

Predicting Music-Induced Visual Imagery Using Occipital Alpha



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Introduction

- Visual imagery has been shown to recruit the same brain areas as visual perception.
- Music can trigger visual imagery formation (Taruffi & Küssner, 2019).
- However, only one case study to date provides evidence that occipital activation accompanies subjective reports of music-induced visual imagery (Fachner et al., 2019).
- In this study, we aimed to fill this gap in the literature and further asked whether nuances of the visual imagery experience are reflected in neural data:
 - Indeed, while the content of much visual imagery reported in response to music is static (e.g. scenes of landscapes; Küssner & Eerola, 2019), some reports emphasize the dynamic aspects of this experience (e.g. visualising scenes of running people or one's self running)

We hypothesised that:

- Static imagery ratings would be negatively associated with occipital alpha levels
- Reports of dynamic imagery would be associated with activity in motor areas.
- Neural correlates of visual imagery formation would change over time

Methods

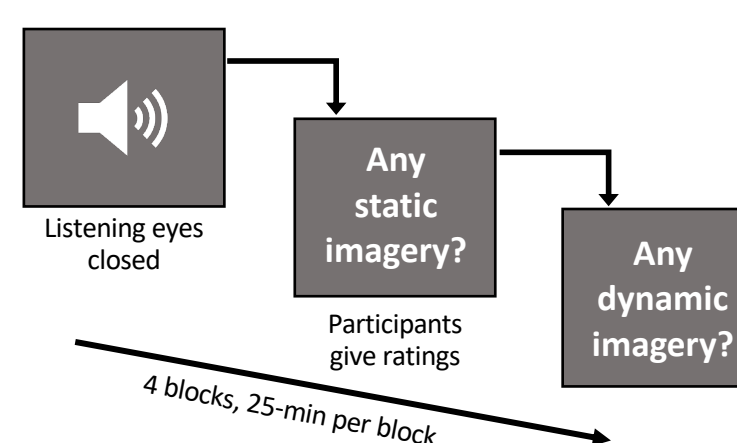
Participants:

- 43 participants ($M = 28.58$, $SD = 5.08$) from a German population

Materials:

- Musical stimuli comprised of 24 excerpts conveying joyful, neutral and fearful emotions (Koelsch et al., 2013)
- Visual imagery experiences measured in terms of **Static** and **Dynamic** imagery along a 0 to 100 continuous scale

Procedure:

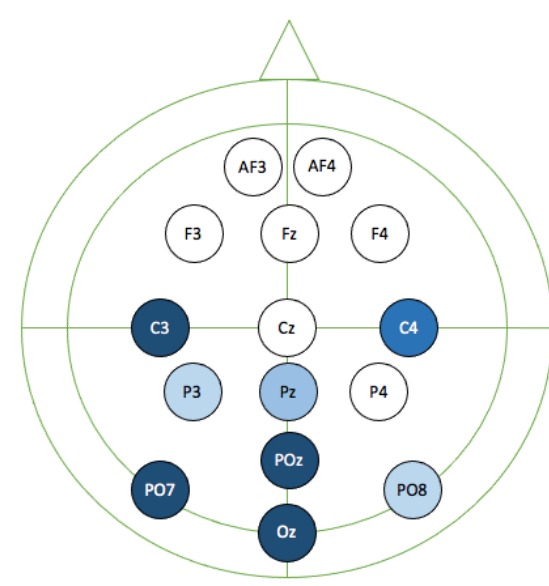
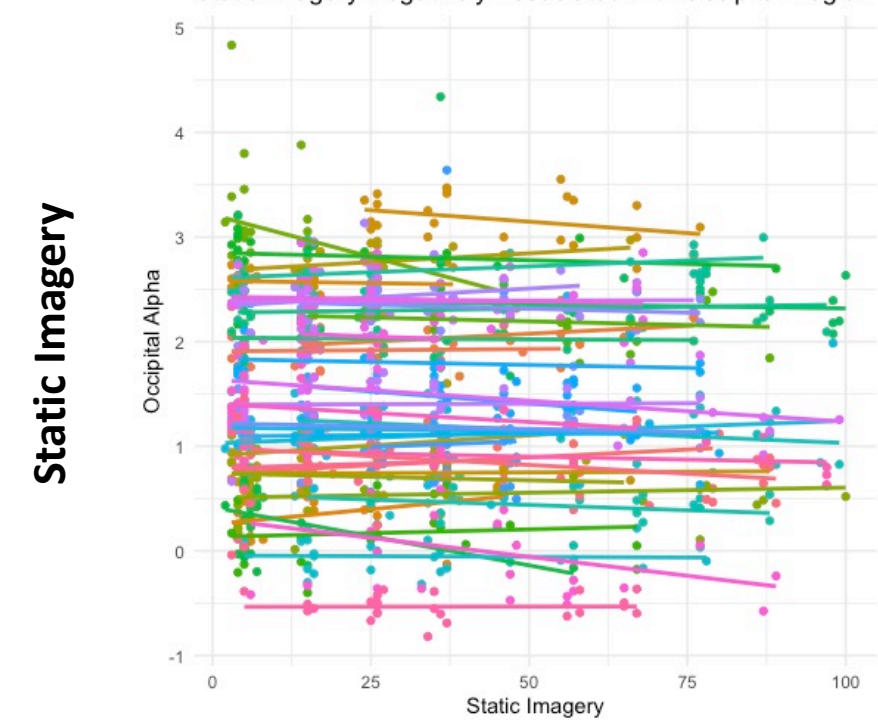


EEG Recording & Analysis:

- 15-Electrodes:
AF3, AF4, F3, Fz, F4, C3, Cz, C4, P3, Pz, P4, POz, PO7, Oz, PO8
- 1. Independent components analysis for artefact removal
- 2. Topography inspection for removal of eye components
- 3. Time frequency decomposition

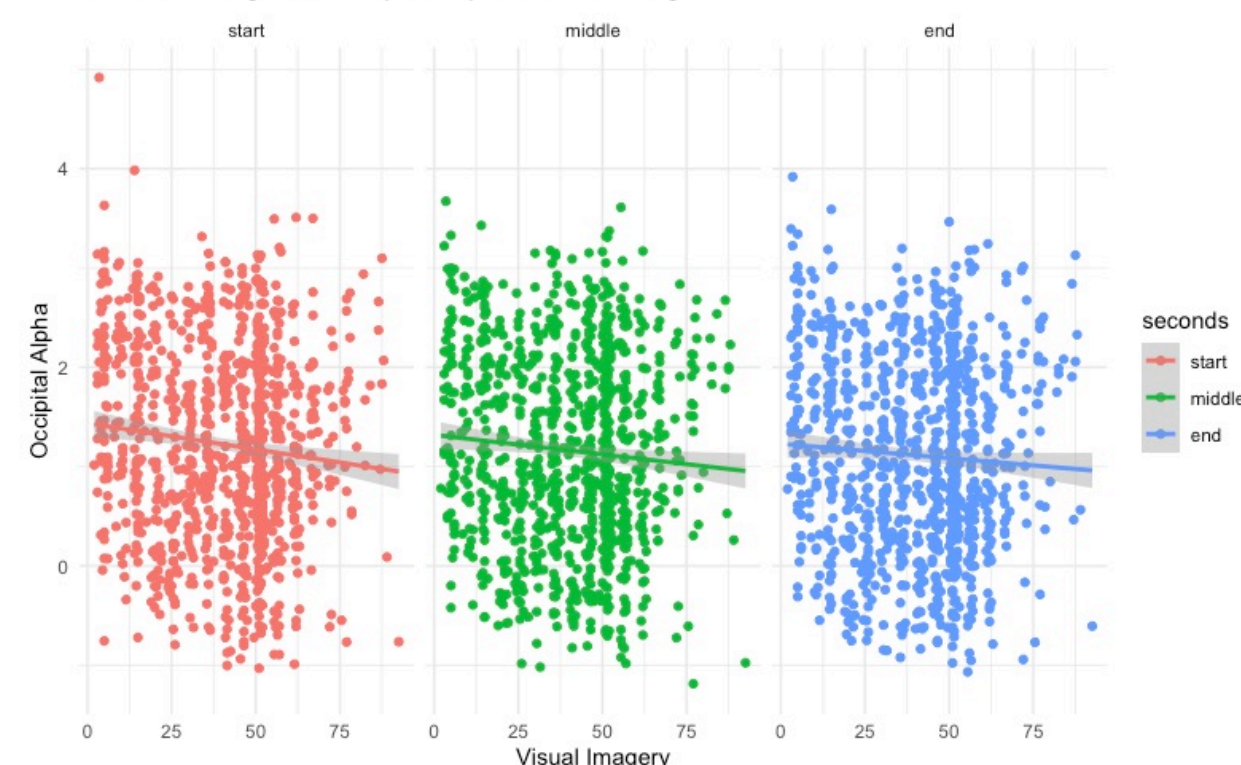
Results

Static Imagery Negatively Associated with Occipital Region



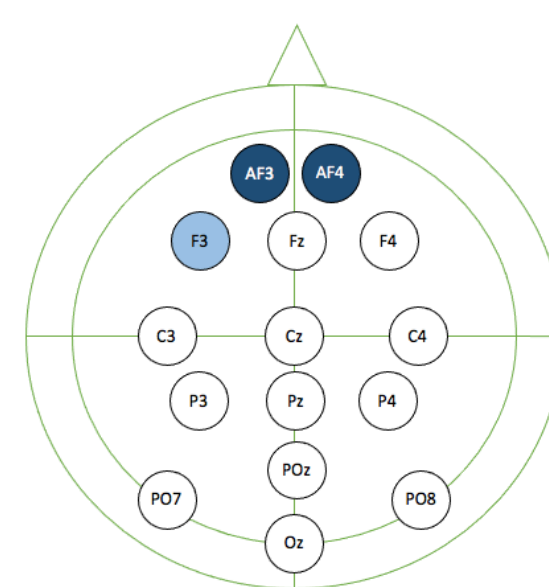
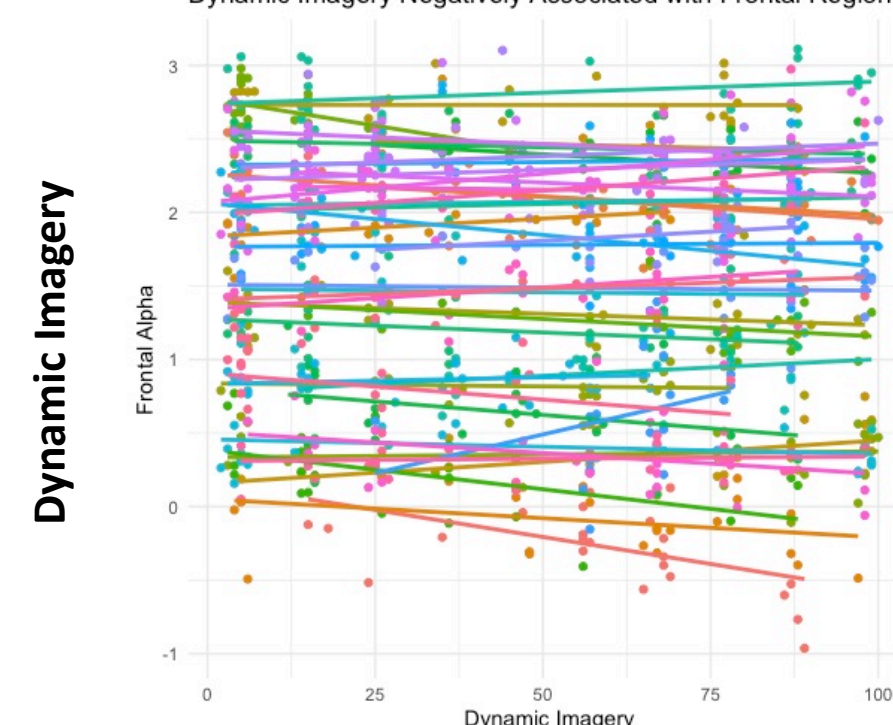
→ Linear mixed models showed static imagery to have a significant **negative** association with occipital areas, as predicted, as well as with parietal and central areas

Increased Negative Occipital Alpha as Trial Progresses



Using the start time window as a reference, occipital alpha levels appear to build towards the end of a trial

Dynamic Imagery Negatively Associated with Frontal Region



→ Linear mixed models showed dynamic imagery to have a significant **negative** association with frontal areas.

	β	SE	t	p
Intercept	1.29	0.14	9.16	< 0.001**
Start	–	–	–	–
Middle	0.00	0.00	1.52	0.127
End	0.00	0.00	2.701	0.032**

Note. * < 0.05, ** < 0.01, *** < 0.001

Discussion

- Static imagery ratings were found to be strongly related to occipital brain areas in line with our hypotheses.
- Findings of parietal activity may be due to the proposed role of spatial awareness and mental rotation during imagery (Thompson et al., 2009; Zacks, 2008).
- That reports of dynamic imagery were additionally associated with frontal areas (not accountable for by eye movements) require further investigation.
- We offer evidence that subjective reports of visual imagery in response to music are observable in neural activity.

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