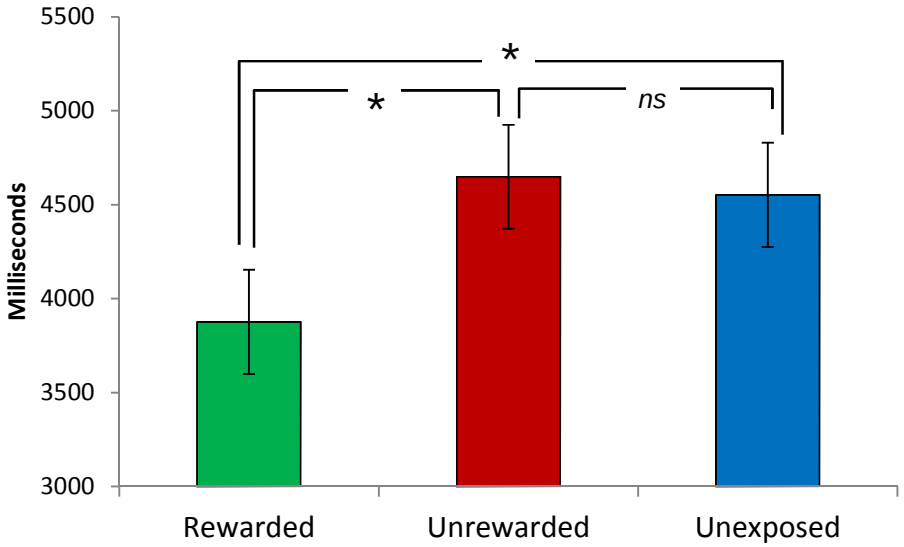
Trials

Trials were excluded where reaction times were greater than 2 SD from the mean for that participant (*M* = 5%).



RESULTS

Reaction Times in Breakthrough Task



We see an effect consistent with stimuli subliminally paired with reward acquiring 'unconscious salience', as supported by faster conscious access.

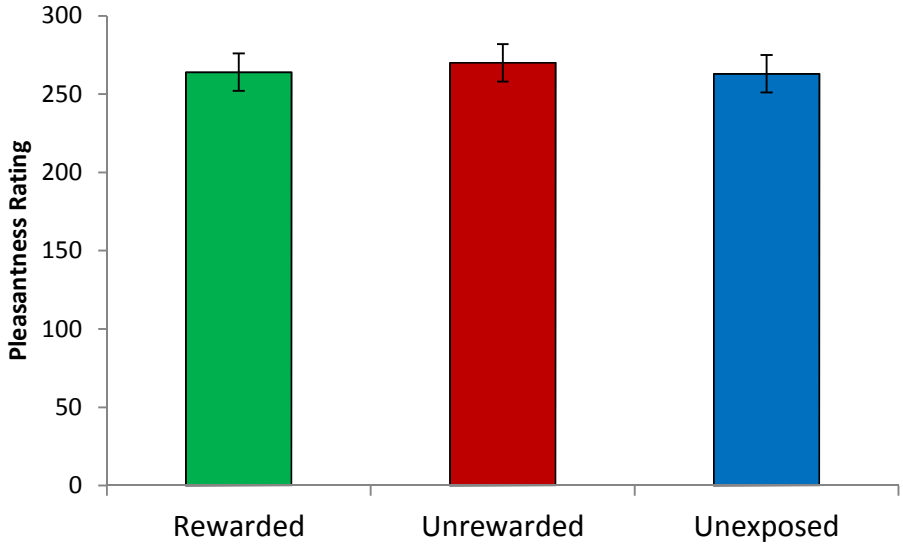
Rewarded vs. Unrewarded
Mdiff. 773 ms, $t(54)=2.23$, $p=.030$, $dz = 0.30$

Rewarded vs. no prior exposure
Mdiff. 676 ms, $t(54)=2.64$, $p=.011$, $dz = 0.36$

Unrewarded vs. no prior exposure
Mdiff. 98 ms, $t(54)=0.43$, $p=.667$, $dz = 0.06$

RESULTS

VAS RATINGS of Pleasantness (1-600)



Reward vs. Non-reward,
Mdiff. -6, $t(54) = 0.44$, $p = .664$, $dz = 0.06$

Reward vs. no prior exposure,
Mdiff. 1, $t(54) = 0.07$, $p = .946$, $dz = 0.01$

Non-reward vs. no prior exposure,
Mdiff. 6 ms, $t(54) = 0.51$, $p = .614$, $dz = 0.06$

Despite the significant influence on conscious access there is no influence on subjective liking for the stimuli. There is no evidence of the unconscious mere-exposure effect.

CAUTION
The stimuli were seen at breakthrough. A future study needs to examine liking effects without that prior breakthrough exposure.

CONCLUSIONS

- **Salience – using the working definition of something of relatively greater value or relevance – does appear to increase the speed of conscious access.**
- **Stimuli do *not* need to have been consciously perceived to acquire such valued status.**
- **Novel, neutral stimuli can acquire 'unconscious salience' without ever being consciously perceived.**
- **This can potentially occur without any detectable change in the conscious valence of the stimuli (requires further testing).**

Even small rewards work when accompanied by misleading pictures!

THANK YOU

Collaborator

Anil Seth

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

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