Computer Game Usability Study in F1 racing game: Comparing Combinations of First-person vs Third-person Perspective - Keyboard vs Joystick Controller

Group 11:

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Abstract

This study investigates the usability of different control methods (keyboard vs. joystick) and perspectives (first-person vs. third-person) in a Formula 1 racing game to determine their impact on user performance, satisfaction, and immersion. Participants, comprising novice and intermediate gamers, played the game using four combinations: first-person joystick, first-person keyboard, third-person joystick, and third-person keyboard. Metrics such as lap time, number of collisions, spins, and track exits were recorded, alongside user satisfaction through surveys and System Usability Scale (SUS) testing. The results revealed distinct differences in user experiences, with the first-person joystick combination providing the highest satisfaction and the third-person keyboard combination the lowest. These findings offer valuable insights for game developers to enhance game accessibility and user experience by optimizing control configurations and perspectives.

Background of the Study

As emphasized by Young et al. (2016), interest in games has been increasing day by day in recent years. As a result, the number of novice players is increasing day by day. The adaptation of these new players to the games is primarily through the controls that enable them to play the games, control their characters, and reflect what is in their minds on the screen. Nowadays, it can be said that these controls are of two types: Keyboard & Mouse and joystick. Again, Young et al. (2016) stated that players should be able to reflect whatever they want on the screen so that they do not lose their concentration on the game and do not get bored and leave the game. Therefore, some factors need to be controlled. These factors are ergonomics, comfort, quality, and functionality. Apart from this, there are game-specific factors as well as the physical aspects of the controls. These include setting correct key bindings for each game type, designing game types according to input devices, and similar factors. The results of the research conducted by Kavaklı and Thorne (2002) show that novice players achieve better results on keyboards that are used more on a daily basis. However, Young et al. (2016) emphasized that when players play games with a joystick, their hand positions are better and they feel more comfortable. The differences between First Person and Third Person, which is also the subject of this research, are another factor that changes the desire of novice players to play at immersive levels. Pinelle et al. (2008) stated that differences in game types and camera angles also vary according to player experiences. A third-person perspective is preferred by novice players as it increases their control of the environment. However, experienced players said that they enjoyed the First Person perspective in racing games more and felt the atmosphere more.

The main purpose of this study is to investigate how the keyboard and joystick affect user performance, satisfaction, and immersion when playing racing games, from both first-person and third-person perspectives. Specifically, it aims to measure differences in user performance metrics such as time to complete the track, number of hits to the walls, number of spins, and the number of times that the car goes out of the track. Additionally, this study will collect data on user satisfaction and experiences through interviews, surveys, and System Usability Scale (SUS) testing. By addressing these goals, the research aims to provide new insights into the optimal use of input devices and perspectives in racing games.

The significance of this study is to provide game developers with information about how beginner players perceive and experience different combinations of gaming styles (first-person-keyboard, third-person-keyboard, first-person-joystick, third-person-joystick). By understanding the preferences and challenges faced by novice players, developers can restructure their games to facilitate better adaptation and increase overall user satisfaction. Findings from this research may lead to the development of more intuitive and accessible game configurations, thereby improving players' gaming experience. increasing the appeal and accessibility of games to beginners and potentially novice players.

Methodology

Hardware	
Laptop	MSI GS65 Stealth Thin 8RF
Keyboard	Logitech G915 LIGHTSPEED Wireless Mechanical Keyboard
Controller	Xbox Wireless Controller
Software and Details	
Game	F1 2023
Track	Australian GP - Albert Park Circuit
Vehicle	Mercedes W14

Table I. Hardware and software used for the usability testing

When it comes to driving games, a player's experience can be greatly impacted by the selection of control device and camera viewpoint. Different control devices, including joysticks and keyboards, have varying degrees of comfort and precision, which can have an impact on a player's overall enjoyment and performance. Furthermore, the First-Person or Third-Person camera perspective offers different levels of vision and immersion. In order to improve user experience, game developers must comprehend how these aspects interact. There is little empirical data regarding how alternative control devices and camera viewpoints impact user performance and enjoyment in driving games, despite a wealth of study on gaming experiences. To understand the relationship between controller and camera perspective in the context of user

experience in racing games, this study aims to answer the following research question: *How do the choice of control device (keyboard vs. joystick) and camera perspective (First-Person vs. Third-Person) impact user performance and satisfaction in playing a driving game?*

Participants and Persona(s): In total there were 5 male and 5 female students participating in this study. Their ages, gender, general game experience, and familiarity with car racing games are recorded. The participants are university students aged between 22 and 24. Their game experiences generally vary between novice and intermediate.

Name - Surname	Age	Gender	Game experience (1-Beginner, 5-Very experienced)	Familiarity with car racing games? (1-Not at all, 5-Very familiar)
Barış Ulaş Çukur	22	Male	5	5
Elif Berfu Evliya	22	Female	2	2
Emirhan Özdemir	23	Male	4	3
Osman Kara	22	Male	5	5
Duru Imamoğlu	22	Female	1	1
Ahmet Tuna Çöllü	23	Male	3	2
Ayse Beraa Ozcan	22	Female	2	2
Sümeyye Sude Arkaç	23	Female	3	3
Öykü Demir	24	Female	2	2
Berke Alacacı	24	Male	3	3

Table 2: Personal information of participants

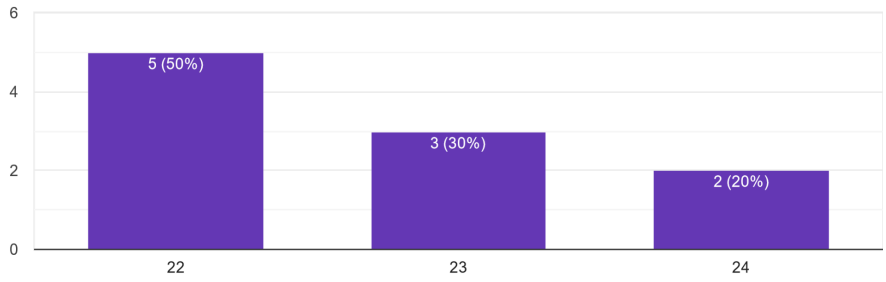


Figure 1: Age of the participants

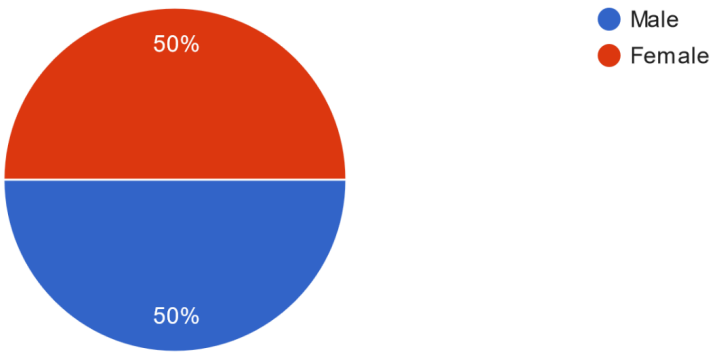


Figure 2: Gender of the participants

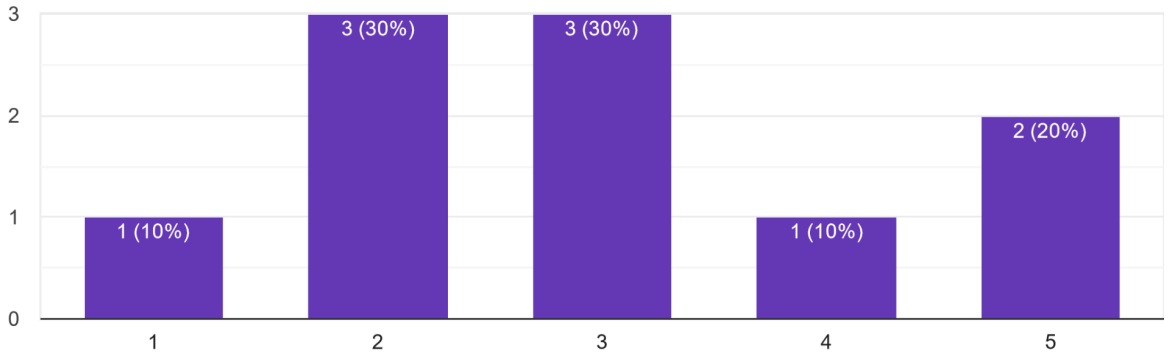


Figure 3: Game experience of participants (1-Beginner, 5-Very experienced)

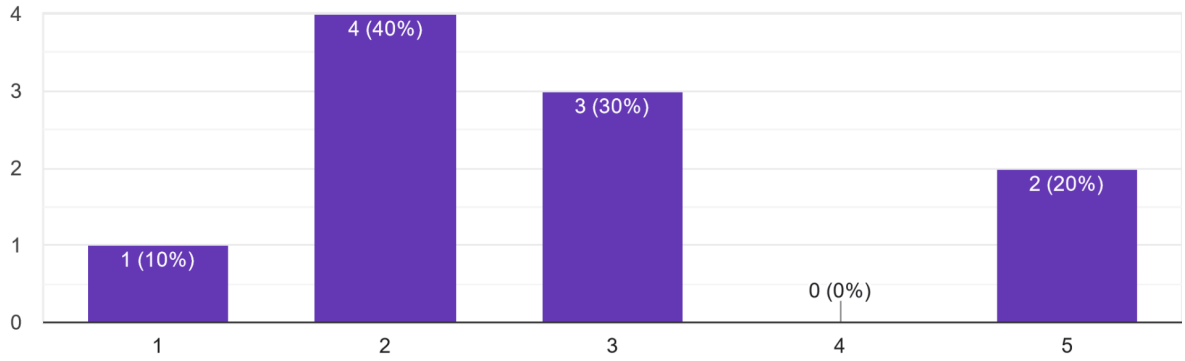


Figure 4: Participants' familiarity with car racing games (1-Not at all, 5-Very familiar)

Materials:

- Voice recordings
- 3 Google Forms questionnaires that evaluates:
    - Satisfaction
    - Immersion
    - Effectiveness
    - Comfort
- Screen recording of gameplay
- System usability test

Pilot study: A pilot study was conducted before the main experiment to check that the research concept and technique were effective. Two students from Sabancı University who were not part of the main study participated in the pilot trial. The main purpose of the pilot study was to evaluate the suitability of the survey items and the understandability of the test. The study also focused on finding potential issues with participant engagement and data collection. The tasks given to participants in the pilot study were the same as those in the main study. Participants in the pilot test tested different combinations with exactly the same equipment: joystick, keyboard, and laptop. They were asked to fill out the "pre-gameplay", "after each gameplay" and "post interview" forms that we prepared to ensure that the questions in the forms were understandable and that the necessary data was collected.

Collected data: Voice recordings of reactions during the gameplay were transcribed and thematic analysis was applied. Questionnaires were conducted before the gameplay, after each mode, and after finishing the gameplay. Screen recordings of the gameplay were saved for further analysis. The acquired data was processed and structured into tables to allow for the comparison of different control techniques (joystick vs. keyboard) and views (first-person vs. third-person) in a Formula 1 gaming context. For every combination of control method and perspective, the data were classified according to hit number, spin number, out of track number, and lap time. System usability score (SUS) is recorded for each participant and gameplay mode.

Tasks:

Figure 5: Participants playing the game with each combination (first-person/joystick, third-person/joystick, first-person/keyboard, third-person/keyboard).

Four different tasks are completed by the participants. To not cause any bias in the results, players who played the game tested different gameplay combinations in shuffled order. The tasks are to test using Mercedes W14 on the Australian GP track in the F1 2023 game with four combinations of two controller types (joystick/keyboard) and two perspectives (first-person perspective/third-person perspective). So users played the game four times with each combination (first-person/joystick, third-person/joystick, first-person/keyboard, third-person/keyboard).

Results / Analysis of Data

According to the results that we collected from our "pre-gameplay" questionnaire we recorded the biased opinions of the participants before they started the test process. Their estimation of the rankings of the each gameplay mode were recorded.

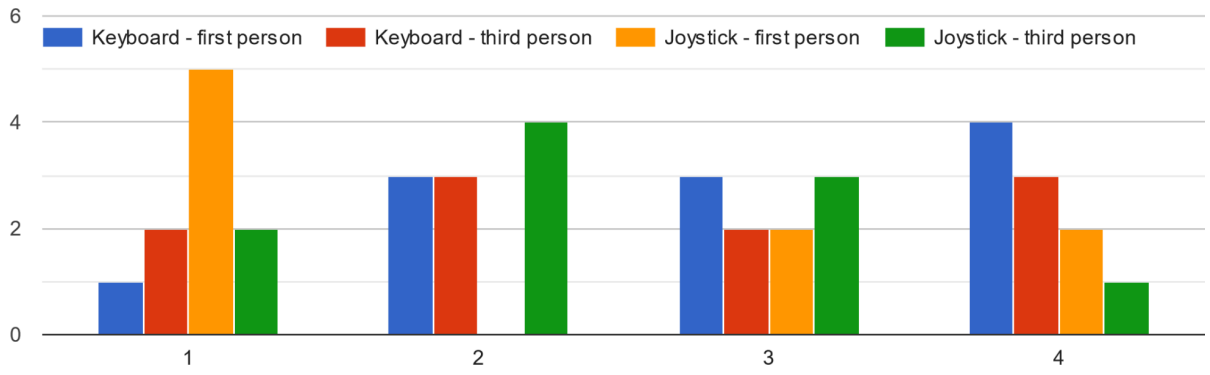


Figure 6: Rankings of the control modes by the users before starting the game

Figure 6 demonstrates that 50% of the participants think that the joystick-first-person combination will be easier to use in the F1 game before testing the game. Moreover, the majority of participants think that the keyboard-first person combination will be more difficult to use in the F1 game.

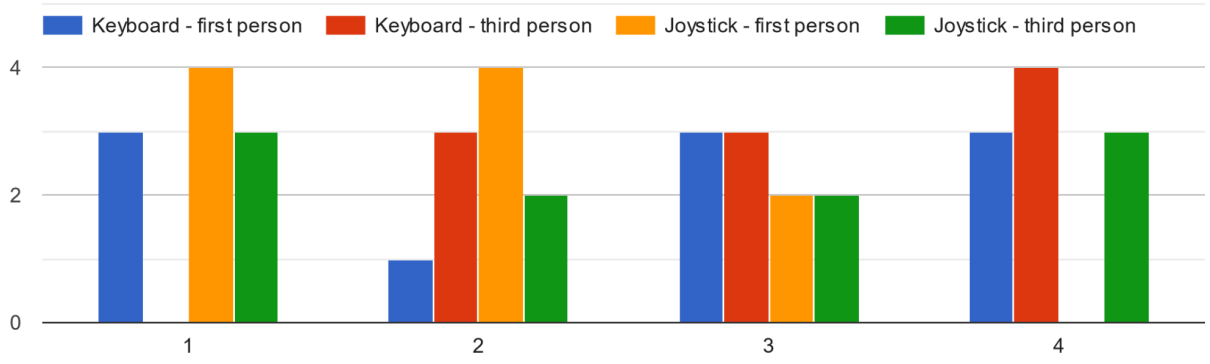


Figure 7: Rankings of the control modes by the users after finishing the game

Figure 7 shows that the joystick-first person combination is one of the first two preferences of most participants after testing the game. On the other hand, the most difficult combination to use was the keyboard-third person combination. In addition, the number of participants who chose the joystick-third person combination as the worst to use has increased. The biggest reason for the keyboard-third person combination to be chosen as the worst may be due to the finger pain caused by constant pressing and pulling of the keyboard keys during long use, and may cause wrist pain due to the posture of the hand.

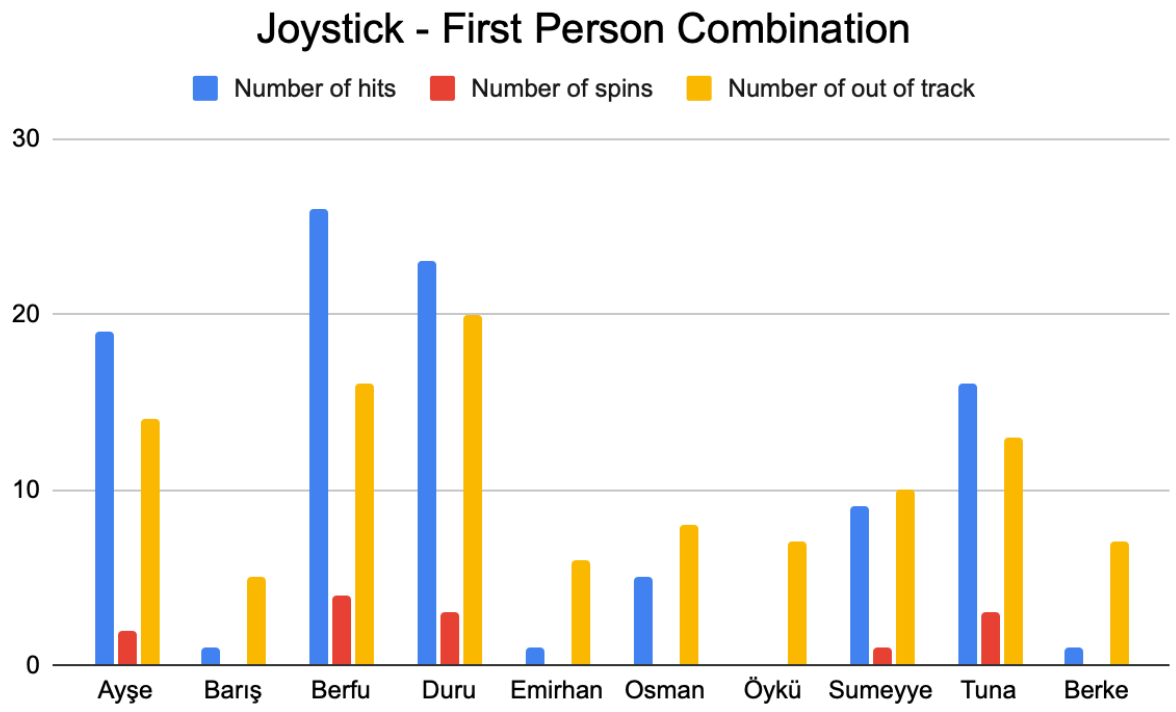


Figure 8: Number of hits, spins, and off the track in joystick - first-person mode

Above graph (Figure 8) shows number of hits, number of spins, and number of out of track when participants testing the joystick - first person combination. The number of crashes of female participants using joysticks was higher than that of male participants. The fact that male participants had used joysticks before may have been an important factor here.

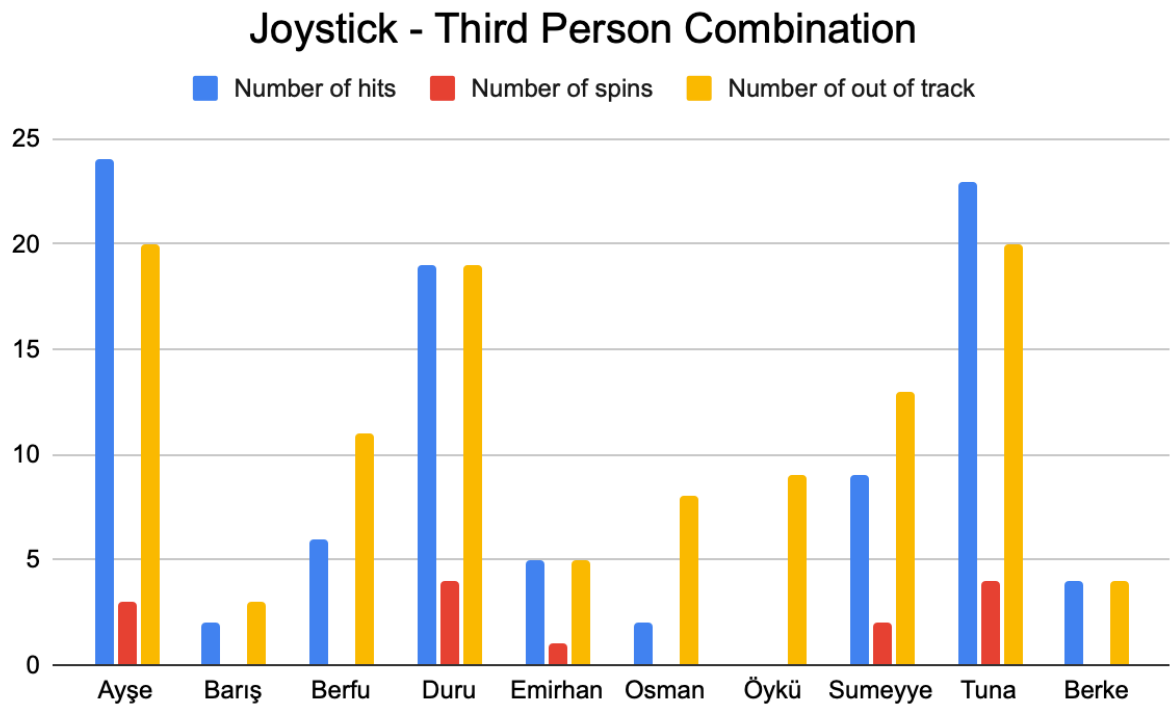


Figure 9: *Number of hits, spins, and off the track in joystick - third-person mode*

Above graph (Figure 9) shows number of hits, number of spins, and number of out of track when participants testing the joystick - third person combination. A significant reduction in the number of hits is observed compared to the joystick - first person combination. Changing the camera angle to third person seems to allow users to see the entire vehicle and surrounding obstacles more easily. For this reason, they may have driven more carefully. The small increase in the number of spins also supports this idea. On the other hand, it is observed that the number of out of track increases in the third person camera angle. The participants stated in the form they filled out that they had difficulty controlling the car from the third person camera angle. The numerical data we obtained also supports this.

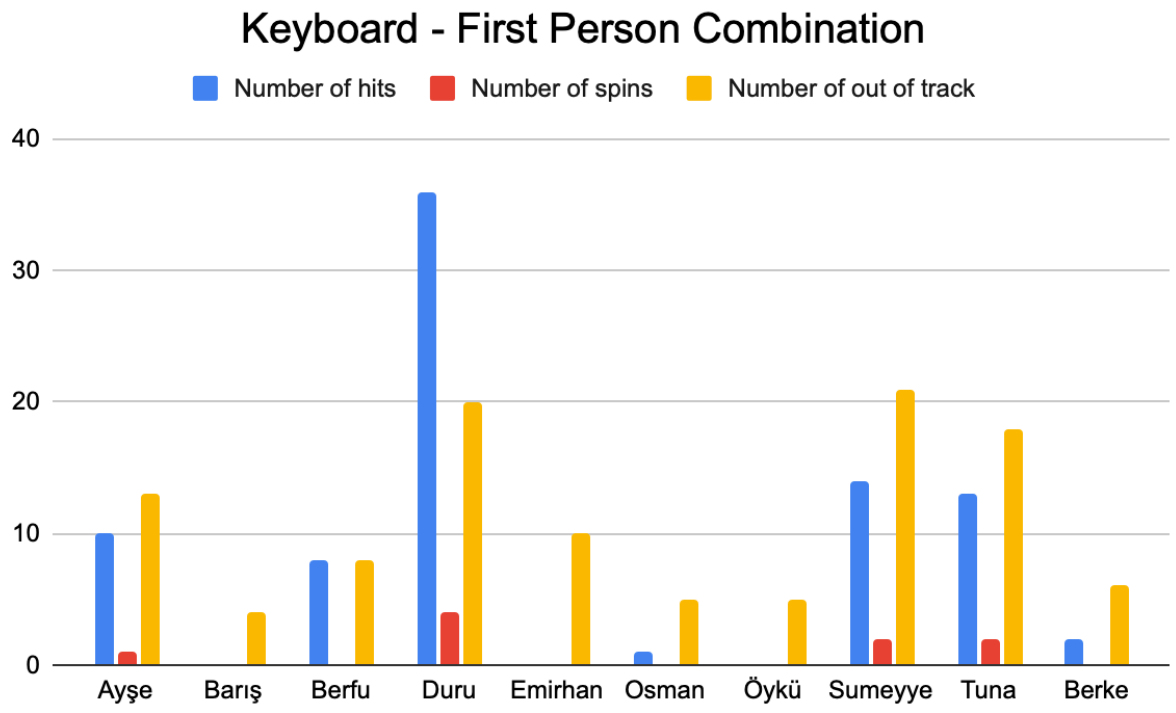


Figure 10: Number of hits, spins, and off the track in keyboard - first-person mode

Above graph (Figure 10) shows number of hits, number of spins, and number of out of track when participants testing the keyboard - first person combination. Participants performed better with this combination than with the joystick. Most participants stated in our survey that the absence of the vibration feedback on the keyboard, which the joystick gives in situations such as entering pebbles or passing over curbs, has a positive effect on these results. The data we obtained supports what the participants said. Number of spins and number of hits have the lowest values among the four combinations we tested. On the other hand, users have stated that controlling the car with the keyboard may cause pain in their fingers. This may be because they are pressing and pulling the buttons frequently.

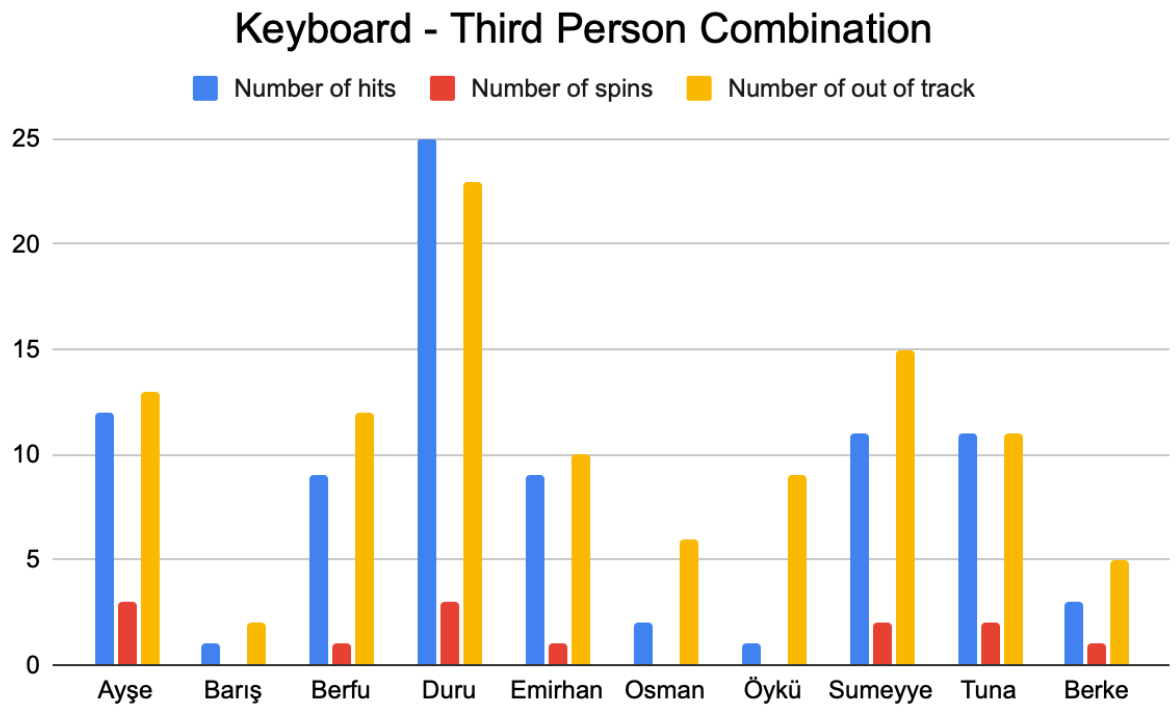


Figure 11: Number of hits, spins, and off the track in keyboard - third-person mode

Participants stated that the third person camera angle reduced the immersion. When combined with the keyboard, most participants stated that their enjoyment of the game was reduced to a minimum. Our results show that the number of hits is minimal in tests performed with the keyboard. The number of spins and out-of-tracks are less than the tests performed with the joystick. As supported by the results, using the keyboard in car racing games can seriously affect the playability (Kavaklı & Thorne, 2002). The biggest reason for this is that when the buttons on the keyboard are pressed, the vehicle is made to move fully right/left or full gas/brake. Since steering angle cannot be adjusted and the gas/brake amount cannot be adjusted like a joystick.

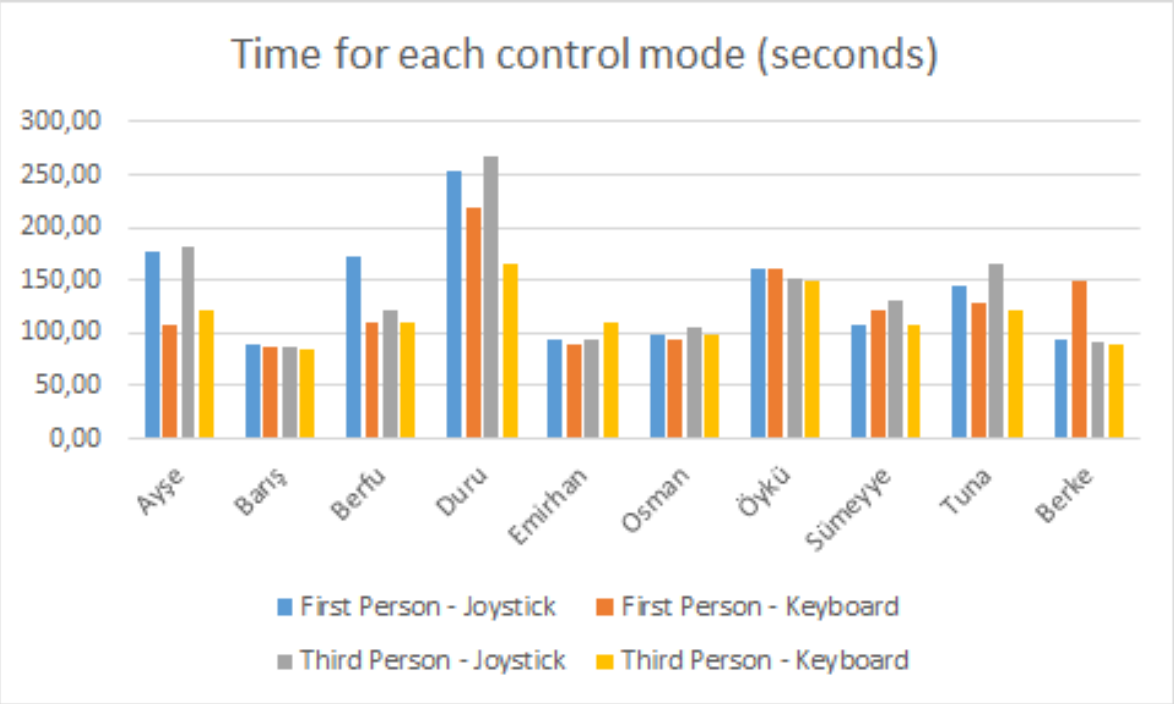


Figure 12: Times for completing the track in every game control mode

Times required for participants to complete the race track in each control mode are shown in figure 12. For novice players, completion time of the track is highly varied according to game control modes. For middle or highly experienced players, different game control modes don't affect the completing time greatly. In general, completing the track with a joystick takes longer than a keyboard.

	First Person - Joystick	First Person - Keyboard	Third Person - Joystick	Third Person - Keyboard
Average Time	2.19.399	2.00.438	2.19.367	1.45.759
Average # of hit	10	8.3	9.4	8.4
Average # of spin	1.3	0.9	1.4	1.3
Average # of out of track	10.6	11	11.2	10.6

Table 3: Quantitative analysis of gameplay with combinations of first-person/third-person perspectives and joystick/keyboard controllers.

As seen in table 3, the most number of mistakes is made in first-person-joystick combination. It can be seen from the graph that the combination with the least errors is third-person-keyboard. When the participants were asked to rank their preferences before, the participants generally preferred the first-person-joystick combination, in which they made the most mistakes, but the least preferred was the third-person-keyboard combination, in which they made the fewest mistakes.

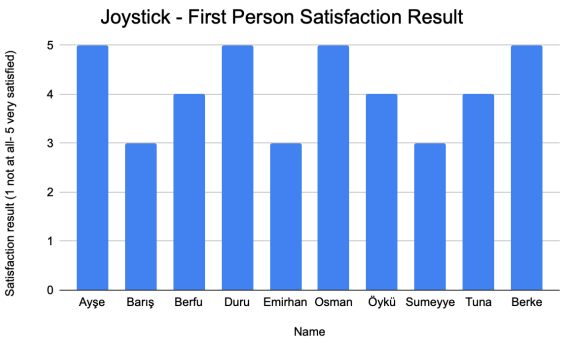
Figure 13: Visualization of the places where most mistakes are made on the track

The areas where the participants made the most mistakes on the track are shown in the picture. It can be seen that the parts where they hit the walls are the points where the vehicle accelerates the most and also needs to turn. Again, it is seen that the sections where they spin are mostly observed in the 3rd section of the track and the DRS Activation 1 section, where the track is the fastest and also requires turning. It was observed that the areas where they went off the track were generally sharp bends, and since they could not take the curve completely, they continued

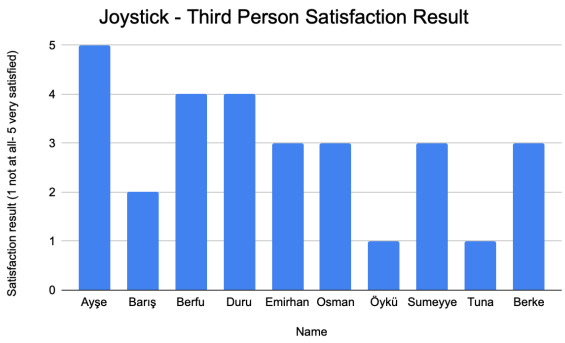
on their way by widening the track. In spinning cases, players tend to be faster in a straight way and cannot control the car properly at the fastest stage of the track to adapt to the coming turn, independent of controller type. However, in out of track cases, mistakes are dependent on the controller since they could slow down the car easily by using the "S" key on the keyboard, but in the joystick they could not figure out how to use the "LB2" button when using the acceleration button "RB2". Therefore, it shows us that the familiarity of the control devices affects the number of out of track mistakes.

Satisfaction Results

a.



b.



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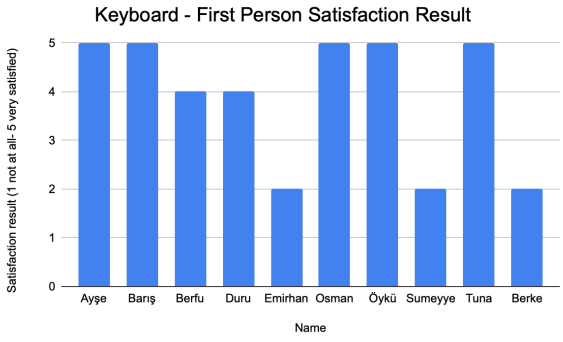

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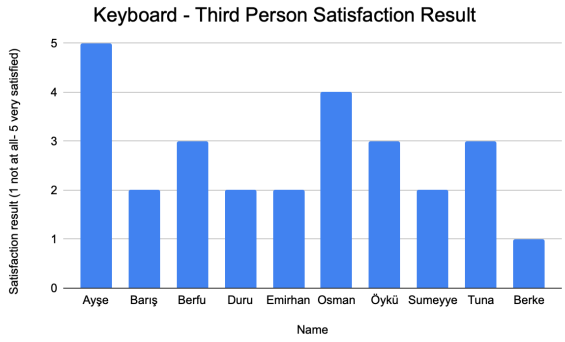

Figure 14: a. Satisfaction of users with joystick - first-person combination. b. Satisfaction of users with joystick - third-person combination. c. Satisfaction of users with keyboard - first-person combination. d. Satisfaction of users with keyboard - third-person combination

When the salesfaction results were examined, the most satisfactory combination for the participants was the joystick - first person combination in terms of total score. The combination that followed with a slight difference was the keyboard-first person combination. However, apart from these two combinations, the other two combinations with third person camera angle received a lower satisfaction score by far. The most unsatisfactory combination for the participants was the keyboard - third person combination.

System Usability Scores

Participants	**First-person/ Joystick**	**Third-person/ Joystick**	**First-person/ Keyboard**	**Third-person/ Keyboard**
Ayşe	60	5	87.5	47.5
Barış	90	97.5	85	85
Berfu	40	15	95	60
Duru	30	32.5	15	15
Emirhan	92.5	92.5	92.5	72.5
Osman	85	67.5	65	52.5
Öykü	80	10	92.5	50
Sümeyye	75	87.5	47.5	60
Tuna	87.5	75	75	75
Berke	67.5	60	62.5	62.5
Average	70.75	54.25	71,75	58

Table 4: Final SUS scores of the participants according to the perspective/control mode combinations.

Table 4 shows the usability results for each control mode combination. Each participant evaluated all four combinations, and their SUS scores were calculated. Interestingly, the first-person/keyboard mode received the highest score, even though it was less preferred than first-person/joystick (Figure 7) by participants. On the other hand, the first-person/joystick mode, which was the most preferred both before (Figure 6) and after (Figure 7) gameplay , also received a high score. The third-person/keyboard combination, although the least preferred after gameplay (Figure 7), did not have the lowest score. The third-person/joystick mode had the lowest score, indicating the lowest usability and satisfaction among participants.

Category	Code	Code Name	Count
Doing	D1	Fail	10
	D3	Observing the environment	2
	D4	Moving the car	16
	D5	Exploring the difference between modes	2
	D6	Hand Sweating	1
Thinking	T1	Like the content	25
	T2	Having difficulty in the game	20
	T3	Easy to control	15
	T5	Unlike the content	1
	T5	Exploring the game	7
Feeling	F1	Dizziness	2
	F3	Unpleasant	6
	F4	Pleasant	18
	F6	Surprise	1
	F7	Scary	2
	F8	Confusing	5
	F9	Pain	2

Table 5: Thematic analysis of reactions recorded with first person - joystick combination

Doing: Users generally found the joystick comfortable to hold and use, which allowed for smooth maneuvers during gameplay. The vibrations provided a realistic touch, simulating the tactile feedback of driving a real car. However, this feature received mixed feedback; while some appreciated the added realism, others found the vibrations excessive and distracting. Controlling the car at higher speeds and navigating sharp turns posed significant challenges for many users, leading to frequent errors and frustration.

Thinking: The first-person view was widely favored for its immersive and realistic experience. Users liked the perspective, which made them feel more connected to the game. However, the joystick's sensitivity was a common point of contention. Many users found it too reactive, making precise corrections difficult. Following other vehicles and making accurate maneuvers were particularly challenging, especially for those less experienced with joystick controls. This lack of familiarity often led to difficulties in achieving smooth gameplay.

Feeling: The tactile feedback from the vibrations was appreciated by many users, enhancing their sense of immersion in the game. However, the constant or inconsistent vibrations caused discomfort and fatigue for some. Despite these issues, the first-person view generally made users feel more engaged and immersed in the game. Nevertheless, varying levels of frustration and confusion were reported due to the control challenges posed by the joystick, impacting the overall enjoyment of the gameplay experience.

Category	Code	Code Name	Count
Doing	D1	Fail	9
	D2	Overcharge	2
	D3	Observing the environment	2
	D4	Moving the car	2
	D5	Exploring the difference between modes	4
Thinking	T1	Like the content	8
	T2	Having difficulty in the game	25
	T3	Easy to control	7
	T5	Unlike the content	6
	T5	Exploring the game	8
Feeling	F1	Dizziness	1
	F2	Annoying	5
	F3	Unpleasant	10
	F4	Pleasant	7
	F9	Pain	4
	F10	Exhausted	2
	F11	Brave	1
	T12	Focused	1

Table 6: Thematic analysis of reactions recorded with third person - joystick combination

Doing: Users found the joystick comfortable to use, but controlling the car in third-person view presented several challenges. While the broader view allowed for better awareness of the surroundings, it also made precise maneuvering more difficult. The joystick's vibrations continued to provide realistic feedback, but this feature was sometimes perceived as excessive and distracting. Overall, users struggled with sharp turns and maintaining control, particularly at higher speeds.

Thinking: The third-person view offered a different perspective that allowed users to see more of the environment and their vehicle. However, this wider view did not always translate to better control. Many users felt that the third-person perspective made it harder to judge distances and angles accurately, complicating their ability to make precise adjustments. The joystick's sensitivity was again a point of contention, with users finding it difficult to balance between responsive controls and overcorrection.

Feeling: Feelings about the third-person joystick combination were mixed. Some users enjoyed the enhanced visibility and found the broader view less disorienting. However, others felt that the perspective detracted from their immersion, making it feel more like watching a race than participating in it. The vibrations, while adding to the realism, sometimes contributed to discomfort and distraction. Users generally felt less engaged and more frustrated with the third-person view, as the challenges in control often overshadowed the benefits of increased situational awareness.

Category	Code	Code Name	Count
Doing	D1	Fail	4
	D4	Moving the car	4
	D5	Exploring the difference between modes	1
Thinking	T1	Like the content	5
	T2	Having difficulty in the game	11
	T3	Easy to control	4
	T5	Unlike the content	1
	T5	Exploring the game	4
Feeling	F1	Dizziness	1
	F3	Unpleasant	5
	F4	Pleasant	4
	F6	Surprise	1
	F8	Confusing	1
	F9	Pain	1
	F10	Exhausted	1

Table 7: Thematic analysis of reactions recorded with first person - keyboard combination

Doing: Users found that using a keyboard for control was generally comfortable, particularly for making straightforward maneuvers. The absence of vibrations, as compared to the joystick, made the experience less realistic but also less distracting. However, the keyboard's lack of analog input made precise adjustments and smooth turns more difficult. Users frequently had to resort to tapping keys repeatedly to achieve the desired control, which could be cumbersome.

Thinking: The first-person view was found highly immersive, allowing users to feel as though they were truly inside the vehicle. This perspective was favored for its realism and the direct view of the road ahead. Nevertheless, the keyboard's binary input system (keys being either fully pressed or not) often made it hard to achieve the nuanced control that a joystick or steering wheel might provide. Users had to think more about how to manipulate the keys to maintain control, which sometimes interrupted the flow of gameplay and increased the cognitive load.

Feeling: Feelings about the first-person keyboard combination were mixed but leaned towards positive. The immersive first-person view combined with the ease of use of the keyboard made many users feel more secure and in control. However, some users felt that the lack of physical feedback (like vibrations) and the need for precise key presses made the experience less engaging and more mechanically challenging. Despite these challenges, many users appreciated the straightforward nature of keyboard controls and the focused, immersive experience of the first-person view.

Category	Code	Code Name	Count
Doing	D1	Fail	9
	D3	Observing the environment	1
	D4	Moving the car	3
	D5	Exploring the difference between modes	4
Thinking	T1	Like the content	3
	T2	Having difficulty in the game	19
	T3	Easy to control	4
	T4	Slower Car	1
	T5	Unlike the content	7
	T5	Exploring the game	2
Feeling	F1	Dizziness	5
	F2	Annoying	2
	F3	Unpleasant	19
	F4	Pleasant	6
	F5	Boring	1
	F6	Surprise	1
	F9	Pain	4
	F10	Exhausted	2

Table 8: Thematic analysis of reactions recorded with third person - keyboard combination

Doing: Users generally found that using the keyboard in third-person view facilitated a comprehensive visibility of the surroundings and the vehicle. However, achieving precise control proved to be challenging due to the binary nature of keyboard inputs. This lack of analog input necessitated frequent key tapping for fine maneuvers, which was perceived as cumbersome and less intuitive compared to joystick controls. The difficulty in making sharp turns and maintaining control at higher speeds was particularly pronounced, often resulting in overcorrection and loss of control.

Thinking: The third-person perspective provided an enhanced awareness of the environment, which some users found advantageous. Despite this, the perspective also introduced challenges in accurately judging distances and angles, complicating precise maneuvering. Users consistently noted that the keyboard's lack of analog input hindered their ability to perform smooth and controlled movements. This limitation required users to consciously think about how to manipulate the keys effectively, disrupting the natural flow of gameplay and making the control experience feel harder and more mechanical.

Feeling: User sentiments towards the third-person keyboard combination were mixed, with a tendency towards negative. While the broader view was less disorienting for some, providing a sense of comfort, many users felt that it detracted from the immersive experience of the game, making it feel more like observation rather than active participation. The absence of physical feedback, such as vibrations, combined with the mechanical nature of keyboard controls, resulted in a less engaging and more frustrating experience. Users often felt a reduced sense of connection to the game and were more preoccupied with the mechanical aspects of control, leading to an overall less enjoyable experience.

Discussion and Conclusion

The results of this study indicate distinct differences in user performance, efficiency, satisfaction, usability and immersion across the various combinations of control methods (joystick vs. keyboard) and perspectives (first-person vs. third-person). **Performance** of players is evaluated according to each game control mode and different mistakes of the players are compared. Participants often went off track at sharp bends due to difficulty with curves, widening their path. Spinning occurred on straight sections where players couldn't control speed before turns, regardless of the controller. Out-of-track errors occurring less in keyboard controller shows that control device familiarity impacts out-of-track mistakes (Figure 13). Performance was particularly evident in the third-person perspective, where both control methods generally demonstrated lower numbers of hits and spins, indicating higher effectiveness in controlling the vehicle. Conversely, the first-person perspective posed greater challenges for users generally, resulting in higher numbers of spins and out-of-track incidents. Especially in the case of first-person-joystick, even though the players prefer this combination more than other combinations (Figure 7), they had the most number of mistakes in this mode. This contradiction may be because the first-person perspective captures the participants, enhancing the feeling of immersion and causing impulsive behavior like instant acceleration and mistakes during gameplay. This heightened feeling of immersion also contributes to this combination being their favorite. In terms of **efficiency**, participants completed the track more quickly with the keyboard-third person combination, highlighting the efficiency of the keyboard for precise and rapid inputs (Figure 12).

Satisfaction was highest with the joystick-first person combination (Figure 14). This result aligned with the participants choice of the best gameplay combination after the tests were over (Figure 7) . This might be due to the fact that the participants appreciated the immersive experience and the natural control feel this combination of gameplay provided. In contrast, the keyboard-third person combination received the lowest satisfaction scores due to the mechanical and less intuitive control experience it offered. The **thematic analysis** revealed that the first-person joystick and first-person/keyboard combinations were generally more satisfying for users. These findings align with Young et al. (2016), who emphasized the importance of ergonomics and comfort in maintaining player engagement. The preference for joystick controls in the first-person perspective can be linked to the more comfortable hand positioning and better immersive experience. Additionally, the results reflect Pinelle et al.'s (2008) insights on camera perspectives, where novice players found the third-person view more challenging due to the difficulty in judging distances and angles, despite the increased situational awareness it offers. These combinations provided higher immersion and control, contributing to positive user experiences. In contrast, the third-person joystick and third-person keyboard combinations faced more challenges in terms of precise control and overall engagement, leading to lower satisfaction levels.

The first-person-keyboard mode received the highest **usability** score (Table 4), despite being less preferred initially, indicating effective control. The first-person-joystick mode was highly preferred and received a very close usability score to the first one, reflecting user satisfaction with immersive control (Table 4). The lowest score was third-person-joystick mode instead of the least preferred one (third-person-keyboard) (Figure 7) showing the importance of control device familiarity. Like the previous study conducted by Kavaklı and Thorne (2002), novice players have more familiarity with the keyboard controller, thus their performance and effectiveness are higher by this controller. The results suggest that immersion and ease of control are critical factors in user satisfaction. The immersive first-person view combined with effective control methods like the joystick and keyboard enhances the gaming experience. However, the complexity and nuances of different control devices and perspectives highlight the need for game developers to carefully balance realism, comfort, and usability in game design.

In conclusion, the study highlights significant differences in user performance, efficiency, satisfaction, usability, and immersion across various control methods and perspectives in gaming. The third-person perspective generally offered higher control effectiveness and performance, while the first-person perspective, despite its challenges, was preferred for its immersive experience. Joystick controls provided a more natural and satisfying gaming experience, particularly in the first-person perspective, due to their intuitive and responsive nature. The keyboard controls, although less preferred for their mechanical feel, demonstrated higher efficiency and effectiveness, particularly in the third-person view. These findings emphasize the importance of balancing realism, comfort, and usability in game design, aligning with established principles of user-centered and ergonomic design. Overall, the study underscores that both control familiarity and the immersive quality of the gaming experience significantly influence user satisfaction and performance.

REFERENCES

Kavakli, M., & Thorne, J. R. (2002). A Usability Study of Input Devices on Measuring User Performance in Computer Games. *Charles Stuart University Research Output*, 291–295. https://researchers.mq.edu.au/en/publications/a-usability-study-of-input-devices-on-measuring-user-performance-

Pinelle, D., Wong, N., & Stach, T. (2008). Using genres to customize usability evaluations of video games. *ACM*. https://doi.org/10.1145/1496984.1497006

Young, G., Kehoe, A., & Murphy, D. (2016). Usability testing of video game controllers: a case study. In *A K Peters/CRC Press eBooks* (pp. 145–188). https://doi.org/10.1201/b21564-8