Summer 2024
Honors Research Fellowship Reports

Director:

Dr. Anastasia Elder

Edited by:

Morgan Elmore

Table of Contents

Name: Joseph Hays Romano

Faculty Advisor: Dr. Donna L. Clevinger

Project Title: *The Night Owl Lounge*

Description of Project:

Over the summer, I was given the opportunity to write my second play script for the Shackouls Honors. After the success of my first play, *Scipio*, I was so excited to be able to get to writing again, and thus, after getting my funding approved by the Shackouls Honors College, I began work on *The Night Owl Lounge*. However, there are several things that separate this script from my last one. Firstly, this script's plot is entirely my creation and not an adaptation of a real person's life. This affected the time that project required as I was not given a historical outline to work with but had to come up with every plot beat myself. This also allowed me to shift the narrative structure when compared to my first work. *Scipio* was first and foremost a character study about one man, whereas *The Night Owl Lounge* has dual protagonists and a large supporting cast. The combination of a completely original plot and ability to focus on a larger group of characters allowed me much more freedom in the writing process. Overall, this ended up resulting in the first draft of the play being significantly longer than *Scipio*. As I continue to edit the script and hopefully eventually put it on, I believe that the final product will be a production that far exceeds the quality of *Scipio*.

Research Performed:

There were three major steps involved in the creation of this script. Firstly, there was basic research. *The Night Owl Lounge* is set in prohibition era America and has a plot surrounding organised crime at that time. Before I started drafting the plot itself, I knew I had to familiarise myself with the time period in order to write a story that felt authentic to it. This involved looking through many different aspects of the time such as the music, the food, the crime, and the slang. This research happened mostly at the beginning and continued in

small bursts throughout the rest of the writing process. Mostly, I needed to check if certain phrases and idioms were used in America during the 1920's. The second step was outlining the play's plot, characters, and themes. This was the most important part of the process as it was the foundation of the entire project. The plot outline went through several drafts, and each of these drafts included several major changes. These ranged from the removal of scenes to the cutting of entire characters. The main themes of the story did not change very much throughout the outline drafting process, however the way those themes were exemplified and expressed by the plot and characters changed massively. Once I had a working outline finished, I began actually writing the script itself. This was a long and difficult process of writing, revising, and repeating those two steps ad nauseam. As I continued writing, issues with my original outline would pop up here and there, and as such, I would occasionally have to pause the writing process and go back to the drawing board. However, I believe that every revision only led to the script getting stronger. Ultimately, I am very proud of the first draft of *The Night Owl Lounge* that I have produced, and I look forward to continuing to build on the work I did over the course of this research project to make this script and eventual production the best it can possibly be.

Impact of Experience:

This has been one of the most impactful experiences of my life. Ever since I was in third grade, I have always loved telling stories, and it has always been one of my dreams to be able to do it in some professional capacity. I got my first chance to do this last year when Dr. Clevinger approached me about directing the spring production for Honors Onstage. Seeing the opportunity, I offered to write my own play for it instead of choosing someone else's, and that is how *Scipio* was born. After the arduous process of putting that show together, seeing it get such positive reception was such a rewarding experience, and so, when I was approached about writing another script for the Honors College, I was ecstatic. The fact

that I was getting paid to do it was definitely an added bonus. Moving from a historical adaptation to something completely original was a very difficult process. I was surprised at how much I was second guessing myself throughout the writing process, however, upon reflection, I realised how much of a gift the ability to second guess myself was. When I was writing *Scipio*, I often found myself limited by the necessity to make the plot as historically accurate as I could. While drafting the plot for that play, I had to fit the themes into the plot, however when drafting *The Night Owl Lounge*, I realised that I could use the plot to fit the themes. This allowed me so much more freedom, and every single time I second guessed myself, it was really me wondering if I could change the plot to better push the message I was trying to convey. Now that I have finished the first draft, I plan to continue to revise it as I work towards hopefully putting it on in the spring.

Dr. Clevinger was such an integral part of completing this project. Her advice and mentorship was so helpful, and without her knowledge of theatre and the arts, there is no way this script would have turned out the way it did. Her ability to take the words I wrote and help me put them into a physical space through her intimate understanding of staging was integral to my ability to visualise what I had written. Her trust in my writing ability, and the way she was able to instantly grasp the play's themes proved to be invaluable in getting a working outline done for this project. As I continue to revise this script, I will be regularly checking in with Dr. Clevinger as I would not feel comfortable declaring the script to be final draft worthy without her approval.

Name: Sophia Ruckman

Supervising Professor: Dr. Amirtaha Taebi

Major: Biomedical Engineering

Department: Agriculture and Biological Engineering

Abstract:

Current measurement techniques in the medical field, such as electrocardiography (ECG) and pulse oximetry, are critical for monitoring the cardiovascular health of newborns [1]. Although there are de vices on the market capable of measuring these signals, they are often not designed for use with newborns. This study conducted a preliminary usability test of four cardiovascular monitors for use with a newborn model. The findings indicated that users prefer a simple, wireless device that can be securely attached to a child to minimize movement. Additionally, they value a guided process and straightforward, user-friendly software. Understanding user preferences can facilitate developing an affordable, at-home monitoring de vice tailored for newborns which in turn may enhance early detection and management of congenital heart diseases (CHDs).

Introduction:

CHDs are structural abnormalities of the heart present at birth. These conditions are often identified shortly after birth, allowing for timely intervention and treatment. However, CHDs are still the leading cause of mortality due to birth defects [2]. The most common diagnostic tools for CHDs in newborns include ECG, chest X-rays, echocardiograms, and pulse oximetry. In addition to these primary diagnostic methods, more comprehensive evaluations can be conducted to monitor heart rhythm. Such tests can involve the use of a Holter monitor, implantable event recorder, and pacemaker [1]. Despite the variety of diagnostic tools available, CHDs can remain undiagnosed and untreated until the patient's health is significantly affected, even into adulthood [2]. Screening for these conditions typically occurs in clinical settings, which not all individuals have easy access to. Moreover, the high cost of some of these diagnostic tests poses a barrier, particularly in underserved areas [3]. Consequently, there is a pressing need for an affordable, accessible monitoring device that can facilitate the early detection and management of CHDs in newborns. Such a device could reduce morbidity, mortality, and healthcare costs associated with these diseases. Currently, the market offers limited options for at-home monitoring of newborns, and these are often cost-prohibitive and limited in functionality. This study aims to evaluate users' experience interacting with commercial and research-grade cardiovascular monitoring devices. The insights gained will be used to develop an optimized cardiovascular monitoring

device tailored for the newborn population that integrates essential functions and features while ensuring user comfort and ease of use.

Methods:

After IRB approval at Mississippi State University, user experience research was conducted with 3 subjects (1 female). The inclusion criteria were planning to have a child within the next year or having had a child in the past three years. This ensured that the subjects were in a state of mind of being a parent during the study. Prior to the study, minor modifications were made to some of the devices to make them more compatible with a baby model. User experience was evaluated through interviews with the subjects and in-lab qualitative usability testing employing the think-out-loud method. Participants were introduced to the functions and features of four different cardiac monitors (Fig 1, top row) including a pulse oximeter (PO5, Shenzhen Livenpace Technology Co., Ltd., China), an ECG recorder (HHM1, Shenzhen Livenpace Technology Co., Ltd., China), and two different sensors enabling seismocardiogram (SCG) and gyrocar diogram (GCG) measurements (Shimmer3 Ebio, ShimmerSensing, Ireland; and BWT901CL, WitMotion Shenzhen Co., Ltd., China). Although SCG and GCG signals have not yet been clinically translated, they hold significant potential for providing information about the mechanical activity of the heart and could be utilized in future remote cardiovascular monitoring systems [4, 5]. Participants were then instructed to use the devices on the baby model, following the provided instruction sheets. The tasks of the usability test included setting up the device, using the software program, and utilizing the device's features. They were also instructed not to ask questions to maintain a consistent experience for all subjects by relying solely on the provided materials. During this process, the subjects' audio was recorded, and a Pupil Core eye-tracking headset (Pupil Labs GmbH, Berlin, Germany) was employed to gain deeper insights into their experience, exploring their pain points, opinions, and mental models. After testing each device, subjects were asked a series of questions to further understand their experience. The collected data was analyzed using journey mapping and affinity mapping techniques to comprehensively evaluate the user experience.

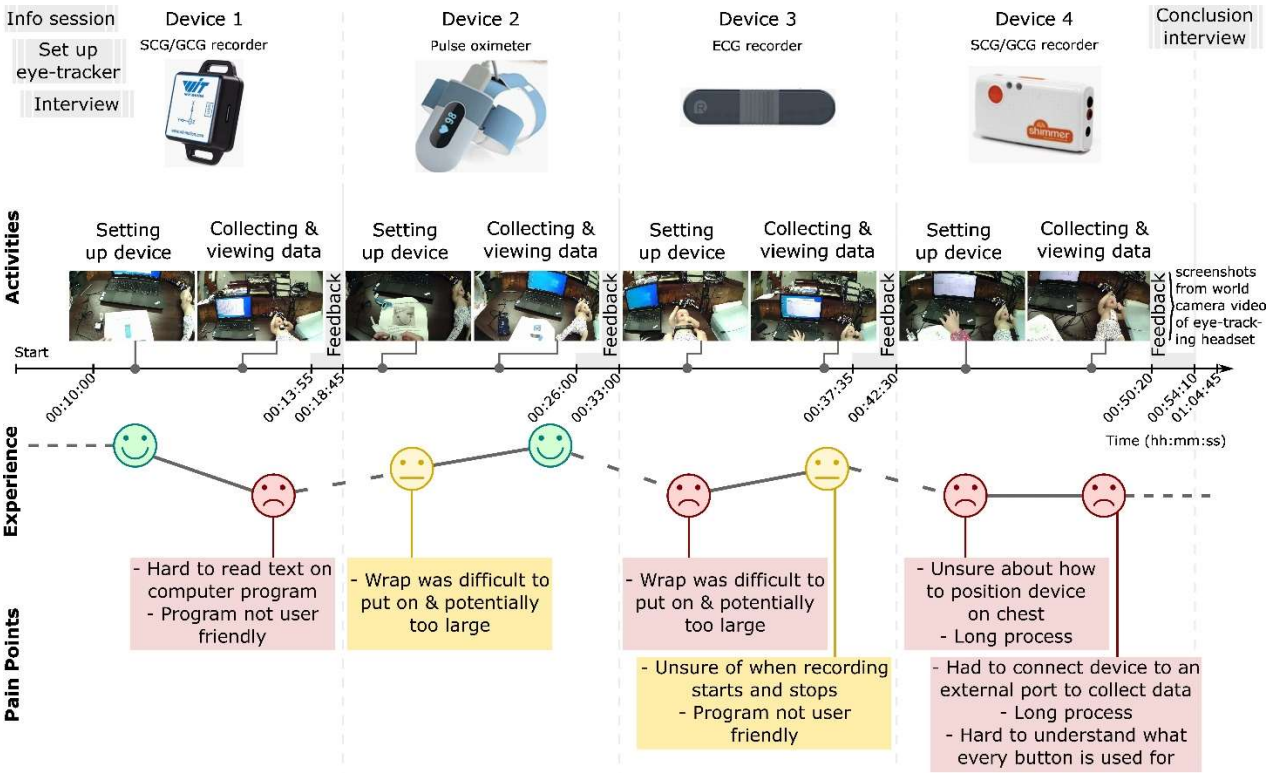

Figure 1*. (Top row) Cardiac monitors utilized in the study to assess user experience. (Bottom panel) Journey map of Subject 1 with pain points. The time axis is not to scale.*

Results and Discussions:

The collected data provided valuable insights into user preferences and comfort levels with home monitoring devices. Two of the three subjects had prior experience using at-home monitoring devices on themselves or others. Overall, participants expressed a preference for a simple and efficient process for both attaching the device to their child and collecting data. Specifically, they appreciated the use of a wireless device. They also preferred that the device be securely attached to the chest, considering the potential movement of the child. Participants felt most comfortable when notifications guided them through the process, such as indicating when the recording had started and ended. Additionally, they found it helpful when the device had icons to direct them to the correct position for recording on the chest.

The user journey map in Fig 1 illustrates the experiences and emotions of Subject 1 while interacting with different devices. During the setup phase, Subject 1 expressed the most comfort with devices featuring a simple setup process and a singular multi-functional button, such as devices 1 and 2. Conversely, the subject was least comfortable with devices that could not be securely attached to the body and were too large for comfort. Additionally, Subject 1 favored software programs that required a minimal number of steps. Device 2 was particularly noted for its ease of use, featuring a streamlined process for data collection and viewing, thanks to its minimalist design and user-friendly software. The subject found the use of multiple components and the lack of clear indication of when recording started and stopped to be the most challenging

when collecting data. Moreover, taking multiple steps to view the data was considered difficult, and the subject stated that remembering all the steps would be problematic.

All participants preferred software programs with large, clear text and a simplistic setup. Two of the three participants also expressed a desire for improved information visualization, seeking results presented in graphical form and receiving user-friendly analysis. They appreciated devices with simple features, such as a single, accessible multi-functional button. Participants felt most comfortable with a single-piece device and valued the ability to interact with the device via a digital screen. Moreover, they were drawn to devices with soft colors and rounded edges, indicating a preference for these design elements when choosing a device for their child.

Conclusion:

The findings identified key features and functions that enhance the user experience with new-born home cardiac monitors. Users preferred a simplistic process that prioritizes the comfort of their child. These insights will guide the development of a new device tailored to these preferences. Further studies are necessary to ensure that users consistently feel comfortable using the device on their children.

References:

[1] R. Sun, M. Liu, L. Lu, Y. Zheng, and P. Zhang, “Congenital heart disease: Causes, diagnosis, symptoms, and treatments,” Cell Biochem Biophys, vol. 72, pp. 857–860, 2015.

[2] B. J. Bouma and B. J. Mulder, “Changing landscape of congenital heart disease,” AHAIASA, vol. 120, 2017.

[3] Z. Javed, M. Haisum Maqsood, T. Yahya, Z. Amin, I. Acquah, J. Valero-Elizondo, J. Andrieni, P. Dubey, R. K. Jackson, M. A. Daffin et al., “Race, racism, and cardiovascular health: applying a social determinants of health framework to racial/ethnic disparities in cardiovascular disease,” Circulation: Cardiovascular Quality and Outcomes, vol. 15, no. 1, p. e007917, 2022.

[4] J. Cook, M. Umar, F. Khalili, and A. Taebi, “Body acoustics for the non-invasive diagnosis of medical conditions,” Bioengineering, vol. 9, no. 4, p. 149, 2022.

[5] A. Taebi, B. E. Solar, A. J. Bomar, R. H. Sandler, and H. A. Mansy, “Recent advances in seismocar diography,” Vibration, vol. 2, no. 1, pp. 64–86, 2019.