

Differential Neural Responses to Overt and Covert Presentations of Facial Expressions of Fear and Disgust

M.L. Phillips et al. (2004)
NeuroImage 21, 1484–1496

- Looked at how conscious and unconscious information processing differs
- Human facial emotional expression
 - Fear
 - Disgust
- Psychophysical and fMRI experiments

Previous Research:

- Double dissociation for conscious perception
 - Fear activates amygdala but not insula
 - Disgust activates insula but not amygdala

This study:

- How does brain activity differ in relation to the distinction between conscious and non-conscious processing?
- Using fMRI, they looked at activation patterns to facial expressions when they are processed above or below the level of conscious awareness.

Thresholds:

- Masking Procedure
 - Neutral expression presented for 100 ms immediately after the target expression
- Length of time that the target expression is presented for is altered to allow it to be either consciously or unconsciously processed.

Thresholds:

- Discrimination
 - The point at which participants cannot tell apart a fearful expression from a neutral expression
- Detection
 - The point at which participants notice whether any type of face was presented at all
- Above-chance accuracy

Target – mask pairs:

- Fear – neutral
- Disgust – neutral
- Neutral – neutral

Psychophysical Experiments:

- 1) Varied the interval between the onset of the target and the onset of the mask (= stimulus onset asynchrony = SOA)
 - 20, 30, 50, 90, 170 or 330 ms
 - Mask always presented for 100 ms
 - No interval between the two
 - 1 target – mask pairs presented every second

Psychophysical Experiments:

- 2) Target duration AND mask duration varied
 - Mask duration: 50, 100 or 150 ms
 - Forced-choice decision: fear or disgust
 - Confidence rating: scale 1-9

Psychophysical Experiments:

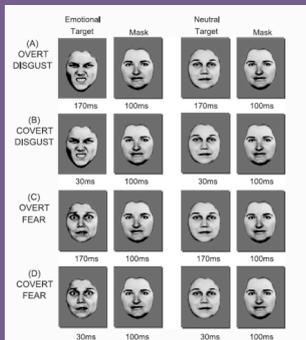
- Results showed that recognition of target expression was not significantly above chance at 30 ms, but reached consistent significantly above chance accuracy at 170 ms for both fear and disgust.

Psychophysical Experiments:

- Confidence ratings were only significantly over 5 at 170 ms.
- When mask was only presented for 50 ms, participants were able to identify the target expressions at the shorter durations. Showed that 50 ms provides inadequate masking.

fMRI Experiment:

- Covert or overt fear, disgust or neutral target followed by a neutral mask
- Covert = 30 ms
- Overt = 170 ms
- Mask = 100 ms
- Did not make any judgements on the presented expressions



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Debriefing:

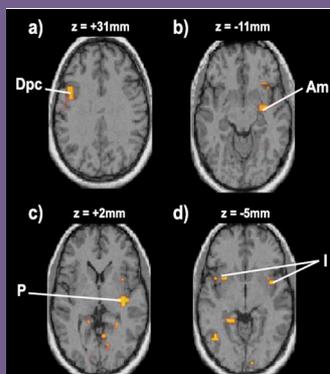
- Participants claimed to be aware of fear and disgust expressions in the overt condition
- They were able to identify the emotional faces they saw during scanning from a choice of seven different expressions

Results:

- Activation in the right amygdala in response to overt fear (but not covert fear)
- Regions involved in visual processing showed activation to both overt and covert fear

Results:

- Activation in the bilateral insulae in response to overt disgust (but not covert disgust)
- Activation seen in the right thalamus and putamen in response to covert disgust
- Visual Processing areas show activation to both



- a)= covert fear
 b)= overt fear
 c)= covert disgust
 d)= overt disgust

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Fully conscious:

- Findings support previous research
 - Fear activates the amygdala
 - Disgust activates the insula
 - Double dissociation

Non-conscious:

- Fear does not activate the amygdala
- Disgust does not activate the insula

Why?

- Fear
 - Pessoa et al. (2002) – If considerably larger demands are made upon attentional resources then amygdala activation to fear expressions is eliminated
 - Possible that the effective manipulation of attention/awareness in this study has a similar effect on amygdala activation

Evaluative Points:

- Thresholds ✓
- Covert definition ✗
- Disgust with fMRI ✓
- Challenges existing theories ✓