A Usability Study of Operating Systems: Mac vs. Windows

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1. Abstract

Background: Usability is a common concern when it comes to the systems people use to complete their tasks. To find the usability of operating systems, this study explores the usability of Mac and Windows Operating Systems among users with limited experience in either system. Therefore, providing valuable insights into their efficiency, accuracy, and overall satisfaction. **Aims:** The primary objective was to evaluate and compare the usability of Mac and Windows Operating Systems through a list of tasks that people do on a day-to-day basis. Using efficiency (task completion time), accuracy (clicks to complete a task), and user satisfaction (System Usability Scale (SUS) survey), the study aimed to identify which operating system provides a more user-friendly experience for novice users. **Method:** A between-subject experiment was conducted with 9 graduate students from a computer science course, who claimed to have limited experience with the operating system they were participated in to test. We assessed participant's interaction with the system and measured clicks, time taken, and SUS survey answers. **Results:** The results indicated that Windows systems offered a more efficient, accurate and usable experience. However, when it came to making concrete generalizations, none of the factors had a significant correlations with the system. **Conclusion:** We found that for limited users, Windows offer a more accurate and user-friendly experience than the other. However, the conclusions are weakened by the study's limitations. With such as a small sample size and potential participant bias, it highlights the need for further research with a larger participant pool.

2. Introduction

The motivation for this study was to understand the usability differences between Mac and Windows OS. With Mac and Windows representing a majority of the world's operating systems, it is important to distinguish which performs better for in experienced users. This can help users make informed decisions about their computing preferences, and alert developers to weaknesses in software.

With this study, we compare the usability of MacOS and WindowsOS for individuals who have limited prior experience with the operating system they took part in for testing. Through a controlled lab experiment, we assessed the interaction of 9 participants, from a computer science course at a public research university, with the system. They were given a list of tasks designed to measure their ability to navigate and utilize the features of not so familiar OS. The tasks were designed to test the users comfort with the OS - not the applications installed on the OS. With this, we answered two of our research questions:

1. Given a list of tasks and an OS they have never used before, can inexperienced users complete the tasks more efficiently and accurately using MacOS or WindowsOS?
2. How satisfactory was their experience while using the specific OS?

For the first part, we calculated efficiency and accuracy based on their interaction with the systems. For the second part, we assessed overall user satisfaction by the SUS survey answers, which were provided to each participant at the end of the study. On answering these questions, we aim to contribute insights into the field of human-computer interaction, in the context of operating system usability for novice users.

3. Methodology

3.1 Design Overview:

In this study, we conducted a between-subject experiment to compare the usability of Mac Operating Systems and Windows Operating Systems. The primary independent variables in our investigation were the two systems: Mac OS and Windows OS. Efficiency, accuracy, and usability were the dependent variables, respectively measured by time, clicks, and SUS survey scores.

3.2 Procedure:

The methodology employed a targeted recruitment strategy, purposefully selecting participants with diverse computer usage backgrounds. Each participant was assigned either a Mac or Windows machine, logging in as a "guest user" to ensure a standardized testing environment.

The guest user accounts were preconfigured, containing specific files and applications relevant to the tasks, but were left as empty as possible. This allowed us to gauge participants' ability to adapt to novel scenarios. The participants were presented with a tutorial, outlining the basic features of their OS, and the terminology used for the tasks. They were told not to search for answers on the internet and given no other information.

Upon arrival, participants were given questionnaires to gauge their experience with the two systems. This would help us contextualize our results at the end of our experiment, and assure us that all participants fit within our inclusion criteria.

Throughout the study, participants engaged in a series of tasks designed to evaluate their interaction with the operating systems. During these tasks, efficiency and accuracy were measured in time and number of clicks. Following the experiment, participants were given a survey to assess their satisfaction with the software. This meticulous approach was adopted to facilitate a thorough understanding of the strengths and weaknesses of Mac and Windows systems, combining qualitative insights with precise quantitative measures in a controlled setting.

3.3 Participants:

Participants in this study were graduate students currently enrolled in CS 567, a course focusing on Lab Studies in computer science. To recruit participants, we shared our experiment dates and times with our classmates on a public spreadsheet. Those who were available and interested put their names down. Our research question aimed to gauge usability for inexperienced users, so our inclusion criteria required participants to have limited experience with either Mac OS or Windows OS. Exclusion criteria included regularly using both OSs. These users would not be able to help us test either system.

We had participants sign up for one of our two group slots based on their current primary computer. If a participant used a Mac as their primary computer, they signed up as a Windows tester. If they used Windows on their primary computer, they signed up as a Mac tester.

Depending on their choice, the participants will receive one of the two systems to work on, system 1, which is MacOS, and system 2, which is Windows OS. The participants will be provided with machines on which they will be logged in as guest users, where they will be granted access to all the essential functionalities needed to complete the specified list of tasks.

Given that the participants will have limited familiarity with the system they are to use, a tutorial will be provided to demonstrate how to utilize the specific operating system to complete the tasks.

The task list will comprise basic tasks that users might encounter in their daily use. We are avoiding complicated tasks since the participants are not well-acquainted with the operating system they will be using. Completing these tasks will provide them with a general

understanding of the system's usability, enabling them to respond to survey questions effectively. The list of tasks and all the information given to participants is attached in the appendix.

3.4 Data:

To test performance on tasks we measured data in three different ways. To gauge the efficiency of task completion we measured participants on the time taken to complete a task. We used a stopwatch to record the time. Since there were very few participants in each session, we were able to monitor them all, starting and stopping a stopwatch at the beginning and end of each task. To be sure, we screen-recorded the entire session, allowing us to go back to the record and double-check the timing. Additionally, we measured the accuracy of the participants by counting the number of clicks they made. This would show us if they were able to find the most direct method in completing their task, or if they needed a few extra clicks to get there. To track clicks we used a click counter, which was installed in the application beforehand. Our recordings also showed when a user made clicks, so we used the recordings to double-check our click counters. Finally, we measured the users' satisfaction with the OS through a survey. Once a user had completed all the tasks, we surveyed them on the System Usability Scale, a validated survey meant to measure the usability of a system. The SUS (System Usability Scale) survey was ten questions, with a scale ranging from 1 to 5, where 1 denotes the lowest rating and 5 signifies the highest.

3.5 Treatments and Tasks:

3.5.1 Mac OS

Task 1:

Participants using system 1 or MacOS will first see the home screen logged in as a guest user as shown in Figure 1. The task is to take a photo using a laptop camera and email it to an address provided using the email application.

Figure 1: The home screen shown to participants as they first log into system 1 as guest users.

Participants will be required to search for the camera app to take a picture of themselves. They will be provided with the name of the app, but they will still have to locate it. Instead of apps being displayed directly on the screen, they will be located in the dock. The icons, appearing different from those on Windows, will prompt them to explore and utilize the tools they are permitted to use during the session. They are permitted to use the search feature as shown in Figure 2, which is located in the menu bar at the very top. After successfully navigating to the photo app and capturing a photo of themselves, they will be required to locate it in their files and share it via the built-in email application (Mail on Mac, Outlook on Windows). They will be asked to do this in two ways. First, use the share button from the Camera application. Second, as an attached file in a new mail. These apps will be logged in beforehand, allowing them to quickly compose an email and send it to a provided address.

Figure 2: The search option launches a search tab, allowing participants to look for the specific app.

Figure 3: Participants have full access to the toolbar and must figure out a way to share the image via email.

Task 2:

Participants will be asked to change the wallpaper of their computer. There will be two methods to accomplish this task. They may either find the Settings app in the dock as shown in Figures 4 and 5, and navigate to the Wallpaper section within the application, or they can utilize the Search option as shown in Figure 2 to directly access Wallpaper. Upon reaching the Wallpaper settings, they are free to select any photo to set as their wallpaper. The choice of method is left to the participant's discretion.

Figure 4: System Settings in the dock.

Figure 5: Wallpaper in the System Settings the participants have to navigate to to complete the task.

Task 3:

Participants will be asked to pin two applications to the dock using two different methods. First, participants will have to open an application not present in the dock and add it to the dock by right-clicking the open application, and selecting “Keep in Dock”. Secondly, they will be asked to add a closed app to the dock by dragging the application from Finder.

Figure 6: Looking for an app in the search bar that is not in the dock.

Figure 7: Clicking and dragging it to the left side of the line separator.

Figure 8: The app is pinned in the dock. The task was done successfully.

Figure 9: Opening Finder, navigating to “Go”, then “Applications” to look for the app.

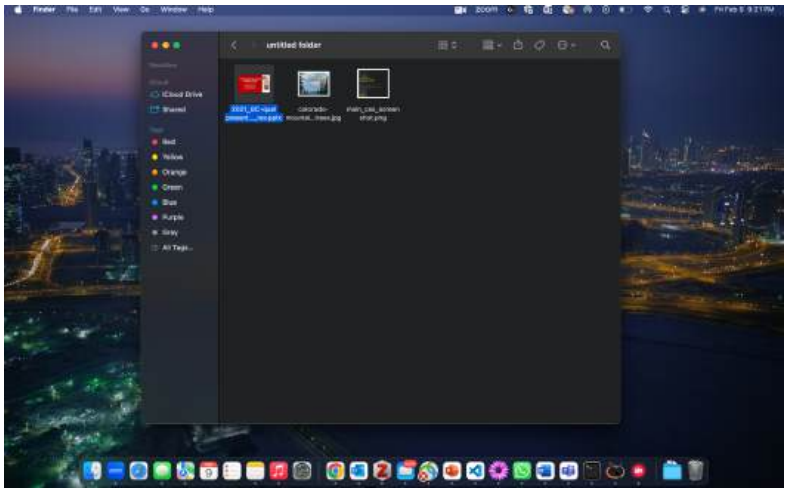


Figure 11: Participants must find the path of the selected file, and sort the directory by “Date Modified”.

Figure 10: Dragging the app down to the dock from the Finder.

Task 4:

The final task consists of two subtasks. The first subtask requires participants to obtain the path of a specified file without leaving the current directory. For the second subtask, participants must sort the directory containing the file by “Date Modified”. They will have access to the toolbar within the directory, which will provide them with the necessary tools to complete both subtasks.

3.5.2 Windows OS

We will now demonstrate what the users will see when completing the tasks on system 2. Initially, they will be directed to the home screen upon logging in as guest users.

Figure 1: Home screen the users will be logged into.

Task 1:

For a fair comparison between the two systems, we are altering the typical setup where most Windows laptops display the Camera app as a desktop icon. Instead, participants will have to locate the search bar and search for the camera app. After opening the app and taking a photo, participants will have to share it via email directly from the camera and through the Outlook app.

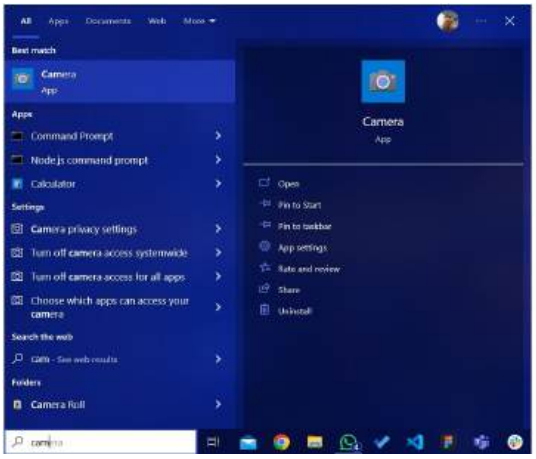


Figure 2: Participants will have to search for the app in the search bar.

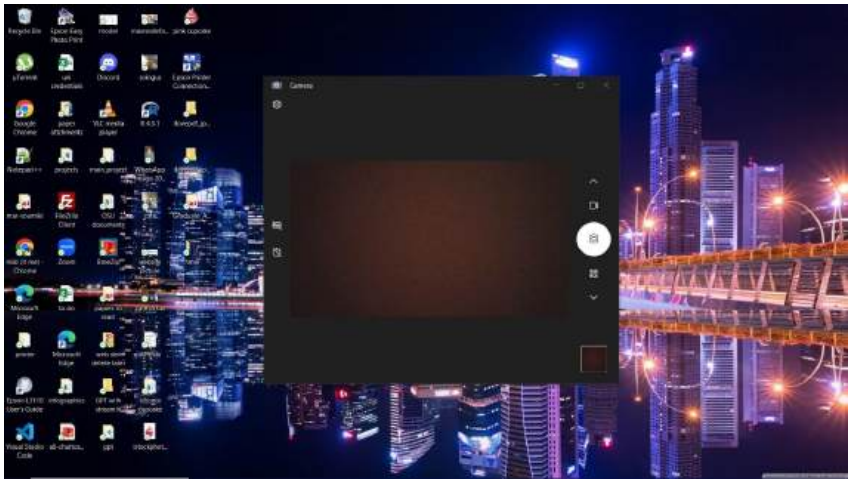


Figure 3: The camera app will open upon clicking.

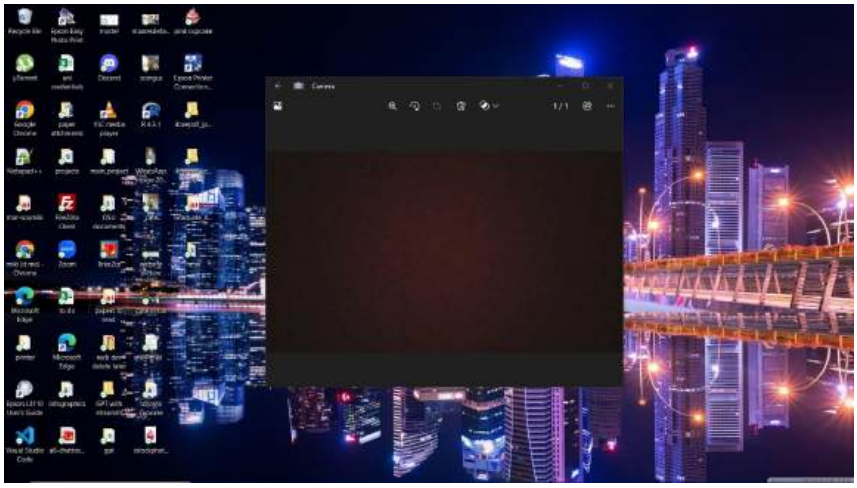


Figure 4: They have to share the image taken to an email address via the options available.

Task 2:

Similarly, for wallpaper, participants will have access to the search bar and the settings. However, the terminology is different here. It is “desktop background” instead of “wallpaper” (we will introduce them to all the vocabulary necessary for the tasks). They can navigate to “Desktop background” through Settings or directly go there by typing it in the search bar. They will be then given the option to choose from any of the available images or their library.

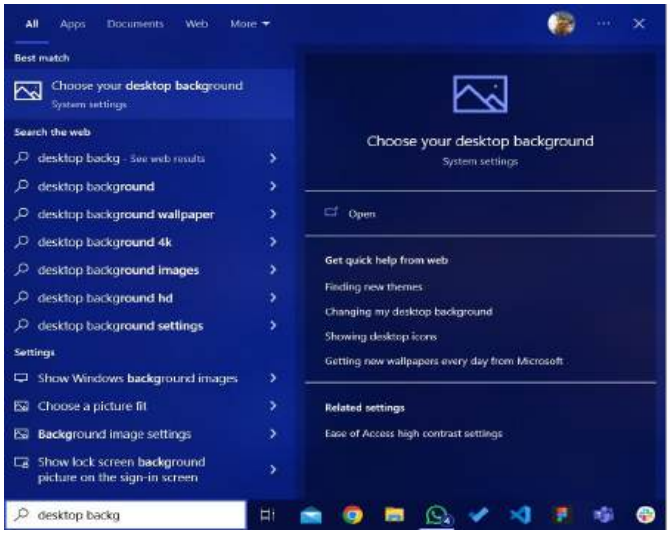


Figure 5: Searching for it directly through the search bar.

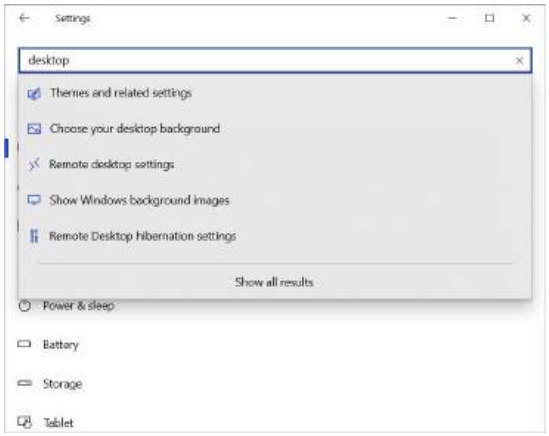


Figure 6: Navigating to the Settings, then finding the way to choose a new background.

Task 3:

For the third task, they will be asked to pin an open and closed app to the taskbar. They will have access to all the necessary options to complete the task. First, they will be expected to open an app and pin it by right-clicking the taskbar app icon. Second, they can search for the app, right-click on the app and choose “Pin to taskbar”. The process is demonstrated in the following screenshots.

Figure 7: Finding and pinning an app through Windows option.

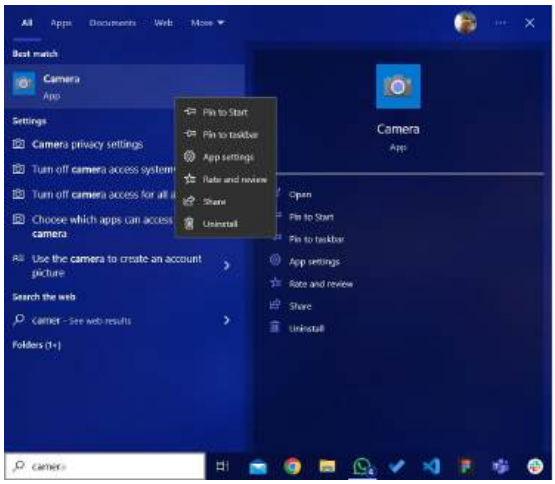


Figure 8: Searching and pinning an app through the search bar.

Task 4:

In the final task, participants will be provided with a specific file within a folder and instructed to obtain the file's path without leaving the current directory. Additionally, they will need to sort the items in the folder by “Date Modified”. The following screenshots demonstrate what the users will exactly see.

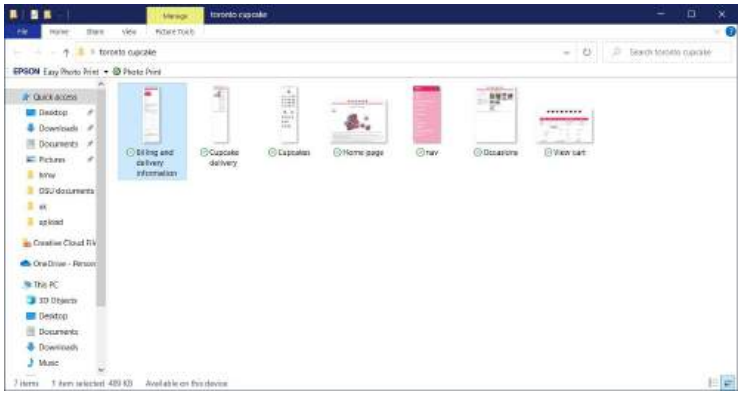
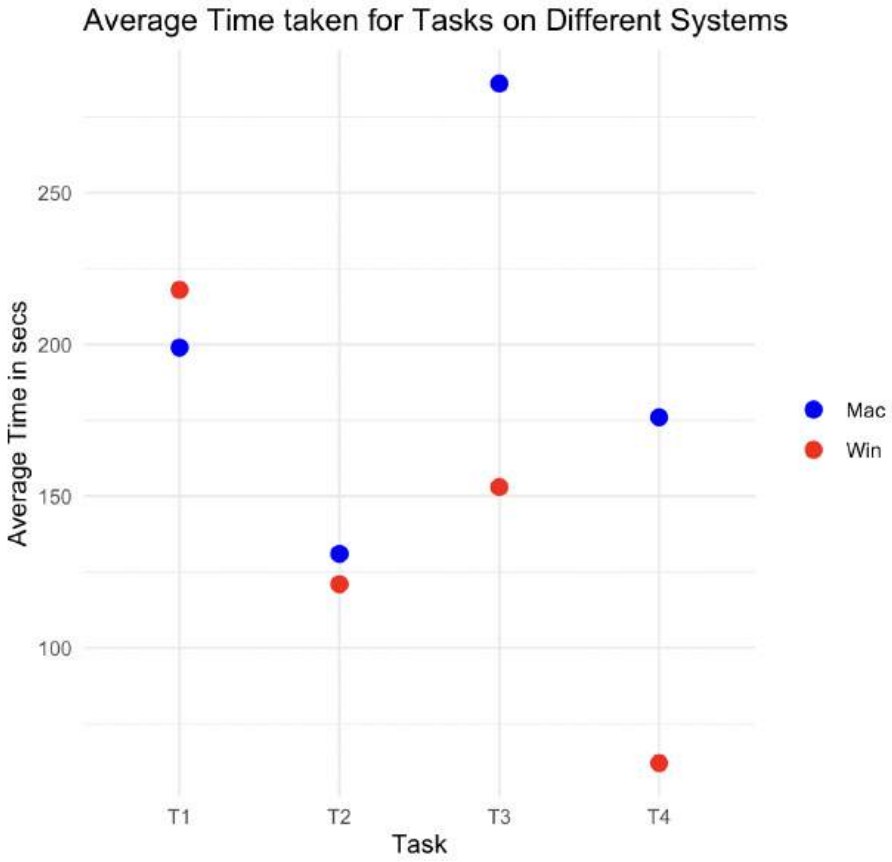


Figure 9: Getting the path of a given file, and sorting the contents of the folder by “Date modified”

4. Results

4.1 Task Time

Measuring task time helped us understand how efficiently participants were able to complete their tasks on whichever system they used. The graph below shows the average time for each task. To find a correlation, each participant’s total time was summed and tested as a single value. This allowed us to test how the system functioned as a whole, rather than each task.

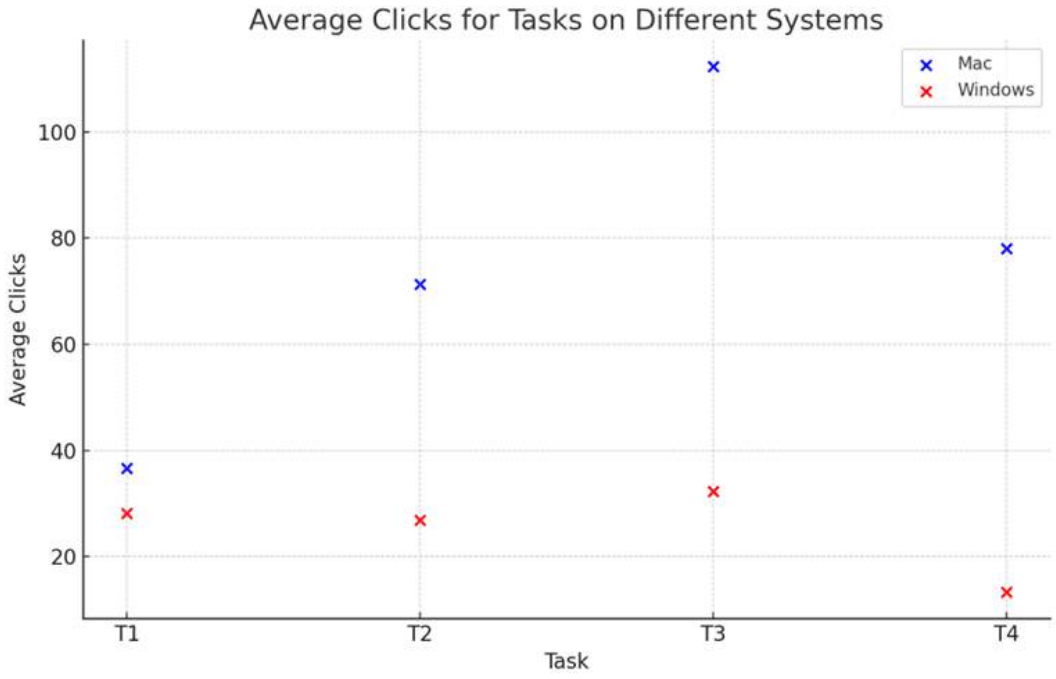


Since the amount of data was so limited, we could not assume normality. Because of this, we used the non-parametric Wilcoxon test to evaluate the correlation. The test was unpaired due to the between-subjects experiment design. In this case, the p-value was 0.5476, which is greater than the 0.05 threshold. This indicates that the observed difference in the time taken to complete tasks between the two systems is not statistically significant at the conventional 0.05 level. Therefore, we do not have sufficient evidence to reject the null hypothesis. Any difference in the time taken to complete tasks between Mac and Windows systems could very well be due to random variation rather than a systematic difference between the systems.

In conclusion, based on this t-test, we cannot conclude that there is a significant difference in the time taken to complete tasks between the Mac and Windows systems with the data provided.

4.2 Task Clicks

To measure the accuracy of participant's methods in completing a task, we measured the number of clicks. The data below references the number of clicks taken for each of the four tasks (T1, T2, T3, T4). A scatterplot visualizes the average clicks for these tasks across the systems. As shown in the visualization, there is a clear trend with users on Mac requiring far more clicks to complete tasks. To test the correlation between clicks and the system, we found the total number of clicks each participant made in completing all four tasks. This allowed us to gauge the performance of the system as a whole, and not split by task.



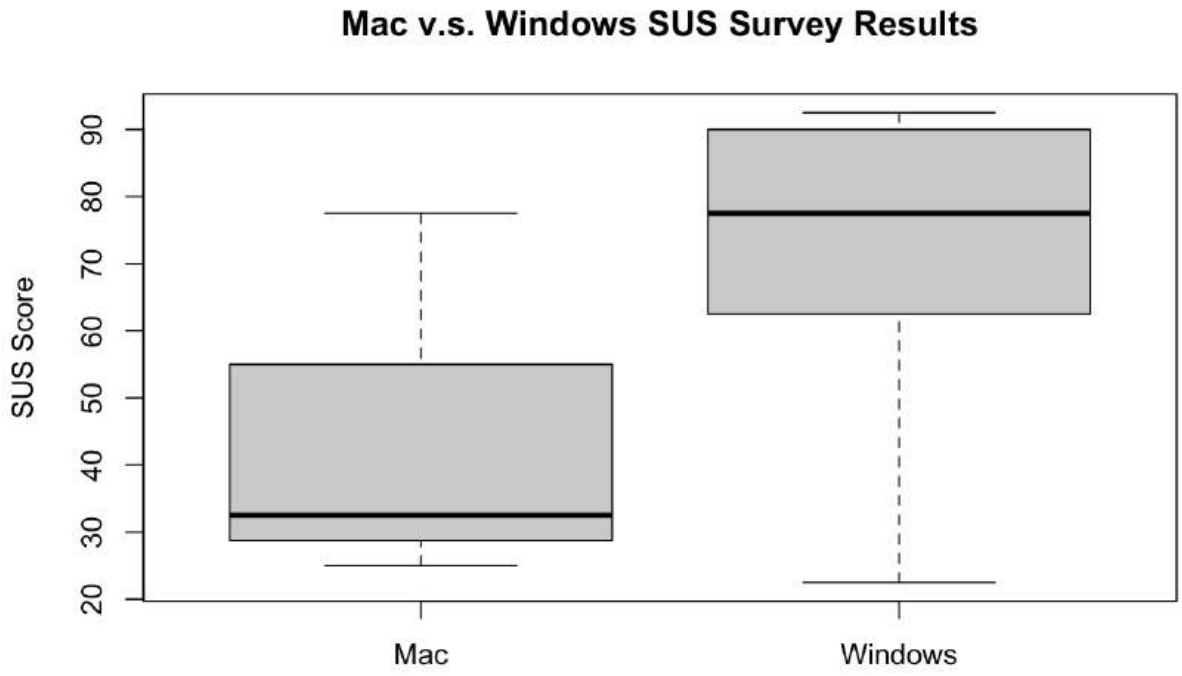
We repeated the use of the Wilcoxon test to suit the non-normal, unpaired data. An unpaired Wilcoxon test revealed no correlation between the number of clicks a user made and the results, $W = 5$, $p = .1667$. The difference between the two variables cannot be labeled as a correlation.

4.3 System Usability Scale Survey

The SUS survey is a standardized survey to measure the usability of a system. The survey contained ten questions, judged on a scale of one to five. To process results, an individual's survey results were summed up and gave us a value between 10 and 50. To standardize our score to a range between 0 and 100, we subtracted 10 from each score and multiplied it by 2.5.

It is important to note that negative question responses were flipped before processing. For example, in the question “I found the system unnecessarily complex”, a response of 5 meant that the system was unnecessarily complex. For calculations, this became a 1. This choice allowed us to combine the results, and ensure that high scores represented better results.

The processed results are represented below in a box plot. There seems to be some correlation between the system and results, but there is far too much variance in the data. This is especially true of the Mac survey results, where the minimum and the maximum values differ by 52.5 points, but represent 2 out of 3 data values.



A Wilcoxon test revealed no correlation between Mac and Windows and usability for testers, W = 5, p = .381. We used a Wilcoxon test because it is a reliable tool to check the correlation in data that is not normal. An unpaired test allows us to evaluate systems tested by unrelated users.

4.4 Task Time 3x

Upon tripling the dataset and re-evaluating the time taken to complete tasks between the two systems (Mac and Windows), we have enough data to assume normality and use a t-test. A t-test with tripled data shows a significant correlation between system and time $t(25) = 2.1520$, $p = 0.0413$.

Given that the p-value is less than 0.05, we can reject the null hypothesis, which states that there is no difference in the time taken to complete tasks between the Mac and Windows systems. This

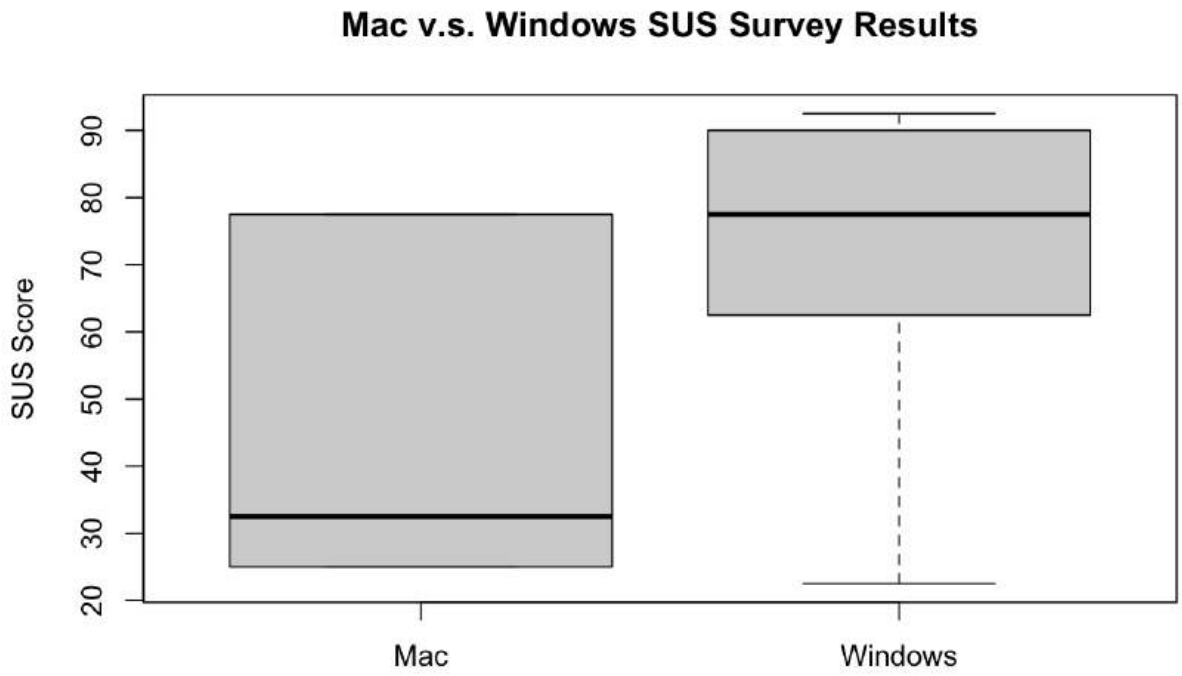
indicates that the difference observed in the dataset is unlikely to have occurred by chance alone. We have evidence to propose that the system type (Mac vs. Windows) does affect the time taken to complete tasks.

4.5 Task Clicks 3x

Again, when data is tripled, we are free to assume normality and run a t-test. An unpaired t-test with tripled values revealed that Mac users required more clicks to accomplish the same tasks as Windows users, $t(25) = 4.5765$, $p = .0001$. This change is due to the volume of data, which allows us to assume normality, and see a clear difference in mean.

4.6 System Usability Scale Survey 3x

Below is the box plot with the tripled data. The altered Windows box plot remains very similar, but the new Mac clearly shows the issues with the data. The variation is so strong that it is hard to produce a result. That being said, it is clear to see that Windows usability scores are higher than Mac scores.



An unpaired t-test on the tripled data revealed that Windows testers had a more usable experience than Mac testers, $t(25) = 2.5531$, $p = .0172$. This changed because there was enough data to conclude. Previously, with only three Mac testers, the volume of data could not justify a correlation.

4.7 Result Significance

The research question attempted to find correlations between Mac and Windows OS and a user's efficiency, accuracy, and usability. From the raw data, it is clear that Windows performed better in all of these categories. Windows testers performed the tasks more efficiently and accurately, by taking less time and using fewer clicks. Windows testers also considered their experience more usable, rating it higher on the SUS survey.

After processing and testing the data, we were able to make a few generalizations. With the genuine results, none of the dependent variables had a significant correlation with the results. All statistical analysis suggested that the mean difference was due to random chance, not a direct correlation. However, with enough data, a significant correlation can be made for all three of these variables. The results suggest that Windows can be more efficient, accurate, and usable for users. This shows that the patterns seen in the raw data do suggest a correlation between variables, but do not have enough evidence to prove it. If the patterns repeat in a larger experiment, they would signify a correlation. This is grounds for a repeated experiment with a much larger scope and sample size.

5. Threats to Validity

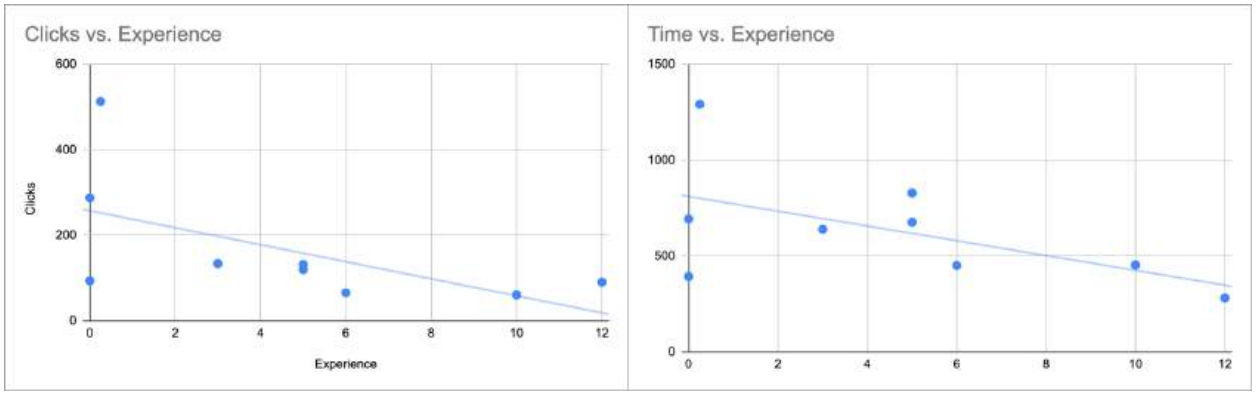
5.1 Internal Threats

As with any study, this experiment contained threats to validity. Internal threats aim to evaluate how the experiment's design could impact its validity [1]. In this study, all participants were chosen from a pool of classmates, meaning we had personal connections with them. They might have skewed their performance to help us find consistent results. Additionally, we found that most participants were quite attached to their current OS. People might have answered survey questions dishonestly because of their bias towards their primary OS.

Our tasks were designed to be simple, such that anyone could complete them on their first attempt with the OS. However, we found that these tasks were too simple, and created a gap in data. Most participants instantly knew how to do the task, and accomplished it in under two minutes, or they spent the entire time figuring out how to execute the task.

The largest threat to the validity of this study was the disparity between the experience of Mac testers and Windows testers. When selecting participants we asked that Windows testers be primary Mac users, and Mac testers be primary Windows users. We figured that this would help us place inexperienced users in both test groups. However, this was not the case. In reality, the average experience on the testing system for a Windows tester was approximately 7 years, and the minimum experience was 3 years. On the other hand, the average experience for a Mac tester was under 0.1 years, and the maximum experience was 0.25 years. This gap in experience meant

that Windows testers almost certainly knew how to do the tasks we assigned, while Mac users were learning how to do them on the spot. To test the impact of this threat, we tested the correlation between experience and performance/usability. Below are graphs of experience plotted against total clicks and total time for each participant.



A Pearson's correlation test revealed a negative correlation between experience and clicks, r (9) = -0.5881, p = 0.101. It also revealed a negative correlation between experience and time, r (9) = -0.5548, p = 0.125. Neither of these are deemed as significant correlations, but provide a low enough p-value to show how experience could be a threat to validity. The results suggest that this study requires a follow-up, with more control over the participants.

5.2 External Threats

The limitations of participants' experience also create an external threat to this study. External threats are threats to the generalizations made by the results [1]. It is hard to make generalizations out of data that is skewed by the participant experience. Additionally, we recruited participants who were all students in CS 567. They pose a potential threat to our study as they are from the same background, skill, and knowledge. We risk introducing bias and limiting the generalizability of our findings.

5.3 Conclusion Validity

In examining the validity of our study's conclusions, two critical issues present significant challenges to the robustness of our findings.

The study faced a foundational limitation in the form of an insufficient number of individuals taking part, with only 9 actual participants. This sample size is considerably lower than what is typically deemed necessary for qualitative research, necessitating a methodological adjustment where data was expanded by tripling to facilitate the analysis of the data.

The data on time and clicks required to complete tasks revealed notable outliers, complicating the interpretation of results. While most participants completed the tasks in under two minutes, a few outliers took as much as ten minutes, introducing potential biases in the analysis of task

efficiency and user interaction patterns. These issues underscore the importance of approaching our study's conclusions with caution, acknowledging the potential impacts of these limitations on the reliability and generalizability of our findings.

6. Discussion

6.1 Results Discussion

Throughout the study and results analysis, it was clear that Windows users generally performed better on task time, clicks, and SUS scores. Initially, this was thought to be a genuine result due to the simplicity of Windows. Based on personal observations, Windows users were able to get started on a task much more efficiently. Mac users required some time to familiarize themselves with the system and locate basic features such as the system search bar or application explorer. Once in the relevant application, both groups were able to complete the task with relative ease.

However, understanding these threats helps us learn more about the significance of the results. All Windows testers had significant experience, giving them an advantage in completing tasks. Though Pearson’s coefficient does not suggest a direct correlation, it suggests that there could be some influence. This explains some of the patterns we detected in our analysis. Windows users already knew about the built-in shortcuts, so they required fewer time and clicks to get started on the task. On the other hand, Mac users were learning the basics of the system as they attempted to complete the tasks.

6.2 Lessons Learned

The biggest lesson learned from this experience was the importance of participant selection. A majority of threats to this study were due to issues with the number of participants or the background of participants. In future studies, inclusion and exclusion criteria should be more strict and contain concrete rules. Additionally, recruitment should be done from a bigger pool containing candidates with more diverse backgrounds.

6.3 Questions

The discrepancy in experience unveils some relevant data and brings up some questions for future studies. We saw that all users had a minimum of 3 years of experience on Windows computers. Is it common for all computer users to have significant experience with Windows? On the other hand, a majority of Mac testers had never used a Mac. Do most Windows users have no experience with Mac? Is Windows OS the most accessible OS? Can this accessibility be labeled as usability?

7. Conclusion

The study comparing the usability of Mac and Windows operating systems suggests that Windows may offer a more user-friendly experience for inexperienced users. This conclusion is based on several findings:

Efficiency and Accuracy: Windows users completed tasks with fewer clicks and in less time compared to Mac users. This suggests higher efficiency and accuracy with the Windows OS.

User Satisfaction: The System Usability Scale (SUS) survey results indicated that Windows users rated their experience better than Mac users, though this finding was significant only when the data were tripled, pointing to the need for further research with a larger participant pool.

However, the study faced several limitations, such as a small sample size, potential biases due to the participants' backgrounds, and varying levels of experience with the systems being tested. These limitations kept the study from finding many significant correlations, and discounted the correlations that were dound. They highlight the need for an expanded study with a more diverse and larger sample size to validate these findings.

References

[1] Forrest Shull, Janice Singer, Dag I. K. Sjøberg. 2008. Guide to Advanced Empirical Software Engineering. London, England.

Appendix

Raw Data

Time

Participant	System	T1	T2	T3	T4	Total Time (min)	Total Time (sec)
3	Mac	6:19	2:43	10:00	2:30	21:32	1,292
6	Mac	2:10	1:36	1:20	1:28	6:34	394
7	Mac	1:28	2:16	3:00	4:50	11:34	694
	AVG	**3:19**	**2:11**	**4:46**	**2:56**	13:13	793
1	Windows	4:35	3:32	2:20	0:50	11:17	677
2	Windows	3:20	1:17	4:16	1:47	10:40	640
4	Windows	2:54	2:27	1:12	1:01	7:34	454
5	Windows	5:33	1:18	0:30	0:10	7:31	451
8	Windows	4:07	2:30	5:30	1:42	13:49	829
9	Windows	1:24	1:06	1:30	0:42	4:42	282
	AVG	**3:38**	**2:01**	**2:33**	**1:02**	9:15	555

Clicks

Clicks						
Participant		T1	T2	T3	T4	Total Clicks
3	Mac	63	130	291	29	513
6	Mac	30	32	13	19	94
7	Mac	17	52	33	186	288
	AVG	**36.66666667**	**71.33333333**	**112.3333333**	**78**	
1	Windows	30	35	40	15	120
2	Windows	20	39	48	27	134
4	Windows	24	20	9	8	61
5	Windows	20	25	15	6	66
8	Windows	40	11	65	16	132
9	Windows	35	31	17	8	91
	AVG	**28.16666667**	**26.83333333**	**32.33333333**	**13.33333333**	

SUS Responses

PID	Name	Platform	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
3		Mac	2	4	1	3	4	4	2	5	2	5
6		Mac	3	1	4	1	3	2	4	1	4	2
7		Mac	1	4	2	3	3	4	4	4	2	4
1		Windows	3	1	5	1	4	2	5	1	5	1
2		Windows	1	3	2	4	3	4	2	5	1	4
4		Windows	1	3	4	1	2	3	4	3	5	1
5		Windows	4	1	5	1	5	1	3	1	5	1
8		Windows	3	1	5	1	3	1	3	1	4	2
9		Windows	3	3	5	1	4	1	4	3	4	2

TASK INFORMATION FOR PARTICIPANTS (MAC OS)

Task 1: Taking a Photo and Sending via Email

- Use the Camera app called “Photo Booth” to take the photo
- Email using Mac OS email app called “Mail”

Task 1a: Share via Photo Booth

- Share the photo directly from the Photo Booth app

Task 1b: Share via Mail App

- Export the image to Finder
- Compose an email from Mail and attach the photo

Task 2: Changing the Wallpaper

- Mac OS Settings is called “System Preferences”

Task 2a: Change the image to a default Apple image

- Use one of Mac’s default images

Task 2b: Change the image to a custom image located in the different folder

- Use the photo in the folder

Task 3: Adding an App to the Dock/Taskbar

- The Taskbar located at the bottom of the screen is called the “Dock”
- Find an app not currently in the dock, and pin it to the dock

Task 1a: Add an open app to the dock

- Find and start the “Text Edit” app
- Pin it to the dock, so that when the app is closed it remains there

Task 1b: Add a closed app to the dock

- Find the “Calculator” app
- Pin it to the dock without starting the app

Task 4: Obtaining File Path and Sorting by Date Modified

- You'll be provided with a specific file within a folder.
- Obtain the file's path without leaving the current directory.
- Sort the items in the folder by "Date Modified" using the toolbar within the directory.

These tasks are designed to assess your familiarity, efficiency, and comfort level with the respective operating systems. Please proceed with each task carefully, and feel free to ask any questions if you encounter difficulties. Let's begin the study!

TASK INFORMATION FOR PARTICIPANTS (WINDOWS OS)

Task 1: Taking a Photo and Sending via Outlook

- Use the Camera app called “Camera” to take the photo
- Email using Windows OS email app called “Outlook”

Task 1a: Share via Camera App
  - Share the photo directly from the Camera app

Task 1b: Share via Email App
  - Compose an email from Outlook and attach the photo

Task 2: Changing the Wallpaper

- Windows OS Settings which is called “Settings”

Task 2a: Change the image to a default Windows image
  - Use one of Window's default images

Task 2b: Change the image to a custom image located in the Downloads folder
  - Use the photo in the Downloads folder

Task 3: Adding an App to the Dock/Taskbar

- The dock located at the bottom of the screen is called the “Taskbar”
- Find an app not currently in the taskbar, and pin it.

Task 3a: Add an open app to the taskbar
  - Find and start the Notepad app
  - Pin it to the taskbar, so that when the app is closed it remains there

Task 3b: Add a closed app to the taskbar
  - Find the Calculator app
  - Pin it to the taskbar without starting the app

Task 4: Obtaining File Path and Sorting by Date Modified

- You'll be provided with a specific file within a folder.
- Obtain the file's path without leaving the current directory.
- Sort the items in the folder by "Date Modified" using the toolbar within the directory.

These tasks are designed to assess your familiarity, efficiency, and comfort level with the respective operating systems. Please proceed with each task carefully, and feel free to ask any questions if you encounter difficulties. Let's begin the study!

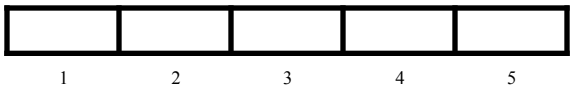
DEMOGRAPHIC SURVEY (Done through Google Forms)

1. What is your experiment ID
2. What do you use as your primary computer (choice between Windows, Mac or Other)
3. I am satisfied with the user experience of my current OS (1 to 5, strongly disagree to strongly agree)
4. I can accomplish tasks efficiently with my current OS (1 to 5, strongly disagree to strongly agree)
5. I can accomplish tasks accurately with my current OS (1 to 5, strongly disagree to strongly agree)
6. What system are you testing today (choice between Windows or Mac)
7. How many years of experience do you have with this OS
8. How many years has it been since you have used this OS on your primary computer? Leave this blank if you have never used this OS before
9. I have experience with this OS (1 to 5, strongly disagree to strongly agree)
10. I have used this OS on my primary computer (1 to 5, strongly disagree to strongly agree)
11. I feel comfortable completing challenging tasks on this OS (1 to 5, strongly disagree to strongly agree)
12. I need to learn a lot of things before I could use this OS (1 to 5, strongly disagree to strongly agree)

System Usability Scale

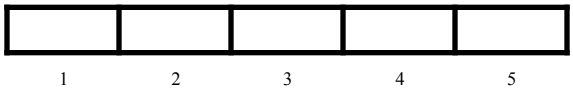
Strongly disagree — Strongly agree

1. I think that I would like to use this system frequently

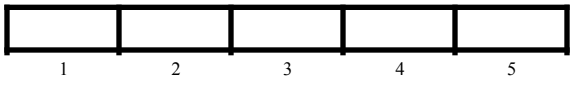


2. I found the system unnecessarily complex

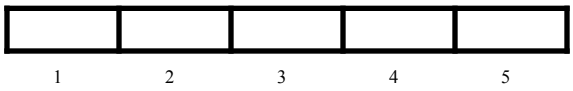
3. I thought the system was easy to use



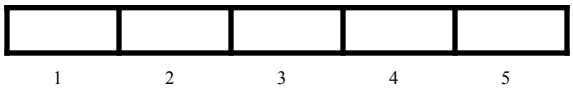
4. I think that I would need the support of a technical person to be able to use this system



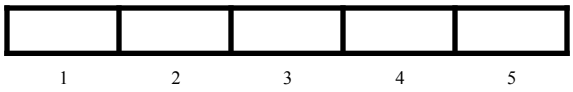
5. I found the various functions in this system were well integrated



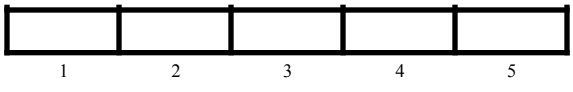
6. I thought there was too much inconsistency in this system



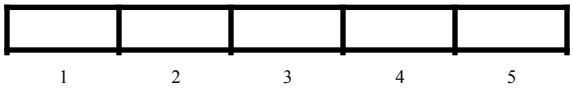
7. I would imagine that most people would learn to use this system very quickly



8. I found the system very cumbersome to use



9. I felt very confident using the system



10. I needed to learn a lot of things before I could get going with this system