User Interface Factors that Impact Flow in Prominent Media Streaming Platforms

By Cameron R. Blankenship

The use of streaming services such as Netflix and Amazon Prime Video continues to rise due to the diverse number of television (TV) and movie titles that are offered, which allow users to easily stream media, often commercial free, across various electronic devices. Streaming and viewing TV shows or movies offers a low effort route to decrease boredom and to increase positive emotions such as enjoyment or interest for users. Before viewing a title, a user must first navigate a streaming service’s web pages to locate a preferred media title to view. A user’s navigation activity seemingly meets the criteria to reach a Flow State, an extreme form of engagement that is marked by perceived time distortion, perceived effortless concentration on an activity, which is completed by the user automatically and efficiently. The goal of the current study was to investigate how streaming webpage features (e.g., auto playing video clips, ambiguous user location information) impact a user’s effortless concentration and loss of self-awareness Flow State components. Results show that the webpage feature differences are primarily minute and do not significantly impact Flow. Specifically, Netflix and Amazon Prime Video webpage differences did not significantly differ in user’s effortless concentration and loss of self-awareness within a navigation context. However, participants on average did experience moderate levels of Flow, suggesting that Flow can be experienced while navigating a streaming service to select a show to watch. Supplemental considerations, methodological limitations, and future research directions are also discussed.
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by

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User Interface Factors that Impact Flow in Prominent Media Streaming Platforms

Introduction

Television (TV) and movie streaming services such as Netflix and Amazon Prime Video continue to dominate the media streaming market and continue to push cable and satellite services out of the market. Last year, Netflix alone reported that they had surpassed 200 million subscribers and gained $7.7 billion in revenue in the final quarter of 2021 (Peterson, 2022). However, Netflix is not alone in their success. Global streaming subscriptions in 2020 alone have increased from the previous year by 217.6 million subscribers, surpassing the previous 2018 record by 5.9 million (Rapid TV News, 2020).

With the increase of streaming service options throughout the past decade, “cutting the cord” or cancelling cable and satellite subscriptions for streaming subscriptions, is becoming more prevalent. According to a 2018 survey of 801 Americans, CNBC reported that only 30% of their sample solely used cable or satellite TV services, with 20% of respondents solely using streaming services to watch TV or movies (Liesman, 2018). Media executives also predict that 25 million cable subscriptions will be cancelled by 2025, which would result in a loss of $25 billion in revenue for cable providers (Sherman, 2020).

Many suggest that the popularity of streaming services is continuing to explode due to the diverse, on demand TV and movie options that can be easily accessed with the continually increasing prevalence of smartphones, video game consoles, smart TVs, and computers. Streaming services offer users personalized suggested content where users
can easily search for specific titles or can navigate intuitively organized content by differing genres. Additionally, cable and satellite package prices range from $25 - $135 per month, making streaming services, which often cost $6.99 – $19.99 per month, a cheaper alternative that allow users to view their shows commercial free.

Despite their popularity, streaming service platforms differ widely in the options and layouts used by consumers to navigate their content. One of the significant challenges for these companies and their competitors is understanding what features of these platforms drive user interest, engagement, and the ease of use for consumers.

**Motivating Factors that Drive Media Consumption**

Viewing TV shows or movies continue to be a prominent, low effort route to decrease boredom and to increase positive emotions such as enjoyment or interest. Boredom is defined as a negative emotion or mood state (i.e., an enduring affective state that is not tied to a specific object, but rather a person’s general environment; Ekkkekakis, 2013) that reflects low cognitive arousal (Bench & Lench, 2019). According to the Cognitive Arousal Theory, the causal relationship between an initial appraisal of a situation or object and a target’s cognitive arousal gives rise to a specific emotion (Reisenzein, 2017). Emotion, defined as a subjective evaluation of an external or internal stimulus event, is the culmination of coordinated and interrelated changes of subsystems (e.g., appraisal, physiological response, motivation, expression, and subjective feeling). Within the experiential system of emotion, the interrelated subsystems monitor the target’s internal state in relationship to the target’s environment, which gives rise to
subjective “feelings” such as excitement or boredom, which the target can then respond to (Scherer, 2005).

As a person reaches a low cognitive arousal state (i.e., boredom), they often actively seek an environment or activity that returns them to an optimal level of arousal. Illustrated through the Uses and Gratification Framework Theory, boredom then acts as the motivator that facilitates pleasure seeking, with the goal being the reduction of boredom or, in other words, reaching an acceptable level of cognitive arousal (Korhan & Ersoy, 2016).

Additionally, users are not always just actively seeking to view media to decrease boredom. Instead, users often want to watch a movie or a new episode of their favorite TV show simply because they enjoy their selected media and viewing the show promotes other positive feelings such as relaxation or excitement (Rieger et al., 2014). This motivational route for consuming media is reflected by the theory of hedonism, which broadly states that people seek activities or environments that create pleasurable experiences and avoid environments or activities that are not extrinsically or intrinsically rewarding.

While these factors may serve as motivations to consume media, users often must engage in streaming service platforms’ search tools to identify which content to consume. This active searching process is a prominent part of users’ experiences with the platform overall and is perhaps one of the most important activities for differentiating experiences among platforms. Therefore, deeper examination of engagement, ease of use, and reward
during this searching process is likely particularly valuable for service providers to understand.

**An Introduction to Flow**

These experiences are characteristic of flow, which is described as a form of engagement that is a transient, altered cognitive state that resembles perceived effortless concentration on an activity that produces positive emotions, such as enjoyment, a sense of accomplishment, or happiness (Barros et al., 2018; Bonaiuto et al., 2016; Hancock et al., 2019). A person can experience a Flow State while participating in essentially any activity such as playing a sport or writing an essay. While in a Flow State, people also report a sense of time distortion, describing that time is passing more quickly than perceived, with limited self-awareness and attention to the environment around them (Csikszentmihalyi & Nakamura, 2018; Sinnet et al, 2020).

Recent work has described nine dimensions that are divided into antecedents, experiential, and consequences of a flow experience. These include the equilibrium of challenge and skills between the user and the activity, clear immediate goals set by the actor, immediate feedback based on how well the user is preforming, effortless concentration, the merging of the activity and the actor’s awareness, the feeling of being in control of the activities outcome, distorted time perception, a loss of self-awareness, and the intrinsic reward of being in a Flow State (Csikszentmihalyi & Nakamura, 2018; Hancock et al., 2019).
Flow State Antecedents

To enter a Flow State, there are necessary conditions that must be met, beginning with the equilibrium of challenge and skill. If the challenge of completing an activity is too great and the person does not have the necessary skills to complete their activity efficiently, increased effortful concentration occurs, undermining the ability for a person to enter a Flow State. Additionally, due to the mismatch between challenge and skill, an individual may become frustrated based on their ineffective performance and may discontinue their activity (Csikszentmihalyi & Nakamura, 2018).

While performing an activity, an individual must also have clear and immediate goals of what they will want to achieve. A person may begin an activity with a global goal such as completing the activity quickly and efficiently, but immediate goals directly related to steps that need to be taken to complete the task must be present (Csikszentmihalyi & Nakamura, 2018). Without a clear immediate goal set, there will be a lack of guidance for the person’s next immediate action. The individual must intermittently engage in a goal identification process to identify the next step to be taken to complete the activity. This repeated shifting between progressing toward a final goal and identifying immediate, short-term goals leads the person to approach the activity in a clumsy and unorganized manner that may extend the completion length of their activity. Again, increased effortful concentration and potential anxiety related to how the actor is preforming occurs, undermining the individual’s ability to reach a Flow State.

When there is an equilibrium of challenge and skill, and a person has clear and immediate goals, an individual must receive swift, interpretable feedback based on how
well they are achieving their immediate goals during an activity. External feedback from the actor’s environment and their activity may be received in tactile, visual, or auditory forms. Conversely, if the feedback is delayed or unclear, an actor may become unaware of how well they are performing during their activity. A person will then be unable to make skill related adjustments to efficiently complete their activity, undermining their ability to reach a Flow State.

**Flow State Experiential Components**

Once the Flow State antecedent conditions are met, an actor may begin to experience perceived effortless concentration, the merging of the activity and the person’s awareness, and a gained sense of control over the preferred outcome of their webpage navigation. During the experiential phase, it should be noted that concentration is not completely effortless; however, an actor experiences increased, easily obtained concentration while completing their task.

While being completely focused on their task, an individual also begins to lose their sense of their physical self within their environment and performs their actions automatically without directly thinking about how they need to. The person’s “self” becomes intertwined with the activity and the individual may become so fixated on the activity that they lose awareness of occurrences happening outside of the activity. Further, when the Flow State antecedents are met, a person then becomes confident that they can operate efficiently and effectively during their task. If external factors start to negatively impact the person’s ability to succeed, such as other people creating a distraction, an individual may need to begin to focus more intently on their task. While
attending to the task and extraneous distractors, a person’s ability to concentrate fully on their task becomes more difficult, decreasing the individual’s ability to maintain a Flow State.

**Flow State Consequences**

In the consequential phase of Flow State, a person can begin to experience perceived time distortion, a loss of self-presentation concerns, and most importantly, obtaining a rewarding autotelic experience. While a person is in a Flow State and completely focused, time seemingly “flies by”, where a person may eventually become aware that they have been working through their activity for a lot longer and much more time had passed than they expected.

Furthermore, while a person is completely engrossed in their task, the individual’s sense of their self-presentation is also transformed. The individual enters a hypo-egoic state, where they perceive themself in a manner free from their own ego, where they are not concerned with their self-presentation to others or their own personal expectations they may have while completing their task (Cziksentmihayli & Nakamura, 2007). While the person’s ego seemingly dissipates, the individual remains intensely focused on the activity.

Lastly, an individual may gain an autotelic experience or, in other words, an intrinsic reward such as self-fulfillment, joy, or a reduction of boredom while completing their activity. The autotelic nature of a Flow State is an important factor due to the positive intrinsic outcomes, which promotes the seeking of other activities that allows the individual to experience positive rewards. The intrinsic rewards may be so sought after
that a person may continue their activity for long periods or consistently over time. Due to the peripheral motivation to continue seeking activities that promote a Flow State, an individual can eventually master their preferred activities and continue reaping the intrinsic rewards that support their mental well-being and sense of self (Cziksentmihayli & Nakamura, 2007).

**Flow and Streaming Service Navigation**

User navigation of titles seemingly meets the requirements for reaching a Flow State. However, differences among the webpage presentations between streaming services such as Netflix and Amazon Prime Video may differentially undermine a user’s ability to reach a Flow State. Certain components of the presented webpages such as webpages that extend as a user scrolls down lists of media titles, a lack of apparent webpage location identifiers, and auto playing TV and movie clips during navigation may undermine a user’s ability to effectively navigate or create distractions, which may undermine Flow.

It is important to identify webpage components that create a more difficult or frustrating navigation process for a user. A user’s experience may be so poor that they end their streaming subscription or share their negative experience with other users, potentially increasing the chance that other users end their subscription and move towards a different streaming service. To avoid this issue, webpage designers should seek to create webpage layouts that promote reaching and maintaining a Flow State, where users can meet the specific requirements to reach a Flow State and experience the positive benefits that occur during and after reaching a Flow State.
Graphical User Interface and Flow State Considerations

The ability to reach a Flow State while navigating a streaming service is theorized to be largely the result of the software’s graphical user interface (GUI). The GUI is the medium of communication and interaction between the user and the streaming software. The visual presentation allows the user to navigate the streaming software in a more intuitive manner. The visual representations, or elements, are generally presented as buttons, icons, or search fields. Without optimized and user-friendly interfaces, a user would have to directly communicate with the software through high level text-based commands that require specialized knowledge surrounding a specific computer programming language. Instead, users are presented with various GUI buttons, icons, and search fields that directly translate a user’s action to a programming language-based command that the software then executes.

Mental Models of Graphical User Interface (GUI)

While navigating through a streaming software is often a simple process, various cognitive processes occur before, during, and after interacting with specific GUI components. Prior to interacting with a software’s GUI to reach a preferred outcome, such as searching for and finding a specific movie title, a user’s actions are guided by their mental model of a specific GUI element (Norman, 2013). A user’s cognitive representation of an element is based on their previous knowledge and experience interacting with other elements in similar contexts, which guides user interactions with GUI elements presented across different platforms (Peschl & Stary, 1998).
When presented with an element, the user is provided with affordances (i.e., functions or capabilities) that are determined by the visual appearance and location of the element. The appearance and location of the element activates a user’s mental representation of similar elements and their affordances, which guides their future interaction with the element (Norman, 2013). Once a user interacts with an element, they need to be provided with information based on whether they are interacting with the element correctly, or if their interaction was successful. This information is provided to the user in the form of feedback. Feedback can be presented visually, such as selecting a TV show, which takes the user to a different screen that includes episode information, or in an auditory form, such as the “clicking” noises that occur while navigating between presented icons (Norman, 2013). If a user is not successful when interacting with an element, they receive feedback that informs the user that their search was unsuccessful. For example, once a user reaches the end of a list of TV shows, they may try to continue to scroll down the list to see more options, but no more TV shows are presented.

If a user does not have a well-developed model for a specific element, an element’s affordances are not clear, and the feedback from interacting with the element is not present or ambiguous, a user must attempt to identify how to properly interact with the element. A user can attempt a trial-and-error process or reference an external source to obtain the knowledge based on how to properly interact with the element to reach their preferred outcome. Eventually, the user will most likely interact with an element as the designer intended. A user then updates their mental model of a specific element to guide the user during future interactions with similar elements (Norman, 2013).
However, if a user’s interactions with various elements prove unsuccessful and no other informational sources are available to guide the user, a user may become frustrated due to a lack of the informational resources needed to identify immediate courses of action. Frustration may become so intense that the user gives up all together and abandons their current session. Afterward, a user is left with a lasting memory of a negative experience, the cause of which is ultimately attributed to the company owning the software. If a user is consecutively disappointed by their experience when using a company’s service, they may choose to discontinue their business with a company all together. Certainly, identification of potential sources of these kinds of disruptions would be valuable for companies to identify.

**Factors That May Impact Reaching or Maintaining a Flow State**

Netflix and Amazon Prime Video all offer eye catching title art for TV shows and movies and a generally similar layout of their most prominent elements. Netflix, however, offers unmuted TV and movie clips that auto play as soon as you visit the home page and shortly after placing the navigation cursor over a specific title. While the auto play function allows users to preview clips of the show or movie that they would like to watch, Netflix auto plays potentially irrelevant title video clips as soon as you enter the webpage. Auto playing video clips even occur when accidently placing the cursor over an irrelevant title or while trying to read a title’s description.

The auto playing of irrelevant TV or movie clips can become increasingly distracting as a new user spends more time navigating a webpage. Instead of being able to focus on finding a preferred title, the user must then have constant peripheral focus on
avoiding activation of auto-play or muting preview clips when failing to do so. This task is difficult as Netflix’s webpage is dominated by titles, causing the user to be consistently forced to avoid, mute, or listen to irrelevant video clips. As a user’s attentional resources are lessened by having to attend to avoiding auto playing video clips, a user cannot effectively focus on reading a title’s description, which may undermine reaching or maintaining a Flow State, specifically the effortless concentration subscale scores (Hypothesis 1a).

While Netflix offers an indicator that shows which cycle of titles a user is on while scrolling right or left through titles within a specific movie or TV category, Amazon Prime Video does not. A user may become lost in a row of titles and be unable to easily locate a title that they have passed. Automatic, spontaneous navigation actions will then be decreased as a user will have to carefully scroll through the row of titles to locate a title they would like to view. In turn, a user’s navigation actions may not become intertwined with their awareness and their navigation actions will become more calculated rather than occurring automatically, decreasing Flow, specifically the merging of action and awareness scores (Hypothesis 1b).

Users who navigate their most used streaming service may show an increase in their aggregated Flow State scores when compared to users who navigate a streaming service, they have had less exposure to (Hypothesis 2). Users navigating their most used streaming service will already possess a well-rounded mental model of the service’s webpages and various webpage functions. Their mental model will efficiently guide the user during their navigation process and allow the user to meet the goal of finding their
preferred media. Users, due to their previous experience, will also easily interpret feedback from the webpages based on how well they are performing.

While meeting the antecedents required to reach a Flow State, users navigating their most used streaming service will easily obtain effortless concentration and have complete control during their navigation. Due to a user’s well-developed mental model of the interface, a user will know how to effectively navigate the streaming webpages which will inhibit the impact of webpage distractors or potentially confusing webpage layouts on the user’s concentration and control. Users will already have the ability, supplemented by previous navigation experiences, to filter out distractors and have previously found workarounds to navigate ambiguous GUI webpage features. Because of the easily obtained concentration and control of their navigation, a user can then become extremely immersed in their navigation process. A user’s navigation actions then become merged with the user’s self where users begin to perform their navigation actions automatically with little awareness to occurrences happening outside of the navigation process.

Meeting the Flow State antecedents and experiential factors easily due to a user’s cognitive model allows the user to then experience the consequence of a reaching a Flow State. Users can then obtain an autotelic experience from completing their navigation process. The user’s sense of accomplishment is then further rewarded by viewing their selected media.

**The Current Study**

The primary goal of the current study is to identify if varying GUI components between Netflix and Amazon Prime Video impact experiential Flow State subscales.
Additionally, the impact of navigating a streaming platform while having high or low platform experience on total flow scores will be investigated.

Hypothesis 1: Differing GUI features among services will decrease Flow State scores.

Hypothesis 1a: Netflix’s non-muted auto playing preview video clips will decrease effortless concentration Flow State scores when compared to Amazon Prime Video.

Hypothesis 1b: Amazon Prime Video’s lack of presenting a user’s location within a list of specific TV and Movie lists will decrease user’s merging of action and awareness Flow State scores when compared to Netflix.

Hypothesis 2: Aggregated Flow State scores will be higher for participants navigating their most used streaming platform when compared to participants who did not navigate their preferred platform.

Method

Participants

A total of 111 participants were recruited from the University of Wisconsin Oshkosh using the SONA participant pool. Participants were enrolled in an introductory psychology course and were at least 18 years of age due to both streaming services offering mature content.
Materials

Streaming Platforms

Two major streaming services, including Netflix Amazon Prime Video were used as the primary stimuli for the study. One of each service was presented to the participant using a lab room computer with speakers set to medium volume. Prior to the participants arriving, researchers cleared any cookies and used unique Netflix profiles as to avoid any confounds that would occur due to suggested content that was personalized based on prior participants’ searching habits. However, Amazon Prime Video only allows the use of one profile. Therefore, any saved content from previous participants was cleared prior to the next participants arrival.

Flow State Questionnaire

A modified 36 item version of the Flow State Scale was used to measure Flow experiences while searching for titles (Jackson & Marsh, 1996). Questionnaire items were modified to better reflect participant Flow State experiences while navigating streaming services webpages.

Questionnaire statements such as “It was clear to me that I was navigating efficiently” or “Time seemed to alter during the navigation activity (time either slowed down or sped up)” were rated by the participant after their navigation using a response scale of 1 (Strongly disagree) to 7 (Strongly agree). Previous research completed by Jackson & Marsh (1996) indicated a mean internal consistency measure of $\alpha = .83$ for the original 36 item Flow State Scale.
**User Experience Questionnaire**

A modified 20 item User Experience Questionnaire (UEQ) was also presented to participants to gauge reactions to a streaming services’ usability, aesthetic value, and to measure user’s general opinion of a specific streaming service (Rauschenberger et al., 2013). Items from the original questionnaire were excluded if they did not apply well to the navigation activity or were modified to better assess participant experiences and opinions in a webpage navigation context (e.g., excluding an item related to the security of the service or modifying items such as “Easy to learn” to “Navigation was easy to learn”). Items were presented to participants using a 7-point scale where participants rated the streaming services that they navigated based on items such as organization from 1 (Organized) to 7 (Cluttered) or the visual aspect of the webpages from 1 (Dull) to 7 (Creative).

**Demographics Form**

A demographics form was used to gather the participant’s biological sex, gender identity, and ethnicity information. Additional items such as, “What streaming service do you use the most” or “How many hours per week do you stream TV shows or movies?” were included as exploratory items that were anticipated to impact participant Flow State scores.

**Structured Interview**

Lastly, a structured interview occurred following the completion of the participant’s streaming service navigation for every five participants. Participants were asked if they experienced any issues while trying to search for a TV show or movie. Participants were
also asked to note which webpage features they particularly appreciated or disliked. Additional follow up questions were used to determine why participant’s preferred or disliked specific GUI features.

**Procedure**

Participants who attended the study entered the lab, were greeted, and then directed towards a lab room with a computer. Participants were then provided with a consent form and given time to read the form privately. Once the participant had read the consent form, participants were offered time to ask the researcher any questions surrounding the study. Once consent was obtained and any participant questions were answered, a researcher provided the participants with an introduction form explaining that the participant would be navigating Netflix or Amazon Prime Video for 10 minutes to locate three movie or TV titles that they have not watched before but would be interested in viewing in the future.

Before navigating, participants answered two questions designed to gauge the average amount of hours that they spend streaming TV shows and movies using Netflix and Amazon Prime Video. Researchers then randomly assigned each participant to navigate either Netflix or Amazon Prime Video based on the participant’s experience with the platforms. Researchers then presented the participant with one of the streaming services and instructed the participant to stay on the presented website and to crack open the door if anything unexpected occurred during their navigation (e.g., a webpage not properly loading or a webpage being accidentally closed).

After 10 minutes had passed, the researcher knocked on the lab room door to introduce the participant to a Qualtrics survey designed to measure Flow, their reactions
to the service, and the participant’s demographic information. Each participant was given time to complete the survey privately and was instructed to crack open the door once they have completed the survey.

After the survey was completed, the researcher performed a structured interview to a subset of participants (every 5th participant; n = 20) to identify any webpage components that promoted or undermined the participant’s navigation experience. In these qualitative interviews, all participants were asked:

1. Did you experience any issues or have any trouble during the navigation process?
2. Which webpage components did you appreciate or made the navigation process easier?
3. Which webpage components did you dislike or made the navigation process more difficult?
4. How did your previously stated webpage components make the navigation process more difficult?

Following the interview, participants were provided a debriefing form and given time to read over the document privately. Participants were instructed to crack open the door once they finished reading the debriefing form, at which point participants were asked if they had any final questions or concerns surrounding the study. Once all questions or concerns are addressed by the researcher, participants were thanked for their time and granted credit for their participation.
Results

A total of 111 UW Oshkosh students were recruited to participate in the study. Following data collection, four participants were excluded from the final analyses due to either not filling out the Flow State questionnaire or due to stopping their navigation prior to the allotted 10 minutes for the navigation activity (ranging from two - six minutes). Of the 107 participants recruited, 67 (62.6%) were female and 40 (37.4%) were male. Further, 87 (81.3%) of the participants were white and 20 (18.7%) were non-white.

Additionally, 27 outlying responses were visually identified using presented histograms for each of the Flow subscales and total Flow State scores. Follow up z-score transformations were conducted for each of the 27 cases. Using a Z-score cutoff value of 3.29 at $\alpha = .001$, 9 of the 27 participant responses produced a Z-score greater than the cutoff value. To ensure that these large Z-score values resulted from these participants being outliers and not attributable to skew, histograms for each scale were then reproduced to verify that each potential outlier had few cases near the outlying response. After reproducing the histograms, one of the 9 cases were kept due to having a z-score of 3.42 for their total flow score while having several non-outlying cases near the response. Subsequently, skewness statistics were calculated for each of the dependent Flow State measures. No transformations were performed as all measures skew Z-score statistics were less than one.

Flow State items were then averaged into their respective antecedent, experiential, consequential, and total Flow scales using participant’s equilibrium of challenge and skill, clearly defined goals, interpretable feedback, perceived effortless concentration,
merging of activity and awareness, gained sense of control, perceived time distortion, loss of self-presentation concerns, and autotelic experience scores.

An independent samples t-test was then performed to investigate the impact of Netflix’s unmuted auto playing preview videos on effortless concentration scores when compared to Amazon Prime Video. An analysis of 106 responses show no significant difference in effortless concentration scores between Netflix (\(M = 5.18, SD = 1.18\)) and Amazon Prime Video (\(M = 5.17, SD = 1.11\)), \(t(104) = 0.04, p = .97\), Cohen’s \(d = 0.01\). To determine whether Amazon Prime Video’s lack of presentation of a user’s location within a row of titles decreased user’s merging of action and awareness Flow State scores when compared to Netflix, an independent samples t-test was performed. Results based on 107 responses showed no significant difference of merging of action and awareness scores between Netflix (\(M = 5.94, SD = 0.84\)) and Amazon Prime Video (\(M = 5.99, SD = 0.80\)), \(t(105) = 0.26, p = .80\), Cohen’s \(d = 0.05\). Lastly, due to unequal sample sizes and to reduce the potential of producing a Type I Error, a Mann Whitney U test was conducted to test if there was a significant difference in total Flow State scores between participants who navigated their most used streaming services and participants who did not. The analysis shows no significant difference in total Flow State scores between participants who did navigate their most used streaming service (\(M_{dn} = 5.43\)) and those who did not navigate their most used streaming service (\(M_{dn} = 5.39\)), \(U(N_{\text{most used}} = 22, N_{\text{not most used}} = 85) = 809.00, z = 0.97, p = .33\).

During the semi-structured interviews, two themes were identified in participants comments about the services. In the Netflix condition, four participants out of 10
expressed their dislike for the unmuted auto playing preview clips. These participants stated that the preview clips created an unwanted distraction during their navigation process. While a few participants voiced their dislike for the unmuted preview clips in the Netflix condition, three out of 10 participants who navigated Amazon Prime Video described the general layout of Amazon’s webpages as cluttered, making it harder to efficiently navigate and focus on the navigation task.

Subsequent descriptive analyses across all Flow measures were carried out to examine to what degree participants experienced Flow during their navigation. On average, participants generally scored between five and six on each of the Flow measures, with little discrepancy when the data was broken down by condition (see Table 1).

Further, considering that experiencing Flow promotes motivation to continue and seek other activities that allows individuals to experience the autotelic nature of Flow, a navigation motivational measure from the User Experience Questionnaire was correlated with all measures of Flow. Evaluation of the means indicated that participants primarily indicated moderate levels of navigation motivation. Additionally, navigation motivation was strongly positively correlated with Flow and the Flow subscales (Table 2).

**Discussion**

The current study sought to identify if varying web-based GUI components between Netflix and Amazon Prime Video negatively impacted user’s effortless concentration and merging of activity and awareness Flow state subscales within a navigation context. Participants navigated either Netflix or Amazon Prime Video for 10
minutes to select three unwatched TV or movie titles. Results indicate that Netflix’s auto playing preview videos did not significantly decrease effortless concentration scores when compared to Amazon Prime Video’s use of muted auto playing preview video clips. Amazon Prime Video’s lack of presentation of a user’s location within a row of titles also did not significantly undermine merging of activity and awareness scores when compared to Netflix, which presents the user’s location within a row of titles. Further, participants who navigated their most used streaming service showed no significant increase in total Flow State scores as compared to participants who did not navigate their most used streaming service. Semi structured interviews with participants were administered to every five participants to identify additional webpage features that participant may dislike, showed that four out of 10 participants voiced their disfavor for Netflix’s unmuted auto playing preview clips. These participants stated that during their navigation, the unmuted clips created a distraction that undermined their navigation experience. Of the ten participants who navigated Amazon Prime Video and were interviewed following their navigation, three participants described the Amazon web pages as generally cluttered. These participants stated that there were many titles presented to the user, making it more difficult to focus on the navigation task and made their navigation cumbersome. However, these responses should be interpreted with caution due to the small sample of participants that were interviewed, whereas their comments may not generalize well to the larger sample population. In culmination, these results suggest that while there are varying GUI features between Netflix and Amazon Prime Video, with some participants showing dislike for webpage features that are
cluttered or that include unmuted auto playing preview video clips, the differences did not significantly decrease user’s Flow within a navigation context.

One potential explanation for these null results is that a floor effect occurred, and users simply did not experience flow during the navigation activity. Examination of the means among the total Flow and Flow State subscales, however, illustrate that a large portion of participants indicated moderate levels of Flow on the Flow State Scale in both conditions.

Another possibility is that all participants experienced very similar levels of Flow with little variation. In other words, range restriction could be responsible for a failure to detect Flow differences between groups or relationships with other constructs (e.g., experience with a service). However, visual inspection of the histograms, the standard deviations, and the strong relationships observed between Flow measures and Navigation Motivation make this possibility unlikely.

It can be concluded that the current GUIs used by Netflix and Amazon Prime Video (holistically, as well as regarding specific features of focus here) are robust to producing differences in the experience of Flow and that these platforms are generally well optimized for users. Although participants did specifically mention the GUI features of interest here in the semi-structured interviews as areas of frustration, the current study would suggest that these areas are likely irrelevant to experiencing Flow and thus these differences may have implications for other outcomes not studied here.
Limitations and Future Directions

It is possible that our sample of college-aged participants are all relatively familiar with GUIs similar to those used in the current study and that this demographic trait is largely responsible for the similarities in Flow between conditions and non-significant relationship between Flow and experience with the service. Future research should therefore seek to recruit a more diverse demographic of participants using participant recruitment services (e.g., Amazon Mechanical Turk), social media, and other online forums. It is possible, however, that if such differences and relationships are present in other demographics, effect sizes may still be quite small and thus a large sample size for such future research is recommended.

A large majority of the current UW Oshkosh Undergraduate participants only had exposure to Netflix. Future research should also consider targeting a representative sample of participants that have experience with Amazon Prime Video as relationships between Flow and experience may be limited to this platform.

Participant engagement with the navigation activity should also be considered. There were two participants that ended their navigation early due to selecting three TV shows or movies prior to the allotted 10 minutes for their navigation. This occurred even after participants read and had the study introduction reiterated to them before the activity began. It was also not possible to confirm that each participant was spending the entire 10 minutes navigating the webpages. While having the participants share their screens with researchers during their navigation was considered, due to the potential of self-presentation concerns regarding their title selections undermining a participant’s ability to
experience flow, we chose not to capture the participant’s screen. Less invasive measures could be used in future research studies such as asking the participant, “Did you find your titles before the time limit was reached”, “Did you spend the entire time navigating the web pages”, or “How many titles were you able to find during your navigation activity?”.

Including these questions may assist in creating a manipulation check and help determine an optimal navigation activity title selection goal and time allotment.

Measuring user’s opinions relating to their satisfaction with large scale updates and intention to use or end a service subscription would further provide important supplemental information that streaming companies could use to promote consumer satisfaction. Questions and situations presented to participants such as, “Do large scale webpage updates promote your navigation experience while searching for titles to view?”, “Would you continue to subscribe to a service that makes large webpage modifications consistently?”, or “Do webpage updates often promote or undermine your navigation experience?”.

Lastly, the current study only had participants navigate a streaming service using a computer in a research lab setting, where many individuals are using Smart TVs or devices connected to a TV such as gaming consoles or dedicated hardware (e.g., Chromecast, Amazon Fire Stick, or Roku) to stream their preferred shows. Future research should seek to implement a refined version of the current study method in a more naturalistic research setting to provide further external validity (e.g., seated in front of a TV using a remote to navigate). Researchers may even choose to guide the participant through the study remotely while they are at home. However, using this
method proves to be difficult due to scheduling, ensuring the participant has adequate internet connection and access to devices, minimalizing potential distractors, and the need to exchange account information so each participant has access to the studied streaming service. A lab setting may be a more optimal option due to being able to balance between creating a naturalistic setting and maintaining experimental control, but may become too costly (e.g., TV, streaming device, comfortable seating, and subscriptions to streaming services).

**Practical Applications**

Developers of GUIs among streaming service providers (and similar services) should consider the amount of time, effort, and cost of continuous modification of GUI features and layouts in light of the current findings. The similarities in these services’ GUIs in users’ experience of Flow suggest that such investments may provide little gain, at least for users experience of Flow while using the service. Further, continuous modification of webpage features may inhibit a user’s navigation experience by creating webpages that do not align with a large majority of long-term users’ mental models. While users can update their mental model of the webpage features, the initial frustration of learning how to efficiently navigate options and locate a preferred title may lead to a poor user experience. Additionally, if web page updates are consistent, long-term users will experience a less than optimal user experience continually, potentially decreasing their satisfaction with the service. In turn, some users may turn to another streaming service for ease of use. Streaming services should consider making minute changes over longer periods of time as to avoid introducing mismatches between current user's mental
model and the modified webpages. Given that Flow experiences did not differ between these two platforms despite seemingly large differences in presentation (e.g., layout, density of options listed) and function (e.g., auto-play on mouseover), implementation of more significant changes should be considered carefully in light of their potential to provide minimal benefit to users’ Flow experiences.

**Conclusion**

While there was no significant decrease or increase in effortless concentration and merging of activity and awareness Flow subscales for users, investigating varying web-based features and their impact, or lack thereof, on user’s experiences within varying contexts remains essential as to continually balance between choosing to optimize or to identify if the current webpage layout and features are well liked by users. A well-designed streaming website can create a cascade of positive effects that both consumers and businesses can benefit from. Ultimately, a tactfully optimized website can increase consumer satisfaction, creating a positive brand experience where a consumer will continue to use a service and potentially refer others to use the service (Seiders et al. 2005).

Considering the near constant use of electronic devices and the opportunity for both consumers and businesses to benefit from potential GUI insights, very little public research has been conducted to directly identify varying webpage features and their effect on user’s flow while using different electronic devices in varying contexts. This is especially true for video streaming services, which continue to become more prevalent for consumers. While flaws in the current study method were identified, the method
provides an acceptable reference point for future streaming Flow research to be conducted. Researchers should then reference the previously stated method limitations and continue to strive to identify webpage features that increase, decrease, or do not impact a user’s flow during their online navigation. In turn, researchers can then provide supplemental suggestions for methodology improvements for web design research that will promote the identification of more catered web design layouts that will promote positive user experiences.
APPENDIX A

Consent Form
Purpose of the research: Christopher Groves, from the Department of Psychology, is conducting a research project to identify how different users react to and evaluate different web streaming services (e.g., Netflix, or Amazon Prime). By conducting this research, we hope to learn more about how users navigate web based streaming services and user preferences based on varying webpage presentations. You are being asked to participate because are at least 18 years of age and are enrolled in an introductory psychology course. This consent form contains important information about this project and what to expect if you decide to participate. Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate.

Procedures: Your participation will involve navigating and evaluating one of three prominent streaming service webpages including Netflix or Amazon Prime Video. You will be asked to navigate the webpages for 10 minutes to select three TV or movie titles that you would be interested in viewing in the future. Additionally, you will be asked to complete a survey and participate in a brief interview to gauge your general navigation experience and your demographic characteristics.

Time Involvement: Your participation will take approximately 45 minutes.

Risks & Benefits: The risks associated with this study are minimal. The benefits to participation include the payment of two research credits and the opportunity to provide important feedback based on a web based streaming service. The findings from this project will provide information related to user preferences for web based streaming services and will give insight on potential routes for streaming services to better accommodate their users.

Privacy & Confidentiality of your Information: The results of this research study may be presented at scientific or professional meetings or published in scientific journals. Your individual privacy will be maintained in all published and written data resulting from the study. Further, data collected will be stored in a locked research lab on a password protected computer.

Payment: You will receive two research credits for your participation.

Right to Withdraw from the Research: Your participation in this research is completely voluntary. You have the right to choose not to participate or to withdraw your participation at any time without loss of any service, benefits, or rights you would normally be entitled to. As a student, if you decide not to take part in this study, your choice will have no effect on your academic status or class grade(s). If you decide not to participate in the study, please let the researcher know and any information collected during your participation will be destroyed.
Questions about Research Study:

The person in charge of this study is Christopher Groves from the Department of Psychology. If you have questions, suggestions, or concerns regarding this study, please use the following contact information:

Dr. Christopher Groves, Ph.D.,
Department of Psychology - Clow F022
University of Wisconsin Oshkosh
(920) 424-2313
grovesc@uwosh.edu

Independent Contact for Reporting Concerns about Research:
If you have any questions, suggestions or concerns about your rights as a volunteer in this research, contact staff in the University of Wisconsin Oshkosh Institutional Review Board Office (IRB) at 920-424-3215 or IRB@uwosh.edu.

Consent:
Your participation in this research is voluntary. Clicking the "I agree" and the next arrow indicates that you have read this form and that all questions have been answered to your satisfaction. Please notify the researcher if you would like a copy of this form for your personal records.
APPENDIX B

Study Introduction
Please be sure to read this form closely and in its entirety. During this study, you will be asked to navigate one of two media streaming platform webpages, including Netflix or Amazon Prime Video to select three TV shows or movies that you would be interested in watching in the future. Please make note of which titles you select after navigating the webpages. Additionally, the movies or TV shows that you select should not be titles that you have watched before. While navigating a service’s webpages for 10 minutes, we ask that you pay attention to the webpage’s usability and aesthetic value. Further, please be sure to note any webpage features that promote or undermine your navigation experience or any general webpage features that you particularly appreciate or dislike.

The researcher will knock on the door to let you know once 10 minutes has passed. The researcher will then present you with a code that will allow you to continue onto the questionnaire portion of the study. Throughout the questionnaire, you will rate your navigation experience, evaluate the streaming service’s webpages, and fill out some demographic information about yourself. Please crack open the door once you have completed the questionnaire. After the questionnaire is completed, you will participate in a brief interview performed by the researcher to better gauge your reactions to different webpage features.

Please note that the researcher may ask you to navigate the streaming service’s webpage while sharing your screen in Collaborate Ultra, but only while you are navigating the streaming service webpages to gain additional information based on how users navigate the webpages (how to share your screen). If a researcher does not ask you to use Collaborate Ultra during your navigation activity, your screen will not be recorded. Additionally, your screen will not be recorded as you fill out the questionnaires. To ensure your screen is not recorded while filling out the questionnaire the researcher will ask you to stop sharing your screen and only give you the pass code to begin the questionnaire once your screen in no longer being shared. Further, we ask that you only stay on the presented study services webpages and do not modify or close any presented webpages unless directed to do so by the researcher. If you have any questions about this study, please be sure to ask the researcher after reading this form. Once you have completely read this form, please crack open the door and the researcher will be right in.
APPENDIX C

Flow State Scale (FSS: Modified)
36 Items

7-point Likert scales (1 = Strongly disagree – 7 = Strongly agree)

chal. = challenge-skill balance  cont. = paradox of control
acta. = action-awareness merging  selfc. = loss of self-consciousness
goal = clear goals  time = transformation of time
feed. = unambiguous feedback  auto. = autotelic experience
conc. = concentration on the task at hand

Please rate the following statements based on your experience while navigating the streaming service’s webpages:

1. I was challenged, but I believed my skills would allow me to meet the challenge. (chal.)
2. I made the correct navigation cursor movements without thinking about trying to do so. (acta.)
3. I knew clearly what I wanted to do. (goal)
4. It was really clear to me that I was navigating efficiently. (feed.)
5. My attention was focused entirely on the navigation activity. (conc.)
6. I felt in total control while navigating the webpages. (cont.)
7. I was not concerned with what others may have thought about me during the navigation activity. (selfc.)
8. Time seemed to alter during the navigation activity (either slowed down or sped up). (time)
9. I really enjoyed the navigation experience. (auto.)
10. My abilities matched the challenge of the navigation activity. (chal.)

11. My navigation actions seemed to happen automatically. (acta.)

12. I had a strong sense of what I wanted to do during the navigation activity. (goal)

13. I was aware of how well I was performing during the navigation activity. (feed.)

14. There was no effort to keep my mind on the navigation activity. (conc.)

15. I felt like I could control what I was doing while navigating the webpages. (cont.)

16. I was not worried about my performance during the navigation activity. (selfc.)

17. The way time passed during the navigation activity seemed to be different from normal. (time)

18. I loved the feeling of my navigation performance and want to capture it again. (auto.)

19. I felt I was competent enough to meet the demands of the navigation activity. (chal.)

20. I performed the navigation activity automatically. (acta.)

21. I knew what I wanted to achieve during the navigation activity. (goal)

22. I had a good idea while I was navigating the webpages about how well I was doing. (feed.)

23. I had total concentration during the navigation activity. (conc.)

24. I had a feeling of total control during the navigation activity. (cont.)

25. I was not concerned with how I was presenting myself during the navigation activity. (selfc.)

26. It felt like time stopped while I was navigating the webpages. (time)
27. The navigation experience left me feeling great. (auto.)

28. The challenge and my navigation skills were equal. (chal.)

29. I did things spontaneously and automatically without having to think. (acta.)

30. My goals were clearly defined. (goal)

31. I could tell, based on my navigation performance, how well I was doing. (feed.)

32. I was completely focused on the navigation activity. (conc.)

33. I felt in total control of the navigation process. (cont.)

34. I was not worried about what others may have been thinking of me during the navigation activity. (selfc.)

35. At times, it almost seemed like things were happening in slow motion. (time)

36. I found the navigation experience extremely rewarding. (auto.)
APPENDIX D

User Experience Questionnaire (UEQ: Modified. R = reverse coded)
Please rate the streaming service that you navigated as a whole based on the following scales:

1. 1 (Good) – 7 (Bad) R
2. 1 (Creative) – 7 (Dull) R
3. 1 (Navigation was easy to learn) – 7 (Navigation was difficult to learn) R
4. 1 (Boring) – 7 (Exciting)
5. 1 (Clear) – 7 (Confusing) R
6. 1 (User friendly) – 7 (Not user friendly) R
7. 1 (Unlikable) – 7 (Pleasing)
8. 1 (Usual) – 7 (Leading edge)
9. 1 (Fast) – 7 (Slow) R
10. 1 (Navigation was complicated) – 7 (Navigation was easy) R
11. 1 (Attractive) – 7 (Unattractive) R
12. 1 (Impractical) – 7 (Practical)
13. 1 (Meets expectations) – 7 (Does not meet expectations) R
14. 1 (Obstructive) – 7 (Supportive)
15. 1 (Webpage button functions were unclear) – 7 (Webpage button functions were clear)
16. 1 (Button functions were not predictable) – 7 (Button functions were predictable)
17. 1 (Navigating was demotivating) – 7 (Navigating was motivating)
18. 1 (Organized) – 7 (Cluttered) R

19. Please rate your agreement with the following statement: Continually extending webpages (i.e., more TV and movie titles that are loaded as you scroll down a streaming services webpage) negatively impacts my ability to efficiently navigate the website to locate a TV show or movie that I would like to watch.

   a. 1 (Strongly disagree) - 7 (Strongly agree)
APPENDIX E

Structured Interview
4 Items

5. Did you experience any issues or have any trouble during the navigation process?

6. Which webpage components did you appreciate or made the navigation process easier?

7. Which webpage components did you dislike or made the navigation process more difficult?

8. How did your previously stated webpage components make the navigation process more difficult?
APPENDIX F

Demographics Form
7 Items

1. What is your gender identity?
   a. (1) Male
   b. (2) Female
   c. (3) Transgender
   d. (4) Non-binary
   e. (5) Gender not listed (please specify):

2. What is your biological sex?
   a. (1) Male
   b. (2) Female

3. What is your race/ethnicity?
   a. (1) African American
   b. (2) Asian
   c. (3) Hispanic
   d. (4) Middle Eastern
   e. (5) Caucasian
   f. (6) Native American
   g. (7) Pacific Islander
   h. (8) Race/ethnicity not listed (please specify):

4. How many hours per week do you spend streaming TV shows or movies?
   a. Free response
5. What is your most preferred streaming service?
   a. (1) Netflix
   b. (2) Hulu
   c. (3) Amazon Prime Video
   d. (4) HBO Max
   e. (5) Sling TV
   f. (6) Crackle
   g. (7) Fubo TV
   h. (8) Disney Plus
   i. (9) Youtube TV
   j. (10) Apple TV
   k. (11) Crunchyroll
   l. (12) streaming service not listed (please specify):

6. What device do you stream TV shows and movies on the most?
   a. (1) Computer
   b. (2) Phone
   c. (3) Xbox
   d. (4) Playstation
   e. (5) Smart TV
   f. (6) TV Stick
   g. (7) Other device not listed (please specify):
7. How technologically savvy are you?

    a. 1 (Not at all savvy) – 7 (Extremely savvy)
APPENDIX G

Debriefing Form
This form will provide you with more in-depth information surrounding the goals of this study. Initially, you were informed that you would be navigating a streaming service’s webpages to determine the usability and aesthetic value of the service’s pages. While we were interested in the usability and aesthetic value of the service, we were additionally interested in how differing webpage components impact a user’s ability to reach a Flow State while navigating the website. A Flow State is generally described as a positive cognitive state where individuals experience increased concentration, increased task efficiency, time distortion, and a loss of self-presentation concerns.

We did not disclose everything regarding this study to you originally because we were interested in your genuine responses. If we had originally presented you with all the information surrounding the study, you may not have reacted as you would in an everyday context and may have responded by adopting a perceived role that would in turn bias your responses.

It is important to remember that the goal of the study was not to trick you and that there were no correct or incorrect navigation patterns or responses to any of the questions. If you have any general questions surrounding the study, feel free to ask the researcher after you have read this form. Once you have finished reading this form, please indicate that you are finished in the Collaborate Ultra chat and the researcher can answer any questions that you may have. If you have any concerns about this study or experience lingering discomfort, then please contact the principle investigator or the Institutional Review Board Administrator using the contact information at the bottom of this page.

Thank you very much for your participation. We value the time and energy you spent in this study and it is our hope that the data you have provided will help us to better user preferences for online services.

Do you have any questions or comments? Feel free to contact the principal investigator: Christopher Groves at (920) 905-3506 or grovesc@uwosh.edu. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (920) 424-1415, IRB@uwosh.edu.
TABLE 1.

Combined Total Flow and Flow Subscales Descriptive Statistics Across Conditions

<table>
<thead>
<tr>
<th>Measure</th>
<th>Amazon n</th>
<th>M (SD)</th>
<th>Netflix n</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Flow</td>
<td>53</td>
<td>5.38 (0.51)</td>
<td>54</td>
<td>5.32 (0.69)</td>
</tr>
<tr>
<td>Antecedent</td>
<td>53</td>
<td>5.48 (0.77)</td>
<td>54</td>
<td>5.38 (0.77)</td>
</tr>
<tr>
<td>Experiential</td>
<td>53</td>
<td>5.72 (0.62)</td>
<td>54</td>
<td>5.63 (0.88)</td>
</tr>
<tr>
<td>Consequential</td>
<td>53</td>
<td>4.95 (0.63)</td>
<td>53</td>
<td>5.01 (0.64)</td>
</tr>
</tbody>
</table>
TABLE 2

Correlations Between Navigation Motivation and Average Flow Scales

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Amazon M (SD)</th>
<th>r</th>
<th>Netflix M (SD)</th>
<th>r</th>
<th>Combined M (SD)</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation Motivation</td>
<td>53</td>
<td>5.02 (1.22)</td>
<td>-</td>
<td>5.39 (1.24)</td>
<td>-</td>
<td>5.21 (1.23)</td>
<td>-</td>
</tr>
<tr>
<td>Total Flow</td>
<td>53</td>
<td>5.38 (0.51)</td>
<td>.53**</td>
<td>5.32 (0.69)</td>
<td>.60**</td>
<td>5.35 (0.60)</td>
<td>.55***</td>
</tr>
<tr>
<td>Antecedent</td>
<td>53</td>
<td>5.48 (0.77)</td>
<td>.55**</td>
<td>5.38 (0.77)</td>
<td>.34*</td>
<td>5.43 (0.72)</td>
<td>.42***</td>
</tr>
<tr>
<td>Experiential</td>
<td>53</td>
<td>5.72 (0.62)</td>
<td>.27*</td>
<td>5.63 (0.88)</td>
<td>.49**</td>
<td>5.68 (0.76)</td>
<td>.38***</td>
</tr>
<tr>
<td>Consequential</td>
<td>53</td>
<td>4.95 (0.63)</td>
<td>.41**</td>
<td>5.01 (0.64)</td>
<td>.60**</td>
<td>4.98 (0.63)</td>
<td>.50***</td>
</tr>
</tbody>
</table>

Note: Navigation motivation was measured using a 7-point scale, 1 (Navigation was demotivating) - 7 (Navigation was motivating).

*p < .05, **p < .01, ***p < .001
References


(Chapter 2, pp. 33-51)


