Visual Perception & Interoception Lab

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The Stomach's Electrical Rhythm Response to Visual Food-Related Stimuli

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INTRODUCTION

- The human body generates various physiological rhythms that may synchronize with neural activity[1].
- The slow gastric rhythm is a repetitive myoelectrical activity that propagates along the stomach's wall to support digestion. It is generated by the Interstitial Cells of Cajal and its normal frequency in humans is ~0.05 Hz[2].
- A recently identified neural network, known as the gastric network, exhibits temporal connectivity to the gastric rhythm[3,4], yet its role and functionality are not well characterized.
- Here, we measured the stomach's electrical response to different visual food-related stimuli to explore gut-brain interactions from a top-down perspective. Specifically, we compared the two halves of each experimental condition to examine potential fluctuations in the effect over time, such as adaptation or sensitization.

METHODOLOGY

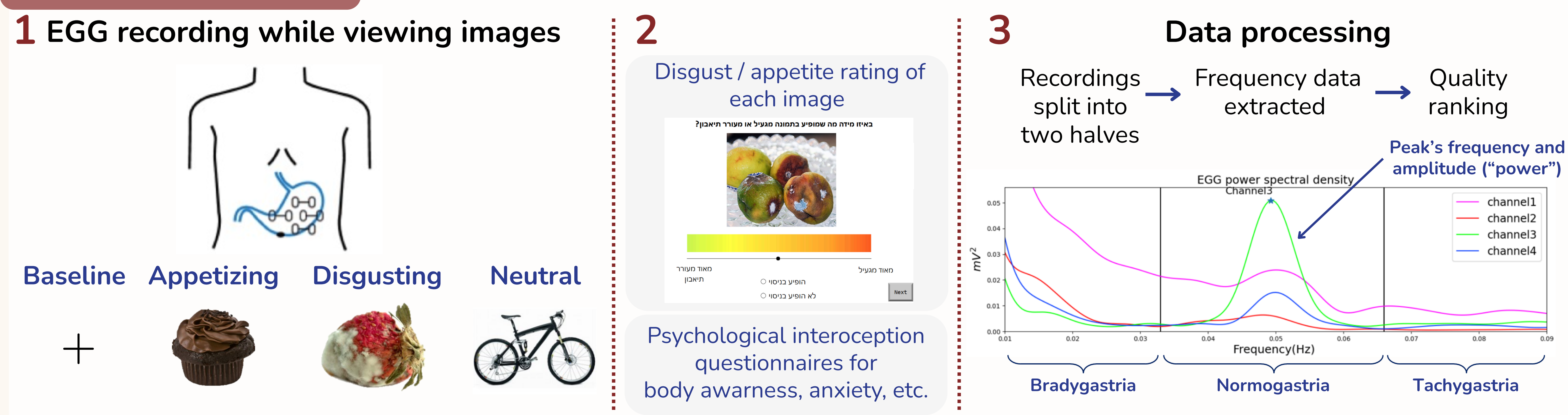
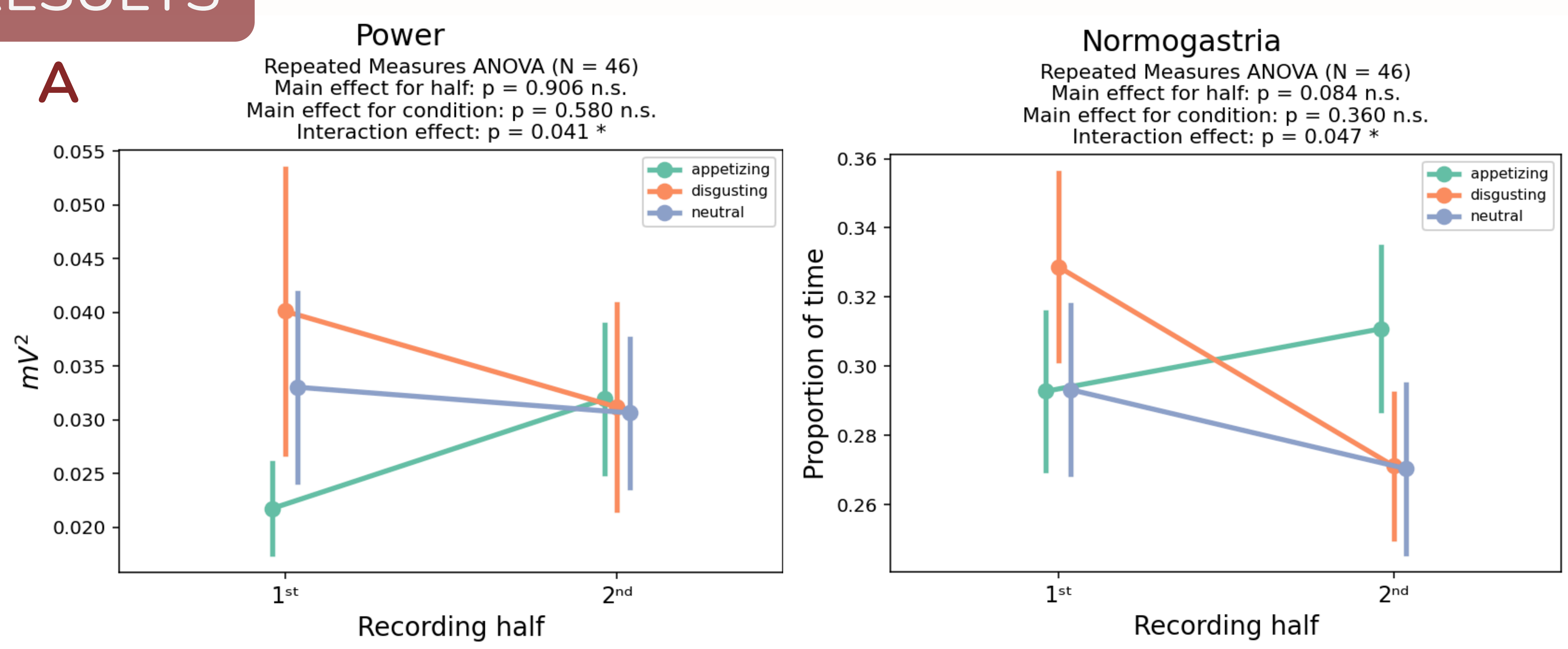


Figure 1 - Study Design: The stomach's electrical activity was recorded for ~1 hour using Electrogastrography (EGG), while participants (N=74) viewed randomized blocks of appetizing, disgusting and neutral images (70 per category). Post-recording, participants rated the degree of appetite or disgust evoked by each image, and answered psychological interoception questionnaires. To capture temporal dynamics, each condition's recording was split into two halves, and frequency distribution was analyzed. For high-quality recordings, the following measures were extracted: the proportion of time spent in each frequency range, and the amplitude ("power") and frequency of the peak within the normal range (normogastria).

RESULTS



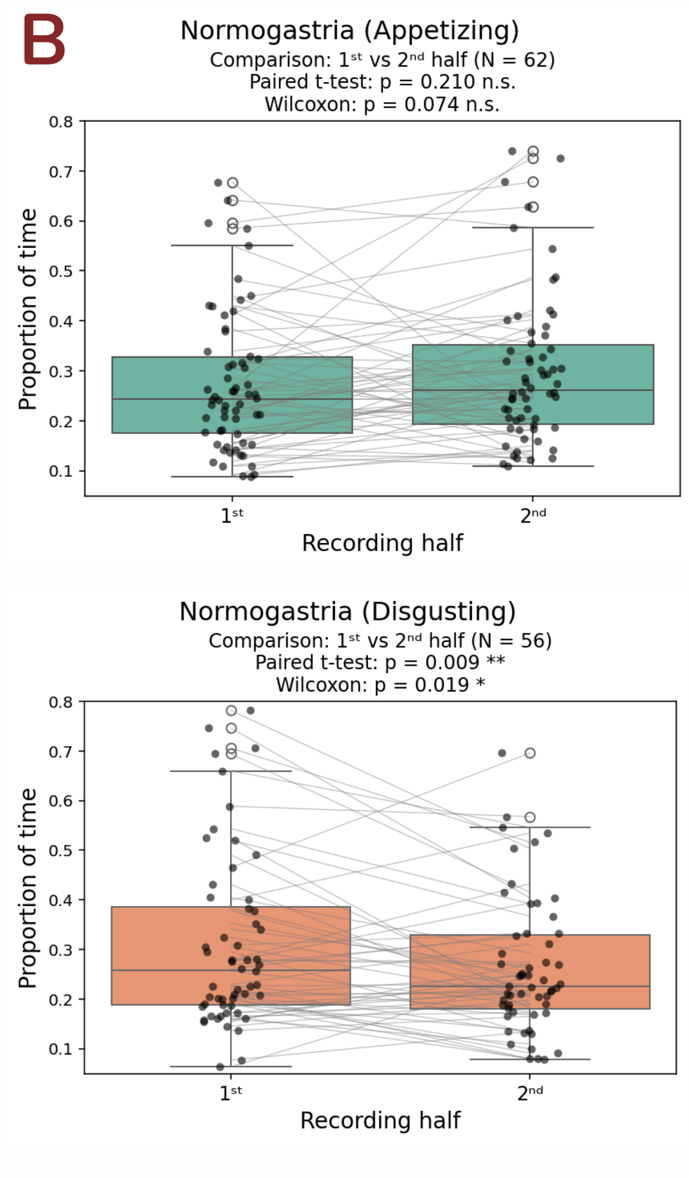


Figure 2 - Effects of Time and Condition (no outliers excluded): (A) An interaction effect between recording half (1st or 2nd) and image condition (appetizing, disgusting and neutral) was observed across various aspects of the gastric signal, while main effects were generally weaker. (B) Within each condition, significant differences or non-significant trends were detected between the two halves of the recording in several measures, revealing changes in the influence of the visual stimuli on gastric activity over time. For example, the proportion of time within the normogastria range shifted in opposite directions across different conditions.

DISCUSSION

- Comparing the two halves of each experimental block revealed subtle temporal dynamics that were not detectable in full-session analysis.
- In the appetizing condition most measures increased over time, while the disgusting condition evoked the opposite pattern. These findings suggest adaptive gastric responses to the type of visual stimuli.
- Further investigation of additional factors, such as condition order, questionnaire data and corresponding brain activity, may offer deeper insights into gut-brain interactions.

REFERENCES

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