

# Processing of threatening bodies under different levels of perceptual awareness

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## **Introduction and Aim**

Substantial evidence has been gathered over the years about affective stimulus processing outside awareness in cortically blind subjects as well as in healthy participants<sup>1</sup>. However, these findings are often criticized for being artifacts of the methods used to assess awareness<sup>2</sup>. In addition, there is substantial controversy regarding whether perceptual awareness is a graded or a dichotomous phenomenon<sup>3</sup>. Here, we investigate the processing of threat stimuli (fearful vs. neutral body expressions) in healthy participants using a continuous flash suppression (CFS) paradigm and a 7T scanner. By using a finer measure to assess perceptual awareness, we were able to test not only whether affective processing can occur under perceptual unawareness but also whether perpetual awareness shows a gradual or a dichotomous pattern, both behaviorally and at the brain level.

## **Materials and Methods**

- Healthy participants (N=17)
- CFS paradigm
- Stimuli: fearful vs. neutral body expressions
- Task: emotional recognition task (fear vs neutral) + Perceptual Awareness Scale (PAS) rating (no experience, brief glimpse, almost clear experience and clear experience)<sup>4</sup>
- Event-related design
- 7T scanner (1.2mm<sup>3</sup>)

## **Behavioral Results**

• Behavioral responses were objectively characterized with signal detection theory measures<sup>5</sup> (h: hit; m: miss; fa: false alarm; cr: correct rejection; d': sensitivity; c: criterion bias). H' = (h + 0.5) / (h + m + 1)



## **Brain Results**

• A group ANOVA revealed a significant main effect of perceptual awareness in early visual areas as well as in temporal, parietal and inferior frontal regions and amygdala.



- In early visual areas, activity decreased with increased body perception while EBA, FBA, pSTS, IFG and IPS showed an increase in activity as a function PAS.
- The activity of the amygdala also increased with clearer subjective visual experience and did not differ from zero during non-conscious perception.
- None of the ROIs modulated by perceptual awareness showed an effect of emotion, including amygdala.





- We found behavioral support for a gradual account of perceptual awareness:
  - Instead of clustering at the outermost ends of PAS, participants' responses showed a more spread-out distribution, indicating a continuum of intermediate states of perceptual awareness.
  - Participants' ability to discriminate fearful from neutral body expressions showed a linear relationship to the four types of perceptual awareness, as recognition sensitivity increased as participants became subjectively more aware of the stimulus and its identity.
- We found no behavioral evidence of body processing under perceptual unawareness: sensitivity values differed from the chance level at all PAS levels with the exception of "no experience" (i.e., PAS1).



 To test whether perceptual awareness is a gradual or a dichotomous phenomenon, two linear mixed-effects models were fit to each ROI with predictors resembling each phenomenon, respectively. LOTC(r) activity was better described by a gradual model while mIPS(I) and IFC(I) responses were best described by a dichotomous model. The activity in the SOG across PAS levels was found to be different for the neutral (preference for gradual) and fearful (preference for dichotomous) body expressions. The rest of the ROIs did not show a significant preference for either of the models.

#### Conclusion

We found a corticocortical network constituted by the fronto-parietal and temporal cortex involved in perceptual stimulus awareness, in line with previous work<sup>6,7</sup>. Different relationships to perceptual awareness were observed in fronto-parietal areas (dichotomous) and temporal regions (gradual) suggesting different roles: IFC and IPS may only detect perceptual conflict when the competing stimulus representations are perceptually different, leaving sensory areas in charge of resolving perceptual conflict when that is not the case<sup>8</sup>. In addition, our results argue against perceptual discrimination without subjective report in neurologically intact observers and support the view of subjective perceptual awareness as a gradual phenomenon.

#### References

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