

College of Saint Benedict and Saint John's University

DigitalCommons@CSB/SJU

Celebrating Scholarship and Creativity Day
(2018-)

Undergraduate Research

4-25-2024

Physiological Processes During Reading

Elizabeth Morrey
College of Saint Bene

Emma Smith
College of Saint Benedict/Saint John's University

Catherine Bohn-Gettler
College of Saint Benedict/Saint John's University

Jennifer Schaefer
College of Saint Benedict/Saint John's University

Follow this and additional works at: https://digitalcommons.csbsju.edu/ur_cseday



Part of the [Biology Commons](#), [Education Commons](#), [Physiology Commons](#), and the [Psychology Commons](#)

Recommended Citation

Morrey, Elizabeth; Smith, Emma; Bohn-Gettler, Catherine; and Schaefer, Jennifer, "Physiological Processes During Reading" (2024). *Celebrating Scholarship and Creativity Day (2018-)*. 247.
https://digitalcommons.csbsju.edu/ur_cseday/247

This Poster is brought to you for free and open access by DigitalCommons@CSB/SJU. It has been accepted for inclusion in Celebrating Scholarship and Creativity Day (2018-) by an authorized administrator of DigitalCommons@CSB/SJU. For more information, please contact digitalcommons@csbsju.edu.

Physiological Processes During Reading

Elizabeth Morrey, Emma Smith, Catherine Bohn-Gettler (Faculty Supervisor), & Jennifer Schaefer (Faculty Supervisor)

Introduction

Research Question

Do narrative inconsistencies in text cause sympathetic nervous system activation?

Text Comprehension

- The level of activation, integration, and validation during reading influence comprehension (O'Brien & Cook, 2016)
- Integration processes during reading links newly presented concepts with general world knowledge. Initial linkage is based on how well the pieces of information fit. (O'Brien & Cook, 2016)
- Inconsistencies slow down integration and validation, which could arouse the SNS.

Sympathetic Nervous System Arousal

Sympathetic nervous system (SNS) activation indicates stress and might impact how we process information.

- Galvanic Skin Response (GSR) measures the skin's electrical conductivity, reflecting SNS activation (Albert & Tullis, 2023).
- Heart Rate Variability (HRV) reflects the autonomic balance via variation in time between adjacent heart beats (Shaffer & Ginsberg, 2017).

Hypotheses

- H1:** Minor narrative inconsistencies increase SNS activation.
 - Physiologically, would expect to see an increase in GSR & a decrease in HRV.
- H2:** Minor narrative inconsistencies do NOT increase SNS activation.
 - Physiologically, would expect to see no change in GSR & HRV.

Methods

30 college students participated

- 70% female, 30% male
- Mean age = 19.73
- 76.7% White, 6.6% Black, 3.3% Asian, 13.3% declined to answer

Study Procedures

- Connect participants to GSR and ECG electrodes
- Read a series of 37 passages:
 - 9 contained inconsistencies
 - 9 contained consistencies
 - 18 neutral fillers

Data Analysis

- PowerLab Hardware, LabChart Software (ADInstruments) and SPSS were used for statistical analysis.
- 35-sec segments for GSR analysis
- 1-min segments for HRV analysis

Introduction: Bill had always enjoyed walking in the early morning and this morning was no exception. During his walks, he would stop to talk with some of his neighbors.

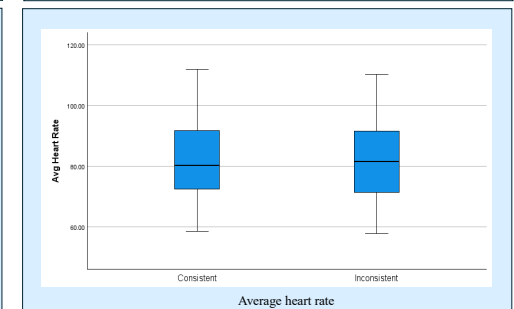
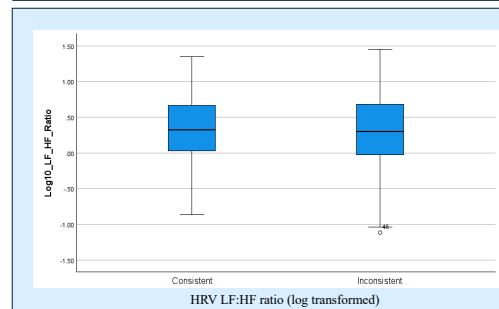
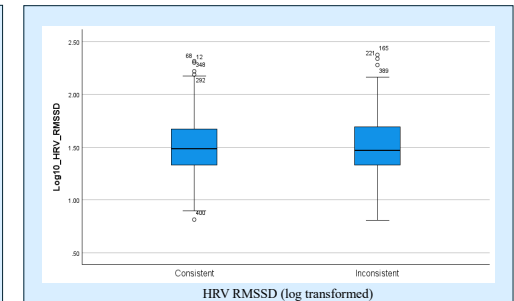
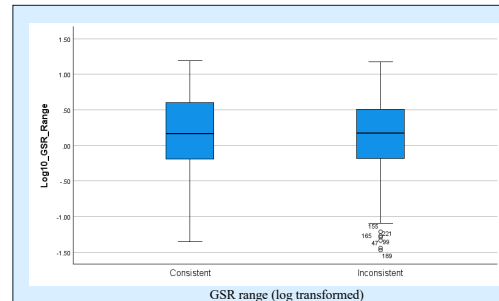
Consistent Scenario: Bill had just celebrated his twenty- fifth birthday. He felt he was in top condition, and he worked hard to maintain it. In fact, he began doing additional workouts before and after his walks. He could now complete a 3-mile run with hardly any effort.

Inconsistent Scenario: Bill had just celebrated his eighty- first birthday. He didn't feel as strong as he was twenty years ago. In fact, Bill began using a cane as he hobbled along on his morning walks. He could not walk around the block without taking numerous breaks.

Background: Today, Bill stopped to talk with Mrs. Jones. They had been friends for quite some time. They were talking about how hot it had been. For the past three months there had been record breaking high temperatures and no rain. Soon there would be mandatory water rationing. As Bill was talking to Mrs. Jones, he noticed something in the middle of the street.

Target: Bill ran and picked up a young boy. He quickly walked back to the curb.

Closing: Bill's time was perfect, because just then a sports car came racing up the street. Bill was grateful he had acted when he did. He then continued his conversation with Mrs. Jones. They both noted that the sports car looked quite expensive, and that the driver looked young. They then discussed how people need to be more responsible drivers, and always need to keep their eyes on the road. After saying goodbye to Mrs. Jones, Bill headed home to have some lunch.



Results

- Log transformations were performed on the GSR range, HRV RMSSD, and HRV LF:HF ratio, as the distributions were skewed.
- Paired samples *t*-tests were performed to compare DVs between consistent versus inconsistent target sentences.
- There were no differences in sympathetic nervous system activation when reading inconsistent versus consistent target sentences.

Discussion

- Minor narrative inconsistencies did not impact SNS arousal, making the texts appropriate for examining non-emotional cognitive processes.
- The main challenges with the study include small sample size and short segment lengths measuring physiological parameters.
- Future research can examine whether texts of higher emotional relevance to participants demonstrate different patterns, such as those that relate to personal beliefs or high-stakes topics (exams, diagnoses, etc.)

References

- O'Brien, E. J., & Cook, A. E. (2016). Coherence Threshold and the Continuity of Processing: The RI-Val Model of Comprehension. *Discourse Processes*, 53(5-6), 326-338. <https://doi.org/10.1080/0163853X.2015.1123241>
- Albert, W. (Bill), & Tullis, T. S. (Tom). (2023). Measuring Emotion. In *Measuring the User Experience* (pp. 195-216). Elsevier. <https://doi.org/10.1016/B978-0-12-818080-8.00008-X>
- Shaffer, F., & Ginsberg, J. P. (2017). An Overview of Heart Rate Variability Metrics and Norms. *Frontiers in Public Health*, 5, 258. <https://doi.org/10.3389/fpubh.2017.00258>