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"Looks of Desire"
Leveraging Gaze To Dynamize Player-NPC
Relationships and Explore Consent in a
Dating Simulator Game

MASTER DISSERTATION

Bárbara Paulista de Faria

MASTER OF INTERACTIVE MEDIA DESIGN



UNIVERSIDADE da MADEIRA

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Abstract

The last decade has seen a rise of discussions over the curation of more genuine relationship intimacy between player and non-playable characters in gameplay, whether through the reimagining of traditional game mechanics or the introductions of new technologies. In parallel, methods to best integrate matters of consent in narratives, in order to awake reflections of the virtual other's non-conformity to certain player actions, have been, in addition, debated. This dissertation presents the design, development and evaluation of *Desiree: Eyes On You*, a dating simulator game integrating eye-tracking technology with the objective to dynamize the relationship forged between player and virtual love interest.

A mixed-methods approach was employed in the study. Quantitatively, it used the Networked Minds Social Presence Inventory to measure participants' perceived social presence when interacting with a gaze-aware character in a virtual world, as well as how their behaviours influenced responses, emotions, and direction of the narrative. Qualitatively, it examined how the love interest character prompted participants to reflect on issues of consent in relation to their gaze behaviours, taking into account the romantic narrative context.

Study findings have shown that high measures of social presence were obtained amongst participants who interacted with the design, which held key interactions and influenced the game's outcome behind gaze behaviour triggers. Positive reports on reflections over the love interest's consent were observed, character comments, animated reactions and early date terminations given an emphasis as the primary factors which derived these reports.

The research conducted has shown the power eye-tracking technology holds at successfully augmenting player social immersion with non-playable characters, lowering the constrictions with which digital relationships can be explored and introducing a new metaphor, "looks of desire" to gaze-research design.

Keywords— Eye Tracking, Dating Simulator, Consent, Social Presence, Diegetic Gaze, Games

Resumo

Na última década tem-se verificado um aumento significativo das discussões acerca de como melhor construir relações de intimidade entre jogadores e *non-playable characters* em jogos, de forma a torná-las mais genuínas, quer através do reimaginar das mecânicas tradicionais, quer pela introdução de novas tecnologias. Ao mesmo tempo, a procura de métodos inovadores para integração de temas de consentimento em narrativas, para despertar reflexões acerca da não-conformidade do “outro” virtual face a determinadas ações de jogo, têm sido debatidas. Esta dissertação apresenta o design, desenvolvimento e avaliação de “Desiree: Eyes On You”, um *dating simulador* que integra *eye-tracking* no seu *gameplay* com objetivo de dinamizar a relação estabelecida pelo jogador num romance virtual.

Quantitativamente, foi utilizado o *Networked Minds Social Presence Inventory* para avaliar os níveis de presença social reportados pelos participantes ao interagirem com uma personagem consciente do seu olhar no espaço virtual, bem como a forma como os seus comportamentos influenciavam as respostas, emoções e direção da narrativa. Qualitativamente, examinou-se a efetividade da personagem em levar os participantes a refletir sobre temas de consentimento, tendo em conta os comportamentos oculares registados no contexto romântico da narrativa.

Resultados do estudo revelaram elevadas perceções de presença social por parte dos participantes que interagiram com o design, que mantinha interações chave, capazes de influenciar o decorrer do jogo, através das interações oculares. Relatos acerca das reflexões sobre o consentimento da personagem foram positivos, tendo os comentários realizados pela mesma, as animações e a possibilidade de se terminar a experiência por iniciativa própria sido os principais fatores de sucesso apontados.

A investigação realizada demonstra a capacidade da integração de *eye-tracking* na amplificação da imersão social de jogadores no contacto com *non-playable characters*, reduzindo constrangimentos prévios de exploração de relações digitais e sugerindo uma nova metáfora, “olhares de desejo”, à comunidade de pesquisa.

Keywords— Rastreamento Ocular, Simulador de Namoro, Consentimento, Presença Social, Olhar Diegético, Jogos

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I leave you with a poem that summarizes my wishes of what to come:

III

Lullaby.

Adult and child
sink to their rest.

At sea the big ship sinks and dies,
lead in its breast.

Lullaby.

Let nations rage,
let nations fall.

The shadow of the crib makes an enormous cage
upon the wall.

Lullaby.

Sleep on and on,
war's over soon.

Drop the silly, harmless toy,
pick up the moon.

Lullaby.

If they should say
you have no sense,
don't you mind them; it won't make
much difference.

Lullaby.

Adult and child
sink to their rest.

At sea the big ship sinks and dies,
lead in its breast.

- Songs For A Colored Singer, Elizabeth Bishop (1969)

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Acronyms

RtD Research Through Design

NPC(s) Non-Playable Character(s)

NMSPI Networked Minds Social Presence Inventory

UI User Interface

AOI(s) Area(s) of Interest

VR Virtual Reality

FPS First-Person Shooter

HCI Human-Computer Interaction

SDK Software Development Kit

LI(s) Love Interest(s)

ROI(s) Region(s) of Interest

POC Person of Colour

LLM Large-Language Model

NLA Non-Linear Animation

1 Introduction

“The eyes are the windows to the soul.”

The gamification of gaze has been a rising topic of discussion in game studies [3], having already made its presence known in mainstream game titles [4]. Despite its emergence, some patterns in regards to its usage have been identified and criticized over the years such as the propensity for developers to let the applications fall under the same umbrella of interactions [5]. One way to work around this problem is to incorporate gaze intrinsically into the game’s narrative by applying to it roles and metaphors, therefore turning it diegetic [6].

Alongside this development in technology, there has been a growing effort to promote more realistic portrayals of intimacy in gameplay, either by reimagining the use of traditional gameplay tools [7] or by bringing in new perspectives and technologies for its translation [8].

The joint incorporation of eye-tracking as a core gameplay mechanic to explore the influence of relationships and virtual character consent in regards to player behaviour in games is currently at fault, as well as its analysis on the experience’s effects in players. Therefore, this paper proposes the introduction of gaze-enabled interactions as the core mechanic to influence a virtual relationship. Through this approach, a new application of eye-tracking in games is explored and evaluated in this new diegesis, assessing the viability of its introduction. On the other hand, it also serves to analyse how it can potentially be utilized to explore consent, offering a new getaway to create more genuine relationships with Non-Playable Characters (NPCs) in games.

To this end, a game will be developed replicating an intimate scenario, specifically a date, where eye-tracking serves as a conductor for the experience. A new metaphor (“looks of desire”) in which eye-tracking can be utilized in diegesis, will be presented along with the development, suggesting a playful, non-hassling counterpart to the already existing metaphor “looks that charm” found in research [9, 10].

Using a Research Through Design (RtD) approach [11], the viability of the technology to connect a player more intimately with a NPC will be measured quantitatively, recurring to the Networked Minds Social Presence Inventory (NMSPI) [12], while the metaphor’s capability of bringing reflections on consent will be evaluated both quantitatively and qualitatively through a questionnaire specifically crafted for this purpose.

Accordingly, this project proposes to answer the following research questions:

- RQ1: *What measure of social immersivity can an eye-tracker provide when applied to dynamize intimate relationships in a virtual environment?*
- RQ2: *Can gaze-aware mechanics offer a successful means for assessment of a non-playable character's consent in an intimate virtual relationship?*

This project provides the following contributions: in the field of gaze-based interaction, the suggestion of a new approach of the technology to enhance virtual relationships in games; in consent design, by providing a framework that enhances player reflections on a virtual other's conformity to their actions; in studies on social presence, by understanding how players receive the application of their gaze in game as a conductor of a relationship's progression and the psychological effects on the players towards NPCs; and to the active research conducted in the International Game Developers Association's *Forum for Erotic and Romantic Interactive Media*, on understanding how this technology can enhance the exploration of consent by gamifying player gaze in a fun, healthy experience and gathering feedback on player's experiences.

1.1 Dissertation Structure

This dissertation begins with a thorough **Literature Review** on the current state of games which include eye-tracking in their gameplay, the prior uses given to this mechanic and potential for the creation of new design approaches. Afterwards, in the **Design and Development**, the complete process of designing the intended experience, from early conceptualization until the final product is described, with a breakdown of each technical implementation and design choice made. In the **User Study**, all the proceedings in regards to the user testing can be found, including the evaluation tools used, permissions obtained, protocols of each session and respective analysis of the obtained data. To finalize, in the **Discussion**, the results obtained are carefully analysed, answering the research questions posed in the context of this study. In the **Conclusion**, strengths and improvements of the final project are presented, suggesting potential approaches to optimize future researches in this area of study.

2 Literature Review

This section presents the necessary context to establish the theoretical basis in which this dissertation falls upon.

It begins with the core definition and characteristics of eye-tracking technology, applications and metrics. It is then followed by a review of use-cases in games which have included consent in their narratives, dwelling into the definition of said term and it's many interpretations. A review of current games in the market and the uses provided by the technology in this context is presented as well. It finishes with an overview of the current gaps in literature, which is tied to the research questions at hand.

2.1 Eye Tracking Fundamentals

It is understood by “eye-tracking” a set of techniques and technologies used to measure eye movement and position with the goal to estimate gaze direction and visual attention of a user. [13].

To provide the technical background for the eye tracking study conducted in this thesis, this subsection will refer to the different applications eye-tracking can range from across different fields of study, as well as detailing the intrinsic eye movements and core gaze metrics that are an essential part of its functionality. Afterwards, it focuses on the applications of this technology in the field of game research specifically, the critiques received on their past implementations and potential solutions that have been suggested to overcome them.

2.1.1 Practical Applications

Eye-tracking has been integrated across a wide range of research disciplines: by linking gaze behaviour to underlying cognitive mechanisms, it is capable to study user attention, visual search and scene perception in psychology and neuroscientific studies [13]; educationally, it is capable to provide insights on different learning strategies and difficulties [14]; it has also been used to evaluate user engagement and the efficiency of information processing in marketing and usability [15]; and in a medical context, it has proven to be a valuable tool for condition diagnosis and rehabilitation, as well as in surgical training, to assess professional expertise, situational awareness

and performance. [15]

More specifically, in the field of HCI, eye-tracking is a powerful method for usability evaluation and interface optimization, by allowing the understanding of how users visually perceive and interact with digital interfaces, analysing gaze patterns, identifying subjects of attention and how visual layouts are navigated by users. [16]

Beyond these usages, eye-tracking enables the creation of gaze-based interactions, where eye movements are used as an input modality for the control of digital systems. This kind of interactions that surface are valuable due to their hands-free usage, being able to be applied in assistive technologies and generation of immersive applications in which traditional input devices would be impractical or limiting. [17]

- **Gaze in Games**

Commercially, gaze tracking has been present in games as early as of 2015, through a wide range of technological devices, from Virtual-Reality (VR) headsets to Sensor-Based Eye-Trackers [3]. Tobii Eye-Tracking has been the leader company of non head-mounted trackers, with products used in a wide range of appliances, from scientific and marketing research [18] to mainstream gaming [4]. In game studies, a lot of design frameworks have been structured, analysing the overall uses of eye-trackers in games to date [3], reflecting on its potential uses for novel interactions [19] and searching for opportunities in under-explored areas of implementation [5].

In this context, the concept of Social Gaze is introduced as an emergent area of study for both collaborative [20], and single-player games [21], reflecting on how replicating similar social gaze norms we portray in the real world into the digital space affects player's sense of social presence and overall play experience.

In First-Person Shooter (FPS) games, tracking of gaze for procedural content generation according to the player's focus [22] and to optimize visual cues [23] has also been studied.

Besides entertainment, games supporting this technology have been additionally developed for fields such as therapeutics [24] and cognitive behavioural studies [25], to support how beneficial this technology can be in certain medical conditions.

Implementation Critiques

Despite its innovation, eye-tracking and more specifically, eye-tracking in game-related research has encountered some difficulties along the years. Perhaps the main one being that in HCI eye-tracking applications tend to fall under the research fields for health, user-experience, marketing and accessibility, most often disregarding games in their research focus. On the few works centered in the gaming experience, researchers often disregard the game-specific demands and opportunities that can only be offered through thinking of the play experience [3].

Gomez and Lankes [5], on a state-of-the-art survey on games containing eye-tracking technology concluded that the majority of games containing eye-tracking utilized it simply as a gaze-pointer control. This trivial application limits an important aspect of the player's gaze: the social and cultural implications gaze holds within the player's personal experiences and how these ultimately influence the way of playing. As discussed, players hold different mental models of what their gaze might mean in a game, as a control or as a social mechanism, to communicate non-verbally with NPCs as one does with people in real life. The power of gaze beyond a point-control can aid in the creation of more realistic experiences, augmenting the immersion.

It is in this context that the proposal of games as diegetic is introduced as a design solution, leveraging the role of social gaze, among others, to its end [6].

2.1.2 Eye Movements and Visual Behaviours

The fovea is considered to be the region of highest visual acuity an human eye possesses. Our vision is then characterized by the active process of continuous ocular movements responsible by repositioning the fovea, directing it to different sections of a visual scene [26, 27]. Our perceptual vision is then limited by this system, relying on eye movements to gather relevant information samples across the environment. [28]

Eye-tracking research has distinguished several basic types of eye movements, directly related to this region, of which fixations and saccades are at the centre for metric derivation [29].

- **Fixation-Based Metrics**

A fixation is usually defined as a period of time where gaze remains focused

within a specific spatial region, the minimum time of duration varying from 60 to 100 ms, according to task and screen sampling rate. [28]. Detailed visual processing occurs during fixations, making fixation-related metrics relevant to interpretations of attention and cognition [30].

From the several measures derived from fixations, the ones most commonly found are of:

- **Fixation Count:** Total number of fixations within a trial or stimulus. Higher fixation counts are often associated with increased visual exploration or higher task complexity [31].
- **Fixation Duration:** How long a fixation lasts. Mean and total fixation duration are commonly reported, since longer fixation durations have been linked to increased cognitive processing, information density, or processing difficulty [30].
- **Time to First Fixation:** Time elapsed between stimulus onset and the first fixation on a specific area, often interpreted as an indicator of attentional priority or visual saliency [32].
- **Dwell Time:** The cumulative duration of all fixations within a visual region, combining fixation count and fixation duration into a single measure of attentional allocation [28].

Fixation-based metrics are often used due to their intuitive interpretation [29], however, a longer fixation does not necessarily mean a deeper user understanding, being able to, on the contrary, reflect user confusion or increased task difficulty. [30].

- **Saccade-Based Metrics**

Saccades are characterized by rapid eye movements that reposition the fovea across two different fixation points. This movement lasts an average of 20 ms to 50 ms [33]. Visual perception is, for the most part, suppressed during this movement, a phenomenon known as “saccadic suppression” [34]. Key saccade-related metrics include:

- **Saccade Count:** The number of saccades during a trial or stimulus presentation [28].

- **Saccade Amplitude:** The angular distance covered by a saccade, usually measured in degrees of visual angle [33].
- **Saccade Velocity:** The peak velocity the movement reaches, which is systematically related to saccade amplitude through the saccadic main sequence [35].
- **Scanpath Length:** Calculated as the sum of all saccade amplitudes, reflecting the overall spatial extent of visual exploration [31].

Saccade metrics are highly useful for the construction of visual search strategies and exploration of ocular patterns [29]. Larger saccade amplitudes may indicate global scanning, while shorter saccades suggest localized inspection. However, saccade detection is sensitive to noise and tracking accuracy [28].

- **Gaze Paths**

Gaze paths, or scanpaths, represent a sequence of fixations and saccades that occur over time, capturing both spatial and temporal aspects of visual behaviour [36]:

- **Transition Matrices:** Quantify the probability of gaze shifts between points and reveal structured viewing patterns [37].
- **Scanpath Similarity Measures:** Compare gaze sequences across participants or conditions to assess consistency or strategy differences [38].
- **Entropy-Based Metrics:** measure the predictability or randomness of gaze behaviour, with higher entropy indicating less structured viewing [39].

Scanpath is mainly a resource for visual comparison of strategies, noting differences, for example, in expert-novice behaviours of attention and prioritization [28]. Despite this, scanpath metrics are computationally complex and less standardized, which complicates reproducibility and cross-study comparisons.

- **Areas of Interest (AOIs)**

Areas of Interest (AOIs) denominate any spatial region within a visual display that contains elements such as interface components, objects, text regions, faces or anatomical structures, capable of drawing a user’s attention [29]. These areas

serve as abstractions layers between the raw gaze coordinates captured and high-level interpretations of the visual focus, allowing for the aggregation of gaze data in a task-relevant manner [28]. AOI metrics can be broadly categorized into frequency, temporal and spatial based measures:

– **Frequency-based AOI Metrics:**

- * **Number of Fixations per AOI:** How often attention is allocated to a specific region. A higher number of fixations may reflect repeated inspection, uncertainty, or task relevance [31].
- * **Total fixation duration per AOI:** Cumulative time spent fixating within an AOI. This metric is commonly interpreted as the overall amount of attentional resources devoted to that region [30].
- * **Mean fixation duration per AOI:** Value provides insight into the depth or difficulty of processing associated with the AOI [28].

– **Temporal AOI metrics:**

- * **Time to first fixation on an AOI:**, Defined as the time elapsed between stimulus onset and the first fixation within the AOI. Shorter time to first fixation values are often interpreted as indicators of visual saliency, attentional priority, or expectancy [32].
- * **First fixation duration:** May reflect initial processing demands or early attentional capture by the AOI [30].

– **Spatial attention metrics**

- * **Dwell Time on AOI:** Defined as the sum of all fixation durations within an AOI, including multiple visits. Dwell time integrates both fixation frequency and duration and is one of the most robust indicators of attentional allocation [28].
- * **AOI Visit Count:** Number of distinct entries into an AOI. A visit may contain one or more fixations and is useful for distinguishing between sustained attention and repeated re-orienting [29].
- * **AOI Revisits:** Quantify how often gaze returns to an AOI after leaving it. High revisit rates may indicate uncertainty, comparison processes, or strategic monitoring [31].

AOI measurements allow for the comparison between different stimulus elements and, in direct consequence, there is an inherent categorical boundary on what is considered continuous gaze behaviour [28,29]. This leads to possible misclassification of attentional effects on AOI borders. [30,31]. Due to this problem, AOI metrics are usually interpreted in conjunction with other task performance measures [28,29].

2.1.3 Defining Gaze

In the context of this thesis, the term gaze is operationally defined as a fixation, rather than a continuous stream of raw gaze coordinates. This definition is grounded in established eye-tracking methodology, where fixations are understood as periods of relative eye stability during which visual information processing predominantly occurs [28,30].

While raw gaze data represents moment-to-moment eye position, this data is typically segmented into fixations and saccades to enable meaningful cognitive interpretation [29]. Because saccades are rapid transitions during which visual perception is largely suppressed, they are generally excluded from analyses of attentional allocation [33]. Consequently, defining gaze as fixation aligns with common practice in eye-tracking research, where fixation locations and durations are used as primary indicators of overt visual attention and information uptake [28].

Defining gaze as a fixation ensures conceptual consistency with the eye-tracking metrics described in this chapter in a way that is both theoretically motivated and methodologically robust.

2.1.4 Diegetic Gaze

Applying roles and metaphors to gaze is the concept translation of a diegetic approach to the design of gaze-enabled interactions, as opposed to a non-diegetic one [6].

- **Non-Diegetic Interactions:**

A Non-Diegetic interaction is any gaze which is mechanic, viewed not as part of the game, but a complement to it. Gaze is given a secondary role and if the eye-tracker was removed, the game would still be playable. Most often than not, gaze is substituting or augmenting the game controller or simply facilitating interactions during gameplay. This application sets gaze immediately as a tool to

achieve an end and may or may not affect the player experience. Essentially, any interaction that can be summed up in improving the Navigation, Aim, Shooting, Selection and Commanding avatars or trigger implicit interactions or visual effects fits this non-diegetic use of gaze [6].

- **Diegetic Interactions:**

A Diegetic interaction takes in any gaze mechanic that blends into the gameplay narrative, making the eye-tracker essential for a successful gaming experience. This does not mean that the game is completely inaccessible without the tracker, but otherwise offering a monotonous experience, lacking dimensions only the tracker can provide. The player would be faced with a linear conversation with the characters involved, progressing the game with no difficulty, achievements or penalizations, missing out on the full experience. This happens due to the gaze interactions in it, which take on a social role, being so intrinsic to its narrative, triggering reactions and modifying character's opinions, modelling the entire experience.

Diegetic Gaze not only affects the player, game experience and the game's narrative, but plays a crucial role in connecting these to benefit gameplay [6].

2.1.5 Gaze Roles

Gomez and Lankes [6] recognize that no matter the level of influence played in narrative, gaze in literature tends to fall under one of the following types of roles: Social Gaze, Gaze Power and Gaze Hurdles.

- **Social Gaze:** Through a diegetic lens, social gaze is defined as a role in which gaze is viewed as a social artifact, used to indicate social cues in-game. Mainly utilized to bring character awareness to virtual agents in the world, with each the player is then able to interact with. Its actions may trigger any kind of social constructs, behaviours and events connected to the different kinds of human relationships of attention [6]. Examples of applications of this role are, therefore, the ability to greet a character by initiating eye contact, show interest, disinterest, respect, draw attention or avoid it, and even seduce them [6].

- **Gaze Power:** This role sets gaze as an artifact for the fantastic. Its presence offers players otherworldly powers to their gaze, inexistent outside the virtual world. It often brings players a sense of empowerment [6].
- **Gaze Hurdles:** Presents gaze as an artefact for challenge. When this role is in use, gaze tends to play the function of an obstacle, curse or impediment to the player’s experience. It is often penalizing, burdening the player by triggering unwanted outcomes. Implicitly, as an example, it can trigger sound effects when exploring a scene. Explicitly, it tends to work alongside other dynamics to inform the player that their gaze may lead to unknown consequences, better to be avoided [6].

Based on these roles any kind of metaphors can be incorporated into the game’s diegesis, allowing the designer to create new scenarios who break down the confinements of the traditionally established interactions. Gaze metaphors, as discussed, can be aligned to one role in particular, but are not solemnly bound to one, being able to combine various roles to achieve new meanings and intentions [6].

2.1.6 Gaze Metaphors

Gomez and Lankes [6] recognized up to 27 different kinds of metaphors attributed to gaze, all in relation to one or more of the roles previously mentioned. Their distribution according to their inherited roles can be viewed through the Venn Diagram presented on Figure 1, drawn directly from the authors’ framework.

Practical examples to the metaphors presented are given to better understand their applications and connection to the roles they fit under:

- **Social Metaphors:** Metaphors such as “Looks to Greet” and “Eye Contact” justify the use of gaze to make characters aware that the player is looking at them [6].

“Looking Distracted”, “Looks of Interest”, “Disrespectful Looks” and “Avoiding to Look” appear often when gaze acts as a social pointer with potential to trigger unexpected reactions from NPCs in the world [6].

One of the games that best suits this usage is Vidal’s *The Royal Corgi* [21], where taking away its metaphors, the game offers alien outcomes such as the

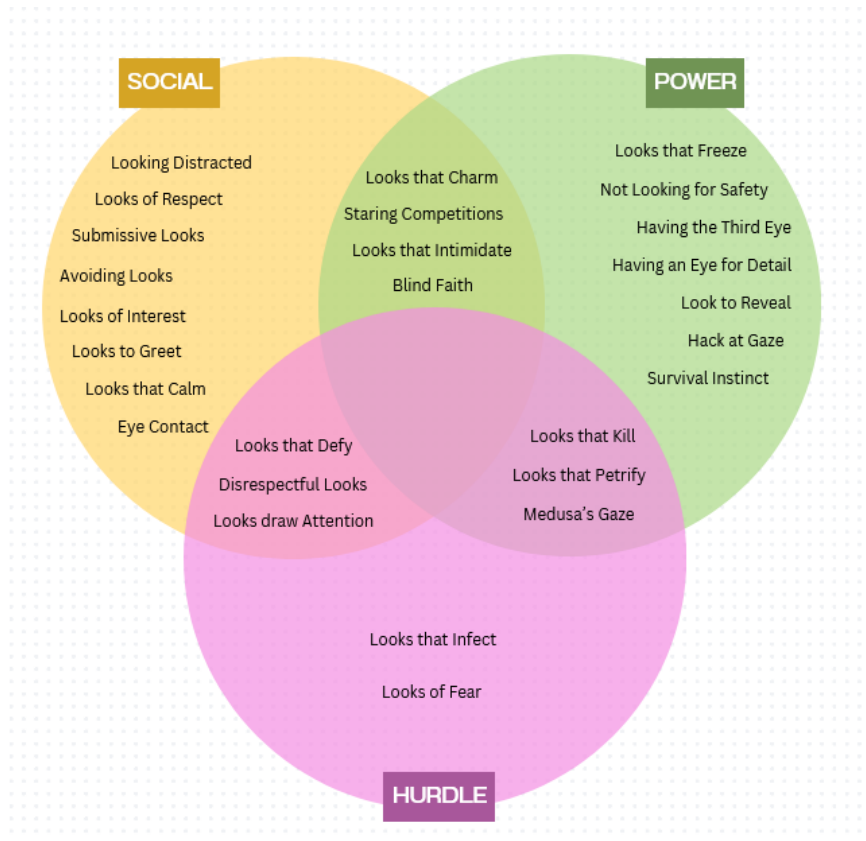


Figure 1: Gaze Roles and Metaphors

characters moving away without a reason, when in reality it is due to the player not paying proper attention to their needs [6].

- **Power Metaphors:** “Looks that Freeze” and “Looks that Petrify” are commonly used in narrative in regards to actions performed against enemies [6].

“Having a Third Eye” power tends to make objects in the world highlight to our gaze, “Looks that Reveal” may cause events to materialize as the player looks around [6].

When unusual interactions are at play, such as closing one’s eyes, metaphors such as “Not Looking for Safety”, “Blind Faith” and “Looks of Fear” are key for their interpretation. *Invisible Eni* [40] uses these metaphors in order to support the mechanic of the player character disappearing in-game as a protection against monsters [6].

- **Hurdle Metaphors:** Metaphors such as “Looks that Infect”, “Looks that Kill”, “Looks that Petrify” and “Looks that Charm” help justifying the player’s pe-

nalization when looking at certain points of focus. Both *VirusHunt* [41] and *Supervision* [9] have leveraged these metaphors to build their punishment systems [6].

- **Social Powers:** Metaphors of “Having an Eye for Detail”, “Staring Competitions” and “Looks that Intimidate” fit this category where social behaviours hold power within them.

“Having an Eye for Detail” can make butterflies fly away in *Amphora* [42]. This action performs both a social role for the interaction between player and creatures, and of power, by consequently making them fly away.

Metaphors such as “Staring Competitions” and “Looks that Intimidate” can be found in *Revenge of The Killer Penguins* [43] and *Shynosaurs* [44], respectively. The first establishing a social role that can help assert power of dominance or submission according to the result of the interaction, the second making enemies stop in their tracks and, in cases of extreme staring, run away crying due to the social awareness and power the player gaze holds.

- **Social and Power Hurdles:** “Looks that Draw Attention” has been used in commercial games such as *SOMA* and *Dying Light* in order to make enemy characters, most accurately robots and zombies, become aware of the player’s presence the moment their gaze lingers on them. This attention is often unwanted by the player, due to the context of these games, whose objective is to avoid them at all costs, becoming therefore, a social hurdle [6].

“Looks that Kill” proves to be an expression that would be non-nonsensical outside of its metaphorical meaning. The game *Cyclops* from *SuperVision* [9] provides one potential use of this metaphor, where the player needs to sort balloons without looking directly at them otherwise they’ll explode, gaze presenting a hurdle. Although, on certain cases, bad balloons require popping, gaze becoming then a powerful ally. The switching between hurdle and power roles for the gaze brings up an interesting gameplay dynamic [6].

- **Socially Powerful Hurdles:** “Looks that Draw Attention” enter this category. Sometimes, our gaze can draw unwanted social attention, but the persistence of it can become a power later on. One of the best examples for this use-case is in the two-player game *Keyewai* [45], where one player alone can catch the

attention of a zombie, bringing a hurdle in their direction, but if both players focus on the individual, they gain the power of confusing it instead, preventing the previously triggered attack.

In *Spectrophobia* [46] the metaphor for “Eye Contact” is uncertain, certain monsters attacking when looked at, gaze becoming a hurdle; others being tranquilized by it, the metaphors “Looks that Calm” posing as power; and sometimes running away when aware of the gaze upon them, “Looks that Intimidate” playing a social part [6].

As previously stated, metaphors can be linked to one or more roles, being dependent on the game’s diegesis. “Looks that Charm” is one of such examples, where in *La Rochelle Lab* [10] it is used to wink at a college bully in order for the player to retrieve their homework, in *Narcissus* [9] it is given an entirely differently connotation, acting instead as an undesirable outcome, making frames the player needs to sort fall in love with them if looked directly at, which in consequence ends up affecting player performance [6].

In a similar fashion, “Looks that Petrify” is used in *SuperVision* [9] as a hurdle for Medusa, which turns into stone mushrooms she needs to remove if directly looked at. *Medusas Lair* [47], an interactive experience, uses this same metaphor in a two-way, multiplayer scenario, acting as both a hurdle for the players escaping Medusa’s gaze and power to the player in charge of petrifying them. In the traditional game of *Red Light, Green Light*, where players pretend to be statues when looked at by a leading players, this metaphor can however be viewed as one of the social kind, the gaze, for example, intimidating the player role to the point they need to stop in their tracks [6].

These examples serve as the perfect portrayal of the complexity present within gaze roles and metaphors, new dynamics being built from their ability to influence one another, inherently connected to the game’s narrative context.

As Gomez and Lankes have stated, this “constellation” of examples help designers broadening the horizons of gaze applications in a game’s narrative context, enabling new and daring mechanics to arise [6].

2.2 Romance, Intimacy and Consent in Games

This subsection dives into the different relationships capable of being established in games with NPCs, explaining how romance can provide players with a strong context to explore consent in regards to another through this medium. Consent is later defined, and previous explorations of it in games, both implicit and explicit, are analysed. It is additionally mentioned past theoretical hypothesis on the possibility to utilize the in-game camera to explore the topic of consent.

2.2.1 Romance as a Mediator for Emotional Agency

The presence of intimacy and sex in gameplay provides the ability to bring emotional connections into the world of the player, allowing thoughtful reflections when correctly implemented [48].

Miller [49] argues that games that allow players to be collaborators in their stories offer emotional agency to a degree other non-interactive mediums cannot. Romance is deemed to be one of such mechanics that allows for player emotional agency, care and investment in video-games.

It has thoroughly been investigated the different kind of emotional attachments that can be formed between players and video game characters [50], more specifically, the romantic attachment and the reasoning behind them through a design perspective [51].

It is not just an aesthetical and superficial appeal that aids in making a character appealing. Coulson [52], using the Interpersonal Attraction Scale on a group of participants over their favourite characters from the popular game *Dragon Age: Origins*, concluded there are three factors that aid in attracting players to different characters: physical, social and task attraction within their narrative role. It was early on understood that characters need to show complexity within themselves in order to establish empathy with the player, otherwise game developers risk them being seen as shells that carry narrative stereotypes, not worth the player's pursue [52]. From this work, Burgess et al. [53] when analysing strong feelings of players in regards to *Mass Effect 2* characters, concluded that the agency to act romantically towards companions had proven a bigger involvement in the narrative, players purposefully performing actions for characters they felt a deeply connection for.

One key aspect that appeals to games containing romantic elements is the ability

for players of different age groups to explore in contained environments relationships and fantasies, helping in the figuring out of their own preferences without stigma or shame, which to some are more engraved in their cultural society than others, providing a safe space of self-discovery [54]. This does not mean that all portrayals of romance are healthy in these genres, the player community being aware they would not interact with certain characters presented if they were real-life people due to their constant overstepping of boundaries and other toxic traits [55].

2.2.2 Consent in Games

Consent is defined by the Merriam-Webster Dictionary as the ability to voluntarily agree to an action that is carried out or proposed by another [56].

Nguyen and Ruberg [57] recognize that consent in video games appears often in the context of romantic and sexual interactions but it can also be presented in broader terms through other forms of non-sexual intimacy. The authors present the concept of “consent mechanics” or game mechanics through which the player is able to negotiate to engage in or out of certain activities in the contexts previously mentioned. It is relevant to indicate that these are focused on mechanics that allow the game to explicitly negotiate consent with the player, outside entities such as NPCs and representations of consent towards them not being a focus of these mechanics. Clough [58] has also made the distinction between game mechanisms that present consent when relating to user agency within the game and game mechanics that allow for reflection of the agency of non-playable characters within an experience, these being two different lines of study in which a developer can concentrate on.

Similar conclusions were reached by Nguyen and Ruberg [57] and Clough [58] when theorizing for the most appropriate practices to be mindful of when designing for consent: in a video game narrative’s context, consent can derive according to the narrative goal and entity at the centre of interaction. Key aspects for an ethical exploration of the subject are the presence of explicitly clear communication between entities, no matter if it is between players or player and an artificial agent; where terms are negotiated by both sides and the chance to interrupt the experience at different stages being offered, without breaking the engagement of the user with the experience, a moment of afterthought required to process clearly how the experience played out

for the parties.

Central examples of these applications are the game *Hurt Me Plenty* and *HUG-PUNX* analysed by Nguyen et al [57] and the game *Sweet Demon Crashers* presented by Clough. [58]. In *Hurt Me Plenty*, the player takes on a dominant role in a BDSM experience where their NPC counterpart discusses openly which kinds of activities each of them are comfortable in experimenting as well as the establishment of a safe-word for explicit expression of a limit being reached. If the player ignores the NPC’s boundaries, continuing their practises after a safe-word is pronounced, the character concludes at the end of the experience their trust in regards to the player has been broken and the game locks the player out of executing it for a given time, depending on how much excess the player practised. This is a good example of a character-focused view on consent, but a non-optimal one for player agency, the character, in the opposite situation where the player under-performs according to the limits negotiated, not acknowledging a potential discomfort having been felt from the player during the exchange. In the other end of the spectrum, *Sweet Demon Crashers* presents the player with the opportunity to engage with different characters that represent different sexual practises. Clough presents this game as the perfect example of where consent is centred uniquely on user agency, the possibility to interrupt an intimate scene at its different stages of the exchange through different User Interface (UI) elements, such as explicit dialogue lines and a button on the screen, ideal. The game does not penalize the player for their desire to stop, a thoughtful discussion being given that their boundaries should always be respected afterwards, the characters not acting disappointed but encouraging. Here, consent from the characters is not presented as required due to the context of the game, where these demons offer themselves full heartedly for the player, if the player so desires to experiment with them. *HUGPUNX* is the first of these examples where consent is not inherently connected to a sexual scenario. The player is given the ability to walk around an area and hug both NPCs and cats they may encounter. If an NPC or animal consents to be hugged, they will equally open their arms when the player approaches them, signaling non-verbal consent.

When mentioning serious games that have been developed with the aim to teach the player about consent towards the other, both in the virtual and real world, the games developed for the program “Gaming Against Violence” are of relevance. Developed by the non-profit charity Jennifer Ann’s Group [59] to prevent relationship abuse, titles

such as *ADRIFT*, *Crossing Boundaries*, *How to Blorrrble-Blobber* and *Rispe Dennis* utilize metaphors in order to present occasions where these topics may arise, *Stuck in a Dark Place* explicitly addressing consent in relation to human relationships.

Narrative driven games and dating simulators present currently an over-exploited mechanic where in order to get into a relationship with a desired character, players need only to offer them the appropriate gifts and choose the correct dialogue choices in order to “win” their affection. This view is ethically problematic by presenting consent as a challenge in gameplay the player needs to overcome in order to win some sort of personal gratification, often sexual [57]. Clough argues that this can occur due to limitations of development, being difficult to approximate the complexity of relationships into mechanical, programmable interactions without the developer losing control of the player experience while making it seem as organic as possible [58]. Solutions to this dynamic which Clough entitles “Chemistry Coins” have been given through the addition of an element of unpredictability and randomness into certain interactions, the “Chemistry Casino”. By hiding information of the character to the player; making the character be the first to initiate interest and having different counters which differentiate fondness for the player character and romantic interest influenced by player choices and act in the game; the character is given more depth and independence, not viewed as a simple object to please in exchange for sexual activity but an independent entity with their own interests and feelings [60].

It is important to note that the definition of the term “consent” has considerably changed throughout history, across different cultural groups and professional fields [61]. Even within individuals that share the same cultural background, the term can hold different weights according to the community they are inserted and ideologies believed. Conceptualizing consent is inherently a political act, due to its close relation to issues of power, agency and ethics, and should be adapted according to user demographic and propensity to belong to any sort of vulnerable group. Queer and feminist game developers have been on the rising in the indie gaming fields, and their visions present often a more progressive perspective on issues of sex and sexuality due to their communities proactive efforts in deeming it crucial at different stages of intimacy [57], as seen by the examples provided by *Hurt Me Plenty*, *HUGPUNX* and *Sweet Demon Crashers*.

2.2.3 Translating Intimacy Through The In-Game Camera

Various methods have been theorized to provide an appropriate translation of intimate and sexual aspects of real life relationships into the virtual world. Trammell and Waldron [48] proposed the bringing of Nordic LARP (Live-Action Role-Playing) mechanics in relation to these themes into digital game development. Clough [7], heavily discussed how traditional game-developing techniques, such as the narrative design, cinematic construction and systems of approval can be leveraged to implicitly or explicitly portray scenarios of this nature as well.

On a lecture at 2015's Game Developer's Conference, Clough [62] theorized the creation of a mechanism where, by recognizing player manipulation of the in-game camera to fixate on a potential love interest in the game, the system would be able to trigger a positive or negative reaction from the non-playable character according to the relationship formed between them up to that point. The essence of this mechanic can be found in the popular game *Lollipop Chainsaw* [63], released three years prior, the developers making it so if the player tried to look under the character's skirt, she would consciously cover herself. The same kind of interaction would be found later in 2017's *Nier Automata* [64], the protagonist 2B having a much more reactive answer to this action, actively pushing the camera away, dragging it back up. More violently, this behaviour would be seen in 2019's *Death Stranding* [65] where, in the private room, the player camera is given the chance to observe Sam Bridges as he rests, where a repetitive focus to the character's groin can lead to the trigger the act of the protagonist punching the camera.

Academically, *La Rochelle Lab* [10] developed a mechanic where the player needed to "wink" in order to charm a student to hand them back their homework and *The Royal Corgi* [21] recognized the potential of gaze to signal desire by turning an NPC hostile when the player character looked at his wife for too long.

2.3 Commercial Games Research

A thorough review of commercial games containing eye-tracking was conducted. The data was obtained from the Tobii Gaming website [4], from which it was extracted the genre of games of which this technology had been applied, as well as what kind of

interactions the eye tracker provided for each. The result is shown through Figures 52 of Appendix A and 2.

It is important to note that some inconsistencies in the collection of this data were identified. The information provided in regards to the uses of the eye tracker for each of the games would be displayed in 3 different ways: text, bullet points and subtitled images. In certain cases, games contained different combinations of these displays, in which the information available would not match in both. Because of this, Tobii's integrity was taken into account, and each feature mentioned considered present in game. One example of this case can be viewed by visiting the *Through The Woods* game page [66].

There was interest in sorting all the games developed with support for Tobii eye-tracking by genre. The data obtained from Figure 52 supports the fact that no game centred on the development of an intimate relationship between player and character, such as a Dating Simulator has previously been developed with support of Tobii technology.

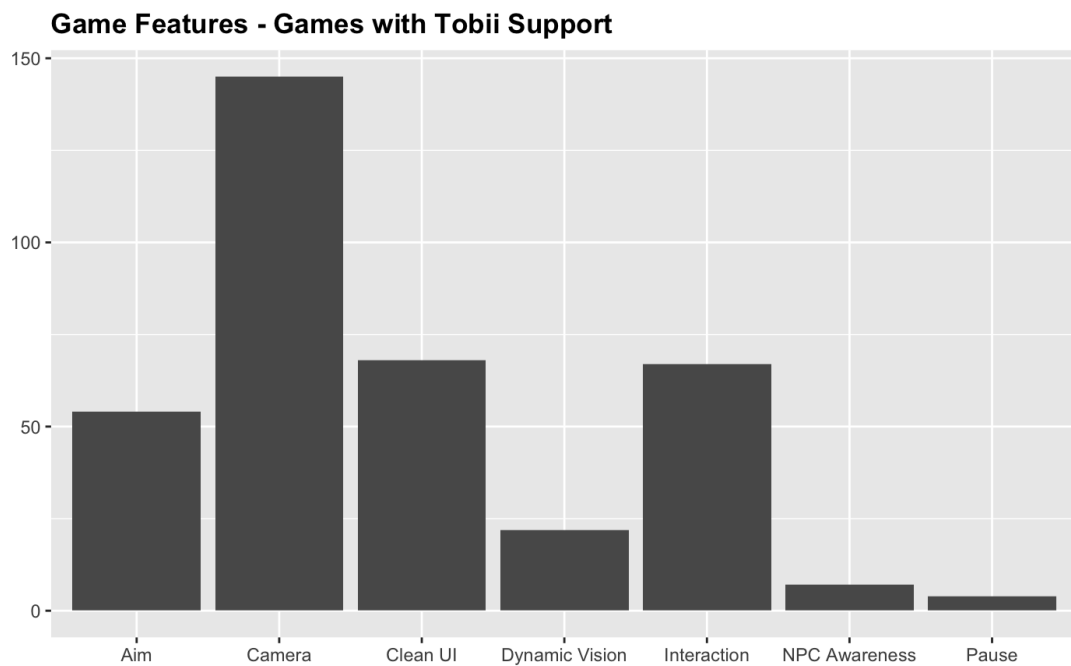


Figure 2: Game Features with Tobii Support

Looking at Figure 2, a distinction was also made between the sorts of interactions the eye tracker enabled. Because of interest in which an interaction with an NPC was made, triggering some sort of reactive trigger, it was separately filtered as “NPC

Awareness”. In the general category for Interactions would then fit ones of other natures such as with objects, menu interfaces and the environment.

There were a total of seven games in which “NPC Awareness” was recognized as a feature: four survival games used gaze to trigger humanoid enemies into chasing the player, two being from the Dying Light franchise, *Dying Light: Good Night Good Luck* [67] and *Dying Light: The Following* [68] ; one indie game *Plight of the Zombie* [69]; and the classic horror game *SOMA* [70]. *Shelter 2* [71] and *Knee Deep* [72] used this feature to spur immediate reactions or status feedback at the moment of eye contact with characters and *Reflections* [73] informs us of triggering a response as well, although the game has been in early access since 2015 and deemed abandoned by the Steam reviewers on the game’s page, no further details of the function have been found [74].

According to the information gathered, it can be concluded that none of the games analysed make use of their eye-tracking feature to present a more complex sort of interaction with an NPC in their respective environments.

2.4 Conclusion

According to the literature review, certain gaps in academic research can be identified:

- Considering game developer’s efforts at bringing more depth to intimate interactions in video games, the non-existent attempt at introducing eye-tracking in a game’s diegesis and evaluation if this technology would be viable in the context.

This gap is addressed by *RQ1*, which investigates to which extent eye-tracking can function as a measure of social immersivity when used to dynamically shape intimate relationships in virtual environments.

- The lack of more complex interactions between player and non-playable character, where the character presents awareness of the player curiosity, both of the world and themselves and respective formal analysis of its impact on the player body.

This second gap is examined by *RQ2*, which explores whether gaze-aware mechanics serve as an effective means of assessing and communicating a non-playable

character's consent within an intimate virtual relationship, thereby foregrounding the role of embodied perception and reciprocal awareness in player-character dynamics.

3 Design and Development

This chapter covers the early conceptualization of the experience, from choices of game genre that best aligned with the research questions to be answered, additional research conducted to assess if the literature gaps were present in commercialized games in the market, technology review of the best tools for development, explorations made with eye-tracking technology to test the feasibility of the design and the consequent build of the first game’s prototype to explore mechanical possibilities and limitations.

Afterward, it focuses on all the design and development choices taken in order to reach the final version of *Desiree: Eyes On You*, the dating simulator game that will serve as the means for the research at hand. All reasoning behind target audience selection, game title choice, narrative thematic, character design, flow of experience and implementation approaches are discussed in this section. In terms of the final prototype, it dives into the promotional content created, from game summary, trailer and poster design, in order to appeal for participation in the research study.

A RtD methodological approach was adopted, where the design of a game serves as the main tool of study from which answers for the research questions were drawn from [11].

3.1 Game Genre

This project designed a dating simulator game to analyse how eye tracking technology can help players feel more connected to the interactions established with a non-playable character in an intimate scenario, besides having evaluated the capacity to bring reflections on consent through the interactivity the technology enables.

The choice of the genre for the game was influenced by the focus of the study: to explore “looks of desire” as a new metaphor for eye-tracking in games, it was required a narrative scenario which would enable the player the permission to look at the character through the lens of desire, giving them freedom of exploration on its immediate context. A dating simulator offers a quick way to contextualize the player on the objective of the game, and a controlled environment to present consent in a situation outside of an explicitly sexual interaction. A Western, feminist and queer view on the conceptualization of consent was taken during the development of the experience, which, in future through a more complex study, could be broadened to

present other cultures and beliefs through the curation of a wider cast of characters amongst the same narrative, the experience serving as a preliminary test of viability.

3.2 Collaborators

For orientation on the experience mapping, contact with narrative game designer Michelle Clough was established, due to her wide knowledge in regards to the game genre chosen, as seen in the Literature Review. Through an online interview conducted over a Discord call, she added her extraordinary expertise and contributed with some valuable insights taking into account the objective of the research and her personal experiences in the game design stages. These related to aesthetic design, relevance to possible elements of the world and attributes of the character the player could pay attention to, simplification of narrative due to time constraints, a thorough discussion on how to make the approval system seem as organic as possible, exploiting the technology, providing of accessible dialogue tools previously used by the author and co-workers such as Articy [75] and Fungus [76] and techniques to manage dialogue interruptions, the listening to the talk given by Josh Scherr on *Uncharted: The Lost Legacy* [77] suggested.

All of these suggestions and ideas played an important role during the early conceptualization of the game and would shape further decisions during the design and development of the game's final version.

3.3 Early Conceptualization

On the first stages of the project, it was necessary to experiment with the technology in question in order to understand its technical capabilities as well as its limitations. To this end, first, an extensive review was executed for all the possible software and hardware mediums with which the study could potentially use in its development. Once its strengths and weaknesses were broken down and a selection of the most appropriate devices and programmes aligning to the objectives defined was done, the creation of a prototype that would serve as the technical proof of concept was developed. A detailed descriptions for each of these design and investigation phases, which served to underpin the technical foundation of the experience, follows.

- **Technology Review**

As previously mentioned, a formal breakdown of the software and hardware chosen to carry this project through was necessary.

- **Eye-Tracking Hardware:** In terms of hardware, the Tobii Eye Tracker 5 [78] is the most recent version of a sensor based eye-tracker that was being utilized in the field of game development, Tobii [4] being a leading brand in the market. VR and AR devices were excluded as possible hardware options due to the desire to provide an experience that could be given to the average PC gamer, with no external bodily-mounted applications required.
- **Game Engine:** In terms of software, Unity [79] was chosen instead of Unreal Engine [80] for its familiar workflow, which was lectured during the Master of Interactive Media Design and later applied to external projects, including the internship in which the Proof of Concept was developed.
- **Dialogue Module:** For the dialogue model, Fungus [76] proved to be the go-to dialogue module to use. Fungus besides being built-in in Unity, is an open-source tool, with a strong community of developers around it, certifying that any help required in relation to its documentations would be easily accessible.

Experimentation with Articy [75] was made, but the program required the dialogues designed to later be imported into Unity, giving in terms of development, unnecessary extra steps that would demand adjusting the export if was not successful at first. Yarn Spinner [81] was discarded right from the start due to its pricing, believe a more accessible free tool could be found. Ink, due to its lack of visual representation of the dialogue trees, was also put aside, the need for some visual aid helping in the maintenance of a balanced experience that would not grow exponentially in complexity during development.

- **Character Creator:** When looking for an avatar creator that could provide the creation of characters models with a high ethnic and bodily diversity, Ready Player Me [82] stood out. This avatar creator can provide stylized characters similar to the Sims, as seen in Figure 3, ready to be imported into Unity or any kind of modelling program such as Blender [83].

Completely rigged, the model is compatible with Mixamo [84] animations, and gives accessibility for developers to create additional animations. It contains documentations and guides online for all of the steps mentioned above, and is free for use as long as the end product is not commercialized. The familiarity of the stylization was essential, Clough advising for a more western look due to the possible polarization a more eastern style, often associated to this genre of games, could bring when presented to a western audience.



Figure 3: Experiments with Gender and Ethnicity in Ready Player Me

- **Proof of Concept**

For familiarization with the technology, a summer internship was taken at the Interactive Technologies Institute where base knowledge of programming with a Tobbi Eye Tracker 5 and its Software Development Kit (SDK) in a Unity environment was acquired.

The internship “Aligning Eye Tracking and LLMs for Playful Interactions” allowed for the creation of a viable, functional prototype of an Large Language Model (LLM) driven Storybook “StorEYEteller”, as seen in Figure 4, where glances on certain environmental objects would highlight them and prolonged fixations triggered the LLM to logically progress the story being told according to the entity that the object represented.

The core gaze interactions scripted in this project served as the pillar to develop the more complex ones that followed through the Low-Fidelity Prototype.



Figure 4: LLM-driven storybook “StorEYEteller”

3.4 Low-Fidelity Prototype

Afterwards, a more complex low-fidelity prototype was built with the final project in mind where three entities, the Date, the Television and the Window, all possible objects of attention for the player, were present [85]. Scripting in Unity the interactions required for the experience in advance served to accelerate the future development of the game, and predict realistically what could and could not be implemented for a better design of the narrative in accord with those affordances. A visual representation of the Low-Fidelity prototype can be found in Figure 5, in which can be identified from left to right: Window, Date and Television entities. From top to bottom images: main dialogue with Date, unlocked dialogue by fixation on Television, unlocked dialogue by fixation on Window.

The following features were successfully implemented:

- A Main Dialogue, capable of being interrupted at any time.
- Object-specific dialogue interruptions, which iterated according to the number of repetitive fixations.
- Interruptions of one object are capable of interrupting another.

- At the end of each interruption, capability for the love interest to return to the main dialogue, to the next line that would give it progress.
- A global counter, for even if the player does not trigger a premature ending related to the character’s limit of being ignored by a certain object fixation, it can still trigger a premature ending by looking everywhere interchangeably.
- Events that can only be triggered if very long fixations are recognized.
- Implementation of the system of approval and respective placement in the main and interruption-related dialogue.

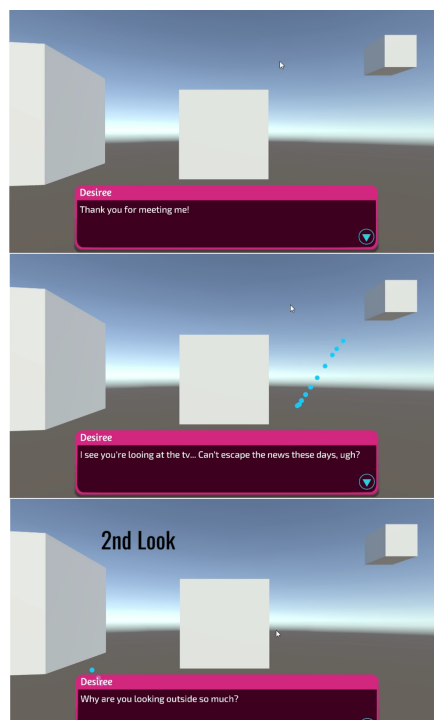


Figure 5: Low-Fi prototype.

3.5 Game Title

Desiree serves as both the game title and the name of the character with which the player will be interacting. It’s a direct reference to the metaphor being applied to the player’s gaze within the game context and it’s real-world meaning “much desired” can additionally be linked to the reflection on consent aimed to be explored underneath the game’s surface. The subtitle *Eyes On You*, serves as a subtle hint for players that their eyes will take a role during the course of the game.

3.6 Target Audience

The game was designed for a target audience of adults between 20-35 years of age, although being opened for any adult participant willing to test out the game. This range was based on the ages of the “raconteurs” interviewed by Kilham et. al when assessing design highlights and pitfalls of characters that enticed romantic attachment in players [51].

All design choices that followed were derived from the need to make the game the more appealing to this specific age group.

3.7 Narrative Context

3.7.1 Setting

Diners are famously common in media to portray romantic escapades. From movies like *Grease* [86], series like *Twin Peaks* [87] and games like *Life Is Strange* [1], they’re perfect spots for characters to meet and get to know each other intimately, while offering a more laid back environment than if they were both alone. Due to the game’s undertones on consent but the want to not make the game too explicit so a larger sample of testers would feel comfortable participating, it was decided some distance between player and Love Interest (LI) had to be established, one a diner booth could easily provide.

In ode to the classic movies and games mentioned above, a 50’s recreational diner was chosen as the spot where the game’s date would be taking place. Inspired by Ubisoft’s art director Mikhail Greuli’s talk “Expanding the world of Pandora in Avatar: Frontiers of Pandora” at the 2024’s DevGAMM in Lisbon [88]- where it was recounted how the design team was taken into museum trips to better understand different cultural customs and vegetations to later inspire their work - a trip was then made to a famous 50’s inspired diner in Funchal, *Red Car*, its atmosphere serving as inspiration in the later level design phase.

From the reference photos gathered, a thorough search for assets in different 3D websites was done, Unity Asset Store [89], Sketchfab [90], CGTarder [91] and TurboSquid [92] providing the necessary free assets to make the concept come to life. These were all gathered under a Miro [93] board, in order to select beforehand the ones that could offer thematic consistency, avoiding hyper realistic models mixed with

low poly ones in the same environment.

Afterward, the level design process was ready to take place. The choice of the Regions of Interest (ROIs) was defined in parallel with this phase, whose process is described in more detail in the succeeding section. Figure 6 shows the time-lapse of the level construction, starting from early conceptualization of the LI placement in Blender to the actual scene assemblance in Unity, temporary NPC placements and inclusion of post-processing.

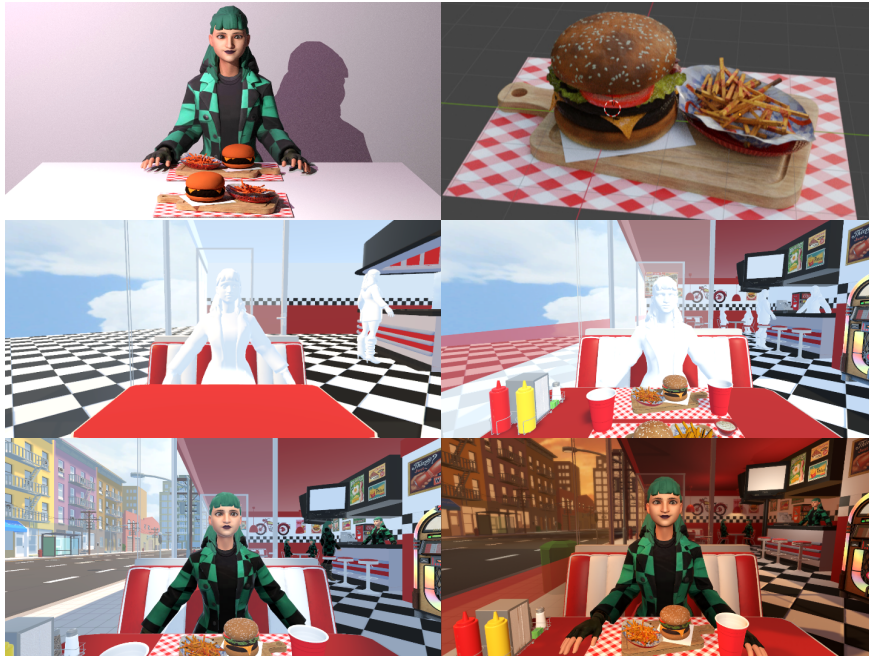


Figure 6: Level Design. Top row: Blender concept. Middle and Bottom Rows: Unity assembling of scene with temporary NPC models.

3.7.2 Regions Of Interest (ROIs)

To define the possible ROIs to exist in game, first the placement of Des, the player's LI, had to be mapped out. At the beginning, it was planned for Des to sit at the right side of the booth with the player, the screen paying more attention to their surrounding area. A good visualization of how this concept would look like can be taken from a screenshot of *Life Is Strange*, presented in Figure 7.

The idea of centering Des in the scene came after realizing the left-sided layout would make it so the player's gaze would be tempted to deviate itself far more often to their surroundings than elements that could be present on Des. Because the ROIs placed on Des would prove essential to explore the idea of consent of bodily perception,



Figure 7: Screenshot of the game *Life Is Strange* [1] where characters hang out at Two Whales Diner.

it was a must the LI could gather most of the player's attention. To prevent this behaviour it was then decided for both the player and Des to be positioned at the centre of the screen, Des taking 1/3 of the player's view space.

It was at this point that the first-person view for the player in the game was determined. If the point of view of the player were in third-person, like in Figure 7, it would cause a clash between their gaze in game and the avatars', the players gaze being an element detached to the avatar they embodied. When in a first person view, not only Des can be shown occupying more of their view point, it aids in the immersivity.

When a general layout of the environment had been build, all possible ROIs were mapped out before exclusion, visualized through Figure 8.

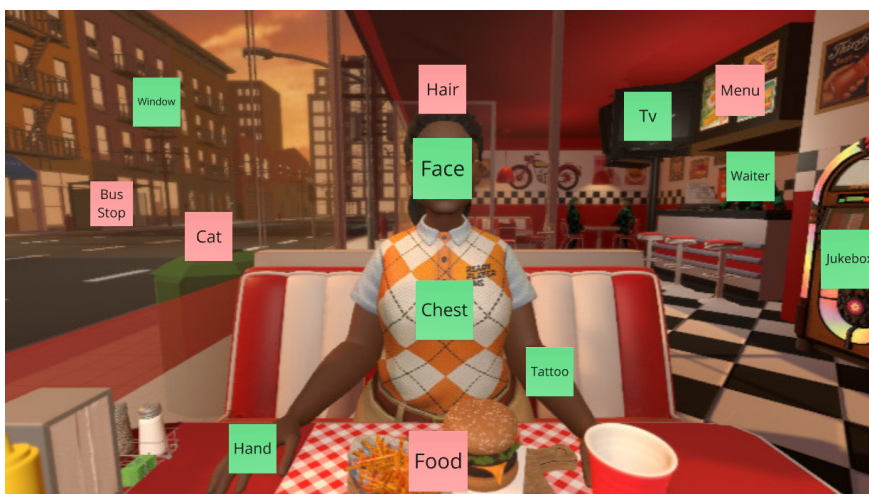


Figure 8: Map of possible ROIs across the scenery. Red: Excluded ROIs.

There are then two kinds of interactions that can draw the player in: external and personal. External interactions refer to the ones related to elements of the environment: a television, an animal on the street seen through the window, a waiter in the background, the food on top of the table. Personal interactions relate to point of focus centred on Des: hair colour or haircut, face, chest, tattoos and hands.

When considering consent of the character, in relation to the player gaze, the personal interactions would be the key to explore this messaging. Des may consent to one fixation upon their chest, but a continuous or repetitive focus on it might bring an animation of discomfort, a scene where a jacket or hoodie is dressed by the model or an abrupt ending by Des feeling offended and verbally expressing the discomfort. When discussing with Michelle Clough possibilities for this usage, it was also suggested the presentation of a neurodivergent character that may vocalize from the start the preference to not be established eye-contact and therefore, a forced fixation of gaze upon their face be seen as the player breaking a boundary personally set by Des. These behaviours mimic the ones seen in the literature review, in order to, in accordance, formally analyse player reception of them when integrated with eye-tracking technology in game.

It is important to note that at this point in the development, the ROI dialogues had not yet been written, but the possibilities were already directing the construction of the experience.

It was clear there were more external sources of attention than personally relating to Des. Because a balance had to be established, to give the player opportunity to interact as many times with Des as with the environment, it was decided that while on the seat, if Des could only map 4 ROIs, the environment could also provide only 4 ROIs to interact with.

Through a series of different criteria, 9 final ROIs made it into the final version of the game. A more detailed reasoning for the inclusion or removal of each follows. *A posteriori*, it was included a section where Des gets up to change the Jukebox's tune, and an additional personal ROI was added, in relation to Des's backside.

Included ROIS

- Personal:
 - **Face:** Eye contact is prominent in human interaction. It is defined that people are most comfortable with prolonged eye-contact that lasts between

2 to 5 seconds [94]. The idea of a longer interaction, that could only be triggered after a specific special time, was appealing. Because of this, the face was included.

- **Chest:** Predicting player’s behaviours of defiance against social norms, considering the nature of video games and their ability to provide a safer place for exploration, the idea of this region and the conversations that derive from it being of slight punishment for the player was expected and of high relevance to surface the topic of consent from the LI. For these reasons, the region was included.
 - **Tattoo:** Tattoos are a good conversation-starter, being done often with a personal meaning to a person’s life, of what is dear to them. They’re capable of adding character to the LI persona and of rising polarizing opinions on the players: admiration or distaste.
 - **Hand:** Included with the thought that an accessory, ring or bracelet, would be attached to it that could once more provide some backstory to the LI. Besides building up the character, it is known that this is another area often appreciated by people, even though it being less commonly known.
 - **Backside:** Similar to the chest, a controversial area to include, if the narrative does not support any sort of punishment of the player by objectifying it. Because the character would be sitting most of the time, but this is an area of relevant interest for conversations around consent, a small segment was added where the LI would get up to perform a task and the player would be given the opportunity, if such a thought crossed their mind, to stare at the character’s backside as they waited for the player’s answer.
- External:
 - **Television:** An easy, dynamic factor capable of catching the player’s attention and even distract them for too long for the LI’s tastes. It’s a natural element to be included in a diner.
 - **Waiter/Waitress:** A cashier of the same gender as the LI that would allow to explore a more jealous side when stared at often.
 - **Window:** The outside world, with different events occurring, is a strong

source of distractions. The player could look outside at a specific point of attention or just by role-playing boredom from the LI's discourse.

- **Jukebox:** A means for fun interactions, such as the diner's vintage feel, favourite genres of music, changed of track, amongst others.

Excluded ROIS

- **Bus Stop:** Element ended being merged with the window, since when someone is looking outside, Des, being back to the street on their seat, has no real perception of the where exactly player is looking at.
- **Trash Bin Cat:** Creating a stray that would jump over the bin and sleep on top would be an interesting game moment, although it required a larger development time, due to the complexity and extra animations required.
- **Menu Panel:** A larger group of elements was already present on the right side of the screen, including the television, the waiter and the jukebox. Due to this reason, it was removed.
- **Hair:** There was a possible overlapping with the facial trigger. Because the calibration of the eye-tracker is never 100% accurate, there was a high risk of bringing the player confusion if the ROI Dialogue for the Face triggered instead of the Hair and vice versa.

The final in-game ROI layout can be mapped in Figures 9 and 10.

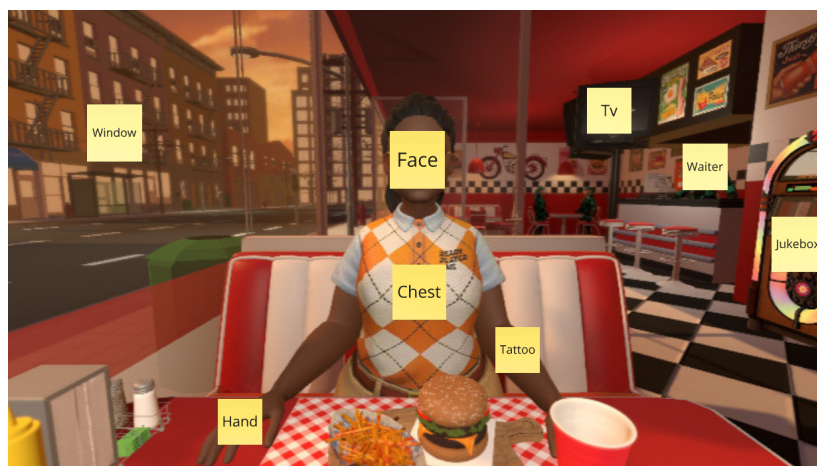


Figure 9: Final Sitting ROIs. Yellow: Personal ROIs. Light Yellow: External ROIs.



Figure 10: Final Standing ROIs.

3.8 Conceptualizing Des

3.8.1 Behaviour

Des' personality would play a major role on how the experience would unfold. The different personalities the LI could embody would change how the character would be perceived by the player. A breakdown of the three major personality types was done to figure out which one would be more fitting to meet the game's criteria. One thing that was certain was that Des would have to be the lead of the date, talkative either by nervousness or confidence. This role was chosen due to the diegetic nature of the game, where the LI would be monologuing through the date unless the player triggered more meaningful conversations locked behind visual focus on the ROIs available.

- **Extrovert:** If Des led the conversation due to an extroverted persona, the talkativeness would be a result of confidence. In this case, the LI's confidence could be used narratively as a "mask" to hide insecurities, that would progressively be of notice if the player gave them full attention. This behaviour was entitled the "Astarion Card" inspired by the game character of *Baldur's Gate 3* and his entire personal journey in-game [95]. Des would then start the game with a body language that portrayed confidence, being extremely flirty and conversational. Focusing on the LI long-term, however, would alter their state into one of discomfort, marked by contrasting closed-off dialogue lines, animations of irritation and gaze deviation from the player. By the end, the character would become emotionally vulnerable with the player, verbally expressing how they

were making them feel up to that point.

- **Introvert:** When with an introverted persona, Des' never-ending conversations would be a direct result of being nervous about the date, attempting to constantly make conversation to avoid the awkwardness felt in the situation. The LI would come across quickly as a people-pleaser, becoming more volatile as the date went on. At the start Des would be taken as a "blank-slate", very proper and reserved. A continuous attention on them would lead to the rising of a sarcastic and more blunt side of the character, that would break out of their shy shell and become brutally honest about the opinions in regards to player behaviours and their inappropriateness. The ending would be characterized by Des being visually annoyed at the player, the tolerance for anything they do at an extreme low.
- **Ambivert:** A balance of the two above. Des would lead the conversation making small-talk. Some time would pass between conversations, one, to dare the player to trigger some branch by the ROIs in cases they were engaged before, two, to make the small-talk seem it appeared genuinely, after some deliberation. Des would always behaving ingeniously at the start of the interactions, curious about the ROIs the player focused. Around the 5th interaction with a ROI, Des would start to portray impatience, annoyance or discomfort according to the the region. Sarcastic or vulnerable comments would aid hint the player to be careful because the character's limit was about to be reached. 3 to 4 strikes would be given before Des terminated the date early. When finishing off a date earlier due to the character's personal limits being pushed, Des would drop the pretence to be alright and give an honest discourse of how the player made them feel due to their actions before the game ending, always being polite before leaving on their own.

The extroverted side could be too much for new players who are not familiar with the genre. The case of a player just letting Des lead was a possibility due to their strong presence, forgetting about the mechanic present in game. On the other hand, the introverted side could be taken as uninterested from the character or bore the player, not daring them enough to explore the hidden side of Des. Due to these conclusions, the Ambivert persona was selected, providing a balance for more than

one type of player, familiar or not with the game genre and technology.

3.8.2 Persona and Aesthetics

In order to gather a larger sample of testers, it was ideal for the game to provide both a female and male LI's that players could pick according to personal preferences. This decision would purely change aesthetics, no dialogues or experience changing according to the LI appearance. Time constraints in the game development was the main reason for this design choice, although long-term it proved to help keeping the experience homogeneous for testers. In direct result, both versions, female and male, of Des would share the same persona and their aesthetic appearances approximated the closest possible to one another in design. This objective led for the LI's background and aesthetics to be developed simultaneously, shifts in one inspiring new considerations in relation to the other.

- **Early Concepts:**

- **Persona:** Des would need to be around the target audience's age, in other to catch the player's interest. They'd have to talk modernly, if slightly affected by the internet, as most Millennials do in present day.

Being talkative, the LI required a profession of a social nature. After much deliberation, between professor to costumer service, nursing ended up suiting them the most. It's a profession of high social interactions, usually associated with kind individuals. It is also a profession that tends to fly under the radar, but can cleverly bring up discussions of what is expected of a nurse when presented with a female or male version. This moment occurs in game where both versions have the same two options the player can comment to the LI once they find they work in Neonatal, if they do, or not, look maternal/paternal enough for the player.

The department where the LI works helped forming their family background: older sibling of two brothers, which makes them responsible, but at the same time a jokester at heart, and where their care for younger kids first originated.

Due to their highly-active work life, it was expected of the character to want to slow down on their free time, common hobbies like games and

television being part of their favourite past-times.

The Sims 4 [96] played an important role in defining majorly the traits owned by Des. Going through the list of all possible traits the game provides when in Sim character creation, certain ones began being picked to complement each other and give origin to the basis of the character's life. *The Sims 4* traits that inspired Des character building can be found in Figure 59 of Appendix I.

Love and Deepspace [97] character sheets for the announcements of both LIs Syllus and Caleb also played a major role in visualizing how Des could be seen at first glance and inspired the inclusion of peculiar traits such as love for EDM, robot dance moves and high excitement for their peculiar household pet, mimicking Syllus's out of the box singing skills and Caleb's strange ability for selecting perfect apples. *Love and Deepspace* character sheets can be found in Figure 60 of Appendix I. Des's first character sheet, result of mixing these inspirations and brainstorming, follows on Figure 11.

- **Aesthetics:** Although the game would be presented to a mainly Caucasian population, it was decided from the beginning that Des would be racially diverse. One can argue this decision could cause a bias of likeness to the character but the risk was taken, assuming play-testers would willing come to sessions aware of the characters available to them according to the advertising made. In real life, it's also safe to assume a person does not pay much attention to racial factors when looking for a potential partner, one that doesn't own personal bias anyway. This decision came from a clear lack of racial diversity in video games besides the "token" Black and Asian characters who are usually presented as optional love interests of a prominently white cast of individuals.

Because of the the game being set in a 50's recreational diner, and that time having been an important moment in history of Black activism, the choice of an African-American identity for Des seemed of relevance, allowing the character, in one of their monologues, to reminisce about that fact and how far society as come after the fact.

Des's geek personality was of high relevance to their first conceptualization,

Basic Info
<ul style="list-style-type: none"> • Name: Desiree • Nickname: Des • Birthday: July 27th • Favorite Color: Orange
About Them
<p>Personality:</p> <ul style="list-style-type: none"> • Ambivert: Shy and reserved to strangers. Talkative when comfortable. • Positive: always tries to see a bright side of things. • Grew up amidst 2 brothers. Still keeps in touch with them. <ul style="list-style-type: none"> • Jokester: tends to break the ice with some dad jokes. • Oldest sibling. Where maternal/paternal instincts come from.
<p>Lifestyle:</p> <ul style="list-style-type: none"> • Works as a Nurse at the Hospital's Neonatal Ward. <ul style="list-style-type: none"> • Loves children, so clearly loves their job. Could spend hours telling fun stories of mischief the little humans were up with the medical staff. • Is highly energetic from spending the day running around corridors, carrying tasks for patients and doctors. • Tidy about their personal spaces. The trait has developed under their job and crossed over their personal life. • Has the most interesting pet in the world... a goldfish. They swear Narcy has a lot of personality! <ul style="list-style-type: none"> • Low maintenance pet bc they spend a lot of hours outside of home. • Homebody: prioritizes partying in their pajamas in the comfort of their home - bonus points if someone they trust joins in ;)
<p>Hobbies:</p> <ul style="list-style-type: none"> • Really, <i>really</i> loves EDM. • Has killer robot dance moves. • Favourite shows: anything sci-fi, the more absurd the better. Helps them relax after a long day's work, briefing shutting off for the evening. • Gamer: Grew up playing with their brothers competitive Mario games. Nowadays, the occasional RPG is their genre of choice.

Figure 11: Des First Character Sheet

glasses and a laid back summer outfit having been selected at the time to match their off-work persona.

The result of the first conceptualization of both female and male versions of the LI can be found in Figure 12.

- **Test Group:** First year students of the Master's of Interactive Media Design along with one alumni and an Engineering student were asked for feedback on the previously defined persona and aesthetics, the test group being in the age range of the target audience desired for the game to appeal to.

A brief contextualization of the project and game's narrative was given before providing a Google Forms with the following exercises: to design the look of Des according to the persona presented, and to build Des' persona, in accordance to the early design of the character.

The reasoning behind splitting the persona from the design was to see which expectations each of these previous elements could potentially be formed in players, and if these would clash or meet accordingly. The results can be consulted on Appendix B.

- **Refinement:**

The results of the test group's exercise allowed for the refinement of both persona and aesthetics, giving place to the final versions of the LIs present in the game.

- **Persona:** The descriptions provided by the test group were filtered and the ones which aligned the most with the ambivert persona were utilized to strengthen the LI's characteristics.

It was noticed how Des's work life and off-work lacked in detail. In order to better visualize what a work day and weekend would rightfully look like for the LI, inspiration was taken once more from the game *Love and Deespace*, most specifically, the build of an average work day schedule and weekend to better get in the shoes of the character being worked with. This method provided a guidance in the writing phase that assured Des's story was kept consistent throughout all dialogues.

To complement the desired schedules, a look into videos documenting Neonatal Nurses were seen for a deeper understanding of the role being describes for the character, including one provided by the National Association of Neonatal Nursing [98] and a newscast by the channel Denver7 [99]. The final LI schedules can be found on Figures 13 and 14. The rightful reference on Figure 61 of Appendix I.

Des' final character sheet, Figure 15, was mapped out associating all of the previously outlined aspects, solidifying the prototype previously constructed.



Figure 12: Early conceptualization of Des, female and male versions.



Figure 13: Des's Weekday Schedule.



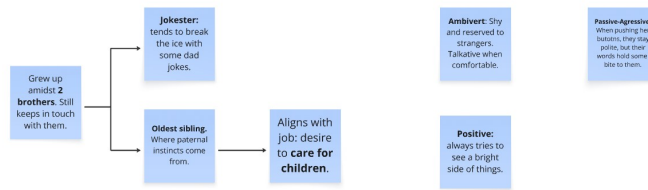
Figure 14: Des's Weekend Schedule

Basic Info

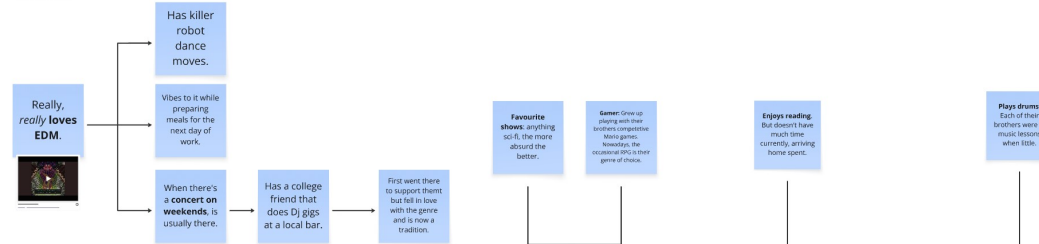
- Name: Desiree
- Nickname: Des
- Birthday: July 27th
- Age: 27 y.o.
- Favorite Color: Orange

About Them

Personality:



Hobbies:



Lifestyle:

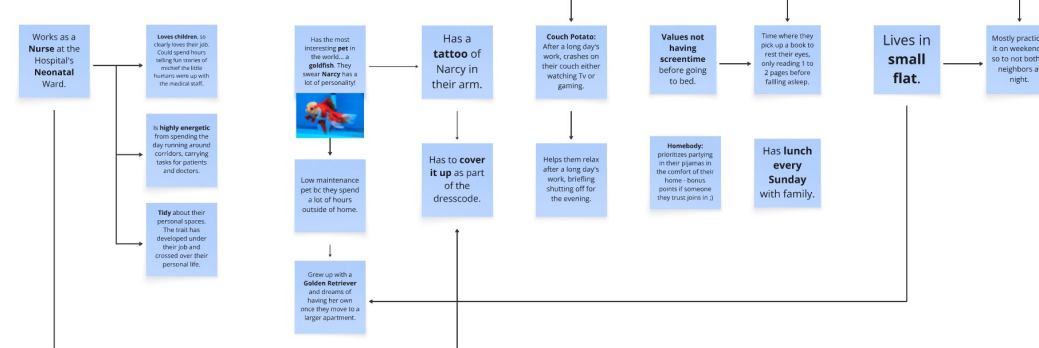


Figure 15: Des' Final Character Sheet

- **Aesthetics:** An interesting phenomena was observed between the test group which the assignment was offered to: 3 out of the 6 female avatar submissions portrayed a similar kind of avatar for the female version of the LI, 5 out of those 6 presenting Des as a Person of Colour (POC) individual. It’s important to remember the exercise of designing Des came before the concept version was given, and students could not advance in the exercise without properly submitting their characters. One student in particular was asked why did their mind navigate to a POC person, in which she said “Des strong personality can’t be associated to a white woman, being so sure of herself, where she stands and what she likes.” and that, additionally, “most of the nurses that appear in media who are kind have the tendency to be black, the meaner ones usually associated to a white, blonde persona”. The student used the show *The Good Doctor* [100] as an example. In total, there were a total of 11 submissions for the aesthetic representation of Des, the contrast between early, suggested and final versions documented in Figure 16.



Figure 16: Des Design Evolution

The female choice of avatar was evident, being re-adapted to the hairstyle and body type suggested. Her clothing style was changed into something casual but still formal, being deemed more “date appropriate”, the rolled up sleeves purposefully picked to highlight her tattoos, the colour fitting the overall ambient’s scheme and being Des’s favourite, adding depth to her choices.

In accordance, the male’s avatar was modified in order to better mirror the female design. There was a struggle, a feeling something was “amiss” from the character however, when he was taken from the character creator. While the female version stayed true to the provided assets of *ReadyPlayerMe*, the male was given a slight hairstyle and accessory makeover in order to look more stylish, matching the female’s version. This included the incorporation of earrings, facial strands of hair and an unbuttoning of his shirt’s collar. A re-sculpt of the face in order to make it more masculine and a reinforcement of his backside were done as well. The documentation of these changes can be found in Figure 17, *Dream Daddy’s* character Mat serving as an inspiration for this new version of male Des [2].



Figure 17: Male Des Modifications and *Dream Daddy’s* [2] character reference.

3.8.3 Voice

In the first draft of the game, the LI was not planned to have a voice, instead the lines being provided by a speech box, in the traditional fashion of other visual novel

games. Later, it was assessed the presence of a text box for the character’s lines would limit the player’s gaze, drawing to it every time the character talked, affecting the desired flow of the experience. It was then concluded voice acting would be necessary, so players could listen instead of read what Des was saying to them. This way the text box UI wouldn’t be present for majority of the game, allowing for a better visual navigation of the scene by the players instead of their gaze being bound to the UI element, approximating the scenario to our real-life communication mechanics. This realization came later in development, and led to the casting being executed later in production, once the game’s script had already been written.

In total, there were around 8.5k words in the game’s script. When looking for voice actors, famous casting sites as Fiverr [101] and Upwork [102] were visited, however, the prices per hour or per word set by the artists led to a high value of prices that could not be afforded on a student’s budget. In consequence of this setback, in-person casting was done instead.

Unfortunately, the second attempt at finding voice actors, through a more personal means, was unsuccessful as well. Although people were eager to voice-act in a game, resistance would immediately be met the moment the game’s genre was mentioned. One of the proposed candidates for the male’s voice labelling the role as “cringe”, proving the stigma still existence around dating sims. It was verified a bigger predisposition from woman to voice the game, but due to the schedule set and their availability, it wasn’t possible to set more than one session for all the voice lines, an objective impossible to be met. Due to the unavailability of female voice actors and the refusal of male ones, the use of LLM text-to-speech voices was required.

It was a priority to have real human voice acting in game, due to the uttermost respected given to the craft. When the decision to use LLMs was taken, it was expected for the results to not come as authentic, nor with the correct tonality of line deliveries envisioned while writing. This predicament proved correct, most of Des’s more romantic or suggestive lines coming off aloof, making their intent pass over the player’s head in certain occasions.

The LLM voices utilized were sourced from the website Natural Reader [103], Jessica voicing the female version of Des and Luca the male version. Similar to what occurred in the design of the male avatar for Des, Jessica’s voice did not fit properly the profile of the character desired, although it was deemed the one with the most

“natural” deliveries of the ones being offered, as well as the one that most fit the character’s energetic persona. To better adapt the voice to the model, pitch and speed changes were applied in Adobe Premiere Pro [104], post recording of her lines.

3.8.4 Animations

Des’s animations were carefully thought of during the writing of the game’s script, their presence crucial for the visual storytelling part of the progression of each ROI. Due to their intricacy with the game’s text, the search for free animations on websites like Mixamo, to speed up production, was not successful, the animations found not meeting the necessary requirements. As a consequence of this effect, all of Des’s in-game animations were produced from scratch using the 3D modelling and animations software Blender.

All desired animations were first broken down per order of priority in production. It was given high priority to animations that allowed Des to look more alive, such as an idle breathing, talking and blinking animation. These were deemed the minimum necessary for the game to work. Medium priority was given to animations related to ROI interactions that only triggered a visual reaction, without dialogue input. Low priority was given to ROI animations that would accompany dialogue lines. There were a total of 43 animations mapped, which then were reduced, giving the 2-week time constraint to create and implement them in the Unity environment. From these all high and medium priority animations were designed as intended, 16 low priority animations ending being discarded by assessing their removal would not affect the experience, only making it more robust.

A total of 27 animations were produced, utilizing the Non-Linear Animation (NLA) method. This pipeline allows for the creation of multiple animations for the same rig, which can be stored in layers and combined in the same timeline. Facial shape keys for Des’s models had to be done individually, but animations were able to be transferred from one rig to another, only minor adjustments being performed due to height differences. A look at the Blender environment for this production phase can be found in Appendix G.

From the animations created, 21 related to body actions, such as idle poses, waving, turning around in the seat, hugging, amongst others. 3 represented talking variations, for the different emotional states Des can present during the experience: happiness,

sadness or madness. 1 blinking animation and 1 gaze deviation movement were necessary in order to bring the own LI's gaze to life.

Exported into FBX's, the animations were later integrated into Unity, there already being background familiarization with the Blender to Unity pipeline. For each of Des's versions, an animation controller requiring 4 different layers was associated, idles in need to play concurrently. Schematics of all of the layers present in one animation controller are shown in Appendix H. In Fungus, the animations were awakened by the change of boolean parameters that directly controlled their transitions.

3.9 Story & Flow

3.9.1 Main Menu Navigation

The executable starts up with a main menu that allows the player to perform 3 actions: begin play, check the game credits or quit. The background pans over a city neighbourhood by sunset. By clicking *Play*, the player will be redirected to a different screen presenting them with Character Selection. The *Credits* provide information on the game's developer, coordinators and websites that provided content to build the game, asset users rightfully mentioned. *Quit* allows them to exit the experience.

3.9.2 Character Selection

When in Character Selection, the characters are presented individually on the screen. The female version of Des is posed on the left side, a phone showing a dating app interface, Date@Date, on the right, with her correspondent profile. If the player decides to "swipe right" by clicking on the love letter icon on the app, the experience begins with her selected as their date. If, otherwise, they click on the cross and "swipe left", the screen will pan down into a similar display of the interface but with the male version on display, featuring his own Date@Date profile.

3.9.3 Premise

The game starts with a short introduction to quickly contextualize the player of their current situation and relationship with Des. Having arrived early at the outskirts of their meeting place, the player pulls out a phone texting Des that they will be saving them a table at the diner. Through the phone text history, it is possible to receive

a bit more of background, the meeting place having been previously agreed upon by both, the messages having been exchanged on a dating app, Date@Date, the same through which the player chose their desired LI back in Character Selection. Inside the diner, the player has a brief monologue about their expectations of the date, their desire to click with Des as they did back in the app, but acknowledging the possibility for failure, hinting at the possible punishing endings the game offers. Des texts the player back that they've arrived, and after exchanging some greetings, the screen fades to black to give a start to the date experience itself. The black screen reminds the player that from then on their gaze starts to take effect on the course of the game by advising them to look around to find conversational topics.

3.9.4 Main Conversation

Des has a main dialogue the player needs to get through in order to progress the game and reach one of its endings, characterized by being a collection of 20 diverse monologues with 10-second silent intervals between them. These monologues can be interrupted at any time by the ROI fixations the player is capable of triggering. At the end of these interruptions, Des will automatically return to the main dialogue, to the line that would logically follow the interrupted one. The choice of a monotone conversation for the base game, with barely any player input, was purposeful: due to the desire for gaze to be diegetic in the experience, the conversations that hold more substance and dictate Des's approval with the player are locked behind the player's gaze interaction. These dialogues were written with the intent to bore the player due to their extension, enticing the user to look around at the ROIs, in search of dialogue trees they can take a part on, instead of being only listeners to Des' small talk.

3.9.5 Dialogues

These conversations provide more meaningful interactions with the character, complex dialogue trees or animations being hidden within their interactions and repetitions; influence approval according to the player's ocular behaviour and are able to provide premature endings to the experience. Each ROI, apart from the facial and backside, has a limit between 8-10 repetitive fixations before the character decides to prematurely end the date due to their personal discomfort being met or recognizing disinterest from the player. Each ROI ending has 3 or 4 "signals" or "strikes" that predate it, to

serve as warnings for the player the character's limits are being reached, accordingly approval being removed in these moments.

- **Face:** Provides 3 different special kinds of moments between LI and player, according to time of the player's fixation on their face:
 - **10 Second Fixation:** The LI starts to deviate their gaze to the surroundings.
 - **15 Seconds Fixation:** The LI vocally admires the player's capacity to pay close attention to them.
 - **10 Second Fixation (Post-15):** Gaze deviation occurs alike the first iteration. Approval is increased.

Here, it is clear that although the character gets slightly nervous at the player's attention, the player is rewarded.

The optimal time for the character to react accordingly was defined through repeated tests with a sample group. Although the duration was originally based on Binetti's previously mentioned 2-5 second time window, users found these interaction windows were too short since it would trigger the shyness of the character in a way that they considered to be too early in the fixation. interaction window durations ended up being doubled for an optimal experience in the context of the experience. [94]

- **Chest:** What first is considered by the character as the player spacing out, is later acknowledged as an intended look. This allows the player conversations around Des' choice of attire. A repetitive behaviour eventually leads to the LI voicing their discomfort at being constantly looked at in that region, in a show of vulnerability. The player is asked to mediate their behaviour, serving as one of the first warnings the character provides to signal a continuation of this behaviour will be punished. Animations of discomfort, by the LI hugging themselves, and sassy comments about their eyes being above serve as additional strikes for the player to understand the character is not pleased.

Through these interactions, the game does not instigate this type of sexualizing behaviour on the player, in cases they choose to see it through the extreme case of the scenario. The punishment of Des's discourse removing approval

and inevitably leading to an ending of negative nature serving as a getaway of reflection for the players.

- **Tattoo:** Depicting Des' pets, the first interactions lead naturally to discussions of Des's family golden retriever or at-home goldfish. The constricting nature of having tattoos in Des's field of work, or how long they've had it is also brought up upon repetitive fixations. After a while, Des starts to feel uncomfortable, considering the player's fixation the only thing they find of interest about them, the player not taking their time to significantly explore other aspects above that one. This leads to Des feeling offended and leaving, due to the lack of interest on other sides of their persona.
- **Hand:** One of the character's hands, as seen previously in Figure 9, is purposefully in display with a ring being worn on one of their fingers. Conversations around the nature of this ring, a graduation present from their father, and compliments to the character's hands, and hidden musical abilities, are some of the first discussion the player is offered between the character. Extreme focus leads to the character questioning their nails, and jokes about the player having a kink. An extreme fixation on this element only makes the character find it an oddity, and excluding themselves on the pretence of this being one of the strangest interactions they've ever had on a first date. When talking about realism, it's normal to assume no one would intentionally play out this behaviour in a real-life scenario. But since the players find themselves in a game environment, inherently prone to play, it's normal for their curiosity to vex Des or defiance of social norms to be rewarded with some sort of reaction from the character, even more if it's done often. The ending connected to this interaction is not meant to be taken as kink-shaming anyone who appreciates this characteristics on a person, but rather a reference at its existence, used here light-heartedly to make the player understand that if they push Des's buttons even after they are vocal about finding it strange, an overstep of the character's boundaries was made.
- **Backside:** A special kind of interaction that can only be found if the player previously choses to let Des change the song being played at the diner's jukebox. In this segment, the character gets up and is turned with their back to the player, eagerly waiting for an answer of which of the available songs to pick. In this

particular instance, the player has 3 strikes to look at the character's back, one including the character turning around visually mad and accusing them of being caught. At the 4th strike, the character sighs and laments the song won't be changed in the end before returning to their seat at the booth, disappointed.

- **Television:** The first few glances lead the LI to hint at videos that the player will eventually find passing on the television, which consist of mostly student works from the Masters of Interactive Media Design. Afterwards, more character-defining conversations inquiring about the player's preference for books or television are available, as well as curiosities such as Des opinions on medical shows and fan interests. Once these topics have been explored, Des starts to take the player's focus on the television as a distraction they are directly competing against. Voice lines about the player turning into a pixel for their prolonged attention, and direct call-outs on their attachment serve as warnings of the character progressively becoming impatient. Once this patience reached an end, Des leaves the date claiming how improper the player was at prioritizing the television over their discourse during most of the experience.
- **Waiter/Waitress:** A waitress in the female version, a waiter in the male version. The diner's assistant that can be found behind Des, standing at the counter, serves to explore a more jealous side of the LI. At the beginning, the player's interest is considered a look at the menu panel of the diner. Once the character turns around to assess the possible source that could be stealing the player's gaze, the waiter becomes the centre of the conversations derived from this ROI. In this particular case, Des is more direct, affirming the player is giving the assistant the heart eyes and unashamedly enquiring if the date should have been between the two of them instead. Once the sarcastic bites don't seem to land on the player, and the fixations persist, Des admits it hurts the player hasn't stopped. To its limit, Des finished the date enquiring the player why they came on a date to spend it looking at someone else, encouraging them to try their luck with the worker, if they so desire, before exiting.
- **Window:** Provides a full view of the neighbourhood the diner is in, a cinematic sunset adorning it. A mascot was placed with intent at the bus stop on the other side of the street, in order to steal the player's attention. First interactions with

this ROI lead to questions of if either Des or the player were familiar with the place, where Des works exactly in the city, and what the LI does to unwind at the end of a day like the one they're experiencing together. More repetitive behaviours make Des look outside contemplating the view and enquires about which season is the player's favourite. With time, Des starts to question if the player is truly looking at something with a purpose outside, or just lost in thought, and the player can use the mascot as an excuse for ignoring Des. After this interaction however, Des begins to state how they are afraid to be boring the player, due to their constant attention deviation, taking their gaze, in this context, as uninterested in them. When Des's tolerance wears out, the date is terminated, Des stating things are clearly not working between them, the player constantly looking outside as if they wish to leave.

- **Jukebox:** The first looks at the jukebox prompt discussions of its model and Des' favourite kinds of music, as well as moments such as the proposal for the current background track to be switched - which leads to the extra section where the character's backside is shown - and the opportunity for the player to groove to the song along with Des while in their seats. Halfway through, Des interprets the player gaze on the jukebox not as one of curiosity, but of dissociation or daydreaming while the LI is attempting at small talk. Actions such as waves in the jukebox's direction follow, and the uncertain reasoning behind the player's gaze is questioned. Once the LI decides to terminate the date, they vocalize how both of the parties ran out of interesting things to say to one another, the player's dead gaze to the size a clear sign of desperation. Due to this, Des finishes the date by thanking the player for at least giving them a try, even though they were not meant for one another, in the end.

3.9.6 Approval System

Des processes approval towards the player, a mechanic characteristic of games with romancing elements. This numerical parameter allows for the assessing of how the character is feeling in regards to the player during the course of the game, according to players decisions, as well as dictating the status of their relationship. In *Desiree: Eyes On You*, however, the counter is kept hidden from the player. This decision helps approximating the scenario to one of real life, where a person is never truly sure of

how the other is feeling or will feel according to their choices and actions, adding some unpredictability to the experience and forcing the player to be attentive and balance their exploration of the environment with the attention they're giving Des.

Des's approval system is dependent on two factors: the player's choices made during dialogue with the character, as well as the number of repetitive fixations they are providing to the ROIs. If a player is nice during dialogues, being constantly curious to get to know more about Des, their likes and backstory, they are rewarded with flirty lines from the character and an approval increase. Approval is also increased in cases where the player provided the character uttermost attention by eye contact. If the player chooses meaner dialogue options, constantly interrupts Des - which leads to the loss of possibilities to gather approval - or reaches warnings the LI is starting to take their gaze with another intent, the approval will decrease.

If no premature ending is reached, it is Des's approval that dictates which ending the player will receive at the game's end.

Taking into consideration the dialogue trees, the mathematical calculations used to determine the necessary approval for the player to obtain the good or bad ending were as follows: in total, 79 player actions (dialogue choices or fixations) allowed for the player to earn +1 approval from Des. In contrast, 41 allowed for the player to lose -1. Divided by two, and rounding the numbers to the lowest, 30 approval would be necessary for the player to receive Des's good graces, while -20 would be required for the date to not go so well.

In theory, the previous calculation would make the game experience balanced, considering there are more chances for the player to please Des other than offend them, however, that was not what was observed when executing gameplay tests with a selected group of individuals. After some trials and error and constant adjustments, it was dictated that removing 10 from the good approval cap would significantly improve the player's probability at obtaining a good ending, equalizing it to the -20 negative cap. This calculation leaves space for an interval where the player can receive a neutral ending, where their approval is between -20 and 20.

In Figure 18 it is possible to visually understand the aforementioned calculations and adjustments.

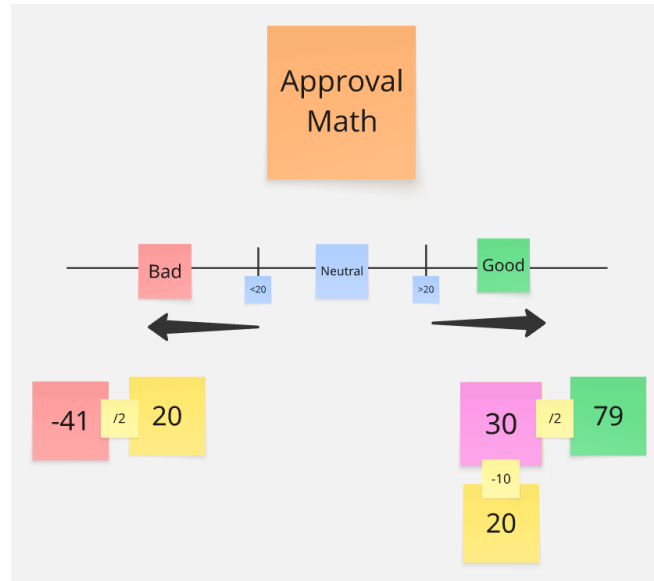


Figure 18: Calculations of LI's approval.

3.9.7 Endings

There are a total of 11 endings to *Desiree: Eyes On You*: 3 tied to approval, 7 to ROI limits and 1 base game ending. As mentioned in the previous section, approval endings compare the final in-game approval to a threshold to assess the success of the player at the end of the game. The base game ending, or *Ending 3: Table For One*, was created in cases the player does not own an eye tracker or has it badly calibrated, and therefore is unsuccessful to trigger one interaction through the entire game, letting Des monologue until the very end. ROI Dialogues are considered “premature” endings.

The game reaches a true ending if one of these two situations occur: the player reaches the end of monologue 20, and is led to the approval threshold if at the minimum one interruption during the game was executed otherwise they obtain *Ending 3: Table For One*; or the player does a maximum of 20 interruptions throughout the game, which served as a security in order to assure if the player constantly interrupts Des and does not allow for the monologues to return and progress, to assure the experience would not become too extensive during those cases.

The number of maximum interruptions was obtained in similar fashion to the calculation of approval threshold. In total, 63 interruptions could be made through the whole game. From these, were excluded the ones that led to ROI endings, as well as the warning that predated them and 1 more for forgiveness. This led to a total of 32, rounded to 30, possibly usable interruptions to decree the ending of the game.

Once more, this value was play tested with the same group of individuals that tested the quality of the approval, and the number was once more reduced to 20. There was a desire for the experience to exceed the 30 minute mark, and this reduction allowed for the game experience to be shortened from 45 playable minutes to around 25.

- **Ending 1 - Afternoon Stroll:** The good ending. Obtained when approval score is equal or higher than 20. Due to the game story being intrinsically connected to the use of dating apps, Des finishes the encounter happily telling the player how glad they were for them to meet them in person, considering the high difficulty to form genuine connections with anyone online. The LI admires how the player was able to break the continuous behaviours of ghosting and hiding behind screens, and suggests for them to leave the diner and take a stroll through the city together, enjoying the rest of their evening.
- **Ending 2 - Mismatched:** The bad ending. Obtainable when approval is equal or lower than -20. The character admits to the player that their expectations of them were not met, their hopes of fitting together like puzzle pieces broken. The LI ends the encounter recognizing how the player has shown them often they weren't the exact match, and says goodbye wishing them good luck finding the one they're looking for, just as they plan to keep on looking.
- **Ending 3 - Table For One:** The base ending. Obtainable if the player is incapable of trigger the minimum of one interruption in the game, this can be due to the lack of an eye tracker or bad device calibrations. In this special case, the LI recognizes they've been monologuing during the entire experience, directly hinting the player they could have immersed themselves more in the date by trying to find conversation topics by looking around at their surroundings. The character finalizes the experience saying the player is not the person they are looking for, but to not take it too personally, that it's normal for these experiences to sometimes not work out.
- **Ending 4 - Separate Bill:** The neutral ending. Obtained if approval score is between -20 and 20. Des admits to the player their expectations were not met and they should stop lying to themselves, that things would not work between them in the long run due to some incompatibilities. Similar in lines to *Ending 2: Mismatched*, leaving apart the conversation about mismatching puzzle pieces.

- **Ending 5 - I Think, Therefore I Kink:** ROI ending, obtained by looking at the LI's hand a maximum of 10 times. Title is a reference to one of Des's dialogue lines, jokingly mentioning to the player their fixation on their hands could be considered a kink by many.
- **Ending 6 - Looking (Not So) Respectfully:** ROI ending, obtained by looking at De's chest a maximum of 11 times. Due to the natural progression of dialogue, the character presents discomfort more often to the player in this instances, in order to see how far the player is willing to go to test their limits. Due to this behaviour that the game deems as an utter lack of respect, the title is self explanatory.
- **Ending 7 - The dog eats the fish, the fish eats the burger... Can Des row a boat?:** ROI ending, achieved by fixating on Des' tattoo a total of 7 times. Because the tattoo portrays Des's pets, and the date is occurring at a diner, a spin of the traditional river-crossing riddle of the *wolf, goat and cabbage* problem is hinted at with the title.
- **Ending 8 - Go Get'em Tiger!:** ROI ending, obtained after exchanging glances with the waiter 8 times. The name is intrinsically connected to Des's final speech, encouraging the player to pursue them, after they leave, filled with jealousy.
- **Ending 9 - Let Them Boogie:** ROI ending, connected to the jukebox and it's limit of 8 fixations. Because at the end of these interactions the character interprets the player's gaze as them spacing out, the title refers to the song *Starman* by David Bowie, being a shortened version of the lyrics "*Let all the children boogie*".
- **Ending 10 - As It was Foretold:** ROI ending, reached at the 8th interaction with the Television. The name was influenced by one of Des's lines, in similar fashion to Endings 5 and 8, where the LI tells the tale of the player turning into a pixel if they focus on the broadcast for too long.
- **Ending 11 - Bear-y Boring:** ROI ending, obtained by fixating on the outside world through the window a total of 10 times. A direct reference to the mascot placed purposefully at the bus stop, in order to steal the player's attention and challenge them to make Des notice it, which the LI inevitably does.

3.10 Technical Aspects

3.10.1 State Machines and Flowcharts

The visual novel extension Fungus for Unity granted a better management of Des's dialogues and the overall game flow.

The add-on allows for the creation of state machines, capable of portraying dialogues, manage variables, create logical conditions, manipulate audio sources amongst a wide range of other useful tools. An example of a state machine utilized for management of the character dialogue audio according to gender chosen, related talking animation and offer of player reply of choice can be seen on Figure 19.

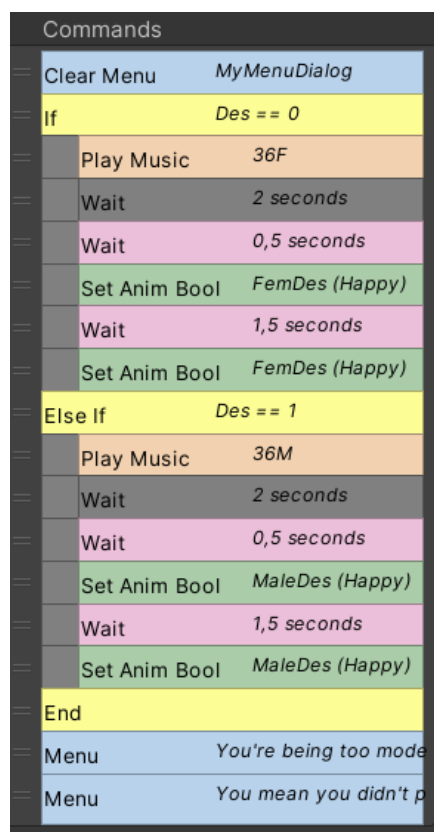


Figure 19: State Machine of a regular Des dialogue with selectable replies.

State machines can be grouped in flowcharts, according to their usage and dependency. In order to better visualize the game's flow, flowcharts were created for different moments of the experience: the introduction, Des' main monologue, one for each ROI and an endgame evaluator.

In the introduction, the flow of the state machines contained inside the flowchart is linear, the only variable accessed being the version of Des the player will be meeting,

picked previously in the Character Selector. The load of this variable will influence the choices of avatar, animations and voice lines throughout the rest of the game. Figure 20 demonstrates the introductory flowchart.

The main flowchart consists of a series of state machines for each of the 20 monologues of Des, linearly connected with a waiting interval of 10 seconds before the call of the one that proceeds it. There's a control node that keeps track of the last monologue being played, in order for the game to progress when the player returns from a ROI interruption. The last state machine is responsible for calling the control node of the endgame flowchart. An excerpt of the main Flowchart can be seen on Figure 53 of Appendix C, showcasing the linear dialogues and the referred control node, capable of tracing back to them.

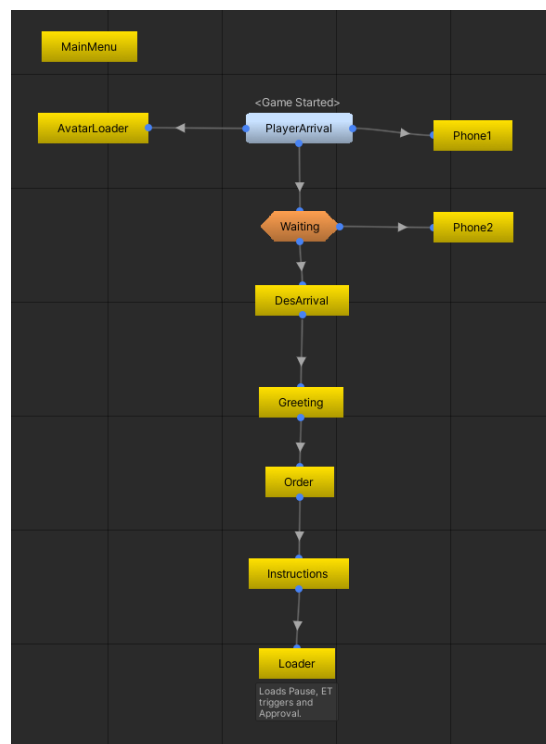


Figure 20: Flowchart of introductory game segment.

ROI flowcharts own a control state, that according to the counter of fixations, direct the conversation to the respective dialogue node associated with the repetition. ROI control nodes are called through C# scripting, due to their dependency with the ocular behaviour the player is presenting, being managed in parallel through the usage of Tobii's SDK. An example of a ROI flowchart can be seen on Figure 21, which presents the complexity of the dialogue trees once the counter directs the conversation

to the rightful direction.

The endgame flowchart's control node is responsible for the assessment of the player's approval rating. According to the approval obtained, an associated state machine will be called containing Des's final speech, finalizing the game and returning to the main menu. An example of this flowchart's structure can be found on Figure 22.

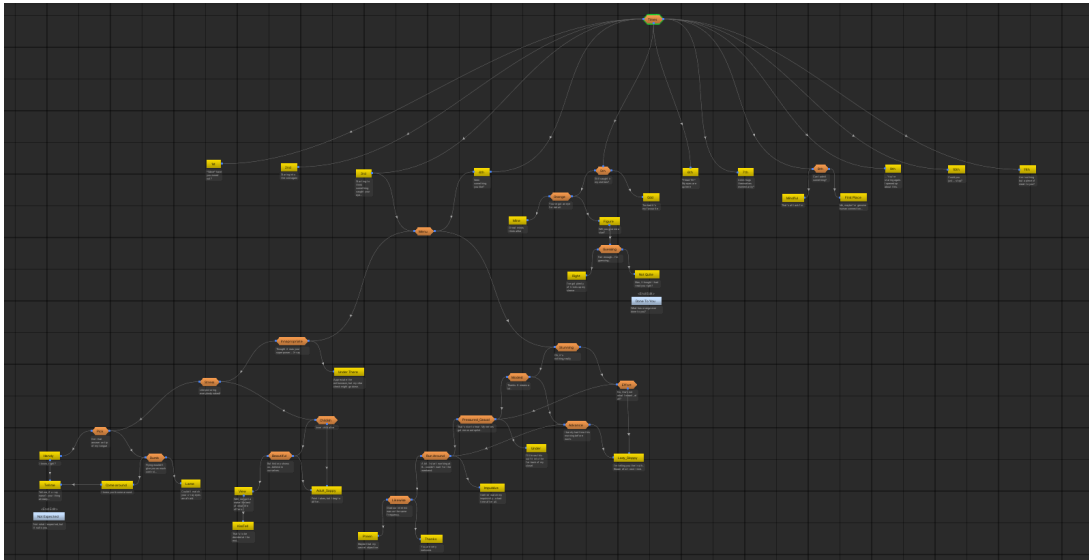


Figure 21: Overview of Flowchart for Chest ROI repetitions.

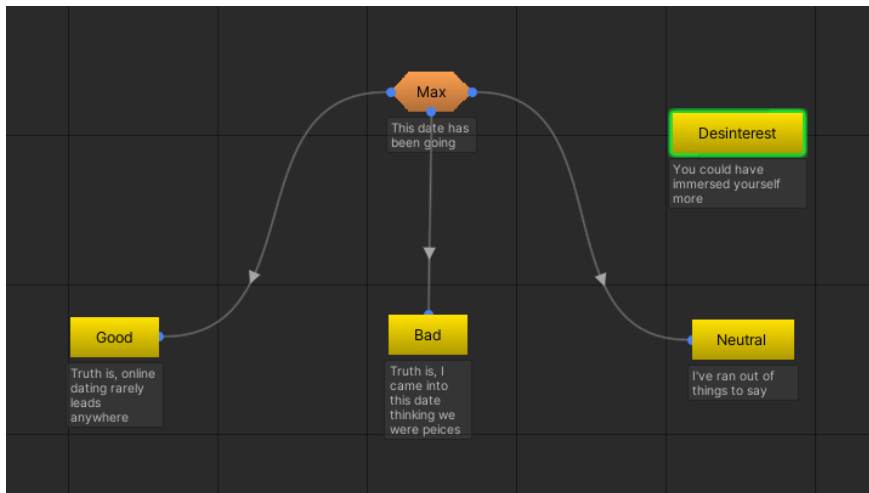


Figure 22: Flowchart of endgame approval related segments.

3.10.2 Scripting Interactivity

To trigger the call of a ROI flowchart, there is a timer that requires a minimum of prolonged focus to activate the instruction. This timer is reset immediately after the fixation is interrupted. This is achieved through the use of the *Invoke* command in C# scripting.

The time necessary to trigger the ROIs varies according to their nature: personal ROIs requiring a 2 seconds fixation while external demanding 3 seconds. These times were play-tested with the same group that previously analysed the performance of approval and endgame flagging, making sense that a person is more aware where exactly they are being looked at in their own bodies than pinpointing in a surrounding environment someone's point of focus.

In Unity scripting, a ROI trigger first checks if the player's gaze is currently on itself through Tobii SDK's *HasGazeFocus* command, and if so, proceeds to begin a counter with *Invoke* that will call a function *RunInter*, responsible to awake the control node of that ROI flowchart to direct the player to the correct reaction the LI is programmed to have, according to the number of fixations previously performed. A scripting excerpt for the timer control can be seen on Figure 23, using the Tattoo ROI as an example.

```
// Update is called once per frame
void Update()
{
    //Object-Specificd Endgame Recognition
    //Check if we've reached Endgame block
    inter = Main.GetIntegerVariable("Tat_Ints"); // --> CHANGE VAR ACCORDING TO ITEM
    if (inter == 7) { GameState.isEndgame = true; } //If we reach Endgame, we flag it for other Inters

    //If we're looking
    //& Endgame NOT reached
    //& Global Interruption Limit NOT reached.
    if (m_gazeAware.HasGazeFocus && GameState.isEndgame == false && GameState.Global_Ints < GameState.maxL)
    {
        Invoke("runInter", 2); //Needs 2 second fixation to invoke Tv_Interuptions Dialogue
    }
}
```

Figure 23: Real-Time recognition of player gaze on ROI and timer for activation.

These timed constraints serve two purposes: first, they avoid the occurrence of the “Midas Touch” problem [3], which is described as the accidental activation of a trigger by hovering over the environment without much thought; second, they assure the player's fixations are given meaning in the game's narrative without making it seem as the character is overreacting over the minor glance.

The invoked function *RunInter* is used with a similar structure across all ROIs, calling the “Times” state related to the ROI flowchart it is inserted, directing to which

dialogue repetition the player will be drawn and interrupting any other flowchart that was previously running. The structure can be found on Figure 24.

3.10.3 Balancing and Realism

It was a design decision for the player’s gaze pointer to be absent during the experience, contrasting with what is usually the norm in games with eye-tracking integration. It was predicted that due to the game’s narrative being influenced by player’s gaze, a conscious awareness of where their eyes were landing would later affect test results related to immersion, the pointer identification distancing the player from the experience due to the clear realization their eyes were being gamified. In similar fashion as the hiding of approval, the pointer would influence player’s decisions during play, allowing them to strategise the flow of the experience and not permitting moments of unconscious ROI fixations. The obstruction of this UI element approximates the gameplay experience to our real-world intimate relations.

```
* Repetition Event.
* Reactions according to Repetition Counter.
*/
private void runInter()
{
    //After sent prompt at the start of fixation, it can only be triggered
    //again once we interrupt it so it's not continuously called.
    if (sent == false)
    {
        Main.StopAllBlocks(); //If we Interrupt Main
        Tat_Inter.StopAllBlocks(); // If we Interrupt Int

        //Other Item Flowcharts that must be stopped
        Tv_Inter.StopAllBlocks();
        Chest_Inter.StopAllBlocks();
        Waiter_Inter.StopAllBlocks();
        Hand_Inter.StopAllBlocks();
        Face_Inter.StopAllBlocks();
        Juke_Inter.StopAllBlocks();
        Window_Inter.StopAllBlocks();

        Tat_Inter.ExecuteBlock("Times");
        GameState.Global_Ints += 1;
        playerLog();
    }
    sent = true;
}
```

Figure 24: Execution of the control node, named “times”, of the tattoo flowchart and interruption of other game states.

The previous reasoning was applied for the highlighting of interaction ROIs in the environment. The lack of feedback would add realism to the experience and incentivize player exploration, aimed at awakening their curiosity to figure out which elements were capable of spurring conversation with Des.

In order to balance out the lack of UI feedback of the approval, gaze pointer and

interaction highlights, other subtle feedback had to be given to bring fairness to the gameplay and allow the player to deduct their performance at any given point. Des' dialogues, which contain flirty replies when the LI is content or displeased replies when the player is taking things too far; animations of relaxed poses, discomfort or impatience and diverse emotive facial expressions being the conduit for the achievement of this goal.

3.11 Desiree: Eyes On You

3.11.1 Game Summary

Desiree: Eyes On You is a dating simulator game mixing innovative eye-tracking interactions with traditional choice-based mechanics, bringing hyper-awareness to the character presented.

Developed under a Thesis Project for the Master of Interactive Media Design at University of Madeira, it aims to evaluate the capacity of eye-tracking to offer a larger sense of social presence when interacting with a virtual character as well as the technology's ability to bring reflections on consent through the interactivity it enables.

3.11.2 Gameplay Trailer

The gameplay trailer, created with Adobe Premiere Pro, can be found in the following citation [105], having being used as a promotional tactic to call in players for the phase of play-testing.

3.11.3 Visual Language

Through the analysis of popular dating simulator games in the industry, a visual language board was created to aid building the game's branding, keeping it aesthetically consistent across different forms.

The logos, posters and main menu screens from famous games were collected and placed side by side, to understand the best approach to present *Desiree: Eyes On You* to the public. The selection consisted of a wide variety of game titles, from recent releases to content dating as back as 2011: *Date Everything* (2025), *MiSide* (2025), *Love and Deepspace* (2024), *A Date With Death* (2023), *Dream Daddy* (2017), *Doki*

Doki Literature Club (2017), *Hatoful Boyfriend* (2011), *Catherine* (2011) and the re-adaptation *Catherine: Full Body* (2019) the picked titles for referencing [2,97,106–112].

The design of all visual elements revolved around the colour palette present in the built gameplay world, consisting of rich reds and oranges, dark browns and cream whites, which associated with the sunset hovering over the city and diner during gameplay.

- **Game Logo**

The game’s logo was obtained through sprite modification and colour variation of a suggested logo template in Canva [113]. Diverse logotypes were tested, experimentation with minimalist designs and heart-shaped icons put against solid colour and more elaborate backgrounds, in order to assess their capacity to stand out in the environment it would be integrated.

Figure 25 presents the final game logo, Figure 62 of Appendix I the inspiration board from other famous game titles. An ode to gathered titles was chosen through embracing the heart thematic characteristic of the game genre. The pixel format in which the heart is conveyed being a mention to the digital space, the fictional app Date@Date, the player and LI first establish a connection in.



Figure 25: *Desiree: Eyes On You* game logo.

- **Menu**

A dynamic camera panning from a city’s horizon to the centre block where the game’s action takes place serves as the welcoming shot of *Desiree: Eyes On You*,

as seen of Figure 26. There was a want for the characters to not be included in the main menu, considering their prominent presence throughout the rest of the game. Additionally, the repurposing of the existing environment presents the players with a new perspective of the locale they'll be acquainted with.

The introduction of a dynamic camera, opposed to a still title screen, was inspired by *MiSide*, *Dream Daddy* and *Doki Doki's* alternative approaches to their introductory screens. The referenced main menus that influenced the game's design layout can be found on Figure 63 of Appendix I.



Figure 26: *Desiree: Eyes On You* main menu.

- **Character Selection**

The LI's selection layout was heavily inspired by the title sequence from the 2018's anime show *Wotakoi: Love Is Hard for Otaku* [114], as seen on Figure 64 of Appendix I. The final character selector screens can be found on Figure 27.

Since the game's narrative surrounds a first date combined through a digital dating app, simulating the selection of the LI as the player "swiping right or left" on the character's Date@Date profile allowed for their choice to be integrated in the narrative that follows.

- **Promotional Content**

Meeting through Date@Date is the propulsion for the game's narrative to unravel, the player not being able to proceed in the experience without "swiping right or left" on the character's profile they desire. Because the familiarity with

dating apps is a commonly shared experience amongst young adults within the age range of the game, having grown up with internet culture, the concept of “swiping right” was taken advantage of for the advertisement of the play-testing phase.

The motif “This Summer... Swipe Right!” is therefore the core message sent to potential players of the game, supported by Des in a pose that is both seductive and slightly goofy, capturing the essence of the character’s personality in the game. As seen on Figures 28 and 29 the designs were kept simple and straightforward, in order to encourage passers-by to engage with the QR code and figure out what the advert was truly about. This design was mostly based on the posters for *MiSide* and *Hatoful Boyfriend*, as seen on Figure 65 of Appendix I. A more aggressive and information-heavy product was considered not appropriate for the dissemination of what is, at it’s core, a relaxed game, not wanting to overwhelm potential players on their first impression with the experience.



Figure 27: *Desiree: Eyes On You* Character Selector screens.

With previous permission, posters were put up at University of Madeira’s [115] student advertisement boards as well as in the research facility of ARDITI [116]. Fliers were left scattered across the University’s hallways, near printers; placed



Figure 28: *Desiree: Eyes On You* play-testing posters.

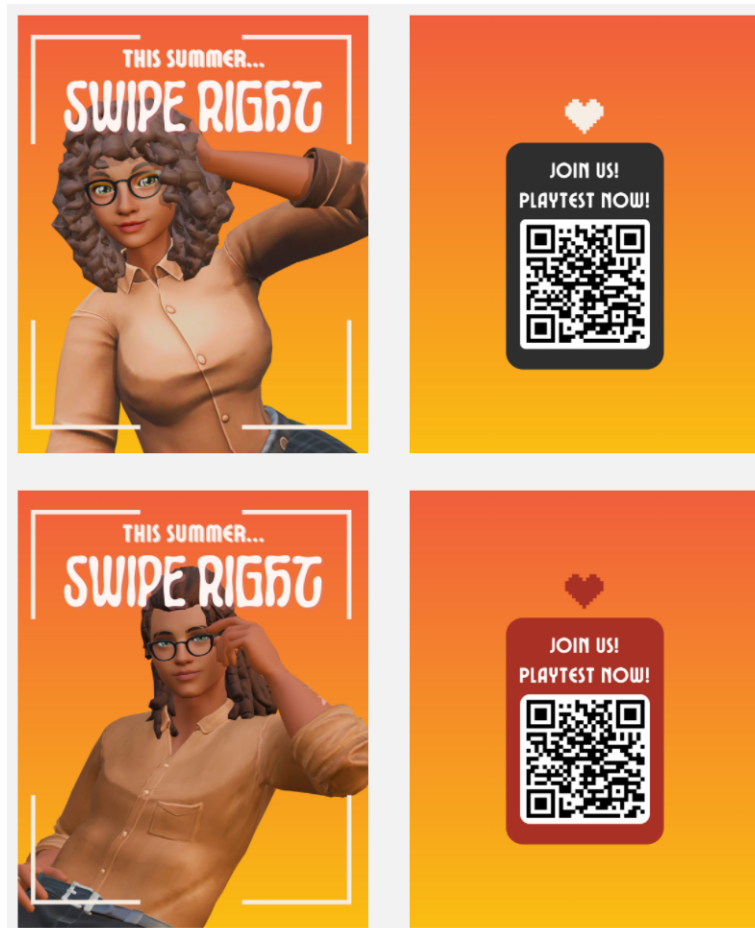


Figure 29: *Desiree: Eyes On You* play-testing flyers, front and back.

strategically in desks on various study rooms and ARDITI's waiting lounges. Contact was established with the immersive VR establishment *Madeira Experiências Imersivas* [117] whose owner, Orlando Ornelas, was kind to allow for the handling of fliers at the establishment's front desk, as well as the play testing of scheduled visitors in his facility. Additionally, fliers were also handled at *Boba & Chill* [118], a boba shop located at the center of Funchal offering a wide range of both tabletop and digital experiences to their visitors. The owner, whose contact was established in person, agreeing to help spreading the word about the play-testing of the game.

4 User Study

A complete view of the user study is given in this chapter, addressing the measures with which the research was analysed, sessions protocol and a detailed delivery of the gathered results.

4.1 Experience Evaluation Tools

A mixed-methods approach was used in order to successfully answer the defined research questions. Both quantitative and qualitative data was collected through the means of a Post-Questionnaire, found on Appendix F, divided into three sections:

- **Demographics:** Aimed exclusively at the collection of data related to player demographics, in order to better understand the results behind the samples collected. Questions including age, gender, sexual orientation, if the participant played games regularly and of what genre were asked in this section.
- **NMSPI:** A quantitative scale that allows for a self-report measurement of social presence in relation to another entity - real life, fictional or virtual - in a controlled environment [12]. The data obtained aids in answering *RQ1*, providing feedback on the success on integrating eye-tracking to establish a deeper social connection to the character in the experience.
- **Reflective Assessment:** A qualitative means to assess player reflections on their personal experience interacting with the game. Consisted of inquiries such as if the character's reactions made them reflect upon consent, or if the experience required more refinement to convey such message, and whether they'd be carrying this perspective into real-life scenarios. These aid in answering *RQ2*, which is dependent purely on player personal experiences and opinions after interaction with the final design.

Additional quantitative data was collected in relation to in-game metrics: time of gameplay, frequency and order in which each ROI was activated throughout the experience. These served to analyse if the user's perception of their behaviour matched their recount of the experience given in the qualitative section of the Post-Questionnaire and were recorded during gameplay.

Any other observation deemed relevant by the researcher, including commentaries, reactions, difficulties or bugs encountered during play-testing, were annotated to strengthen the later analysis of study results.

In the Reflective section of the Post-Questionnaire, open-ended questions were conducted. The choice of this approach, in juxtaposition to conducting an interview, served for one, to offer more privacy to users to freely express and answer how they felt during the experience without feeling pressure from the researcher to be polite in regards to the prototype, as well as to not rush users into answering the questions. While conducting an interview would provide a more direct line to the users feelings and opinions on the experience, it would also increase the duration for each participant, which then would adversely turn away potential participants who would only be interested if it was a quicker experience. Furthermore, continuing with this approach would lead to more rushed opinions that were either basic as to not beget further questions from the researcher, or more pleasing and faux-positive replies when asked as to not come out as overly negative. Meanwhile, this open-ended questions provide the user with their anonymity, allowing them to express themselves without feeling guilty about their personal opinions. They are also faster to complete, as the user does not require a “back and forth” between them and the researcher. This would benefit the overall goal of maximizing potential participants to gather the most amount of data possible.

4.2 Considerations on Ethics and Data Protection

The study was submitted to both the Data Protection Office and the Ethics Committee of University of Madeira.

The approval of the Data Protection Office can be found on Appendix D. The approval by the University of Madeira’s Ethics Committee, identified by the code P205, can be found on Appendix E.

To maintain participant anonymity, recounts will be identified by P[*ID*], the *ID* corresponding to the attributed numerical identifier attributed to each participant when entering a session and with which the post-questionnaire was answered.

4.3 Sessions Protocol

There were a total of 32 participants who willingly signed up for the user study through the available booking website. On average, a session would last between 20 to 30 minutes per participant. During these sessions, only the researcher and participant were present in a closed doors office for discretion and avoidance of any disturbances. Study sessions were divided into 4 distinct phases:

- **Consent Form:** The first step, once a participant arrived at the locale of the study and was accordingly greeted, was the delivery of a consent form which provided a brief contextualization of the study's context, goals, framework, data to be collected and the participants rights to withdraw. The researcher was also available to clarify any additional doubt the user could manifest during this phase.
- **Tracker Calibration:** The calibration of the eye-tracker would follow, a procedure that would last 1 to 2 minutes. Participants were asked to sit comfortably in their seat in front of the laptop the study was being conducted on, in a position similar to the one they'd be playing the game in for a more accurate calibration. Here, they would be reminded that calibration could take 2 to 3 attempts to be deemed precise, and the accuracy would be tested by the researcher by instructing them to look at certain points of the screen and checking if the object of attention was at the centre of the participant's gaze preview bubble.
- **Gameplay:** Before gameplay, a brief explanation of how the game was played and way in which the user's gaze was inserted in the experience was given, anticipating their disregard for the game's instructions. Afterward, the player would be instructed to execute the program present on the researcher's laptop screen whenever they felt ready. During gameplay, the researcher would not intervene unless the participant showed visible signs of confusion, frustration or talked back with curiosity about the game.
- **Post-Questionnaire:** After an ending of the game was reached by the participant and they were redirected to the main menu, the researcher would direct them to quit the game and access the Post-Questionnaire. During the answering of this questionnaire, the researcher would once more not intervene unless asked by the participant.

It is important to note that during each session, the researcher would be sited one sit apart from the participant, at a distance that would provide some privacy at the same time as the capability to control the experiment and intervene if necessary.

At the end of every session, participants were asked informally about additional opinions, comments or thoughts they've had, which would later be pointed by the researcher if deemed of relevance.

4.4 Results

Data analysis for this study was conducted by gathering of all answers from the post-questionnaire and construction of a respective database using Excel. Certain Excel properties allowed for a clearer statistic management of the data, and the creation of graphs of the study results, both qualitative and quantitative.

4.4.1 Quantitative Results

- **Demographics**

Analysing the demographics allows us to understand how the participants characteristics and preferences might have influenced their gameplay experience when testing out *Desiree: Eye On You*.

As seen on Figure 66 of Appendix J, the study catered the most to participants between 20 and 30 years of age, 26 out of 32 study participants being between the mentioned age group.

From the 32 participants, the prominent gender to test out the game was Male, making 59% of study testers, however, Female participants were close behind with 38%, as Figure 67 of Appendix J demonstrates. In terms of absolute frequency, this numbers make a difference of 7 male users prominent over female.

When it comes to sexual orientation, 91% of participants presented a heterosexual inclination, 2% identifying as bisexual, as the pie chart on Figure 68 of Appendix J shows.

In terms of gaming habits, majority of participants considered themselves highly experienced in playing videogames, the average hours of gameplay per week being between 1 up to 15 hours and the most frequent platforms from which games were accessed being prominently PC, Console and Mobile Phone following close

behind in popularity. Figures 69, 70 and 71 of Appendix J presenting accurately the stated facts.

The most preferred genre of gameplay from the user sample gathered was Shooter, Action-Adventure and Puzzle/Casual games showing a high relevance too amongst the gathered results. The genre of *Desiree*, Dating Simulation, was one of the least played amongst the group of testers as seen on Figure 72 of Appendix J, making up 5 out of the 32 players who participated in the study. This helps concluding that despite appealing to the correct player age group, the game was not tested amongst fans of the genre.

- **Networked Minds Social Presence Inventory**

In order to assess how the introduction of eye-tracking as a visual communication technology would change participant's impressions of a virtual other, the NMSPI was utilized. The measures of this scale allow for the construction of a detailed report of how users perceived their gaze-interactive experience with Des. It informs us to which extent the player's gaze being integrated in gameplay and the character's awareness of it affected their perception of the character being co-present in the space, psychologically available and their behavioural responses in regards to their actions having taken an effect in the experience.

First and second order of social-presence measurements were to draw back the results, while third order was excluded considering its relation to the first two, which will already be examined in detail. For the evaluation, a 5 item Likert scale was used in opposition to one of 7, as to clarify the task for the users, where multiple options with minor differences could lead to their confusion, while also simplifying the data gathering and its later analysis from the users experience after their interaction with the prototype.

- **First order social presence: Co-presence**

The first order of measurement helps us analyse to which extent the participants were immersed in the experience, by feeling they were sharing the same space as the virtual character they interacted with, as well as their perception of how Des felt towards them in regards to the same spacial existence.

Figure 30 shows us how majority of players reported a high perception of sharing the same virtual space as Des, as well as being aware of the character's presence.

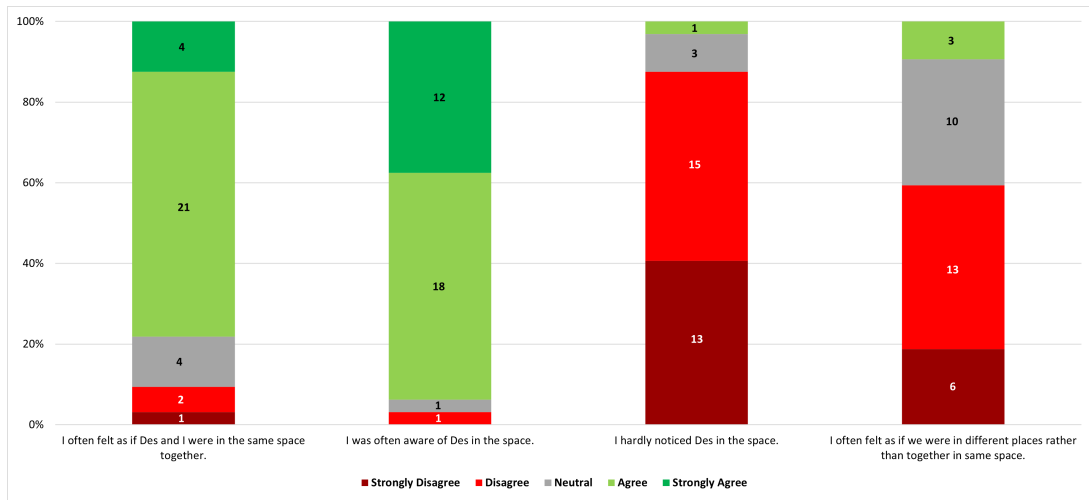


Figure 30: First order social presence: Co-presence. User reported Perception of Self.

Participants perceptions of the other proved to be equivalent, with reports of the character believing to be be sharing the same space, as well as providing an elevated awareness of them in the virtual scenario, as seen on Figure 31.

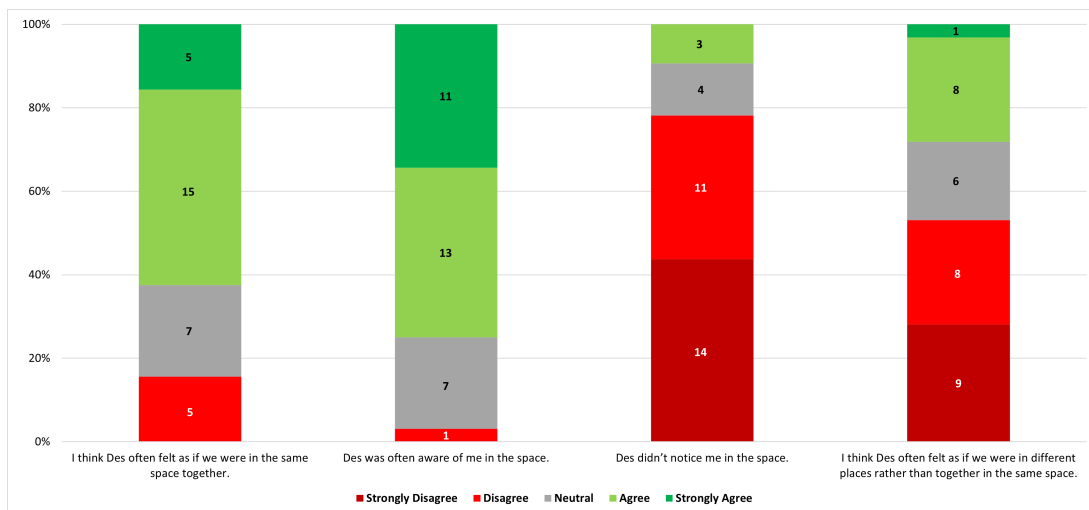


Figure 31: First order social presence: Co-presence. User reported Perception of the Other.

– **Second order social presence: Psycho-behavioural interaction**

Second order social presence allows us to understand how focused players were in regards to the virtual agent, their capability to empathize with Des’ emotional responses and if their intentions were clear in gameplay with the aid of eye-tracking technology. Similarly, it analyses if Des was considered attentive of their persona, able to sympathize with the participants emotional states during gameplay and mutually understand them.

A big portion of participants reported paying close attention to Des, not ignoring the character, although recognizing their focus of attention would switch often-times easily to other elements of the scenario (Figure 32).

Emotionally, Des seemed to have sympathized more with the participants when feelings of happiness were shown, being more impartial to their states of sadness or nervousness (Figure 33). There was a varied response to the players ability to communicate their intentions clear to Des, although their thought were taken clearly by the character, as well as Des’s communication skills having been understood well by the majority (Figure 34). Most realized their actions affected Des’s responses and in consequence, reported that their actions were dependant of the LIs actions in caution of the consequences it brought them (Figure 35).

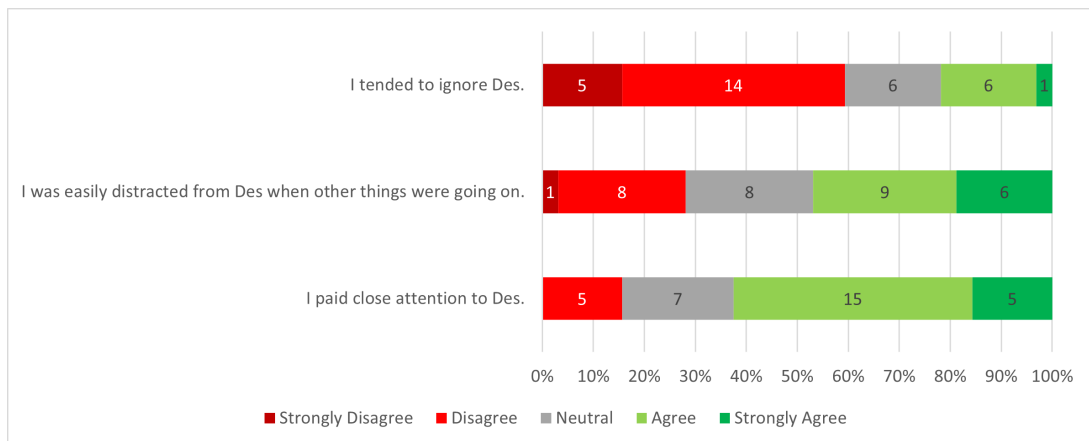


Figure 32: Perceived Attentional Engagement of Self.

In regard to the LI, participants unanimously agreed with the fact Des paid close attention to them, rarely being distracted by outside sources or directly ignoring them (Figure 36). The player’s mood influencing Des obtained a polarizing response, however leaning towards positive. There was

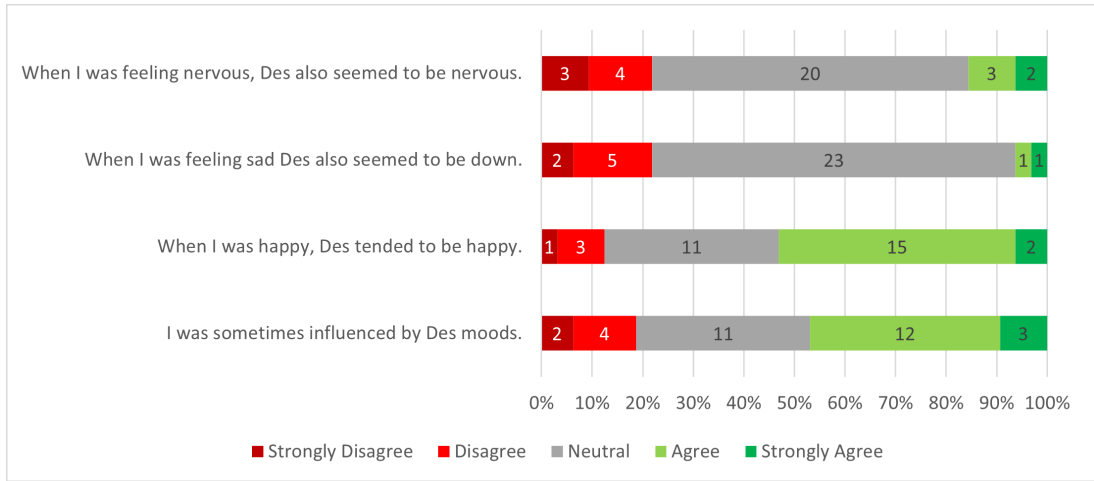


Figure 33: Perceived Emotional Contagion of Self.

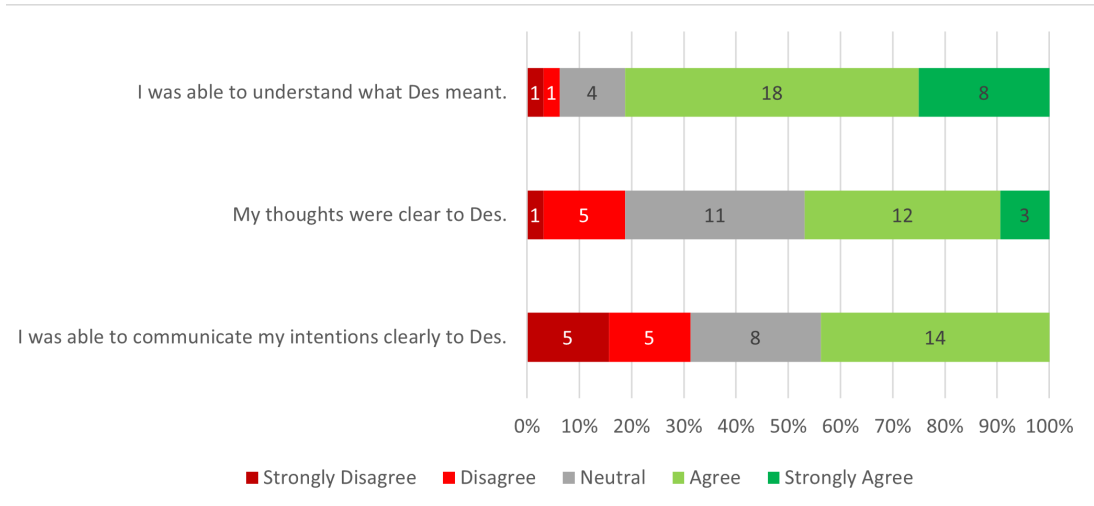


Figure 34: Perceived Comprehension of Self.

a higher report of sympathetic responses from players when the character was portraying happiness, being impartial or not affected by the character's sadness or nervousness (Figure 37). Overall, Des was reported as a good communicator, the character's intentions being clear to players, having an ability to understand player's feedback (Figure 38). There was a high sense of Des's actions being dependent on the participants own, and what the LI did being a direct result of the players manifested gaze behaviour (Figure 39).

The NMSPI scale results present a positive balance of social presence reported by users when interacting with the LI presented in *Desiree: Eyes On You*.

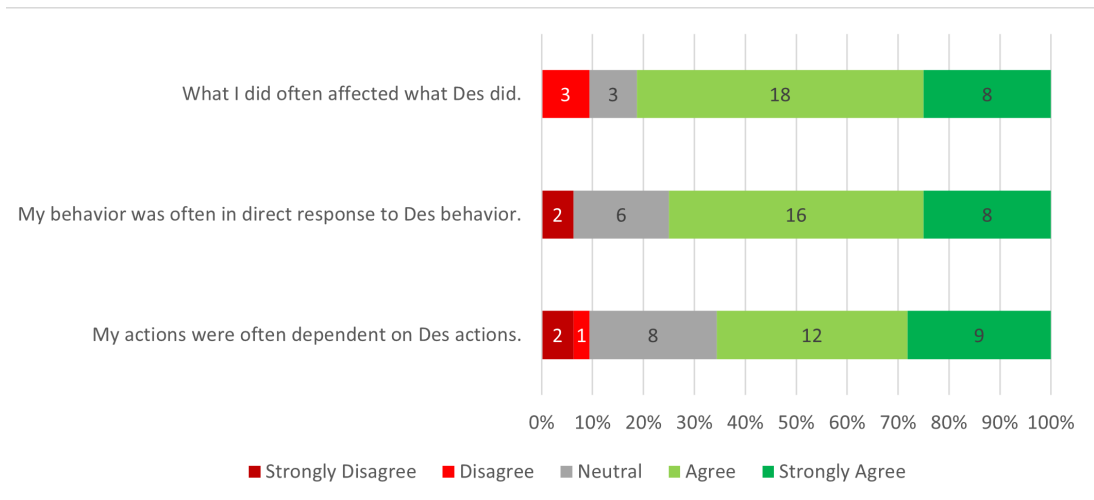


Figure 35: Perceived Behavioural Interdependence of Self.

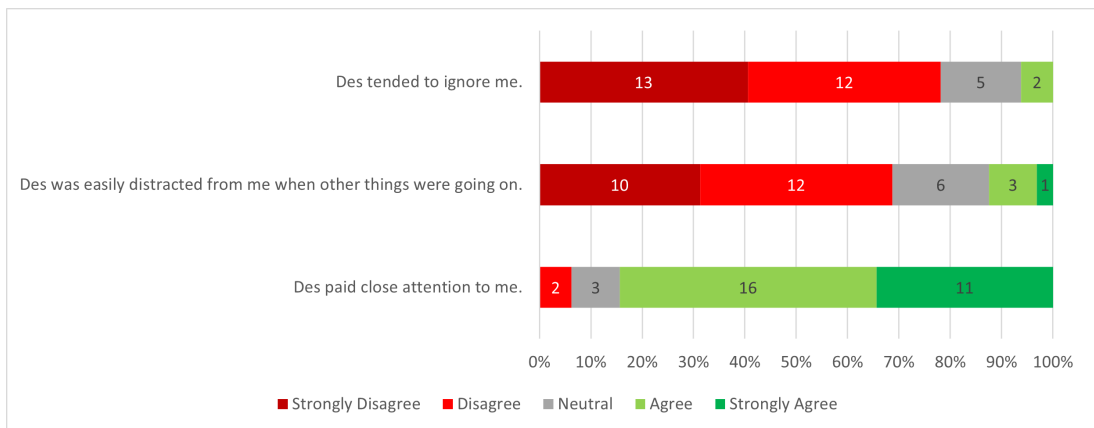


Figure 36: Perceived Attentional Engagement of Other.

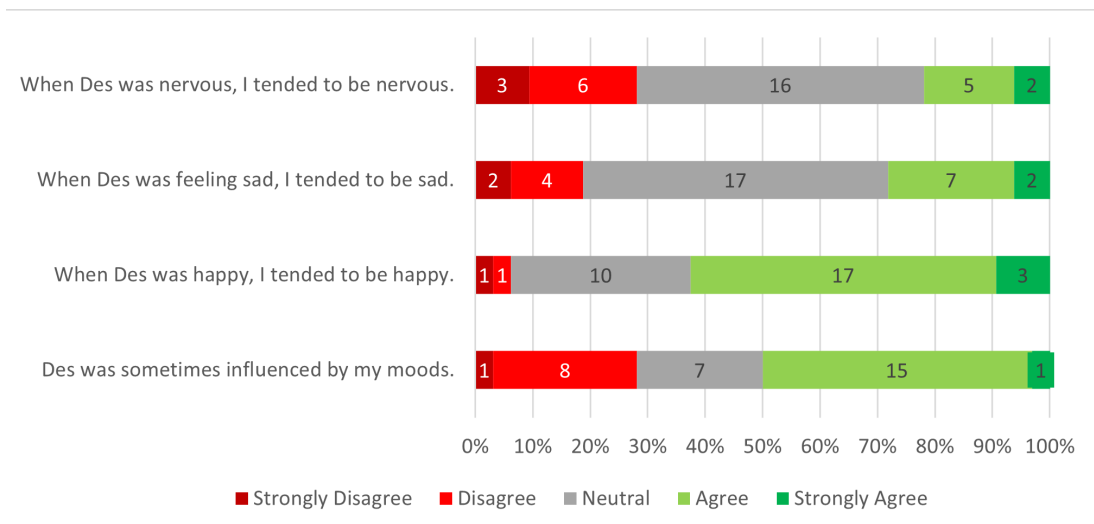


Figure 37: Perceived Emotional Contagion of Other.

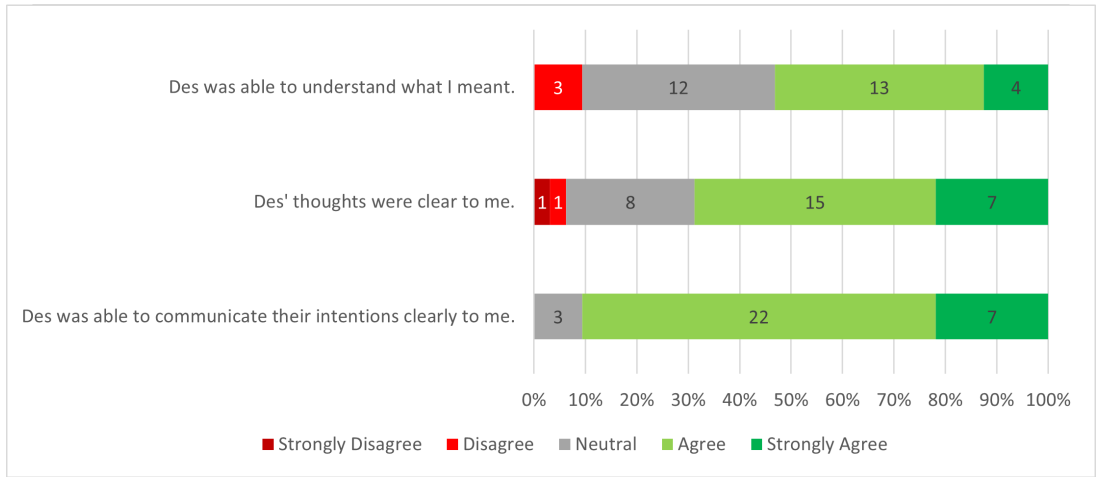


Figure 38: Perceived Comprehension of Other.

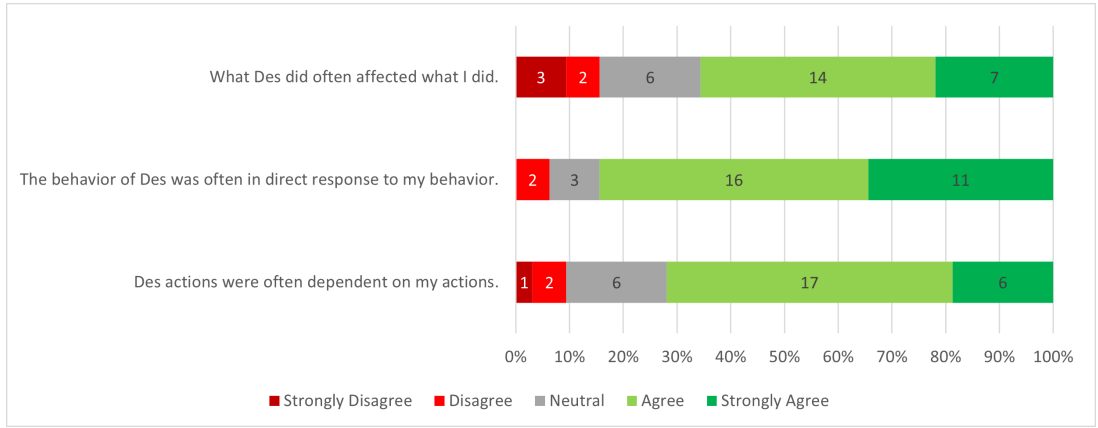


Figure 39: Perceived Behavioural Interdependence of Other.

• **Game Data**

There was a higher preference for the Female version of Des amongst participants, as seen on Figure 40.

The most prominent ending, as seen on Figure 41 proved to be Ending 4, where players do not meet the required approval for a date to be successful, it's rightful opposite, Ending 1, coming in second.

The in-game metrics gathered from Figure 42 help us understand the popularity of each of the ROIs present in the virtual scene, their total frequency amongst the participants explaining why Endings 10 and 11, related to the Tv and Window respectively, were the only ROI endings to be uncovered during sessions.

Looking at the ROI frequency for each version of Des separately, the distribution allows us to conclude the Male version obtained a more balanced attention be-

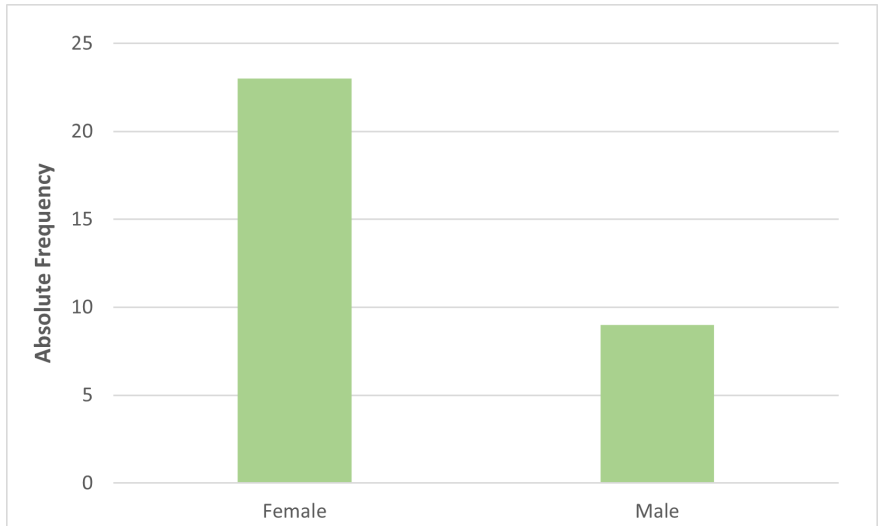


Figure 40: Version of Des with which participants interacted with.

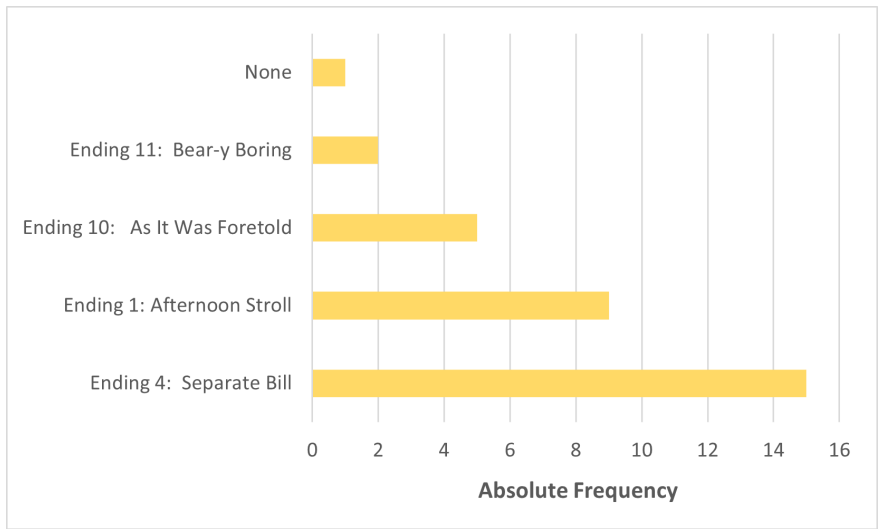


Figure 41: Game endings achieved.

tween all ROIs when the Window and Tv were excluded from both graphs, the Female version presenting a clear preference of her face above the rest, Figures 43 and 44 showcasing these differences.

- **Likeness Assessment**

Overall, Des received positive reviews in all different aspects of their character, independently of gender presentation, as seen on Figure 45.

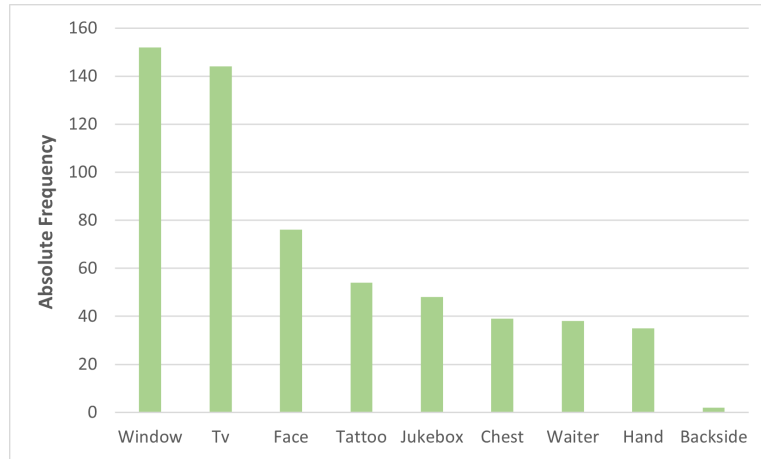


Figure 42: Total ROI frequency across all participant sessions.

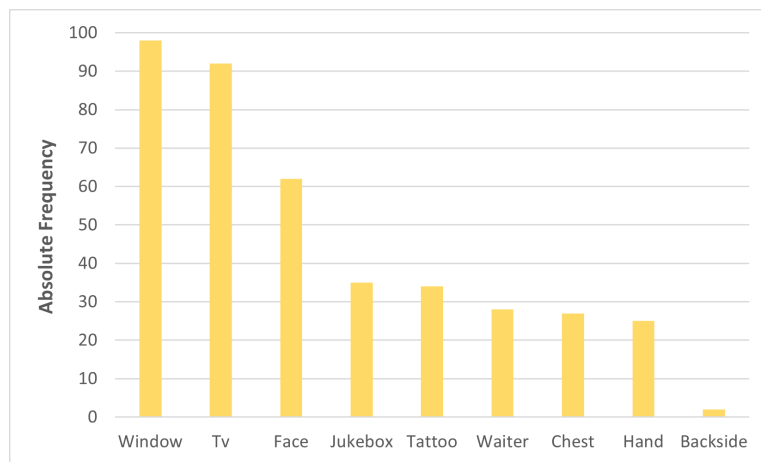


Figure 43: Total ROI frequency for Female Des across 23 participants.

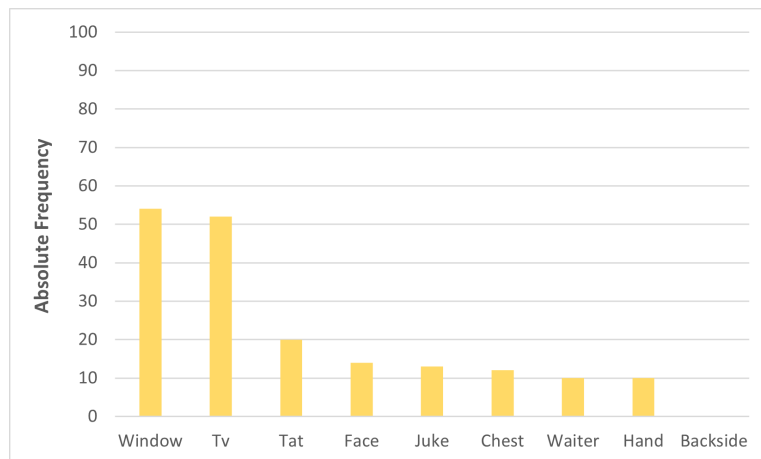


Figure 44: Total ROI frequency for Male Des across 9 participants.

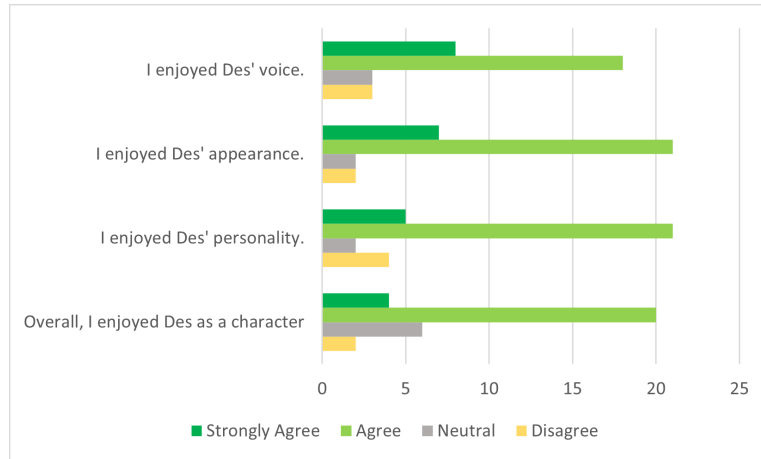


Figure 45: Likeness assessment of Des persona and aesthetics.

- **Reflections on Consent**

The quantity of players who reported experiencing a moment that made them reflect about matters of consent towards the character during play made up 3 times the number of users who disagreed, however, it is of notice majority of testers felt impartial to this messaging, as verified on Figure 46.

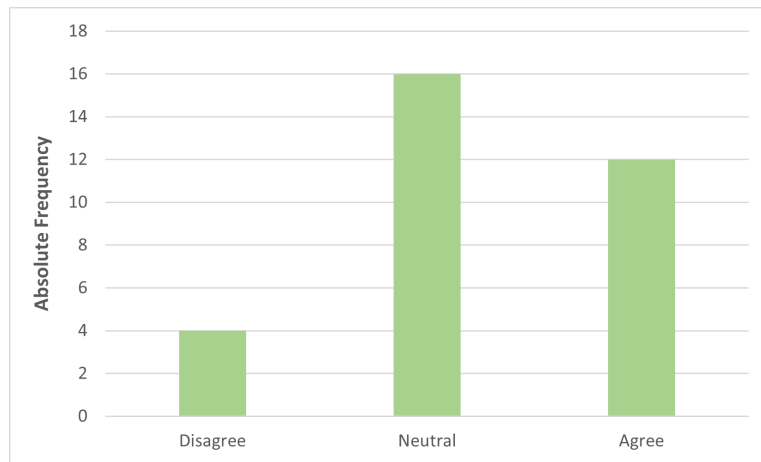


Figure 46: Responses to “Have Des behaviours made you reflect on consent towards another?”

In regards to carrying out the game’s hints on social appropriateness into the real world, there was a higher quantity of participants agreeing with the statement, as Figure 47 demonstrates.

- **Social Gaze Gamification**

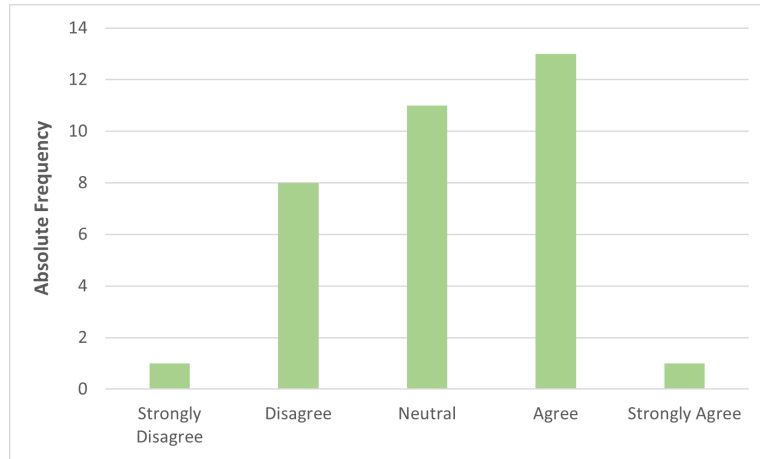


Figure 47: Responses to “Do you believe Des behaviours left an impact on your perception on consent that you’ll be carrying out into the real-world?”

When related to dating simulation games, majority of participants agreed this game genre benefited from eye-tracking technology integration, showcased in Figure 48.

Figures 49 and 50 illustrate the desire for this feature of character awareness to be included in already existing games, the most popular genres among them being of Dating Simulation, RPG and Shooters.

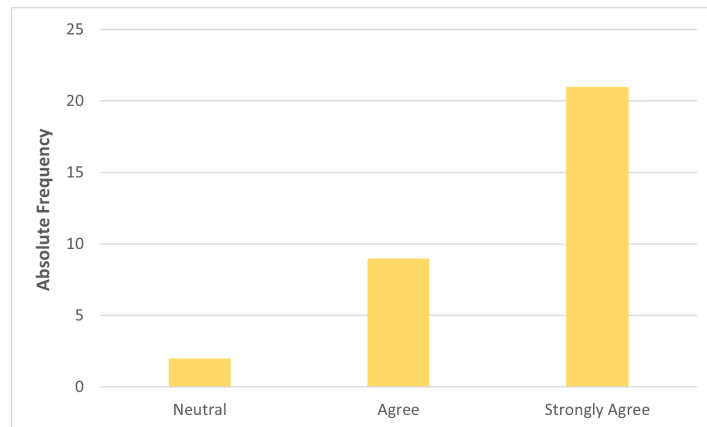


Figure 48: Responses to “Did you enjoy the integration of eye-tracking in this game genre?”.

- **Desiree: Afterthoughts**

Figure 51 illustrates the positive incidence towards the game being recommended to a friend or colleague by the participants.

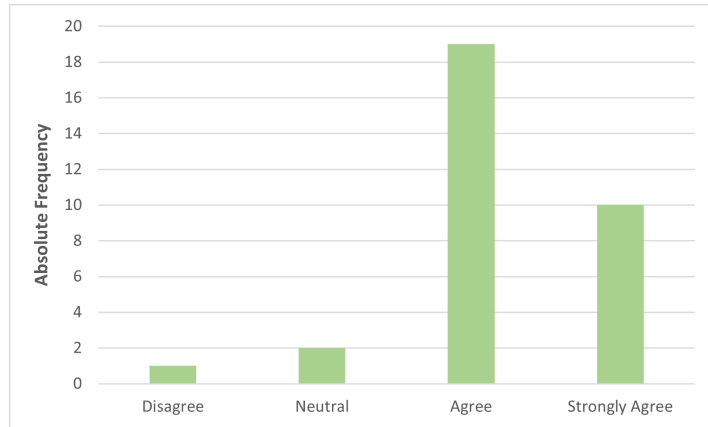


Figure 49: Participants desire to find character awareness integration on current games in the market.

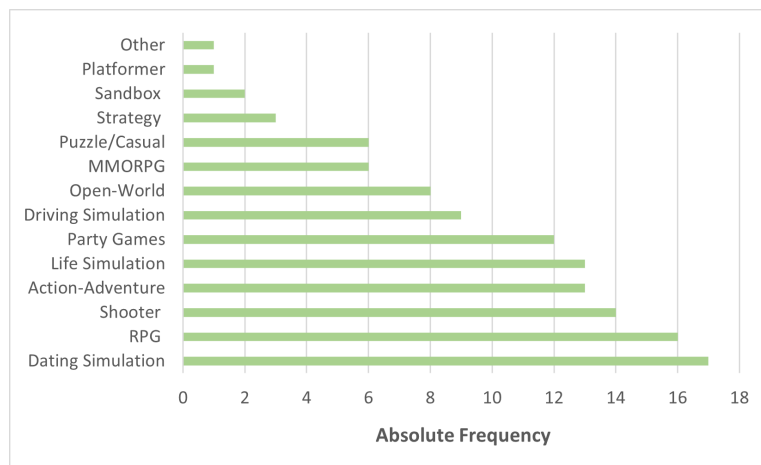


Figure 50: Current game genres participants would like to see character awareness integration in.

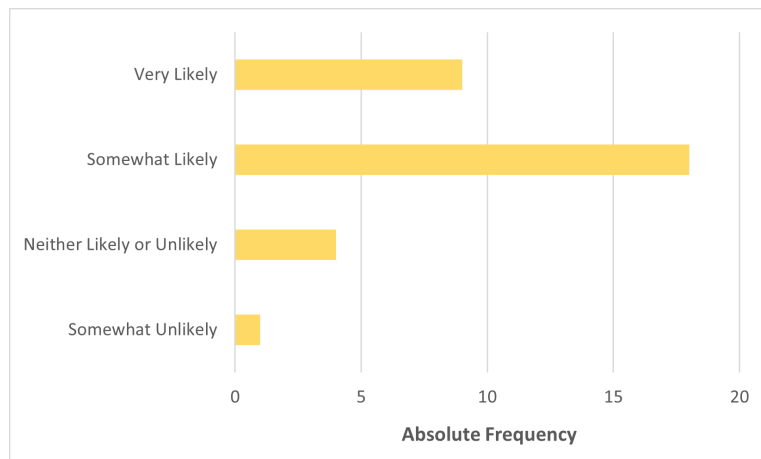


Figure 51: Participant probability of recommending *Desiree: Eyes On You* to a friend or colleague.

4.4.2 Qualitative Results

- **Reflections on Consent**

Participants who were previously impartial to this reflections commented on the reasoning behind the given answer. P2 wrote *“Due to my actions, Des never brought up issues of consent, since I normally avoided any problematic interactions in which it would be relevant.”*. P24 reinforced this indirect awareness to respect the characters boundaries by saying *“When looking at his body, although I had an idea that there were hidden points in certain areas, I didn’t want to make him feel disrespected so I thoughtfully avoided them.”* In these cases, the impartiality was a consequence of caution, which inhibited the participants to experience interactions related to the subject.

From the participants whose LI behaviours did awaken some kind of direct reflection, the key moments described to have been more impactful were the ones related to:

- **Tracking Recognition:** The game providing options to comment on physical traits such as hands, chest and tattoos. P11 reported *“When I was looking at one of her tattoos continuously and she said it was ok for me to ask more about them.”*. P20 added *“She paid close attention to my actions and was very sensitive, alike in real people scenarios.”*, informing how the realistic interaction allowed for the player to consider the consent of the character if they stepped out of line.
- **Tracking Call-outs:** The LI outright mentioning certain focuses from the users made them aware of the directions they were mindlessly looking at and their social appropriateness. P26 recounted *“When she made me aware that I was looking somewhere, it made me reflect on where my gaze was placed and if it was appropriate.”*
- **Tracking Responses:** Moments where the character acted explicitly uncomfortable and voiced said discomfort were also of notice, in interactions such as the one with the Waitress and Tv. As told by P27, *“It occurred whenever I looked at points such as the waitress and she got visibly bothered.”* and P1 *“Her reactions when I looked at the tv while distracted by*

the long rants.” which P3 elaborated by saying *“made me reflect that I’m easily distracted in conversations”*.

- **Dialogue Options:** The game’s script, most specifically, the responses available to the player that would often present either a nicer or ruder option in order to offer player agency in conversation, took a considerate part as well in the player’s reflection of consent about what should or not be said to the character. P22 describes these moments as *“There were some questions that I answered to try to not be a bad person and not cause bad feelings on her”*. P5 detailed how they *“would never say medics work harder than nurses, so I chose the other dialogue option.”*
- **Date Termination:** P21 recalls *“When she understood I was not interested and said it was better to leave”*. This recount allows for an understanding that the act of the character terminating the date due to being ignored by a specific ROI left a lasting impact on the player, reflecting on their behaviour throughout the date.

Through these descriptions, it can be concluded that reflections on consent were passed successfully in players, directly through gaze enabled events or implicitly by user prediction of possible outcomes.

- **Social Gaze Gamification**

When inquiring why the suggested game genres for integration of the technology were adequate, diverse answers fell under similar thematic groups:

- **Realistic Immersivity:** P32 explained *“it is such an important part of day-to-day interaction that not having it integrated takes away a big part of immersion, interactions and gameplay mechanics that surge from it”*. P9 highlighted how *“usually you can hide your natural reactions, but with eye-tracking you show your real intentions”* which adds an extra layer to the relationships forged digitally. When focused on dating simulators, P26 explained how *“it is adequate because it simulates the real life experience of dating, which is the purpose of these games”*, this thought was complimented by P22 who commented *“eye tracking is a top feature particularly in dating simulation games due to the ability of dates becoming more real-*

istic, enhancing the evaluation if the virtual date is interested in the player by paying them continuous attention or showing boredom as feedback”.

- **NPC and Story Enhancement:** Thinking further about NPC interactions, participants state to believe the technology is a chance to develop more intrinsically relationships with NPCs, which might prove crucial in certain story moments and influence them, when thinking of the RPG, Shooter and Action-Adventure genres. P1 describes how the technology *“features a strong focus on interpersonal relationships, capable of promoting healthy relations with digital characters”*. P2 hypothesised how, *“in RPGs we could have NPCs with sensitive to different interactions, which could affect the outcomes in a quest, while bartering or in dialogue in general”*. P13, P14 and P20 add respectively how *“having another way to interact with them (NPCs) would be a fun addition”*, *“bringing a new way to interact with characters and environments”*, which *“would definitely enrich interactions with all kinds of NPCs”*.

The feedback provided by the participants help assess how well-received this feature can be in games of social nature, when utilized as a realistic, social application.

- **Desiree: Afterthoughts**

When enquired about additional comments or opinions, participants adhered with crucial suggestions to improve the game in future iterations, relating to:

- **Audio Quality:** The non-consistent audio quality, result of AI generation of the voice tracks, was picked upon by participants and requested to be resolved, as P11 expressed *“It was a fun experience, but something about the audio was weird, at sometimes it would play normally and other times as if the character was surrounding me”*. *“Non AI voices”*, desired P7 along with other players who recognized the voices were sounding too robotic and inexpressive.
- **UI Enhancements:** P9 requested for *“a timer where the person can see how long the date would be”* in order to control their experience and take more conscious decisions surrounding the ROIs they wished to give priority

and experiment with in a session. Subtitles and the ability to access them once a dialogue line had been said were desired by P10, explaining how *“the chat was quick and I didn’t have time to process all of the conversations”*. The need for a cursor or gaze pointer was more than once brought up during play sessions, P13 explaining how *“I would have liked if there was a faint cursor signalling my gaze, since I did sometimes wonder if I was looking at the right place or not”*. A feature of highlighting or the least hinting at potential interactive elements was desired across various participants, P29 expressing *“Sometimes I wasn’t sure if the game didn’t detect where I was looking at or if the subject of my gaze just wasn’t interactive”*, which in the case of this user, was the later.

- **Increase of Interactivity:** *“She talked a lot”, “she was very talkative”* and *“sometimes Des would talk for long”*, these were the feedbacks on Des’s monologue sections from users P4, P20 and P29. Majority of users desired more interactivity in conversation with Des. P4 suggested *“ more interactive dialogue, with more possible answers to choose in order to have a normal conversation and be more active in the experience”*, to which P20 elaborated: *“I’d like more choices or interactions because sometimes it was kind of one sided the conversations”*. *“More player agency”* was noted by P7. *“User speech recognition instead of pre-chosen answers”* suggested P31, as well as *“more trigger spots. Example: trash bin, people in the background, buildings”*.
- **Narrative Development:** In terms of narrative, P2 suggested a feature for the player themselves to end the date, in direct response to some of Des’s gaze-triggered behaviours, explaining *“there could be an interesting avenue where the player themselves would terminate the date in their own terms”*. *“Branching and evolving narratives”* P31 desired for the story to continue in different scenarios, for example, after having reached Ending 1 and leaving with Des out of the diner, there being more segments such as the park or the character’s house where gaze was still playing a role socially and the story was growing in complexity.

The game was praised on different accounts, P18 commented how *“the experience*

brought another level to dating”, P26 highlighting “the game was well made, has a fun design and fun to play. I enjoyed the element of surprise that the game has”. “Loved the project and have interest on trying out a full fledged version”, confided P30, one of the few fans found of the dating sim genre.

5 Discussion

This section seeks to answer the previously defined research questions with the key findings obtained during result analysis. Discussions over the game's limitations, future improvements and applications as well as study implications will additionally be presented.

5.1 RQ1: *What measure of social immersivity can an eye-tracker provide when applied to dynamize intimate relationships in a virtual environment?*

High measures of social immersivity were reported through the NMSPI, as observed in the analysis of study results.

Participants' levels of co-presence of self and other shown to be positively similar in distribution, concluding that the same virtual space felt was being shared between player and LI, as well as the existence of each other's presence being equally intercepted by both.

Psycho-behavioural interactions of the participants' perception of self and other majorly presented a similar symmetrical distribution towards a positive balance, although higher levels of attention were considered to be given from the LI to the player, players' social interactivity deviating to outside sources inside the virtual environment more often than the character's. These results are explained through the character design, Des having been built to devote most of their attention to the player at all times during a play session, their attention only deviating only when the participant's gaze focused on ROI elements of the world, and even so, interactions often traced back to ask of the player for some sort of engagement between them.

In terms of emotional contagion, participants showed higher emotional empathy toward Des's moods, while Des was more often deemed socially unaware of theirs. Once more, the design of the experience justifies these measures, Des having not been programmed to empathize with the player as often, the focus having been to react emotionally to player input and behaviour.

When it came to mutual understanding, both player and LI scored higher for clear communication and understanding of each other's intentions; reactions and behaviours occurring in direct response to their partner's.

The experience was designed purposefully so that key interactions capable of influencing the date's direction and allow for active player participation were locked behind gaze behaviour. The eye-tracker permitted an approximation of the in-game camera to our real life gaze communication medium, similar to Trammel and Waldron introducing touches and re-enactment of intimate scenes in LARP environments [48] and as Clough theorized, transforming the camera into a direct mediator of the player's desires to both pay attention or ignore the character presented to the player [62]. In consequence, the intimate relationship between players and virtual LI was heightened, as P24 described: *"I found it nice that our interactions weren't just about the already programmed answers but about my actual affinity towards Des."*

5.2 RQ2: *Can gaze-aware mechanics offer a successful means for assessment of a non-playable character's consent in an intimate virtual relationship?*

User study findings conclude gaze-aware mechanics can successfully bring players reflections on consent towards a virtual other, which may manifest consciously or unconsciously during play.

Observing the player sample who positively replied to having reflected on the character's consent when faced with interactions their gaze-behaviour triggered, the primary factors which contributed to the positive feedback were of: character ROI recognition, making players conscious of the LI's awareness; commentaries, mentions and conversations permitted by the character that derived from said points; reactions, LI feedback on the appropriateness of gaze direction, time of focus and repetitions taking in consideration the story setting; responses, animations and dialogues of discomfort and annoyance the character provided; and early date termination, in cases of extreme disrespect, the discourses Des offered on exit considered impactful to the player experience.

It is, however, impossible to ignore the elevated quantity of participants that presented a neutral opinion in relation to reflections on consent due to character actions. Different factors can be traced to justify these findings.

The most evident reason can be derived from the user reports: players that did not experience key interactions from the LI during their sessions reasoned they could

not formulate a rightful opinion by having not witnessed these moments. What was unexpected about this data was the fact that the users themselves felt like they were at fault for these results, their caution having led them to miss out on the interactions available. By being aware of the role gaze would play during the experience, mimicking real-life social constructs, players purposefully avoided problematic ROIs, anticipating immediate negative reactions from the LI from the first glance. Moreover, it is viable to conclude how gaze integration, when playing a social role that affects virtual relationships dynamics, is capable of bringing unconscious reflections on consent towards the other by the simple act of being integrated in play. In consequence to the study, because these thoughts were not directly tied to the LI actions experienced during the session, players did not consider a logical relation to the inquiry made, justifying their neutral stance.

Observing the endings achieved, another explanation can be drawn to justify the elevated adherence of neutral disclosures. Four from the thirteen available endings were unlocked in total during study sessions. From these, there was a higher frequency of Ending 1 and 4, the good and bad endings, which directly related to approval ratings. From the 8 ROIs available, 2 endings were discovered by users, relating to the Tv and Window, only 7 participants having experienced these particular routes. This scarce distribution explains why these results were so high. Key discussions and reactions related to the character's consent were hidden behind ROI triggers. Most participants were merely capable of scratching the surface of the interactions available for each of the ROIs before their session was over due to the trigger limit being reached, which is additionally supported by the even distribution of the ROI frequency across all sessions, when setting aside the TV and Window frequencies.

Reflections on a character's consent can be brought to players through the integrations of gaze aware mechanics in play, character performance as a direct consequence of gaze behaviours being the primary factor to bring these considerations to the surface. The capabilities of the insertion of eye-tracking as a social mechanism to bring unconscious considerations over the LI's consent in a romantic environment should not, however, be overlooked. User awareness of the role their gaze will play in affecting a significant virtual other proving enough a reason for this subject matter to surface implicitly in their minds.

5.3 Limitations and Future Work

Amongst the 32 study participants, 5 identified themselves as active players of dating simulator games. The positive feedback from the player sample shows how well received this mechanic can be when inserted in the genre, even to players who don't actively pursue play sessions with dating simulators. It would be interesting, however, to test out the game with a larger number of participants, specially ones versed in dating simulation and knowledgeable of the variety of mechanics already being offered in the market to increase their immersion, more detailed critiques possibly originating from their reviews.

The time of production, having taken place during the course of 5 months, was another of the major limitations of the project, which ended up influencing the final prototype due to the quick decision making required in game design. It was universally agreed amongst testers that a more dynamic scene would have been able to even out the attention players mostly attributed to the Tv and Window, one being a extremely dynamic element in what was otherwise a still environment, and the other containing one relevant point of attention which challenged players to trigger until it was mentioned, the Bear at the bus stop. Even Des could have presented a larger number of idle poses and gestures during conversations that could have drawn attention to the character's ROI points. A lot of participants verbally expressed the desire for more meaningful events to occur around them and surrounding Des, such as interesting people walking in the street, an unexpected event occurring inside the diner, which could lead to learn more about Des's persona and ideals. Because these animations and moments would require early scripting, and crafting, however, the time of development proved insufficient to apply them. A larger production time would, therefore, allow for a more thoughtful planning of the game's flow, a simplified but active environment that allowed for user focus on Des's character, considering the objectives of the game, a better approach to the scenario at hand. All these considerations should be kept in record for those who wish to explore a similar kind of experiment in future.

Time constraints led additionally to the lack of professional voice acting in game, its counterpart, LLM narration, having been described as unnatural by certain users and reported to have affected their immersion. Needless to say, in future, if the game is developed more thoroughly and with appropriate funding, the finding of real voice actors would be a necessity, this dissertation's results being considered a "demo" of

what could potentially be a polished, high-quality product.

When designing for consent in games with eye-tracking integration as the necessary means to access the subject, improvements should be applied to this prototype in order to guarantee players will not miss out on key interactions during their play sessions. As discussed in *RQ2*, reflections on consent towards the character were positive, although the neutral user reports were higher. In order to lower these results and increase the user agreement reports, the following tactics could be applied:

- **Longer Gameplay Sessions:** Allow players to experience a longer time of play, which could be adjusted by altering the limit of ROI triggers a user could perform per session. This would increase chances of ROI moments that were being built up towards the character's discontentment to be witnessed.
- **Higher Character Sensibility:** Making Des more reactive from the start of the game instead of slowly building towards the LI's discomfort. This way, the explicitly volatile persona could potentially lead the player to reflections on consent towards Des, in cases they wish to avoid the reactions immediately triggered.
- **Thoughtful Craft of Mature Scenarios:** The explorations of eye-tracking as a consent mechanism in a more adult game scenario. Consent is heavily embedded in kink subcultures and voyeurism would be an interesting application of this mechanism, introducing gaze in a sexual scenario where the player would be permitted, or not, to look in certain instances during intimate exchanges. A game that incorporated gaze in this fashion would be approximated to the consent mechanics observed in *Hurt Me Plenty* [58], mentioned in the Literature Review.

During play sessions, it was of notice how younger participants between 20-30 years of age presented more curiosity and spirit of exploration, actively asking beforehand how the interactions were supposed to occur before starting a session, playing with the intent to catch a reaction out of the character more purposefully. The phenomenon mentioned is attributed to meta-gaming [119], a behavioural tendency to collect strategies and approaches to playing the game beforehand, in order to guarantee the expected game results players long for are achieved, which, in this case, were the spurt of Des's reactions. Because of the relation this behaviour has with role-playing games, it was not surprising to observe how younger participants were also

the ones whose tendency to role-playing during sessions was more prominent, commenting aloud what they were thinking, the reasoning behind their actions and more outwardly reacting to game events. In contrast, an older audience tended to sit in front of the screen and listen to Des's discourse while looking around aimlessly, never focusing on one place for too long and expecting Des reactions to surge immediately without attributing intent to their gaze in game. Due to the observed diversity of player profiles, a feature that permitted for the alteration of gaze sensitivity controls in game, which directly relates to time of wait for the triggers to be activated, would also be a necessary requirement in future iterations. This setting would allow for users who present lower attention spans to improve their play experience, personalizing it to their preferences. A minimum time required would, of course, be necessary in order for the system to maintain its proper order of functionalities while avoiding the "Midas Touch" conundrum [3].

It is important to note how the previous observations may include a possible bias, considering the mentioned age range made up most of the user sample gathered in the study. It would be interesting to iterate the project in the future in order to appeal to a larger age group, which could be possible by the inclusion of a larger, diversified number of characters available for users to interact according to personal preferences.

This eye-tracking application could be introduced in games to cater to different experience objectives. From the most discussed between participants, there was an emphasis on:

- **Entertainment:** The social role of the player's gaze influencing relationships, quests and story progression, bringing higher levels of immersivity to NPC characters that play important parts in the game's storytelling.
- **Educational Appliances:** In order to teach individuals that manifest neurodevelopmental disorders, such as autism, which directly affect interpersonal relationships, how to maintain appropriate social behaviours in conversational scenarios such as job interviews, friendly debates and romantic moments of life.

5.4 “Looks of Desire” vs “Looks that Charm”

Finally, when reflecting about the already established metaphor “Looks that Charm” present in the Literature Review, it is concluded that in all cases demonstrated in

previous diegetic gaze research, this metaphor has been applied mostly as a “means to an end”: in La Rochelle Lab [10], a bully is seduced in order for the player’s homework to be retrieved. Charming, in this sense, is a weapon of deceit, to convince the bully to willingly hand back the homework to the player. In Narcissus [9], charming and the way it is framed in narrative, causes negative effects in play. Charming, in this instance, is a power to be avoided. None of these examples bring a positive connotation to the act of “charming” another and maybe “charming” really shouldn’t withhold such properties. The word itself is being associated with themes of deceit and hassle. Common synonyms for this word are to “enchant”, “attract” or “lure” another. Sirens “enchant” sailors with their singing into the sea. Witches pose as pretty young woman to “attract” man and kids. Eve was “allured” to bite the apple in Eden, bringing the downfall of humanity. The term “charm” has established itself in age-old folklore as a negative power or perverse seduction. “Looks of Desire” are then introduced as a new metaphor to be considered in gaze-enabled gaming, where “desire” become the equivalent to a heightened sense of interest, curiosity, appeal. A metaphor for romantic or sexually driven narrative exploits, which can be used in a provocative way, bringing rewards or consequences to the gaze explorer and the world they’re inserted in. It plays a social role, connecting both player and NPCs more intimately in the virtual world game developers are capable of bringing to life.

6 Conclusion

This dissertation followed through the design, development and reception of *Desiree: Eyes On You*, a dating-simulator that embeds eye-tracking to translate our real-world social gaze constructs into the virtual scenario, influencing the love interest's moods, affection and overall date progression.

Debates over how to dynamize the relationships with virtual love interests in computer games through the means of applying new mechanics and technologies are still current in game development [7, 48, 62]. The primary purpose of gaze integration on *Desiree* was, therefore, to evaluate how socially immersed players were able to become when their eyes were given a similar social role in the virtual world as the one in real life through the in-game camera, turning their virtual partner aware of their gaze direction. Additionally, due to the continuous efforts to bring new approaches to explore consent in regards to another in game design [57, 58], this gaze mechanic was also applied to assess its capacity in narrative to awaken reflections in players of the virtual other's comfort towards player gaze behaviours as the date progressed, including focal points and repetitive fixations.

Results from the user study revealed positive measures of social presence reported by the participants while interacting with the character in the world with eye-tracking integration playing a crucial role in the game's direction. Conscious reflections on what *Desiree* consented each player to observe in the scenario were achieved, although the game design could benefit from future iterations in order to magnify the impartial value of reports obtained.

Desiree: Eyes On You has proven to be a valuable design blueprint for upcoming games that wish to integrate eye-tracking as a social influencer in their narratives. While gaze integration in games has been around for years, it had never been fully adapted into the dating simulator genre, introducing a new approach to PC gaming, augmenting the player's immersion and changing the constrictions of NPC interactions for visual novel games and genres beyond for years to come.

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A Tobii Game Genres

122

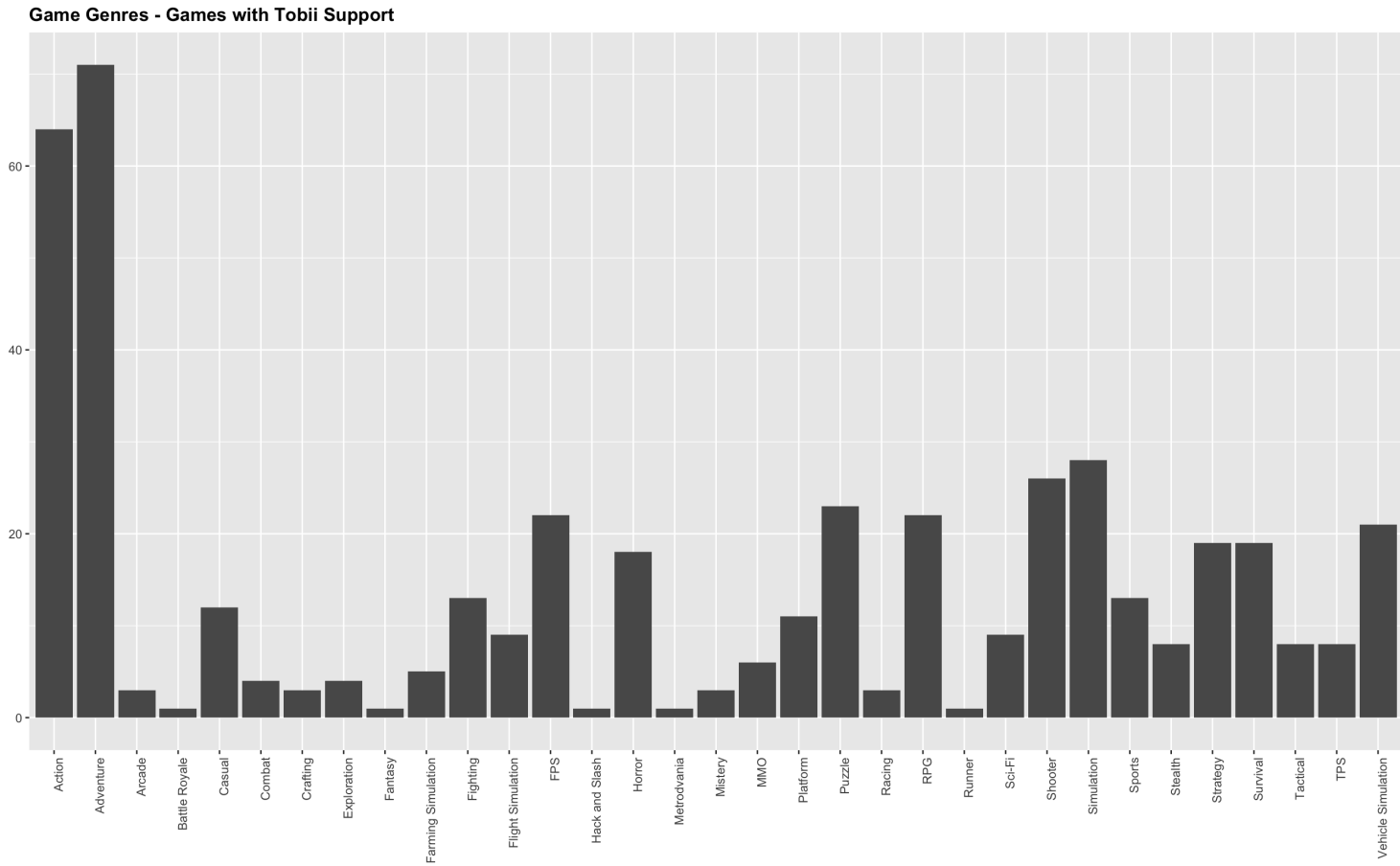


Figure 52: Game Genres with Tobii Support

B Appendix: Test Group Results

Carimbo de data/hora	Character Screenshot	GLB link	Gender Choser	1. Basic Info	2. About Them: Personality	3. About Them: Lifestyle	4. About Them: Hobbies
2025/03/10 12:33:38	https://drive.google.com/open?id=1UualqN5-1WfKMxmmvXQ91lc7Y1sZj0h	https://models.readyplayer.me/67ced689c839d8d6563d2566.glb	Male	Leo, age of 21, has one older sister and a younger brother	Extrovert, very talkative particularly on sports and healthy life style including fitness activities, does not the program at the university which he started recently, wants to be a doctor,	students but working on pizza delivery on weekends and in a local touristy restaurant two night during the week, had a cat before but not now after she passed away, like hiking and walking in the nature, tries to be vegetarian but not successful, tries to eat healthy food.	Swimming is the favourite one, in the ocean during summer, in the pools during the winter, cycling, going to fitness centre three times a week. Avoids being slave of TV but he is addicted YouTube videos, particularly short videos. Tries to read at least one book a month but much effort. Last year was able to read only three novels only.
2025/03/10 12:34:00	https://drive.google.com/open?id=12W6uKVeFy8Hm2edWM7Hg8t3Y-ZMzrKRE	https://models.readyplayer.me/67ced5109ce8d41d31702a3b.glb	Female	Name- Mariam, 24 y.o., doing her master's degree in informatics (data science maybe). Her family consists of her grandparents, parents and younger brother.	She's an extrovert that loves to hang out with her childhood friends and finds connection with new people easily, but she struggles to keep up with university. Mariam is a bit lazy, moody and also a procrastinator. She's a true leo and has a fire personality.	She work part time at a cafe near center of the city, so she meets many tourists and new people, so her knowledge of 4 languages (English, Portuguese, French and Spanish) comes in handy. Her family has a white old Maltese dog. Her habit is constantly listening to music and searching for new artists. She herself sings well, but never tried to go professional.	Mariam is an avid reader, but her books of choice are usually fiction, short, funny and always about romance. She loves to read 3 star books and watch most cliché TV programs about matchmaking.
2025/03/10 12:36:13	https://drive.google.com/open?id=1Orq_Bx442_umlVAeogbYx11zUfyzdSsa	https://models.readyplayer.me/67ced5821e9aaeb7e6897c7c.glb	Male	Name: Fin Age: 27 Family: He is the younger brother and has an older sister. He is very attached to the family	He is a very introverted person but he has best friends with whom he feels himself. He has no animals in the house, even if he likes them a lot	He works as a computer engineer, during his free time he really likes to watch movies and relax at home. Every weekend he goes to visit his family to have lunch all together	He really likes to read books related to computer science, he doesn't listen to much music, he prefers to listen to podcasts. He doesn't like to exercise, if not walks outdoors
2025/03/10 12:42:22	https://drive.google.com/open?id=1EWMWmtr_S4rDxwjlL12s7C8pYdM4y6B	https://models.readyplayer.me/67cedb539657dd027da5d5cf.glb	Female	Bella, 27 years, works in library	Extrovert, likes jokes and good food	works in library, has a cat,	Netflix series, instagram
2025/03/10 12:44:56	https://drive.google.com/open?id=1-PF8JppDhfwTvdXqSpXAxw4ka9JM	https://models.readyplayer.me/67ced559e84d9fa159e9498.glb	Female	Johana, 27, has an older brother who she's not super close with. Aight relationship with her parents, but she's pretty independent. Still has lunch with them every other week.	Introvert but she's outgoing/fakes it very well? Loves animals, would volunteer at an animal shelter if she had more time. Her parents have cats and dogs and she'd love to have some too if they were allowed in the apartment she's renting (her landlord is not the worst, but they've a lot of rules going on). When angry I feel like she'd be passive-aggressive. She'd do her best to seem like she's not angry while wanting to murder you.	Probably a very competitive corporate job. Something that pays nicely and is comfortable (I'm assuming what do I know) but Gods is it stressful as far as the social aspect is concerned. Something that needs a lot of networking and bootlicking to succeed and it's so tiring for her. It's not her dream job. She has no pets. She buys her breakfast at the subway station before hurrying to work – the breakfast is a sad sandwich.	She used to read a lot, not so much nowadays. She's tired always all the time after work so she just kind of lies down on the couch and watches the news on TV before passing out. She does most of her gaming on her phone, whenever she's in a queue waiting or when taking the subway. Her exercise is the daily fifteen minute walk from the subway station to her workplace. She probably likes watching movies. She's not picky nor particularly interested in music.
2025/03/10 12:53:12	https://drive.google.com/open?id=1bxc-IMkUeSp5yXl1n1yWRQjQKZH0XG	https://models.readyplayer.me/67cedbfc45023b1b36d90da2.glb	Male	Carlo, 35, live alone, but meet with family every weekends	Ambivert, energetic, loud but very sensitive	Hi works as a veterinarian, enjoys spending time at home after work, but sometimes likes to go out to a bar with friends. on weekends he loves going for a long walks in the forest with his big, shaggy dog	he loves playing computer games and reads a lot
2025/03/10 12:54:42	https://drive.google.com/open?id=1pnu8iPpPpSBIeJHzUd800Ejq-wPT09	https://models.readyplayer.me/67ced65266695952153abb4a.glb	Female	Des 28 Has a younger sibling, very protective of them Daughter of a single dad	Extrovert Hates when they misspell her name on her coffee order Really nice to service workers Speaks up for her friends when they want to say something but feel embarrassed/shy/nervous	Game developer No pets but feeds the local stray cats every night Eats lunch every saturday with her family	Likes to go to local bands's concerts Enjoys speedrunning games Ironically watches "trashy reality TV" with her friends Plays the drums Has read every single Stephen King book
2025/03/10 13:12:22	https://drive.google.com/open?id=1PeX01ITVM5u8DHPR4q3fdY9x4dUWO_A	https://models.readyplayer.me/67ced31fe5dbcb4d0fd70168a.glb	Female	Dartxi, 25, Sabanta	Extrovert, How the person mind works, likes to help people.	Psychologist, Dog, Likes doing sports	Love exercise, plays guitar and reads drama comedies
2025/03/11 20:45:26	https://drive.google.com/open?id=1kaJA28MzcTM06k_uR3dBq9wv_S055eI	https://models.readyplayer.me/67d099029657dd027da37515.glb	Female	Destiny 32 2 older sisters (she's the youngest)	Introvert Book worm Independent Kind Curious Intentional with her decisions Adventurous	Accountant No pet, she is more of a plant mom Organized Stays up late but wakes up at a reasonable time (8am)	Likes to travel Reading Hanging out with friends (going to cafes) Volunteering (at hospitals, pet clinics, orphanages) Cooking
2025/03/11 23:44:13	https://drive.google.com/open?id=1Hic8R8hYIQqWILQQf93fEY5lSvM9aGc	https://models.readyplayer.me/67d0bed215151efc820f2858.glb	Female	Desdemona, 25, one older sister.	Extrovert: Loves to talk. Especially about pop culture. Tidy. Hates when people talk over her.	Works at a game studio as an programmer. Has one hamster called Hammond. Drinks tea instead of coffee.	Loves to play Overwatch and Sims 4. Re-reads all the series of Harry Potter books. Goes on a morning jog for time to time.

C Flowcharts and States

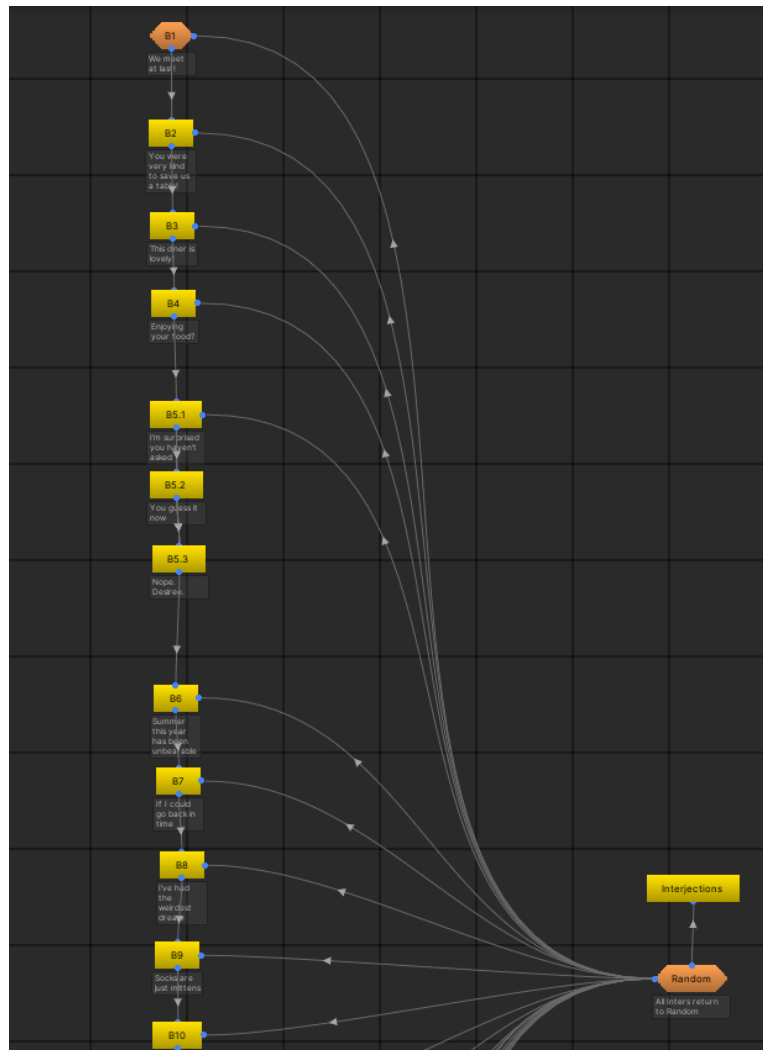


Figure 53: Overview of Main Flowchart with Des continuous banter.

D Data Protection Approval

Firefox

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PARECER N.º 205/CEUMA/2025, DE 26 DE JUNHO

Sobre o pedido de apreciação pela Comissão de Ética da UMA do projeto de investigação: “Looks of Desire”: Leveraging Eye-Tracking to Explore Consent in a Dating Simulator.

A - RELATÓRIO

O pedido de apreciação do documento n.º 205 de 26 de maio de 2025 relativamente ao projeto de investigação intitulado: “**Looks of Desire: Leveraging Eye-Tracking to Explore Consent in a Dating Simulator**” [“Looks of Desire”: Utilização do rastreio ocular para explorar o consentimento num simulador de encontros], a ser desenvolvido por **Bárbara Paulista** no âmbito do trabalho de dissertação do Mestrado em Design de Media Interativos da Faculdade de Ciências Exatas e da Engenharia (FCEE), tendo como orientadores a Professora Doutora **Mara Dionísio** da FCEE, e o Doutor **Paulo Bala** do ITI/LARSyS.

O pedido em análise é constituído pelos documentos dirigidos à Comissão de Ética da UMA, que integram o:

- a) Pedido de Parecer à CEUMA, datado de 26 de maio de 2025, em língua inglesa;
- b) Curriculum Vitae da investigadora principal, em língua inglesa, e ORCID dos orientadores;
- c) Parecer favorável emitido pelo Encarregado de Proteção de Dados da Universidade da Madeira, em língua portuguesa;
- d) Declaração de aceitação pelos orientadores, em língua inglesa e portuguesa;
- e) Declaração de autorização de frequentar e desenvolver os trabalhos no Centro Cultural e de Investigação do Funchal (CCIF), em língua portuguesa;
- f) Consentimento informado, esclarecido e livre de participação, em língua inglesa;
- g) 3 documentos relativamente aos instrumentos de coleção de dados, em língua inglesa (Networked Minds Social Presence Inventory (Scales only, Version 1.2); Observation Table; Post-Questionnaire).

O estudo com início previsto a 23 de junho de 2025 e fim previsto a 31 de julho de 2025 tem como principal objetivo criar um jogo de simulação de encontros para investigar se o eye-tracking aumenta a sensação de presença social em interações íntimas com personagens virtuais e capacidade da tecnologia para refletir sobre o consentimento através da sua interatividade. O estudo decorrerá na ARDITI e no EGamesLab (CCIF) com a duração máxima de 1 hora e uma sessão única por cada participante.

Para atingir os objetivos traçados serão recolhidos dados demográficos (género, idade, orientação sexual, frequência e tipo de videojogos jogados) com vista à caracterização da amostra. Será também aplicada uma medida de autorrelato baseada no inventário Networked Minds Social Presence, para avaliar a perceção de conectividade social. Por fim, recolher-se-ão opiniões dos participantes sobre a experiência, incluindo aspetos de design e sugestões de melhoria, com o intuito de compreender o impacto da simulação nas reflexões individuais sobre o consentimento.

O jogo consiste numa simulação de um encontro romântico, em formato visual-novel, com mecânicas baseadas em escolhas e na direção do olhar do participante, registada através de um dispositivo de eye-tracking. O cenário é um restaurante tipo diner americano, onde o participante interage com a personagem Des durante um primeiro encontro. A personagem

E Ethics Committee Approval

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PARECER N.º 205/CEUMA/2025, DE 26 DE JUNHO

Sobre o pedido de apreciação pela Comissão de Ética da UMA do projeto de investigação: “Looks of Desire”: Leveraging Eye-Tracking to Explore Consent in a Dating Simulator.

A - RELATÓRIO

O pedido de apreciação do documento n.º 205 de 26 de maio de 2025 relativamente ao projeto de investigação intitulado: “*Looks of Desire*”: *Leveraging Eye-Tracking to Explore Consent in a Dating Simulator* [“Looks of Desire”: Utilização do rastreio ocular para explorar o consentimento num simulador de encontros], a ser desenvolvido por **Bárbara Paulista** no âmbito do trabalho de dissertação do Mestrado em Design de Media Interativos da Faculdade de Ciências Exatas e da Engenharia (FCEE), tendo como orientadores a Professora Doutora **Mara Dionísio** da FCEE, e o Doutor **Paulo Bala** do ITI/LARSys.

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- d) Declaração de aceitação pelos orientadores, em língua inglesa e portuguesa;
- e) Declaração de autorização de frequentar e desenvolver os trabalhos no Centro Cultural e de Investigação do Funchal (CCIF), em língua portuguesa;
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- g) 3 documentos relativamente aos instrumentos de coleção de dados, em língua inglesa (Networked Minds Social Presence Inventory (Scales only, Version 1.2); Observation Table; Post-Questionnaire).

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O jogo consiste numa simulação de um encontro romântico, em formato visual-novel, com mecânicas baseadas em escolhas e na direção do olhar do participante, registada através de um dispositivo de eye-tracking. O cenário é um restaurante tipo diner americano, onde o participante interage com a personagem Des durante um primeiro encontro. A personagem



reage de forma dinâmica conforme os pontos do cenário (por exemplo janela, TV, etc) ou do seu corpo em que o participante fixa o olhar (por exemplo, rosto, tatuagens, peito, mãos [“such as her/his face, chest, hands and tattoos]), gerando diálogos específicos.

Se o participante repetir fixações consideradas invasivas (por exemplo, olhar insistentemente para o peito da personagem), Des expressa desconforto e, se tal comportamento persistir, termina o encontro de forma madura e educada, explicando os motivos. Por outro lado, comportamentos respeitosos, como manter contacto visual durante a conversa, são positivamente valorizados. No final, o desfecho do encontro (bem-sucedido ou não) depende das escolhas feitas e da forma como o participante respeitou os limites estabelecidos pela personagem.

A experiência inclui ainda o preenchimento de um formulário de consentimento no início, a calibração do eye-tracker e, após o jogo, um questionário final para recolha de dados relevantes para o estudo.

Os participantes serão maiores de 18 anos. Serão incluídos no estudo adultos com 18 ou mais anos de idade, que tenham uma boa conceção da língua inglesa. Serão excluídos indivíduos de idade menor, adultos que não possam dar o seu consentimento informado e qualquer participante com deficiências visuais, tais como cataratas, estrabismo, etc.

O tamanho da amostra expectável será de 20 a 35 participantes. Esta amostra foi definida de acordo com estudos semelhantes, que utilizaram a mesma tecnologia para tirar conclusões qualitativas e a mesma escala para a análise quantitativa dos resultados. Os participantes serão recrutados através de um código QR em cartazes promocionais do estudo que conduz a um formulário Calendly para a reserva de sessões.

A participação no estudo proporciona como benefício uma reflexão sobre o consentimento em relação a outra pessoa num cenário não sexual. Os principais riscos associados à participação neste estudo incluem fadiga ocular, desconforto físico por permanecer sentado e possíveis sentimentos de frustração ou ansiedade decorrentes das interações com o simulador. Para mitigar estes efeitos, os participantes têm total liberdade para pausar ou interromper a experiência a qualquer momento, sempre que se sintam desconfortáveis. Este direito é claramente indicado no formulário de consentimento informado, reiterado verbalmente pelo investigador antes do início da sessão e novamente recordado no início do questionário final. Não haverá compensações nem custos para os participantes.

Os dados recolhidos neste estudo serão utilizados exclusivamente para este projeto, com acesso restrito apenas aos investigadores envolvidos. A informação será armazenada em pastas protegidas por palavra-passe e de acesso limitado. Os dados serão anónimos, identificados apenas por um código numérico para fins de comparação. Nenhuma informação pessoal será partilhada com terceiros ou tornada pública. Os dados serão eliminados um ano após a publicação dos resultados do estudo.

Os resultados serão divulgados através da dissertação de mestrado, de publicações científicas e de apresentações.

B – QUESTÕES DE PROCEDIMENTOS ÉTICOS



Pela análise da documentação entregue surgem as seguintes dúvidas ou pontos que necessitam de esclarecimentos:

- a) Deve ser alterada a data de início do estudo para data posterior do parecer.
- b) Relativamente à destruição de dados é referido no pedido que serão destruídos 1 ano após a publicação dos resultados. No Consentimento informado é referido na secção “Framework” que serão destruídos 1 ano após a coleção dos dados e a seguir na secção “Anonymity and Confidentialty” 1 ano após publicação dos resultados [sublinhados nossos]. Recomenda-se que o prazo para eliminação dos dados seja definido de forma mais precisa, por exemplo: “1 ano após a recolha dos dados” ou “1 ano após a defesa da dissertação”. A expressão atualmente utilizada “1 ano após a publicação dos resultados” é ambígua, podendo referir-se à publicação académica da dissertação ou à eventual publicação dos resultados em revista(s) científica(s).
- c) Embora o estudo apresente riscos potenciais associados ao desconforto emocional, à interpretação de normas sociais e à representação de género e consentimento, estes podem ser mitigados através de um enquadramento claro, consentimento informado rigoroso, feedback adequado durante o jogo e um *debriefing* final que promova a reflexão crítica sobre a experiência. A forma como a personagem e as interações estão desenhadas pode reforçar estereótipos ou interpretações simplistas sobre consentimento. Recomenda-se especial atenção à diversidade dos participantes e à neutralidade das interações para evitar reforço de estereótipos.

C - CONCLUSÃO

A CEUMa deliberou emitir um parecer favorável com a recomendação de corrigir e dar atenção ao referido nos pontos acima relatados.

Relator: Prof. Doutor Manfred Kaufmann

Aprovado por unanimidade, em reunião do dia 26 de junho de 2025

A Presidente da CEUMa

Assinado por: **Liliana Maria Gonçalves Rodrigues de Góis**
Num. de Identificação: 10084399
Data: 2025.06.27 11:48:39+01'00'

Professora Doutora Liliana Maria Gonçalves Rodrigues

F Appendix: Post-Questionnaire

Post-Questionnaire

<https://forms.office.com/Pages/DesignPageV2.aspx?origin=NeoPortal...>

Post-Questionnaire

Thank you for playing Desiree! One more step and you're done!

We'd be very grateful if you could answer this Post-Questionnaire with honesty. It is divided into 3 sections:

1. Demographics: For comparison of demographics and data collected across all participants.
2. The Networked Minds' Social Presence Inventory: This section helps us understand how socially present you felt with Des while interacting in the virtual environment.
3. Reflective Assessment: This section aims at gathering personal opinions of the intrinsic message the game contains, mechanics and future applications of eye-tracking in the gaming sphere!

We remind you have the right to withdraw from your participation at any given moment, no data being collected or penalties applied.

* Obrigatória

Demographics

This section allows us to anonymously collect demographic data for comparison with other participants and respective experiences.

1. Participant ID *

Please insert the Participant ID previously defined in your Form of Consent.

2. Gender *

- Female
- Male
- Non-Binary
- Prefer not to answer
- Outro

3. Age *

O número tem de estar compreendido entre 18 e 100

4. Sexual Orientation *

- Heterosexual
- Gay
- Lesbian
- Bisexual
- Prefer not to answer
- Outro

5. I have experience playing videogames *

Select how strongly you agree with this statement.

- Strongly Disagree Disagree Neutral Agree Strongly Agree
-

6. In a week, how many hours on average do you spend playing video games? *

Less than 1	2-5	6-15	16-20	21-25	26-30	More than 30
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Which Platforms do you play video games in? *

Select all options that apply.

- PC
- Console
- Mobile Phone
- Tablet
- Tv
- Outro

8. Which video game genres do you usually play? *

Select all options that apply.

- RPG (Baldur's Gate, Persona...)
- Action-Adventure (Last of Us, Detroit: Become Human...)
- Shooter (Marvel Rivals, Call of Duty...)
- Dating Simulation (Love and Deepspace, Boyfriend Dungeon...)
- Life Simulation (Stardew Valley, The Sims...)
- Driving Simulation (Microsoft Flight Simulator, F1...)
- Sandbox (Minecraft, Roblox...)
- Party Games (Fall Guys, Among Us...)
- Open-World (Elden Ring, Zelda: Tears of The Kingdom)
- MMORPG (World of Warcraft, Final Fantasy XIV...)
- Platformer (Super Mario, Hollow Knight...)
- Strategy (Civilization, Clash of Clans...)
- Puzzle/Casual (Candy Crush, Plants Vs. Zombies...)
- Outro

Networked Minds Social Presence Inventory

The inventory is a self-report measure of social presence, which is commonly defined as the sense of being together with another in a mediated environment. It is divided into 2 subsections:

> Measures of Co-Presence: the degree to which the users feel as if they are together in the same space.

> Measures of Psycho-Behavioral Interaction: perceived attentional engagement (PAE), emotional contagion (PEC), mutual comprehension (PC) and behavioural interdependence (PBI).

9. Co-Presence of Self *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I often felt as if Des and I were in the same space together.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was often aware of Des in the space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I hardly noticed Des in the space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often felt as if we were in different places rather than together in same space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Co-Presence of the Other *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I think Des often felt as if we were in the same space together.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des was often aware of me in the space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des didn't notice me in the space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think Des often felt as if we were in different places rather than together in the same space.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Psycho-Behavioral Interaction: Perception of Self *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I paid close attention to Des.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was easily distracted from Des when other things were going on.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tended to ignore Des.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was sometimes influenced by Des moods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was happy, Des tended to be happy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was feeling sad Des also seemed to be down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was feeling nervous, Des also seemed to be nervous.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to communicate my intentions clearly to Des.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My thoughts were clear to Des.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to understand what Des meant.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My actions were often dependent on Des actions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My behavior was often in direct response to Des behavior.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What I did often affected what Des did.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Psycho-Behavioral Interaction: Perception of the Other *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Des paid close attention to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des was easily distracted from me when other things were going on.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des tended to ignore me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des was sometimes influenced by my moods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When Des was happy, I tended to be happy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When Des was feeling sad, I tended to be sad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When Des was nervous, I tended to be nervous.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des was able to communicate their intentions clearly to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des' thoughts were clear to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des was able to understand what I meant.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Des actions were often dependent on my actions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The behavior of Des was often in direct response to my behavior.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What Des did often affected what I did.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reflective Assessment

This section aims at gathering user opinions of their play experience in relation to overall design, subjects of consent and personal views of future implementations of the technology in games.

13. Which version of Des did you interact with? *

- Female
- Male

14. Which ending did you achieve? *

- Ending 1: Afternoon Stroll
- Ending 2: Mismatched
- Ending 3: Table For One
- Ending 4: Separate Bill
- Ending 5: I Think, Therefore I Kink
- Ending 6: Looking (Not So) Respectfully
- Ending 7: The dog eats the fish, the fish eats the burger... Can Des row a boat?
- Ending 8: Go Get'em Tiger!
- Ending 9: Let Them Boogie
- Ending 10: As It Was Foretold
- Ending 11: Bear-y Boring

15. Likeness Assessment *

Select how strongly you agree with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Overall, I enjoyed Des as a character	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed Des' personality.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed Des' appearance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed Des' voice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Have Des behaviours made you reflect on consent towards another? *

Consent is defined as the ability to voluntarily agree to an action that is carried out or proposed by another.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. If so, which behaviours made you reflect upon consent towards another? *

18. Do you believe Des behaviours left an impact on your perception on consent that you'll be carrying out into the real-world? *

Consent is defined as the ability to voluntarily agree to an action that is carried out or proposed by another.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Did you enjoy the integration of eye-tracking in this game genre? *

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Would you like to find this feature of character awareness in already existing games? *

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. If yes, in which genres would you like to find this feature of character awareness? *

Select all options that apply.

- RPG (Baldur's Gate, Persona...)
- Action-Adventure (Last of Us, Detroit: Become Human...)
- Shooter (Marvel Rivals, Call of Duty...)
- Dating Simulation (Love and Deepspace, Boyfriend Dungeon...)
- Life Simulation (Stardew Valley, The Sims...)
- Driving Simulation (Microsoft Flight Simulator, F1...)
- Sandbox (Minecraft, Roblox...)
- Party Games (Fall Guys, Among Us...)
- Open-World (Elden Ring, Zelda: Tears of The Kingdom)
- MMORPG (World of Warcraft, Final Fantasy XIV...)
- Platformer (Super Mario, Hollow Knight...)
- Strategy (Civilization, Clash of Clans...)
- Puzzle/Casual (Candy Crush, Plants Vs. Zombies...)
- Outro

22. Could you elaborate on why you find eye-tracking adequate to this type of games?

23. How likely are you to recommend this game to a friend or colleague? *

Unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat Likely	Very Likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. Any additional commentary or suggestions you'd like to leave?

G Appendix: NLA Blender Environment

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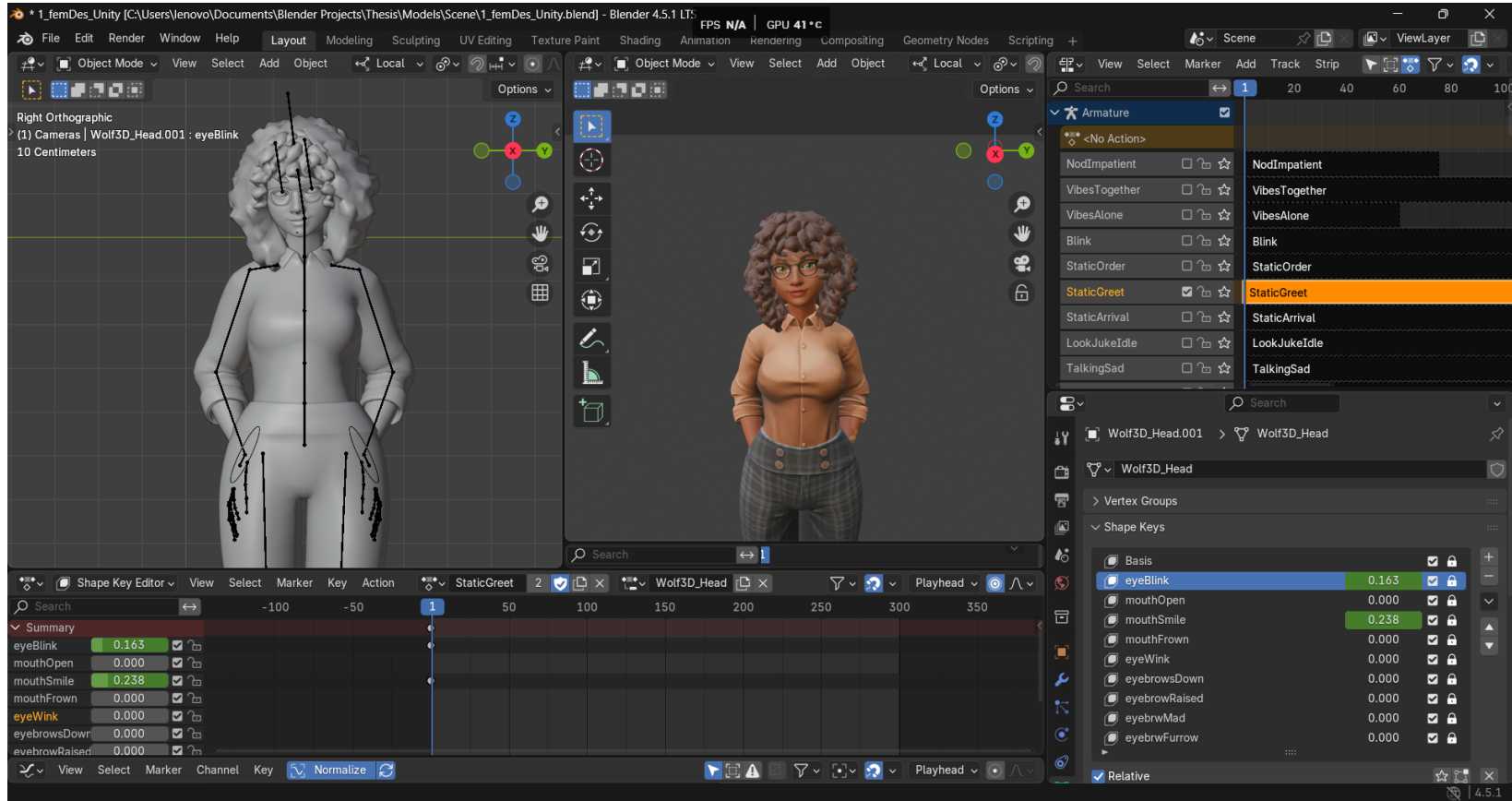


Figure 54: NLA animation Blender environment.

H Appendix: Animation Controller Structure

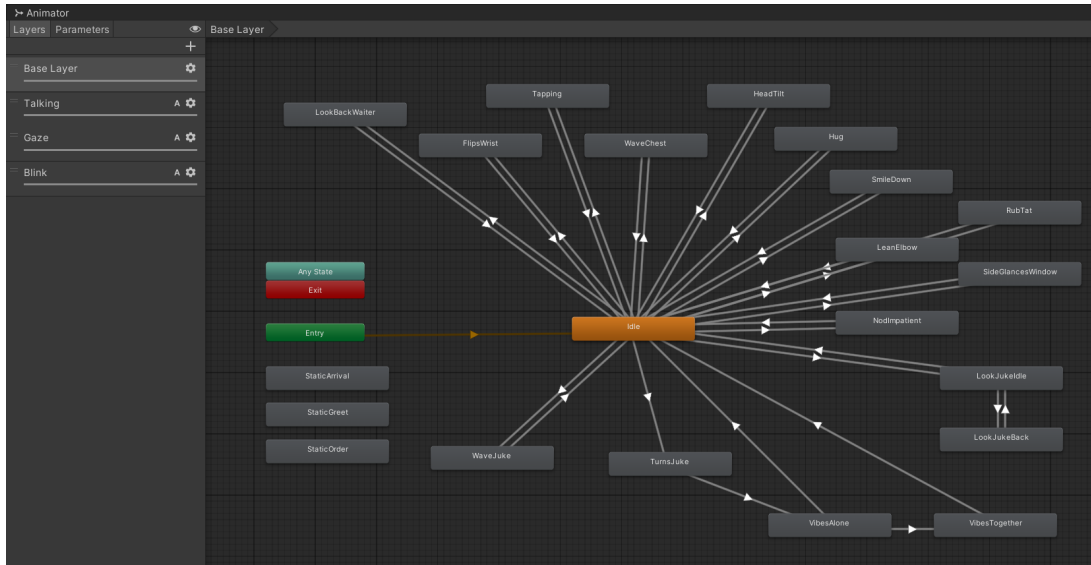


Figure 55: Female Des Unity animation controller: base layer.

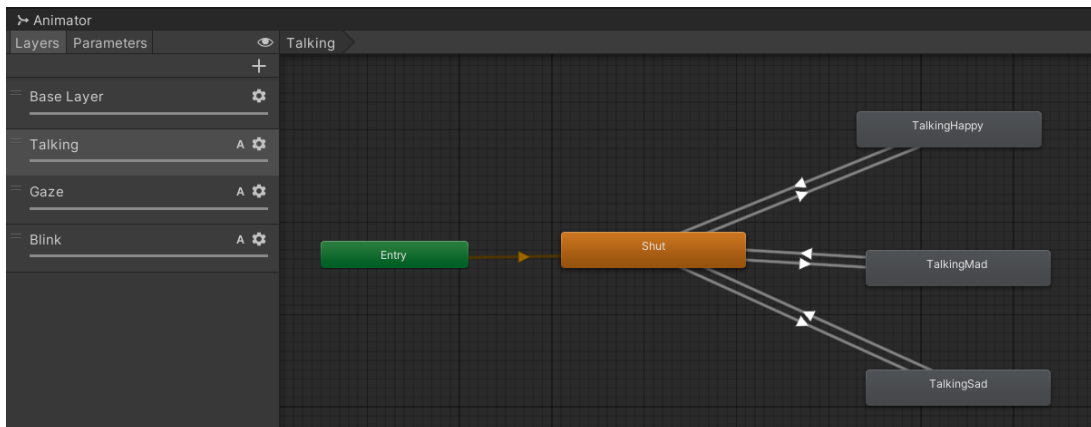


Figure 56: Female Des Unity animation controller: talking variations layer.

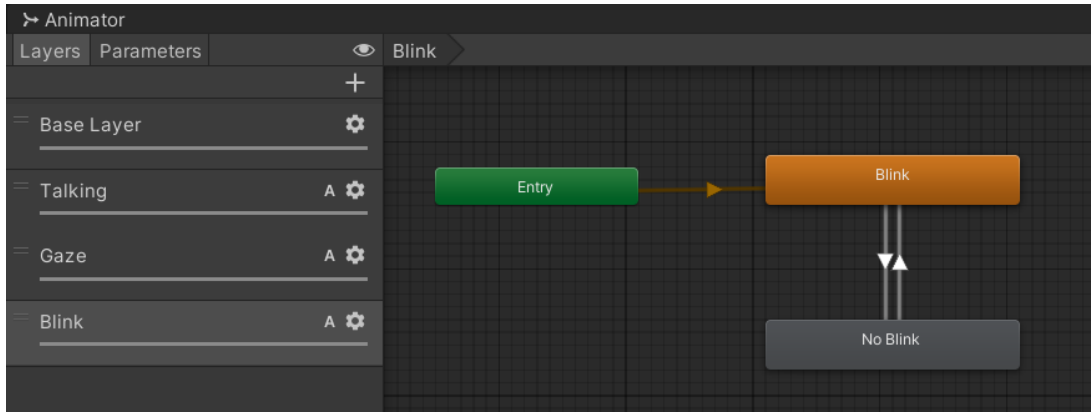


Figure 57: Female Des Unity animation controller: blinking layer.

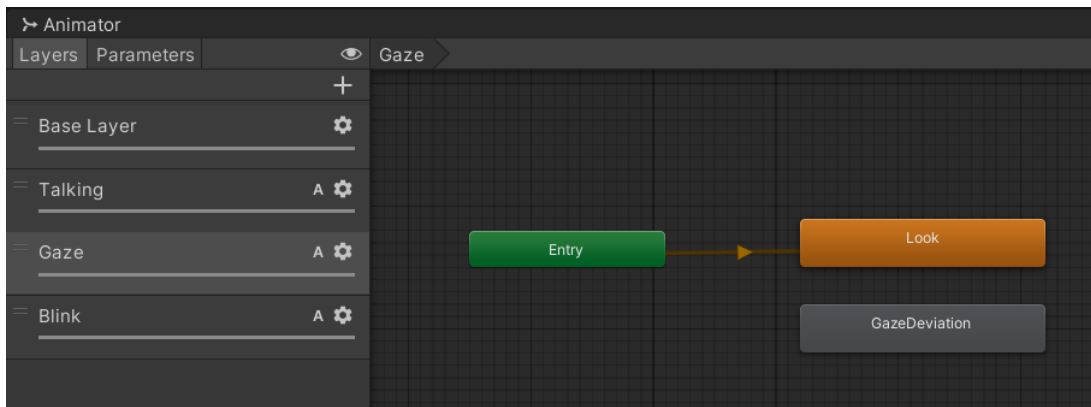


Figure 58: Female Des Unity animation controller: gaze deviation layer.

I Appendix: Design References

Emotional			
	Cheerful	These Sims tend to be Happier than other Sims.	
	Goofball	These Sims tend to be Playful.	
	Childish	These Sims gain powerful Moodlets from watching the Kids Network, become Playful when playing with Children, and become Happy when playing with Children's toys.	
Hobbie			
	Bookworm	These Sims gain powerful Moodlets from reading Books and can Analyze Books and Discuss Books in unique ways.	
	Geek	These Sims become Happy when Reading Sci-Fi or Playing Video Games, may become Tense if they haven't played much, are better at finding Collectibles, and can Discuss Geek Things with other Geek Sims.	
	Music Lover	These Sims gain powerful Moodlets and boost their Fun Need when Listening to Music and become Happy when playing instruments.	
Lifestyle			
	Lazy	These Sims gain powerful Moodlets from Watching TV or Napping as well as from Comfortable furniture, become Fatigued more quickly from exercise, and grow Tense when performing household chores.	
Social			
	Family-oriented	These Sims become Happy around family members, become Sad if they don't interact with family for a period of time, and can Boast about Family.	
	Animal Enthusiast	These Sims are obsessed with animals, and will seek their company often. They will have an easier time caring for animals and getting closer to them.	

Figure 59: Selected Sims 4 character creation traits.



Figure 60: Character Sheets for the debut of characters *Sylus* and *Caleb* from the game *Love and Deepspace*.



Figure 61: Zayne's weekday schedule reference from the game *Love and Deepspace*.



Figure 62: Dating Sim reference board: logotypes.

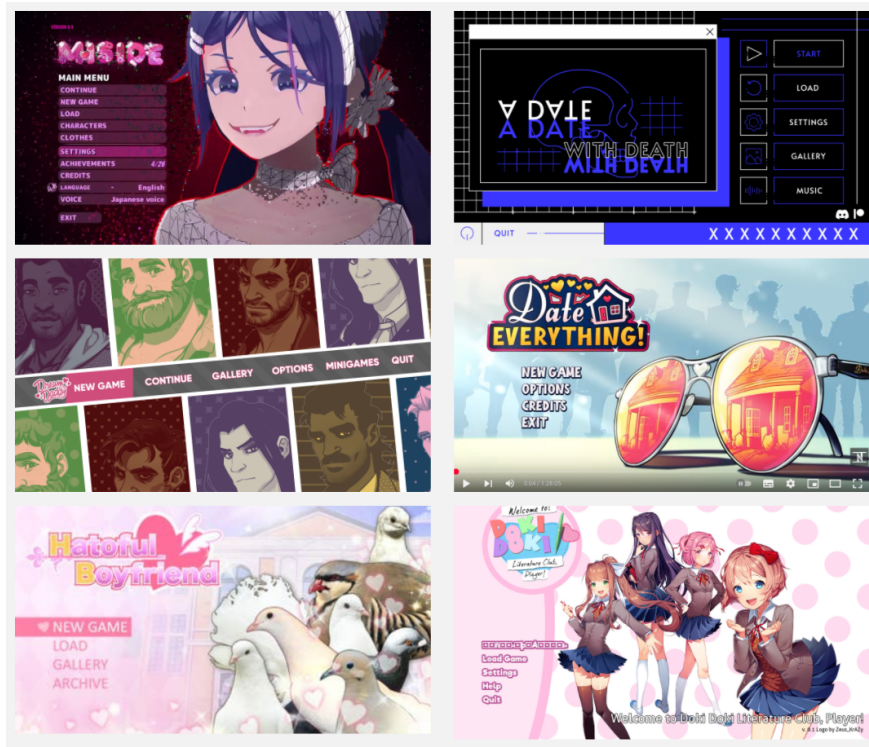


Figure 63: Dating Sim reference board: main menus.



Figure 64: *Wotakoi* anime opening reference.

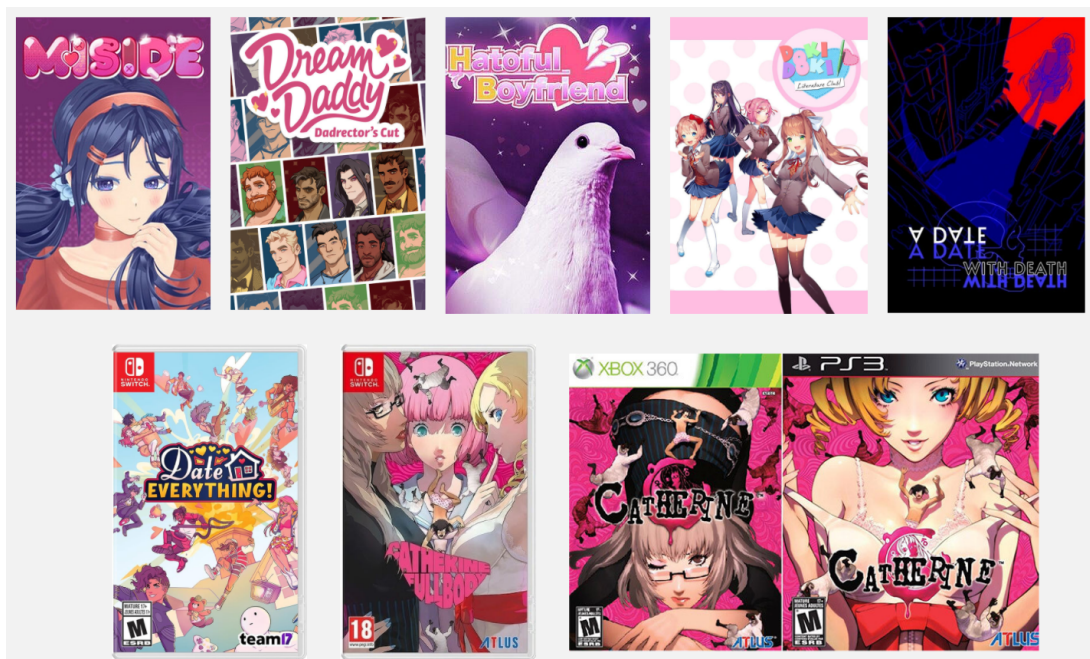


Figure 65: Dating Sim reference board: posters.

J Appendix: User Study Demographic Charts

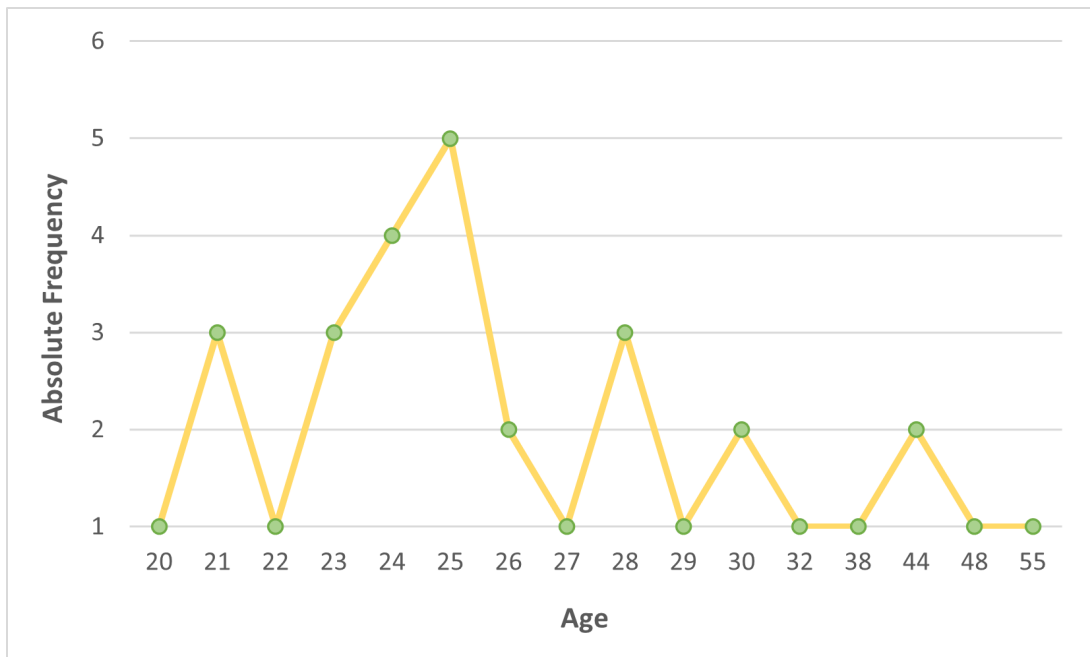


Figure 66: Age of study participants.

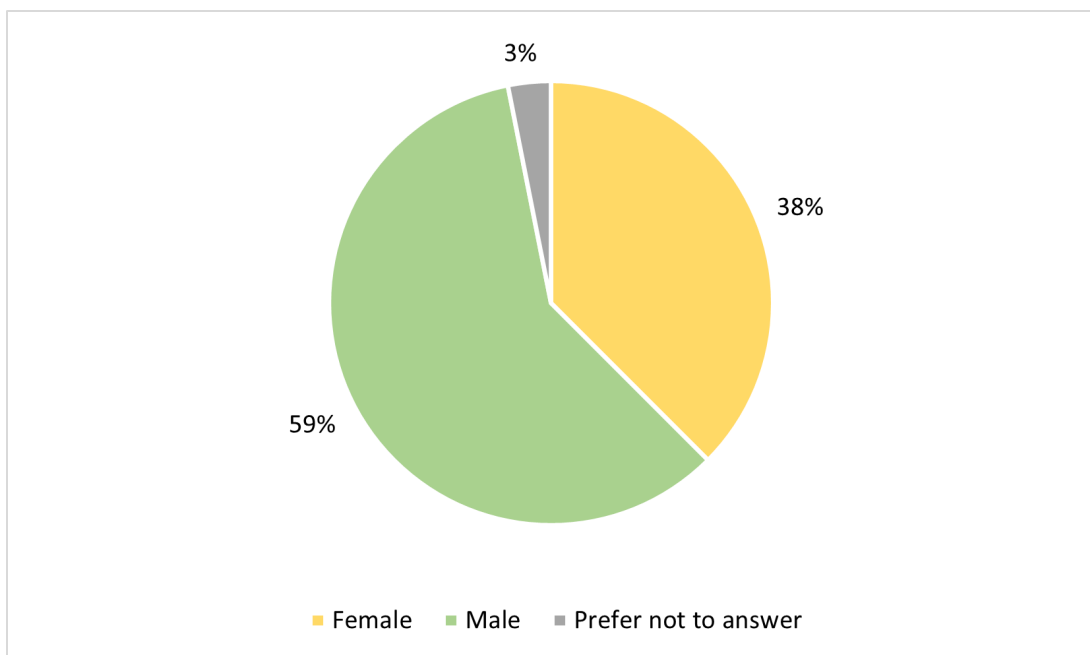


Figure 67: Gender of study participants.

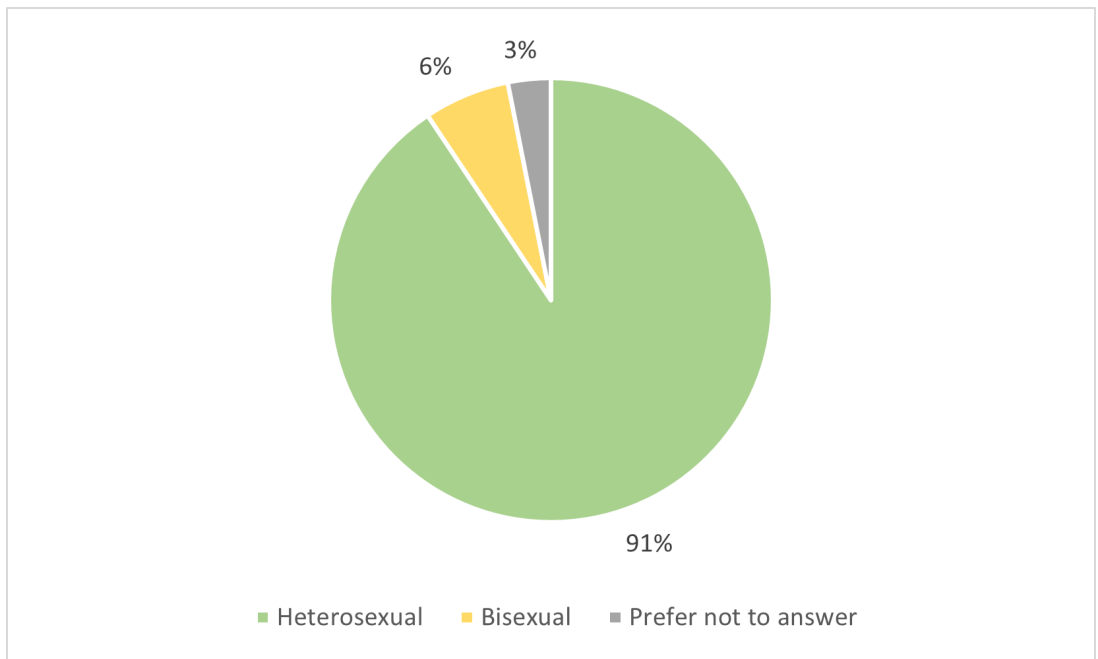


Figure 68: Sexual orientation of study participants.

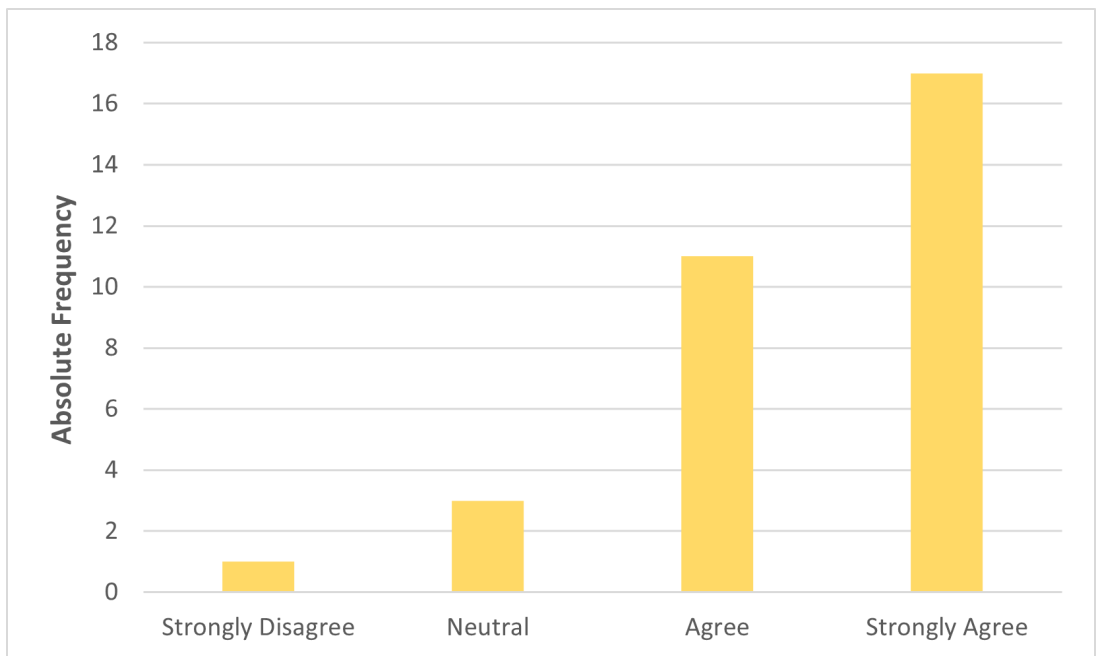


Figure 69: Participant agreement to the statement "I have experience paying video games."

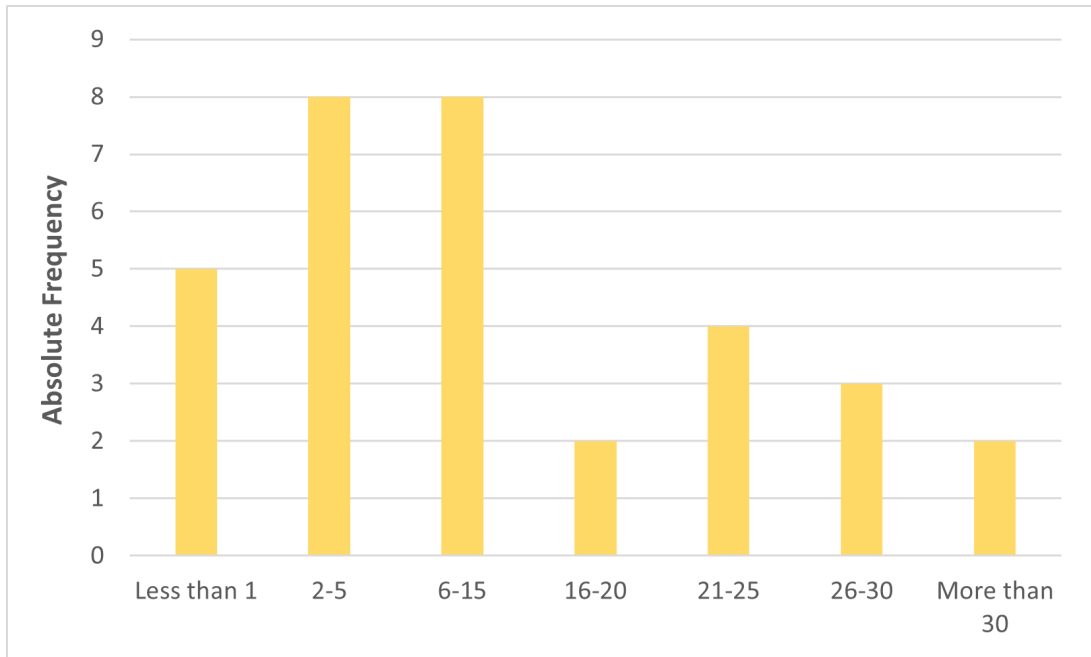


Figure 70: Participants reported hours per week spent playing games.

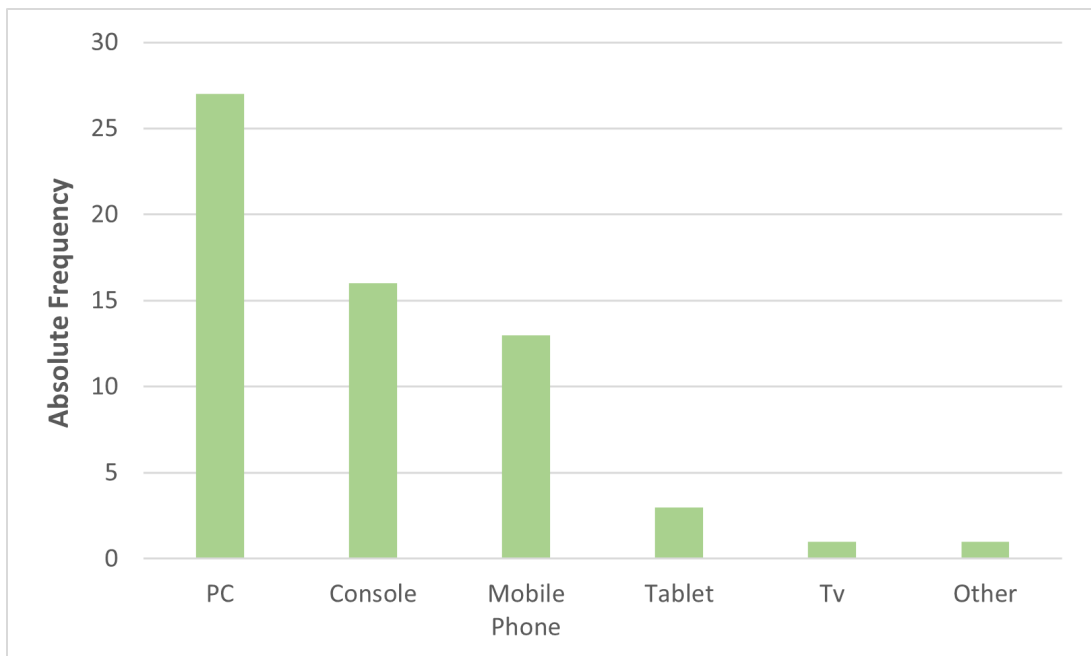


Figure 71: Participants favoured gaming platforms.



Figure 72: Participants favoured genres of play.