fMRI of aesthetic experiences with landscape videos

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Introduction

Aesthetic experience is highly idiosyncratic, yet most everyone has the capacity to be aesthetically moved by something.



Aesthetic experiences unfold over time, but our current understanding comes from experiments with static materials (paintings, photography, landscapes) and single post hoc summary judgments)

Brain systems modulated by aesthetic appeal

Previous experiments identified several systems modulated by aesthetic experience [1]



Methods

Experimental Design

- 24 Participants
- 31 landscape clips
- Clip duration: 30 sec Responses recorded with a custom dial with 180° movement

Scanning Details:

- Functional Localizers: Place-Face-Object, MT
- 6 min resting state scan

Trial Structure:





Task:

movie:



movie: the clip."

- What is the role of reward areas?

- 3 mm iso angled slices







Dial with stops on

left and right

L ----

+R

Continuous (moment-to-moment) ratings during watching the

"How much are you enjoying the clip at each moment?"

Overall ratings (summary judgment) after watching the "Indicate an overall judgment of your aesthetic experience of

Behavioral Results

Overall ratings per participant and movie clip:



Continuous ratings

• Participants showed varying degrees of dynamics in their continuous ratings:



Temporal Variability of continuous ratings



Agreement across participants



References [1] E. Vessel, G. G. Starr, N. Rubin, Art reaches within: Aesthetic experience, the self and the default mode network. Front. Neurosci. 7, 1–9 (2013), [2] Isik, A. I., & Vessel, E. A. (2019). Continuous ratings of movie watching reveal idiosyncratic dynamics of aesthetic enjoyment. PLOS ONE, [3] Vessel, E. A., Maurer, N., Denker, A. H., & Starr, G. G. (2018). Stronger shared taste for natural aesthetic domains than for artifacts of human culture. Cognition

$$rmsd = \sqrt{\frac{1}{n}\sum_{i=1}^{n} \left(\nabla t\right)^2}$$

A measure of degree of change (rmsd) in continuous ratings traces showed:

 The temporal variation differed substantially by observer but less so by movie clips [2].

Mean-minus-one (MM1) correlations: Overall rating agreement values are lower than agreement values for continuous ratings [2].

 Agreement values for landscape videos are lower than agreement values for landscape images (MM1=0.60) and similar to values previously reported for images of cultural artifacts (MM1 = 0.31)

Brain Imaging Results





Regions whose activity correlated with ratings found in:

- Right and Left Collateral sulcus (partially overlaps with Parahippocampal place area)
- L Occipital middle gyrus and L Superior Occipital Sulcus
- Pallidum, Putamen and Caudate

Functional Connectivity: Is there increased functional connectivity between a priori ROIs for aesthetically appreciated landscape videos?





Conclusions

Behavioral

 We observed strong individual differences in the nature of temporally evolving aesthetic experiences: Participants not movie clips are the primary factor governing the amount of temporal variation.

• Level of agreement for landscape videos (overall ratings) is similar to that previously reported for images of cultural artifacts (artworks).

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Whole Brain Analysis: Which brain regions show sensitivity to overall aesthetic appreciation of videos?







Increased connectivity found between:

- Visual network and Nucleus accumbens
- Nucleus accumbens, Pallidum and Putamen to OFC

Multiple comparisons correction (nr of edges = 153) returns no statistically significant results.

Whole brain analysis

- Aesthetic appreciation of landscape videos modulates cortical scene network and the conventional reward system.
- This is similar to what has been observed with static materials with the recruitment of additional visual regions.
- No activity found in DMN or in the frontal cortex. Aesthetic experience with landscape stimuli might engage prefrontal regions to a lesser degree.

Functional connectivity analysis

• We found increased functional connectivity between visual regions and NA as well as increased connectivity between NA and OFC.

