A Gut Feeling: Examining Electrogastrography as a Biomarker of Affective Responses

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Introduction

- Autonomically mediated bidirectional communication between the brain and digestive organs supports allostasis by coordinating behavioral and digestive responses to cues of safety and threat (e.g., inhibiting digestion during perceived threat).
- Disorders of this relationship are implicated in diseases such as Irritable Bowel Syndrome.
- Electrogastrography (EGG) is an inexpensive and noninvasive measure of the electrical waveforms produced by autonomically innervated cells during peristalsis in the stomach.
- Though underutilized, this low-cost signal may be an informative biomarker of the organism's ability to adaptively regulate digestion in response to environmental cues, such as affective stimuli.
- While promising, this signal is highly susceptible to artifacts due to its low amplitude and inter-individual variability in stomach position.
- We aim to test the feasibility of EGG as a biomarker in psychophysiological research.

Methods

- N=49 undergraduates (age 18-21, 78% female)
- Minimum 2 hours fasted
- Reported demographic information
- Collected height, weight, waist circumference
- Recorded EGG, electrocardiogram (ECG), and electrodermal activity (EDA) over 3 blocks

<table>
<thead>
<tr>
<th>Block</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting Baseline</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Montreal Imaging Stress Task</td>
<td>12 minutes</td>
</tr>
<tr>
<td>Resting Recovery</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>

Preliminary Findings

- N=40 EGG files cleaned
- Blocks deemed analyzable had at least 5 continuous minutes of data with adequate signal-to-noise ratio and no motion artifacts
- % of participants with analyzable data in each block:
  - Baseline: 42.5% | Task: 35.0% | Recovery: 40.0%
- No association observed between duration of fast and data quality (p>.05)

Future Directions

- Continue participant recruitment
- Limit participants' fasting duration to <6 hours
- Continue 2-channel data collection
- Utilize respiration band
- Implement water-load test
- Adjust stimulus to minimize movement during participant response (e.g., pressing keypad)

Electrogastrography could be an informative signal, but data loss to artifacts is a major issue in the current study design.