The distribution of usability problems in strategy games revisited

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Abstract

Current research on design of game interfaces has identified a number of usability issues that affect the player's game experience. However, it is limited with studies that specifically identify the usability problems that are particularly relevant for specific game genres. In this master thesis, I address the limited research on usability problems of game interfaces in individual game genres. More specifically, this master thesis will have its focus on the strategy game genre and examine whether there are certain usability problems that game designers need to pay special attention to when designing and implementing the user interface in a strategy game.

Based on a theoretical review of the characteristics in strategy games and existing results in the literature, I expect a variation in the occurrence and share of typical usability problems in strategy games. In addition, I expect problems with control and response times to be more pronounced in the more high-paced real time strategy games (RTS) compared to the turn-based strategy games (TBS).

The results of this master thesis do show a variation in the share of the different usability problems. Specifically, the share is highest for issues with artificial intelligence, control, visual representations and consistency. Assuming that the problems highlighted in the examined game reviews are connected to the game reviewer’s user experience, these results indicate that games designers should pay particular attention to these problem categories when designing strategy games.

Furthermore there are partial support for the expectation that problems with control and response times is more pronounced in the more high-paced real time strategy games since a clear difference in only evident in connection to the control problem category. Nonetheless, my distinction reveals that there are several other differences in the share of problems, depending on whether the game is RTS or TBS. This indicates that it is also necessary for game designers to distinguish between real-time and turn-based, as there is a plausible variation in the usability problems that occur in the two sub-genres of strategy games.

1. Introduction

Of all the entertainment industries that exist in the 21st century the game industry is probably one of the most noticeable of them at the moment (Williams, 2002; Marchand & Hennig-Thurau, 2013). The game industry was established in the 1970s, but peaked and grew in the 1990s and the 2000s, where it became the fastest growing entertainment industry in the world with a growth rate of approximately from 9 percent up to 25 percent according to different experts in the field (Graser, 2000; Zackariasson & Wilson, 2010). The time and effort that players use on playing video games have expanded to new highs over the years and is estimated to expand even more in the future at the cost of the popularity and revenue of more traditional entertainment industries (Yi, 2004; Ryan, Rigby, & Przybylski, 2006). The game industry is now a billion-dollar enterprise, which competes directly with other dominant entertainment industries, like the movie industry and the television industry, to become the biggest entertainment industry in the world in both popularity and revenue (Looser, 2002; Zyda, 2007).

In order to make a successful video game in the emerging gaming industry, it is crucial that the game designer creates a video game, which can entertain and engage the user in different ways (Gentile, Lynch, Linder, & Walsh, 2004; Deterding, Dixon, Khaled, & Nacke, 2011). But creating video games which are both entertaining and engaging is not something that comes by itself. Instead, it involves many different aspects such as game story, pacing and challenge level etc. (Desurvire, Caplan, & Toth, 2004; Callele, Neufeld, & Schneider, 2005). That said, even a video game with a brilliant narrative will probably not be successful, if the game's user interface is not usable.

The usability issues in video games' user interfaces are especially important, since most games require constant interaction between the video game and the player (Pinelle, Wong, & Stach, 2008a). Consequently, usability issues are particularly important for game designers, since a failure to deliver and design usable game interfaces can create major problems for the user experience, which can lead to devaluation of the overall quality of the games (Bernhaupt, 2010).

1.1 The research problem

The goal with the master thesis is to contribute to the existing literature, that focuses on the optimization of user interfaces in video games by developing some guidelines, which game designers potentially can use in their optimization of user interfaces for video games. In order to delimit the scope of the thesis in an appropriate manner and preventing it from becoming too extensive and unfocused, I have chosen to restrict my empirical focus exclusively on the development of user interfaces for strategy games.

In this master thesis, I examine how a identification of usability issues in strategy games can help to refine the existing literature about which usability issues are most prominent when developing user interfaces for strategy games. Hopefully, this identification can help and inform game designers by providing them with additional knowledge and understanding of the problems that they need to pay special attention to during the development process.

In the existing literature and in several scientific articles there are different opinions about how a number of usability issues have an effect on video games and the players' experiences (Clanton, 1998; Desurvire et al., 2004; Desurvire & Wiberg, 2009; Federoff, 2002; Korhonen & Koivisto 2007). However, a common denominator for these studies is, that they do not directly address, whether certain usability issues are more relevant for some particular game genres than others.

To the best of my knowledge, only one study published by Pinelle, Wong, & Stach (2008b) directly examine and address, whether there is a variation in the frequency of usability issues across different game genres. Pinelle et al. (2008b) conclude, that there is a variation in the frequency of usability issues across the different game genres. Pinelle et al. (2008b) argue, that the results on the frequency of usability issues can be used in one form or another to specialize the game designers' work with evaluation and optimization of user interfaces in video games.

Although Pinelle et al. (2008b) have studied the usability problems across different game genres, there is still plenty of room to test and nuance their results further. First of all, and in contrast to the study by Pinelle et al. (2008b), I employ a narrow focus on one game genre in order to get a more detailed examination and description of the usability problems in that particular genre.

Secondly, there is still a very modest literature about which usability issues are essential to consider when designing a user interface in a strategy game.

Thirdly, a potential disadvantage regarding the results found by Pinelle et al. (2008b) is, that they are based on game reviews of relatively few games within each game genre. In other words, the empirical basis could be more robust.

Put together, these above-mentioned factors constitute my primary motivation to look into which usability issues game designers should pay particular attention to when developing user interfaces for strategy games. This leads me to the following research statement:

What usability problems should game designers in particular pay attention to when designing a strategy game?

In order to examine this question, I compare the frequency and percentage share of different usability problems relevant for the design of game interfaces. More concretely, I utilize the same method as Pinelle et al. (2008a; 2008b) by analyzing critical game reviews from GameSpot and theoretically make use of the categorization of usability issues, that Pinelle et al. (2008a) has developed.

1.2 Structure

In order to answer the problem statement, I have structured the thesis as follows. In the first part of the master thesis, I present my conceptual understanding of several key concepts that will be referred to throughout the master thesis. In the second part of this master thesis, I unfold the theoretical framework where I derive four hypotheses about the frequency of different usability issues for user interfaces in strategy games. Before I test the derived hypotheses, I present the applied method for the analysis. This part is followed by the analytical part, where I quantitatively examine the hypotheses of the master thesis. Hereby, I identify the usability issues that are particularly relevant in strategy games. Based on this identification, I nail down how these problems are expressed in the strategy games. Finally, I conclude by summarizing my main findings.

2. Conceptual clarification

In the following section I will clarify my conceptual understanding of two basic concepts that will be referred to throughout this master thesis. The conceptual clarification section will specifically concern 1) my understanding of a strategy game/genre and 2) user interfaces in video games. At first glance, the concepts are not complex concepts. Nevertheless, it is important to clarify my understanding of these concepts as the delimitation of these is a basic prerequisite for understanding the subsequent theorization on the connection between usability problems in a strategy game's user interface and the player's user experience.

2.1 Strategy games

Video games are in its simplest form a digital version of a game, which contains some form of video output in its design. As in the music or movie industry it is possible to distinguish between somewhat different genres. According to Adams and Rolling (2007) the strategy game genre can be defined as follows:

"Strategy games challenge the player to achieve victory through planning and specifically through planning a series of actions taken against one or more opponents." (Adams & Rolling, 2007).

The definition highlights that strategy games are characterized by a gameplay, where the players are constantly challenged throughout their game experience and need to strategically plan, organize and manage their actions in order to complete a range of different challenges (Buro, 2003; Adams & Rollings, 2007; Balla & Fern, 2009). Yet, games from other genres also occasionally have a clear focus on the planning and organization of actions. In this connection, the strategy games are distinguished by its stronger emphasis on conflicts against opponents, in contrast to e.g puzzle games or simulation games where the focus is typically more on solving problems without the presence of opponents or enemies (Adams & Rollings, 2007).

In strategy games the challenges are often characterized as being strategic, tactical or logistical in nature (Buro, 2003; Adams & Rollings, 2007). Often players have to look and think further ahead in their gameplay in strategy games, than they for example have to do in first-person shooters, where the player shoots enemies down from left to right just to encounter a new enemy straight ahead (Quax, Monsieurs, Lamotte, De Vleeschauwer, & Degrande, 2004; Adams & Rollings, 2007). Specifically, in first-person shooters and other more action dominated video games the focus is often more on making actions here and now, rather than using actual tactics and planning to achieve the goals of the game - which is a central element in strategy games (Tekinbaş & Zimmerman, 2003; Adams & Rollings, 2007)

Furthermore, players in first-person shooters and other action dominated games often have all the options in the game available from the beginning of the game, where players who plays strategy games and other more tactical oriented games have to work to gain these options as part of their game experience (Lahti, 2003; Adams & Rollings, 2007).

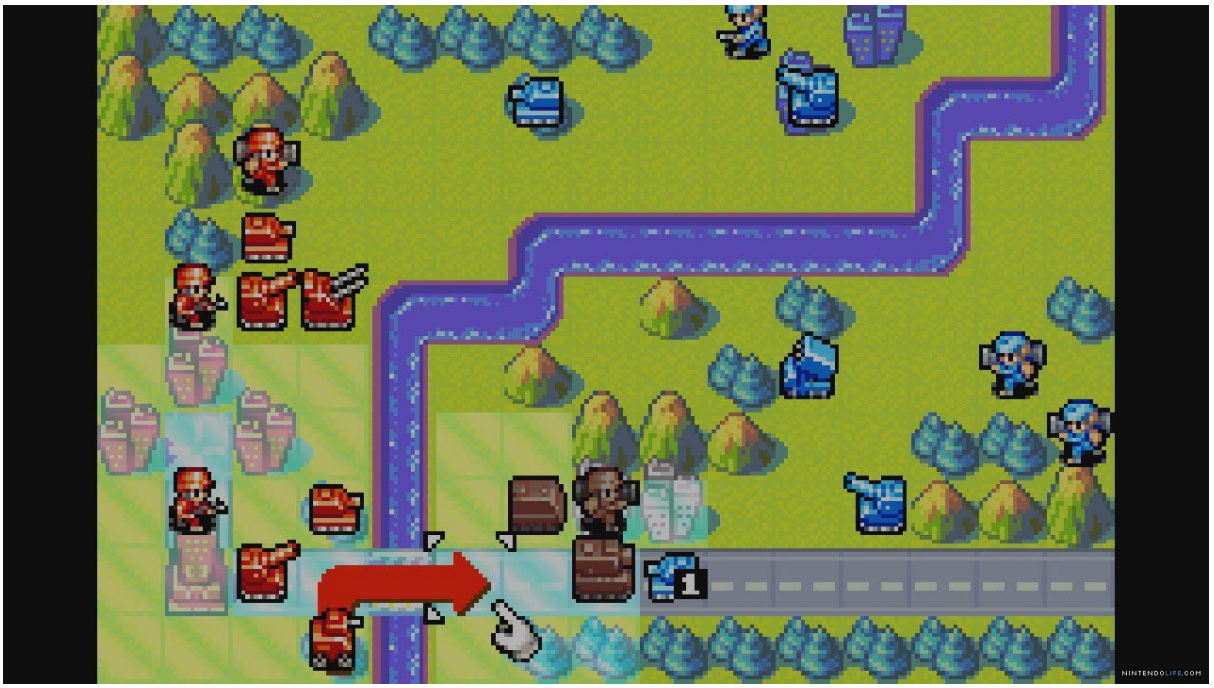
Let us say that a player in a strategy game wants to engage in armed conflict against an enemy. In order to engage in armed conflict, the players need units, which they can command and use against enemy units on the battlefield (Adams & Rollings, 2007). In order to obtain units, players need to have the facilities to produce them. In order to do that, the players usually needs the locate and gather the essential resources, which is found around the game map (Buro, 2003; Adams & Rollings, 2007). What I am trying to point out, is that strategy games to a high degree requires, that the player adopts a more tactical approach, where the player is required to think ahead in several steps in order to accomplish the goals.

2.2 Difference between real time and turn-based strategy games

According to Adams and Rollings (2007) one should distinguish between two types of strategy games, which are turn-based (TBS) and real time strategy games (RTS). In TBS games players take turns playing and making actions in the game (Adams & Rollings, 2007; Khosrow-Pour, 2015). This also means, that the players in TBS games are naturally limited by things like turns, waiting times and limited movement opportunities, while they play (Adams & Rollings, 2007; Khosrow-Pour, 2015). This is also the reason that TBS games have a particular emphasis on performing thoughtful actions through careful planning of each turn (Adams & Rollings, 2007; Hinrichs & Forbus, 2007).

Players in TBS games are required to consider the benefits and the disadvantages of their actions and choices in connection with each turn (Adams & Rollings, 2007; Hinrichs, & Forbus, 2007). The game design and game experience of TBS games can to some extent be compared to a complex and interactive chess game, where players must assess each piece, that their have to their disposal and each action they make in order to think ahead and outwit their opponent (Tekinbaş, & Zimmerman, 2003; Adams & Rollings, 2007; Donovan, 2010).

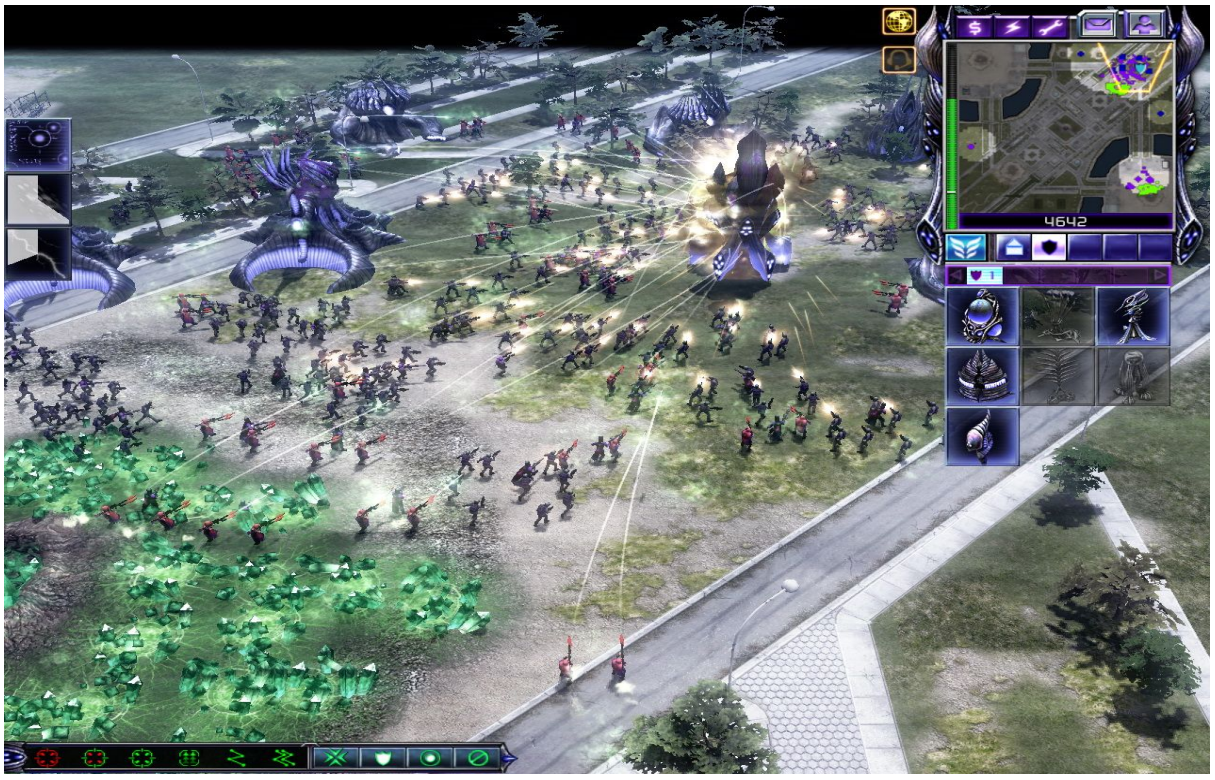
A disadvantage of the turn-based structure in TBS games is, that it sometimes creates frustration or analysis paralysis from players, when some gamers spend a large amount of time to consider his or her action and in this way delays others gamers ability to act (Adams & Rolling, 2007).



Picture 1: Advance Wars (Intelligent Systems, 2001) is a typical example of a turn-based strategy game where the player control the Orange Star Army who battles other countries armies in big turn based battles.

In real-time strategy games the players have the ability and the freedom to perform several actions both at the same time and in real time (Tekinbaş, & Zimmerman, 2003; Adams & Rollings, 2007; Egenfeldt-Nielsen, Smith, & Tosca, 2016). Hence, RTS games put more emphasis on time pressure, because players are forced to make actions, as they occur in the game, which often happens quickly and sometimes without warning (Adams & Rolling, 2007).

Responding quickly enough against enemies in RTS games is also complicated by the fact, that players often do not know both the location of enemy bases or the strength of the individual enemy units, before they meet them on the battlefield which in game terminology is called fog of war (Buro, 2003; Tekinbaş, & Zimmerman, 2003; Adams & Rolling, 2007).



Picture 2 - Command & Conquer 3: Tiberium War (EA Los Angeles, 2007) is a typical example of a real-time strategy game, where the player is part of the battle between the Global Defense Initiative and the Brotherhood of Nod.

2.3 User interfaces in video games

A user interface can be described by its function as the connecting link between user and (digital) system (Rogers, Sharp, & Preece, 2011). Hence, the concept covers several things that we encounter in everyday life. Especially, in most of the technological devices we use today such as televisions, cell phones, computers etc. (Rogers et al., 2011).

Nonetheless, the aims when designing user interfaces in common computer programs and video games differ in a certain and crucial way (Adams and Rolling, 2007). The key objective when designing common computer programs such as word-processing tools, painting tools etc. is to make them as efficient as possible. However, the logic in games differ, since it is important, that the player of a video game is continuously challenged and entertained during the gameplay. In other words, as Adams and Rolling (2007) point out, the game's user interface should entertain as well as facilitate the user. Desurvire et al. (2004) clearly describe the difference in the following way:

“The goals of software productivity are to make the software interface easy to learn, use, and master, and somewhat oppose design goals for games, usually characterized as easy to learn, difficult to master.” (Desurvire et al. 2004).

According to Bateman and Boon (2006) the most important aspect of user interfaces in video games is, that the interface define all the ways in which players can interact with a game (Bateman & Boon, 2006). According to Jorgensen the main objective of user interfaces and interactions in video games is to provide the players with the possibilities to make choices and perform actions (Jorgensen, 2013). As such, a game’s user interface works as a communication and support system, which is important for the practical use of the game and the game experience (Jorgensen, 2013).

In order to function as the link between the player and the video game, the interface needs to communicate/display the options a player have in the game and which parts of a game the player can interact with (Bateman and Boon; 2006; Adams and Rolling, 2007). When a player press a button on a keyboard or activate an option with a mouse on a screen, what they actually are doing is sending an input into the game (Adams and Rolling, 2007). This input is received and interpreted by a user interface and turned into a specific action inside the game as illustrated in figure 1 (Adams and Rolling, 2007).

The way an action is shaped or formed depends very much on which game mechanics a certain video game contains and the specific challenge a player has to complete (Adams and Rolling, 2007; Jorgensen, 2013). Broadly speaking the term “game mechanic” can be understood as the mechanisms through which players make meaningful choices and arrive at a meaningful play experience (Tekinbaş & Zimmerman, 2003). The result of a player's interaction with the game is sent back through the user interface as an output, which can be either an audio or graphic representation, which a player can register and evaluate as illustrated in figure 1 (Adams and Rolling, 2007; Jorgensen, 2013).

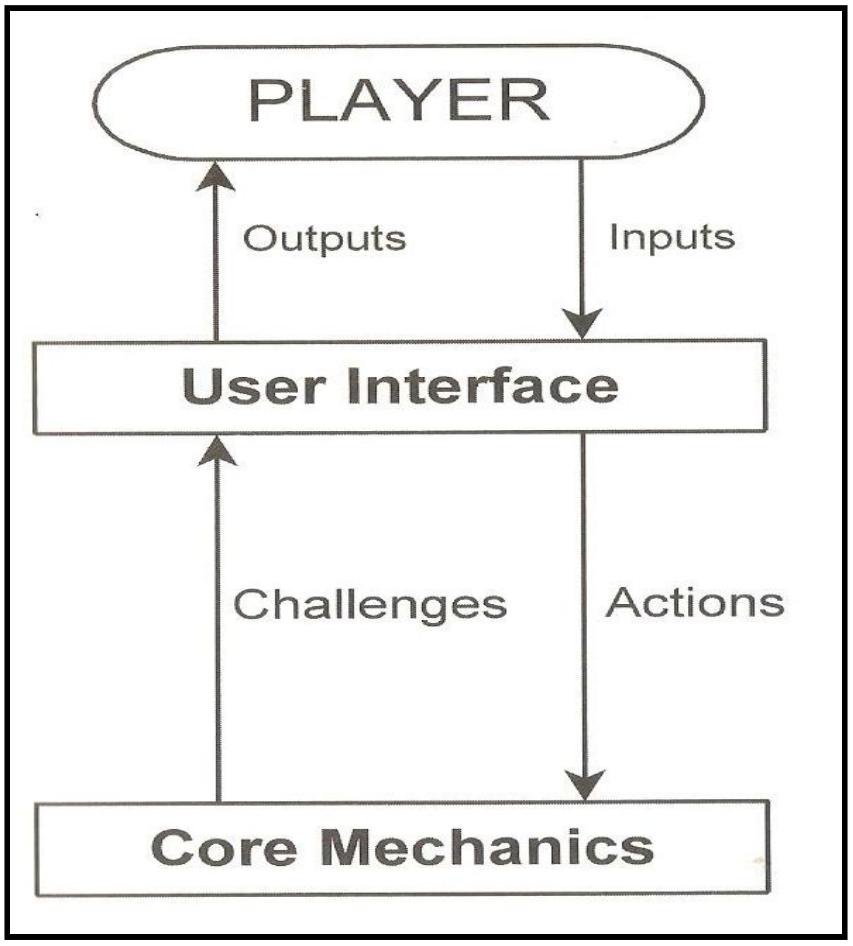


Figure 1: The relationships between core mechanics, user interface and player (Adams and Rolling, 2007)

It is basically about creating a natural association between actions and outcomes to such an extent, that players no longer need to think about, what button they need to press to carry out a particular action but becomes a natural part of their gameplay (Adams and Rolling, 2007).

Finally, it is important to point out, that the user interface functions as much more than just a presentation layer which receives input and display outputs (Adams and Rolling, 2007). The user interfaces also includes all the surrounding audio or graphic elements in the game world, which players can use actively as hints to understand the game and the way they play the game (Adams and Rolling, 2007). Sound and graphics in the game world can for example be used to indicate to the players, if enemies are sneaking up on them or are near their position.

3. Theory

The reason why identification of usability problems and optimization of user interfaces in strategy games are relevant is essentially, that a well-functioning user interface is a prerequisite in order to give the player a good experience - and for the game to sell. Therefore, I will start out with a presentation on how a user experience in the context of video games is understood. I will do this on the basis of the so-called the GameFlow model, which specifically deals with user experience in games. Based on this model, it will be clarified, that problems with usability in games are related to several key criterias, that are important for a good user experience.

Afterwards, I will present the existing literature's research on usability issues in video games, and based on these findings, I will deduce four hypotheses that relates directly to usability problems in strategy games. The first three hypotheses are more or less based on previous findings in the literature. In contrast, the last and fourth hypothesis is more exploratory in its nature, as the existing literature has not yet investigated, whether there is a difference in the frequency of usability problems in the strategy genre, depending on whether the game is turn-based or real-time.

3.1 User experience according to the GameFlow model

Broadly speaking the term experience can be understood as the result of the individual's interaction with the environment (Dewey, 1997). Within the field of Human-Computer Interaction (HCI) the term designing for experience is usually concerned with considerations on the user, the task and the context when designing a computer application. Most of the definitions which try to define user experience often focus on the users' perceptions and responses when using digital products (Takatalo, Häkkinen, Kaistinen, & Nyman, 2011). In this thesis, I rely on the definition of user experience formulated by Alben (1996), where the perception and responses are among the central elements:

"All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it" (Alben, 1996).

Unlike traditional interactive systems e.g. a desktop system, which is designed to perform a specific task, video games are often used by its users because of its recreational nature (Sánchez, Vela, Simarro, & Padilla-Zea, 2012). As a consequence of the recreational nature certain factors and motivations play a more prominent role, when we are talking about the user experience in connection to a video game. Hence, video games is basically interactive systems, whose main goal essentially is to entertain the users in order to create a fun and enjoyable experience for the players (Sánchez et al. 2012). In other words, the user's affective experience is crucial for the user experience. If the game cannot create positive emotions in the user, then the player will simply choose another game, that can provide the demanded fun and enjoyable experience.

In the literature on user experience in video games several different - but interrelated - concepts such as immersion, fun, presence, involvement, engagement, flow and playability are often used in order to describe and evaluate the user's experience (McMahan, 2003; Brown & Cairns, 2004; Nakatsu et al. 2005; Sweetser & Wyeth, 2005; IJsselsteijn, De Kort, Poels, Jurgelionis, & Bellotti, 2007). These concepts are usually defined in a broad manner, why there is often a certain overlap among them (Takatalo et al. 2011). Instead of accounting for all these interrelated concepts, I will focus on the GameFlow model, which has been developed by Sweetser and Wyeth (2005) based on the concept of flow.

Based on the theoretical concept of flow, Sweetser and Wyeth (2005) use insights from the literature on game usability and user experience to formulate a model, that can be used to design, evaluate and understand enjoyment in games. As such, a key strength with this model is, that it seeks to synthesize and integrate the literature on game design into a unified and structured model on enjoyment in games. Furthermore, the GameFlow model here serves to illustrate key elements connected to user experience in video games.

The concept of flow was originally developed by Csikszentmihalyi (1990), who did extensive research on the factors, that makes experiences enjoyable. When Csikszentmihalyi developed the concept of flow and conducted his research, the aim was not to understand experiences in connection to video games per se. Instead, the scope of his research was more broad with the aim to basically understand, what characterises enjoyable experiences. Nonetheless, the concept is often used in the literature on game design (Draper 2000; Jones 1998; Paush 1994; Picard 1997) because of its explicit focus on enjoyment, which - as mentioned - is essential in relation to user experience in video games.

In Csikszentmihalyi's own words, flow is an experience "so gratifying that people are willing to do it for its own sake, with little concern for what they will get out of it, even when it is difficult or dangerous" (Csikszentmihalyi 1990). An key element in that regard is the lack of clear external rewards by performing the task. Instead, doing the task and experiencing flow is an end in itself (Sweetser & Wyeth 2005).

According to Csikszentmihalyi (1990), flow experiences is constituted by the following eight elements:

1. A task that can be completed
2. The ability to concentrate on the task
3. That concentration is possible because the task has clear goals
4. That concentration is possible because the task provides immediate feedback
5. The ability to exercise a sense of control over actions
6. A deep but effortless involvement that removes awareness of the frustrations of everyday life
7. Concern for self disappears, but sense of self emerges stronger afterwards
8. The sense of the duration of time is altered

It is the combination of these eight elements that leads to an experience of enjoyment that make people invest their energy. Yet, also a match between the individual's skillset and the task at hand is understood as a prerequisite for experiencing flow.

Based on the eight constituting elements in Csikszentmihalyi's theory on flow, Sweester and Wyeth formulated a model of eight elements (the GameFlow model), thereby adapting the broader concept of flow directly to flow in games: concentration, challenge, skills, control, clear goals, feedback, immersion and social interaction. In the following I will briefly account for the essence in these elements. Afterwards, table 1 presents a more detailed description of criterias that are associated with the different main elements.

1. Concentration denotes that a game should ideally captivate the player's attention in order to make the person completely absorbed by the activity (Sweester & Wyeth 2005). This implies considering a balance between providing the player with stimuli of different sorts, while ensuring that these stimuli doesn't distract the player or exceeds the player's perceptual, cognitive and memory limits (Sweester & Wyeth 2005).

2. Challenge denotes that a game should be sufficiently challenging for the player and match the player's skill level. This implies that a game should not be discouragingly hard or boringly easy (Sweester & Wyeth 2005). As Johnson and Wiles (2003) argues, challenges exceeding player skills will likely result in anxiety, while challenges below the skills will lead to apathy. In a sense, the key aim is that the players feel that their efforts are paying off as the players try to accomplish the do-able challenges (Gee, 2004).

3. Skills denotes that the game should be able to support the player in developing the sufficient skills that are required to play and master the game (Sweester & Wyeth 2005).

4. Control denotes a feeling that the player should have the ability to control his actions. In company with other the players should feel that their intentions are brought into play in the game (Sweester & Wyeth 2005).

5. Clear goals denotes the importance of precise goals in the game. It relates both to the game's overall goal, but also to the many subgoals, which the player constantly meets as the player progresses in the game (Sweester & Wyeth 2005).

6. Feedback denotes that the player should continuously get feedback. This is partly due to the importance of the player having a sense of progress in the game (Sweester & Wyeth 2005).

7. Immersion denotes the player's involvement in the game. The goal is to be engaged and deeply absorbed by the game and where other factors from "reality" automatically fades into the background (Sweester & Wyeth 2005).

8. Social interaction denotes the importance of supporting the interaction between different players of the game - both inside and outside the game (e.g. through online chat and virtual communities) (Sweester & Wyeth 2005).

Table 1 lists related criterias for the overall elements of the GameFlow model, which provides a more practical presentation of factors, that are important to consider when designing a game.

Overall element	Criterias
Concentration	● There must be stimulus that attracts attention ● The game must quickly capture the player and maintain their focus ● There should be no tasks that are not perceived as important ● The workload must be high without exceeding the cognitive and memory limits of the player
Challenge	● Challenges must be in accordance with the players' abilities ● There must be a variety of difficulty levels for different players ● The degree of difficulty must gradually increase ● There must be new challenges continuously in an appropriate pace
Skills	● There should be no need for a manual, but for example the possibility of online help ● The introduction must not be boring and should give the impression that you are playing the game ● The game must improve the ability of players at an appropriate pace ● Interfaces and game mechanics should be easy to learn and use ● There should be a reward for player development
Control	● The player must feel in control of the characters / units and their movements and interactions, user interface and its input, game shell (eg. Start, stop, save) ● The player must feel an influence on the game through his actions, for example. Through the player's chosen strategies ● The player should not be able to make mistakes that "destroy" the game ● The player must have a feeling that they have the freedom to play the game the way they want
Clear goals	● The overall goal of the game must be clear and presented early in the game, while intermediate goals must be clear and presented where appropriate
Feedback	● There must be feedback in connection with the activities and continued progress towards the game goal ● It must be clear what is the status of the game
Immersion	● The player must become less aware of his surroundings and time as well as being less worried ● The player must feel intuitively and emotionally involved in the game
Social interaction	● The game must support the cooperation and competition between the players ● The game must support the social interaction and community between players - both inside and outside the game

Table 1: Central Criterias in the GameFlow Model (Sweester & Wyeth 2005)

The above eight elements from the GameFlow model and the related criteria in Table 1 illustrate, that there is a wide range of factors, that affect the gaming experience for the user. Nonetheless, it is important to point out, that not all of these criteria are central to the particular focus of this master thesis about the optimization of user interfaces in strategy games.

The GameFlow model indirectly illustrates, that even the most optimal and well-designed interface does not guarantee a good gaming experience. Having said that, the interface is a prerequisite for a good gaming experience, because even the best and most interesting narrative in a game is not worth much, if the interface does not allow the player to act satisfactorily.

3.2 Links between usability and user experience

As mentioned in the previous section regarding users' experiences with video games, there are several factors, which have an affect on the experience. More specifically, it may be factors such as design, game narrative, severity and the actual mechanics (Pinelle 2008a). If a player shall have the opportunity to experience the ultimate state of flow, all these factors are therefore important.

Nevertheless, the usability of the game's interface is an essential prerequisite, since the narrative of the game and game universe of course is never experienced, if the player does not have a functional interface, that allows the player to explore the story and the universe. In other words, usability is an essential prerequisite for a game's success and the game experience itself.

In this thesis, I define usability in line with Pinelle et al. (2008a), which state that usability is the degree to which a player is able to learn, control, and understand a game. Based on this definition, it becomes quite clear why usability is central to the user experience, when you compare the central elements of this definition with the criterias found in GameFlow model, as explained in the last section.

The ability to learn is clearly expressed in the element skills, which emphasize that there should not be a need for a manual and that the interface should be easy to use. The ability to control is especially evident in connection with the element of the same name in the GameFlow-model, which emphasizes the player's sense of control over his actions in the game. The last element in the definition is the ability to understand, which relates mostly to the feedback element in GameFlow model. This element emphasizes the importance of ongoing feedback that should guide the player on whether his actions are correct or not in relation to the game's challenges and goals.

Although the elements in the definition of usability (learn, control and understand) relate to specific elements in the GameFlow model, it does not necessarily mean, that they do not have relevance for other elements and criterias in the model. For example the immersion element deals with a deep and committed involvement in the game, where it is more or less an implied assumption, that the interface has to work, since a poorly designed user interface will naturally interfere with the experience. Another similar example would be in connection with the concentration element, where a lack of control over the interface could likely lead to a loss of focus from the primary tasks in the game.

Despite of the above mentioned examples, it is important to point out, that usability can be delimited if necessary. For example, usability are not usually considered to be related to the more technical aspects such as graphic and audio quality (Pinelle et al. 2008a). The same is true for the more content-related material e.g. the game's storyline and its associated challenges.

3.2 Usability problems in video games

There are several articles and books on usability issues in interactive systems (Rogers, Sharp, & Preece, 2011; Dix, 2004; Nielsen, 2010). Yet, this broad literature are likely not sufficient to draw on, if the aim is to design a good interface in a video game. This results from the underlying logic in video games - as mentioned previously - that differs from the conventional wisdom about how to customize user interfaces. Specifically, the key objective for a common computer program is efficiency, while games' interfaces should also challenge the player in order to improve the player's skills and entertain. Therefore, room for errors are often designed on purpose in video games (Pinelle 2008a). In order to account for the different design objectives in video games, I will therefore now focus on the (limited) existing literature, that puts an explicit focus on usability in video games.

In an article from 2008, Pinelle et al. (2008a) present a set of heuristics specifically designed to test a game's usability. Based on a review of 108 game reviews, Pinelle et al. (2008a) identify 12 usability problem categories that often occur in games. Based on these 12 categories, they develop 10 heuristics that describe how these usability issues can be avoided. These problem categories are presented table 2, since my empirical analysis of usability issues in strategy games will be based on these categories.

Categories of usability problems	Typical issues
1. Consistency - Unpredictable/inconsistent response to user's actions	● Poor hit detection ● Poor in-game physics ● Inconsistent response to input
2. Customizability - Does not allow enough customization	● Does not allow user to change video and audio settings, difficulty, or game speed
3. Artificial intelligence - Artificial intelligence problems	● Problems with pathfinding ● Problems with computer controlled teammates
4. View Mismatch - Mismatch between camera/view and action	● Bad camera angle ● View is obstructed ● View does not adjust to user's action quickly enough
5. Skip Content - Does not let user skip non-playable content	● Cannot skip video and audio clips ● Frequently repeated sequences
6. Input Mapping - Clumsy input scheme	● Bad input mappings ● Limited device support ● Limited control customization
7. Control - Difficult to control actions in the game	● Oversensitive controls ● Unnatural controls ● Unresponsive controls
8. Game Status - Does not provide enough information on game status	● Does not provide adequate information on character, game world, or enemies ● Visual indicators, icons, and maps are inadequate
9. Training and Help - Does not provide adequate training and help	● Does not provide default and recommended choices ● Does not provide suggestions and help ● Does not provide adequate documentation, instructions, tutorials, and training missions
10. Command Sequences - Command sequences are too complex	● Learning curve is too steep ● Requires too much micromanagement ● Command sequences are complex, lengthy, and awkward, making the game difficult to play
11. Visual Representations - Visual representations are difficult to interpret	● Bad visualization of information ● Too much screen clutter ● Too many characters or game elements on the screen at the same time ● Difficult to visually distinguish interactive content from non-interactive content
12. Response Times - Response to user's action not timely enough	● Slow response time interferes with user's ability to interact with the game successfully

Table 2: Categories of usability problems (Pinelle et al. 2008a).

It is important to point out that Pinelle et al. (2008a) assess usability problems from a broad view across many different game genres, as they examine game reviews from the following game genres: role playing, sports/racing, first person shooter/tactical shooter, action, strategy (both real-time and turn-based), and adventure. This leads to the question of whether some particular usability problems are more relevant to strategy games, which will be elaborated on in the following section.

3.3 Usability problems in different game genres

Based on game reviews from the media outlet called GameSpot, Pinelle et al. (2008b) tested whether the frequency of different usability problems varied between the game genres. Probably as a result of the rather few observations within each game genre (18 game reviews per game genre), Pinelle et al. (2008b) "only" found statistically significant differences among pairs of game genres for five of their 12 problem categories (artificial intelligence, view mismatch, skip content, controls and visual representations). Nevertheless, the results showed several distinct problem patterns. Hence, their results still give an indication of how the problems are divided between the game genres, which can be used to derive hypotheses about which issues are especially common for strategy games.

At first glance, it seems quite clear, that there are distinct variations in the user interface across different type of game genres. The clear difference is evident especially in relation to visual and interactive aspects (Pinelle 2008b). This is illustrated in the pictures below, that show the interface in a strategy game and a racing game. The first pictures depicts the interface in the strategy game Total Warhammer (Creative Assembly, 2016), which is characterized by relatively many informations/options.

Picture 3: A typical user interface from a strategy game from Total War: Warhammer (Creative Assembly, 2016)

The next picture is from Need for Speed No Limits (Firemonkeys Studios, 2015) from the genre action/racing. In contrast to the interface in Total Warhammer, this user interface is characterized by relatively few informations/options with only some sparse information on position, progress and speed.

Picture 4: A typical user interface from a action/racing game from Need for Speed No Limits (Firemonkeys Studios, 2015)

The clear differences between the interfaces of the two game genres indicate, that game designers have to base their design considerations and decisions on the genre characteristics. This leads to the question of whether the difference is also expressed in relation to certain usability problems across the game genres. The results from Pinelle et al. (2008b) seem to respond affirmatively to this question as illustrated in figure 2, which summarizes the results of the study by Pinelle et al. (2008b). Here it is evident, that there is a a lot of variation in the frequency of different usability problems across game genres.

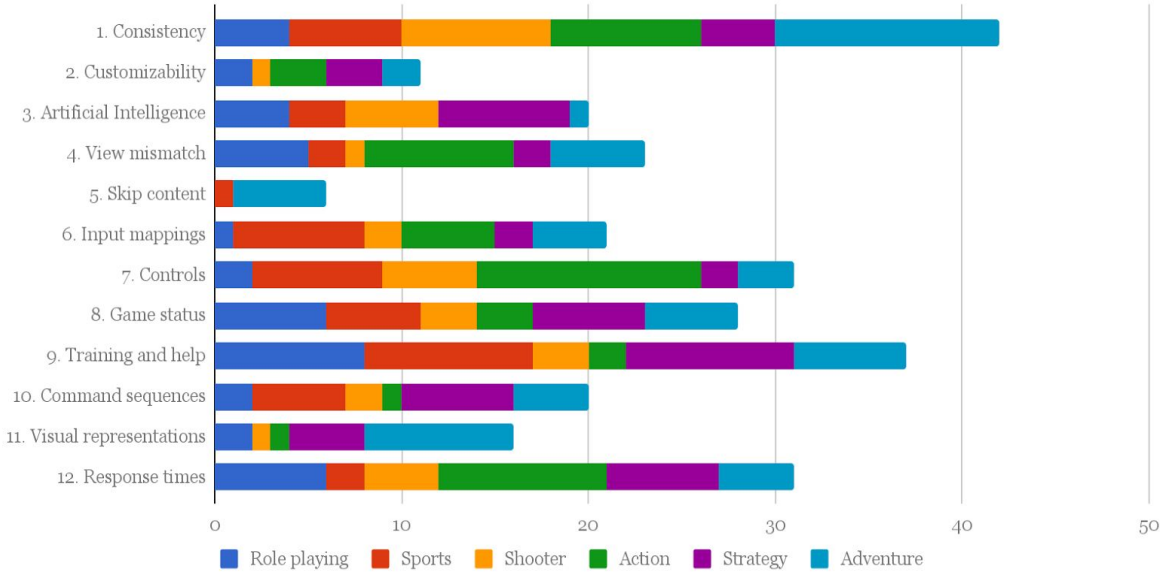


Figure 2: Frequency of usability problems in the study by Pinelle et al. (2008b)

The different frequency of problems associated related to artificial intelligence in strategy and action games illustrates the variation. Since the player usually only control a single person or unit in action games, there is not many demands regarding artificial intelligence. In contrast, players in strategy games have to manage the actions of several units, which demands a well-functioning artificial intelligence as the player cannot usually observe all the units at the same time. Therefore, it makes sense that the frequency of problems stemming from artificial intelligence are more pronounced in strategy games compared to actions games.

Although there are differences in the user interface, they should not be exaggerated (Pinelle 2008b). This is especially true when talking about user interfaces within the same game genre as illustrated in the picture 5 and picture 6 below, which show the user interfaces from Starcraft (Blizzard Entertainment, 1998) and Age of Empires II: The Age of Kings (Ensemble Studios, 2013) respectively. Both games are strategy games, but their themes are widely different, one being historical while the other is sci-fi.

Historical strategy games like Age of Empires II: The Age of Kings (Ensemble Studios, 2013) focuses mainly on historical perspectives and elements in their narrative and gameplay. In constrast, futuristic games such as Starcraft (Blizzard Entertainment, 1998) focuses mainly on futuristic perspectives and elements in their narrative and gameplay. In Starcraft the actions often take places on planets and in galaxy far away in the future, where technology is very advanced and where mythical races fight each other on different planets for the control of the galaxy.

Picture 5: Age of Empires II: The Age of Kings (Ensemble Studios, 2013) is a historical strategy game, where historically battles and heroes are a central part of the gameplay.

Despite the different themes, the pictures show that the basic components of the user interfaces in both strategy games are similar such as the navigation schemes and the input mappings. These similarities within the same genre illustrate, that game designers do not need to start from the bottom each time, as there is a certain basic structure, that is applied within the game genre in question (Pinelle 2008b).

Picture 6: Starcraft (Blizzard Entertainment, 1998) is a futuristic strategy games, where different races fight each other with high tech weapons and advanced technology.

3.4 Usability problems in strategy games

In the section above, the results from Pinelle et al. (2008b) was shown in order to present the different frequencies of usability problems across game genres. Yet, the thesis' problem statement specifically concerns the frequency of usability problems in games from the strategy genre. Therefore, figure 3 shows the frequency of problems only for the strategy genre based on the results by Pinelle et al. (2008b).

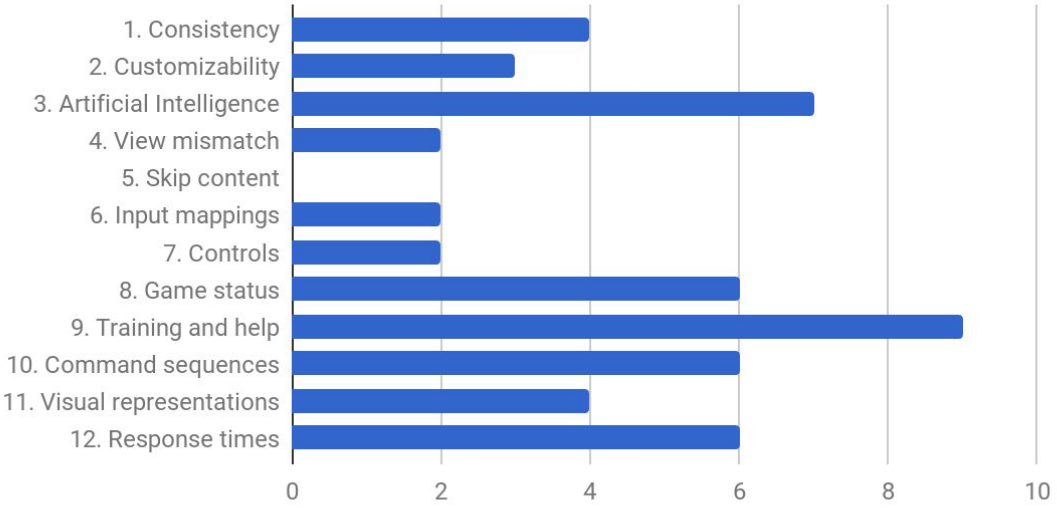


Figure 3: Overview of the frequency of the different problem categories from Pinelle et al. (2008b) research.

At first glance, figure 3 shows a high incidence of problems related to artificial intelligence, training and help, game status, command sequences and response times, while there is a low incidence of problems with skip content, view mismatch, controls and input mappings. In order to make hypotheses about the usability problems in strategy games, I will in the following discuss, if and why these results makes sense, when you consider the characteristics from the strategy genre.

The first problem category from the study by Pinelle et al. (2008b) deals with consistency in video games. Pinelle et al. (2008b) finds, that strategy games have a somewhat low frequency of usability problems associated with the consistency problem category, whereas the frequency of this problem category is highest in shooters and action games (see figure 2). These results make sense to some extent, when considering the characteristics of strategy games and take into account, that strategy games do not use in-game physics in the same way as shooters and action games to guide avatars around in vast 3D environments.

The second problem category from the study by Pinelle et al. (2008b) deals with customizability in video games. Pinelle et al. (2008b) finds, that strategy games have a somewhat low frequency of usability problems associated with customizability. The same is true regarding the other games genres according to the results of Pinelle et al. (2008b) which is evident in figure 2. The rather small variation between the different genres is not surprising as problems with customization of video and audio settings, difficulty or game speed are probably equally relevant across the different game genres.

The third problem category from the study by Pinelle et al. (2008b) deals with artificial intelligence in video games. Pinelle et al. (2008b) finds, that there is a high frequency of usability problems associated with artificial intelligence in strategy games. This make sense from a theoretical standpoint, since strategy games through its gameplay often demands, that the player take control over a large number of units in the game, that need to interact with other computer controlled units and elements. This makes it vital, that the artificial intelligence supports both the players and non-player characters interactions within the games. In contrast, this problem seldom occur in adventure games, since there normally aren't any enemies or more units, that the player needs to control. Instead, the focus in the adventure games are more centered around the single avatar and controlling its actions.

The fourth problem category from the study by Pinelle et al. (2008b) deals with view mismatch in video games. Pinelle et al. (2008b) find, that there is a low frequency of usability problems associated with view mismatch in strategy games. Since the gameplay in strategy games are mostly seen from a top-down view, this also means that strategy games to a lesser extent gets bothered by objects, that block the view of players. In contrast, this is a more common problem in other game types, such as action games where the players often see things from a third person's point of view and need to maneuver around a lot of objects in 3D environments.

The fifth problem category from the study by Pinelle et al. (2008b) deals with skip content. Pinelle et al. (2008b) find a low frequency of usability problems associated with skip content in connection with strategy games, and they find that almost the only problems with skip content is present in adventure games (see table 2), which makes sense since there are often more breaks in the gameplay in adventure games than other types of games as a result of more dialogs and video sequences. This of course doesn't mean that there are no dialogs and video sequences in other type of games such as strategy games, but they are not as dominant as in adventure games.

The sixth problem category from the study by Pinelle et al. (2008b) deals with input mapping. Pinelle et al. (2008b) find a low frequency of usability problems associated with input mapping in strategy games. In strategy games the artificial intelligence normally takes over the control of the individual unit once a command have been given by the player, whereas for example sports games require more rapid responses and a high level of interaction from the players to function effectively.

The seventh problem category from the study by Pinelle et al. (2008b) deals with control in video games. Pinelle et al. (2008b) find a relatively low frequency of problems within this category. Unlike the other categories, I do not find these results as obvious theoretically speaking. One possible explanation may be, that Pinelle et al. (2008b) do not distinguish whether strategy games are real time or turn-based. The importance of this distinction will be elaborated on further in the next section.

The eighth problem category from the study by Pinelle et al. (2008b) deals with game status in video games. Pinelle et al. (2008b) find a high frequency of usability problems associated with game status in strategy games. This makes sense, since game status is essential in strategy games, because the players need to have an overview of his/her units and understand what is happening in the game (Pinelle et al., 2008b).

The ninth problem category from the study by Pinelle et al. (2008b) deals with training and help in video games. Pinelle et al. (2008b) find a high frequency of usability problems associated with training and help in strategy games. As mentioned earlier in the conceptual clarification of strategy games, the management of several different units' actions is a common thing in strategy games. This leads to more complexity in strategy games compared to the majority of other game genres. Therefore, the users need to be provided with adequate help and training in order to keep track of things. Hence, the high frequency of usability problems with training and help identified by Pinelle et al. (2008b) makes sense theoretically.

The tenth problem category from the study by Pinelle et al. (2008b) deals with command sequences in video games. Pinelle et al. (2008b) find a high frequency of usability problems associated with command sequences in strategy games. In strategy games there are a large requirement for micro management, where players need to manage resources, devices, supply lines, etc. Thus, the high frequency of problems related to command sequences makes theoretical sense, because command sequences that are difficult to execute or remember will make the micro management too resourceful (Pinelle et al. 2008b).

The eleventh problem category from the study by Pinelle et al. (2008b) concerns usability problems associated with visual representations. Pinelle et al. (2008b) generally find very few problems with this problem category across the different genres. Having said that, it is important to point out, that strategy games do have the second highest frequency of all the games in terms of usability problems associated with visual representations. This makes sense, because all interactions with one avatar or several units can easily become highly complicated, if it is not easy to see them visually.

The twelfth and last problem category from the study by Pinelle et al. (2008b) concerns usability problems associated with response times in video game. Response times are most important in video games that are high-paced, where there are high demands on how fast a player needs to respond (Pinelle et al., 2008b). Therefore, it also makes sense that it appears mostly in action games, which are typically high-paced. Furthermore, it also makes sense that it does not occur so often in adventure games, that are typically more slow-paced (see results in table 2).

Yet, according to the above logic, it is a bit surprising, that the appearance of problems with response time is low in shooter games, while it is high in relation to the more slow-paced role playing games. Nonetheless, I will once again in connection to strategy games argue, that it might be relevant to distinguish between games that are turn-based and real-time, since real-time games typically have greater response time requirements. In the following section I will elaborate further on this argument.

In sum, the vast majority of the results in the study by Pinelle et al. (2008b) seem to make sense theoretically, as discussed in the above. That said, the results regarding the problem categories of control and response times are a bit surprising. Since the results in connection with ten of the categories seemingly makes sense theoretically, I will start by deducing hypotheses about their expected frequencies and shares in strategy games. Based on the above assessment, I will expect that the problem categories view mismatch, input mapping and skip content will occur very rarely in strategy games. I therefore hypothesize:

> H1: Problems regarding view mismatch, skip content and input mapping will occur the least in strategy games.

Furthermore, I will expect that a number of problem categories will form an intermediate category in relation to their frequency. More specifically, these problem categories are consistency, customizability and visual representation. I therefore hypothesize:

> H2: Problems regarding consistency, customizability and visual representation will neither occur frequently or seldom in strategy games.

Finally, the problem categories artificial intelligence, command sequences, training and help and game status will be expected to be the ones, that will occur with the highest frequency in strategy games. I therefore hypothesize:

> H3: Problems regarding artificial intelligence, command sequences, training and help and game status will occur most frequently in strategy games.

3.5 Identical usability problems in turn-based and real time games?

In the previous section, three hypotheses have been put forward in relation to ten of the problem categories. This leaves two problem categories which is control and response time. In connection to these problem categories, a closer look at the results from Pinelle et al. (2008b) give some clues that can be used to deduce the final hypothesis regarding the frequencies of problems for these two problem categories.

As clarified in the conceptual clarification section in the thesis, a key distinction regarding strategy games is whether the game is TBS or RTS (Adams and Rollings, 2007). Since players take turns playing and making actions in TBS games, they are naturally limited by turns, waiting times and limited movements opportunities (Adams & Rollings, 2007; Khosrow-Pour, 2015). In contrast, players in RTS games have the ability and the freedom to perform several actions both at the same time and in real time (Tekinbaş, & Zimmerman, 2003; Adams & Rollings, 2007; Egenfeldt-Nielsen, Smith, & Tosca, 2016). This implies, that there is a bigger time pressure in the real time games, where the player are required to respond more quickly to the changes and actions in the game.

The difference in time pressure gives rise to the question, if certain problems are more likely to occur depending on whether the game is TBS or RTS. Here the results from Pinelle et al. (2008a) can again be informative in order to derive a hypothesis.

The defining characteristics in action games is coordination and quick reaction time (Pinelle 2008b). In contrast to action games, adventure games are slow-paced with an emphasis on exploration of the game world and problem solving (Pinelle 2008b). Thus, if there is different problems connected with these two genres, it will indicate that differences in time pressure might account for some of the explanation. In other words, differences in problems associated with these two game genres can give clues as to whether differences in time pressure are connected to specific usability problems. In this connection, figure 4 shows the problems' frequency for the two genres.

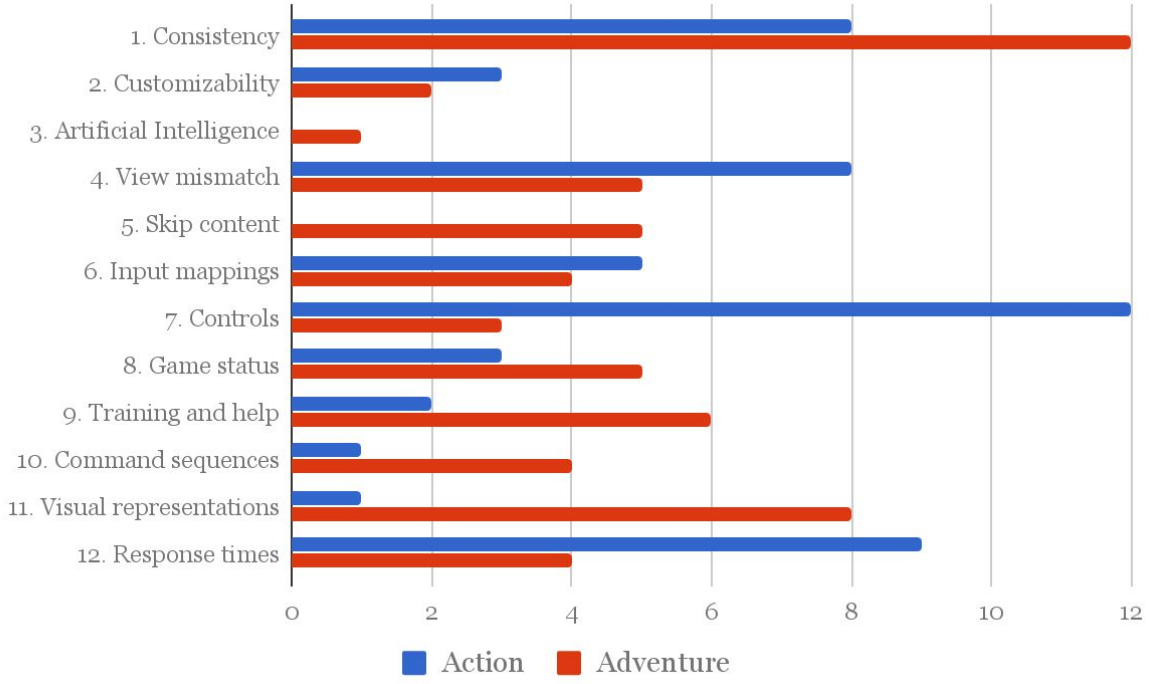


Figure 4: Frequency of problems in action games and adventure games (Pinelle 2008b)

Figure 4 shows, that the type of problems associated with the two game genres are varied - especially regarding response times and controls. For action games there is a high frequency of problems such as responsiveness of controls and response times, while these occur seldom in adventure games.

It will be hasty to conclude, that the difference in time pressure are the main explanation for these differences. Nonetheless, it is not farfetched to assume that differences in time pressure are among the influential factors. Since action games are high-paced and demands quick commands and responses, it makes sense that the problems such as response times and controls are typical for this genre, while these problems seldom occur in relation to the more slow-paced adventure games.

This empirical result from Pinelle et al. (2008b) indicates, that a similar pattern might also be identified between turn-based and real time strategy games, since they also vary in terms of the demands for quick commands and responses. If this is true, it should be expected, that the frequency of problems with both controls and response times will be higher in connection to strategy games that are real time based. This leads to the fourth and final hypothesis:

> H4: Problems regarding controls and response times will be more frequent for real time based strategy games and less frequent for turn-based strategy games.

4. Data and method

In order to answer the problem statement of this master thesis and test the deduced hypotheses, I need to identify the issues that are most frequent in strategy games. Subsequently, I need to analyze how these problems occur more concretely in the context of strategy games. This will make it possible to set up a prioritized ranking of problems for strategy games, that can inform game designers on what they especially need to pay attention to. In the following, I will therefore describe the methodological approach, that allows me to test the hypotheses and create the desired ranking.

4.1 Data

The usability issues for strategy games are identified and classified using the twelve problem categories from the study by Pinelle et al. (2008a), which I presented in the theoretical section. These problem categories were created by Pinelle et al. (2008a; 2008b) by reviewing 108 game reviews from the website GameSpot, which are written by professional game reviewers. Specifically, the game reviews were limited to PC games from the following six major game categories: 1) Role playing, 2) Sports, 3) Shooter, 4) Action, 5) Strategy and 6) Adventure. The game reviews from GameSpot were given to three researchers with extensive experience in making evaluations of usability problems in video games. The three researchers reviewed the reports separately and noted ongoing problems with usability. Subsequently, the researchers met and compared the identified problems, resulting in twelve main problem categories.

Like Pinelle et al. (2008a) I also use game reviews from GameSpot to analyze usability issues in strategy games. These game reviews also concern issues, that do not directly concern usability, e.g. graphic and sound quality. All the factors judged together leads to a score between 1-10 given by the professional game reviewer, where 10 is the best possible rating. More specifically, the score corresponds to the following rating in GameSpot's own terminology 1) abysmal, 2) terrible, 3) bad, 4) poor, 5) mediocre, 6) fair, 7) good, 8) great, 9) superb and 10) essential.

In this master thesis, 50 reviews from GameSpot are included from the strategy game genre that has been published in the time period from 1993 through 2017. This is far more game reviews within the strategy game genre, than in the study by Pinelle et al. (2008a), whose results are based on 18 reviews of strategy games. I selected the games based on GameSpot's own classification of game genres.

Due to the larger data base, the results of the master thesis is expected to be more robust than the results from the study carried out by Pinelle et al. (2008a), where there is a greater chance of a random result - although the findings from Pinelle et al (2008a), as previously mentioned, in general makes good sense theoretically.

Since I also use GameSpot reviews as an integrated part in my own analysis, it makes it easier for me to compare my results with the results from Pinelle et al. (2008b). However, GameSpot is just one of several websites, that have game reviews made by experienced reviewers with quantitative scores for the overall rating (see for example IGN, PC Gamer, Polygon). The question therefore becomes, whether the same usability issues also would have been highlighted by game reviewers from the other websites.

If there are large fluctuations in the scores for the same game across the websites, it will be problematic, as it will indicate that some of the variation is due to certain subjective tastes of preference in the different media outlets. It would be preferable if the reviewers ratings follow each other more or less, as it will indicate a more objective rating.

In order to strengthen the belief in the reviews from GameSpot, I have done a simple test by comparing the strategy game scores from GameSpot and Metacritic, respectively. In the test I have included 32 games from my own dataset, since that was the amount of games, that I could also find game review scores from in Metacritic. Comparison with Metacritic is advantageous as this media outlet’s score represents a weighted average between several game reviews.

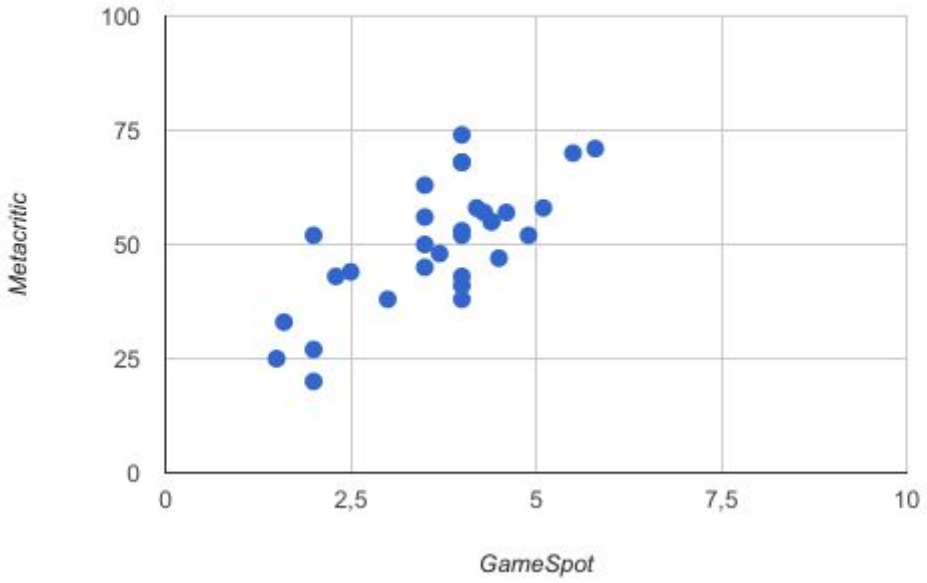


Figure 5: Correlation in game ratings from GameSpot and Metacritic (Appendix 1)

Figure 5 shows that there is a relatively clear correlation between the ratings of GameSpot and Metacritic, respectively. It basically shows that the reviews of GameSpot are relatively coincident with the average rating estimated by Metacritic. Hence, the ratings from GameSpot seems to give a fairly good impression of the average game rating.

The selected game reviews from GameSpot in my analysis is limited to PC games. It is chosen to ensure that the game platform does not vary, as it potentially yields misleading results, if there are some usability issues, that occur more frequent depending on the choice of the platform.

The disadvantage of exclusively looking at PC games is, that it can affect the generalisability of the results of the analysis, since it cannot be excluded, that some usability problems may occur more on other platforms. However, the disadvantage should not be overestimated. This is due to the fact, that in recent years, there have been a significant convergence of games, that have been released to various types of platforms (Pinelle 2008a). Secondly, the majority of strategy games compared to most other game genres are typically made for the PC platform. Nevertheless, it will be valuable to examine games from other platform in the future, in order to understand whether the results also apply to the other platforms.

Finally, it shall be mentioned that I have only include games with a rating under 6.5. The reason for the limit is, that Pinelle et al. (2008a) in their initial pilot study found, that the occurrence of usability problems in the best rated games were extremely limited. As it is the usability problems in strategy games, that are of interest, it is therefore most fruitful to focus on games with a rating below 6.5.

4.2 The Analytical approach

The analytical approach is initially quantitatively oriented. Specifically, in each game review, it is recorded which usability issues are explicitly mentioned in the game review by the game reviewer. As mentioned, I include more game reviews in my analysis compared to the study by Pinelle et al. (2008a; 2008b). Hence, in order to compare the results it would be misleading if I just compared the number of times a problem category is registred. Instead, I have to calculate the percentage share of each problem category because this measurement takes account for the difference in noted problems. I calculate this percentage share by using the following simple formula:

(Number of problem with category X ÷ Total number of problems for all categories) × 100 = Percentage share of category X

Since the last hypothesis of the subject deals with whether there is a variation in the occurrence of problems depending on whether the game is turn-based or real-time, I have also noted, whether the game in question is turn-based or real-time. The underlying rationale in this quantitative approach is, that the most frequently encountered issues indicate which issues are particularly relevant to the strategy games and the game experience.

The actual coding of usability issues is done by myself. It is therefore relevant to consider, whether another coder would also register the problems in the same way as myself. Ideally, it would be best to delegate the registration of game reviews to other experienced individuals in the area, and then test whether these people register the same problems. However, this is beyond the thesis' scope and available resources. In spite of that, the chosen method of self-coding is still usable.

Firstly, I use well-described problem categories specifically developed by researchers in the field to classify usability issues. Thus, I register problems based on a classification scheme validated by several researchers.

Secondly, the usability issues is not found by playing the games myself. Instead, I register the issues that other experienced game publishers put an emphasis on. And as shown before, the reviews from GameSpot correlates with average rating of other media outlets' game reviews.

The strength of counting the occurrence of usability issues and calculating the percentage shares is, that it provides a simple overview of what issues game designers in particular must pay attention to. However, it can be invoked that the counting of occurrence of usability issues do not necessarily reveal how important the usability issues actually are for the game experience. One might for example argue, that one issue of the less frequent issue can still be of greater importance to the player' user experience.

Pinelle et al. (2008a) are apparently well aware of this objection, as they instructed their own coders to also assess the severity of the problems encountered on the basis of Nielsen's severity scale - a scale with the following categories: 1) cosmetic problem, 2) minor problem, 3) major problem and 4) usability catastrophe (Nielsen, 1995). Nevertheless, Pinelle et al. (2008b) do not consider the question of severity in their study on usability problems across different genres (Pinelle, 2008b).

In this master thesis, I also abstain from a direct test of the severity of the problems, as it is not possible to test in a valid manner on the basis of the data. An option could be to examine, whether there is a correlation between the occurrence of particular problems and the rating given by the game reviewers. However, this method is also problematic, since the game reviews do not only concern usability issues. Therefore, it is not possible to judge, if the mentioned usability issues are the crucial factor for the reviewer's assessment. As such, the apparent correlation between a particular usability problem and the game review rating could possibly be caused by another factor unrelated to usability e.g. the game's narrative.

Although it is not possible to directly test the severity of the usability issues based on game reviews, it can however be argued that the frequency of particular usability issues indirectly gives an indication of the severity. The reason for this is simply, that it is likely that the problems the reviewers focuses on in their game reviews, typically also will be among the most significant in their assessment of the game, since the reviewers chose to highlight these particular usability problems in their reviews.

The quantitative approach is well suited to identify the usability problems in strategy games. However, the numbers does not show what kind of specific problems typically occur within the different problem categories. In order to get a more nuanced understanding of the usability problems, I subsequently also apply a more qualitative approach. This is done by examining the text pieces in the game reviews, where the reviewer describes the problem in more detail. Using these text pieces from the reviews, I illustrate the reviewer's criticism with actual pictures from the games.

5. Analysis - Identification of usability problems in strategy games

As mentioned in the introduction, the main objective is to identify usability problems that game designers should pay particular attention to when designing a strategy game. In the following I will examine my four hypotheses step by step, that I deduced in the theoretical section using the method explained in the previous methodological section.

5.1 Hypothesis 1

The first hypothesis (H1) of the thesis is as follows: Problems regarding view mismatch, skip content and input mapping will occur the least in strategy games. In general the results of the analysis shows a consistency with the expectation in H1, as all of these problem categories are among those, who have the smallest registered frequencies and percentage share of usability problems in my analysis, which is shown in table 3. More precisely, the percentage share of problems I have registered from these problem categories combined totals just 10.9 percent, which is close to the 7.8 percent in the study by Pinelle et al. (2008b) as shown in table 3. In the following I will elaborate further on the results for the specific problem categories included in hypothesis 1.

Problem category	Frequency (count)		Percentage share (pct.)	
	Pinelle et al. (2008b)	Thesis	Pinelle et al. (2008b)	Thesis
1: Consistency	4	20	7.8	12.1
2: Customizability	3	5	5.9	3.0
3: Artificial Intelligence	7	25	13.7	15.2
4: View Mismatch	2	9	3.9	5.5
5: Skip Content	0	1	0	0,6
6: Input Mapping	2	8	3.9	4.8
7: Control	2	21	3.9	12.7
8: Game Status	6	19	11.8	11.5
9: Training and Help	9	14	17.6	8.5
10: Command Sequences	6	16	11.8	9.7
11: Visual Representations	4	19	7.8	11.5
12: Response Times	6	8	11.8	4.8
Total	51	165	100	100

Table 3: Comparison of results in the study by Pinelle et al. (2008b) and my own analysis (Appendix 2).

5.1.1 View mismatch

A clear and effective overview of what is happening on a computer screen is important in order to allow and provide players with the tools to interpret feedback and visual representations in video games, so players can figure out how to respond effectively to certain situations and challenges that they encounter as part of their game experience (Pinelle et al. 2008a; Sweester & Wyeth 2005).

I expected that the usability problems connected with the view mismatch problem category would not occur as much in strategy games, since strategy games are mostly seen from a top-down view, which means that strategy games to a lesser extent gets bothered by objects, that block the view of players (Adam and Rollings, 2007). In other words, strategy games for the most part use aerial perspectives. This has the clear advantage, that it allows players from a top-down view to see all or large parts of the game map and the different units and characters without immediate obstructions (Adam and Rollings, 2007).

Instead, problems with view mismatch is more often a central problem in other type of games, such as action games where the players often see things from a third person's point of view and need to maneuver around a lot of objects in 3D environments (Adam and Rollings, 2007).

My results show (table 3) that problems with view mismatch only represent 5.5 percent of the total percentage share of all the usability problems found in strategy games. This result is very close to the 3.9 percent which is found in the study by Pinelle et al. (2008b) in strategy games.

According to Pinelle et al. (2008a) there are three typical issues in the view mismatch problem category (Pinelle et al. 2008a). The first issue is bad camera angles, which can be understood as camera angles, that seriously complicate a player's ability to see what is happening on the screen or in the game (Pinelle et al. 2008a).

The second issue is obstructions to the view which can be understood as any obstruction, that blocks the natural view players have of elements on the screen. The obstructions can be both elements within the game like walls or boxes that block the view, but can also be menus or information bars that pop up and obstruct the view (Pinelle et al. 2008a).

The third and last typical issue in relation to the view mismatch problem category is slow adjustment to the user's actions (Pinelle et al. 2008a). This basically means, that there are an uneven balance between the pacing of a game and the camera that tracks all the movements and provide the grand overview of the game.

A closer examination of the individual descriptions in the game reviews reveals (Appendix 3.2, 3.9, 3.11 3.21, 3.22, 3.23, 3.32, 3.41 and 3.46), that the usability problems, that occur the most in strategy games in relation to the view mismatch problem category, is when views and camera angles do not adjust fast enough to player's actions. An example of this can be seen in G.I. Combat: Episode 1: Battle of Normandy (Freedom Games Inc, 2011), where the reviewer from Gamespot has noted significant problems with an awkward camera control, that together with an awkward unit interaction make it very difficult for players to get the important overview, that they need in order to figure out, what is happening in front of them on the screen (Chick, 2013; Appendix 3.11).

"The awkward camera control conspires with the awkward unit interaction to make it even harder to tell what's going on." (Chick, 2013)

Picture 7: In G.I. Combat: Episode 1: Battle of Normandy (Freedom Games Inc, 2011) having the right camera angle and view of the battle can be very important for players in order to get the right feedback and overview of what happens in the game.

5.1.2 Skip content

Video game cinematics, cutscenes and other non-playable content take many different forms in video games from text-based descriptions to pre-rendered animated sequences to movie produced film clips (Tekinbaş & Zimmerman, 2003; Bateman, 2007). Moreover they can set the scene and tone in any video game, but can also cause problems, if they are not used and implemented in a proper way. Not being able to either skip certain parts of a video game or being forced to go through the same sequences multiple times can be very disruptive for even the most experienced and patient player, who just want to concentrate on playing and doesn't want his/her flow or immersion broken (Sweester & Wyeth 2005).

In strategy games cutscenes, non-playable content and cinematics are often used in an indirect way, which usually do not directly interfere with the gameplay and game experience, as it is seen in other game genres, such as adventure games that relies very much on cinematics and dialog (Adam and Rollings, 2007). Players will often see in strategy games that cutscenes, cinematics and other non-playable content are often confined to certain points in these games, which is usually before and after a mission (Adam and Rollings, 2007). It is very rare in strategy games that cutscenes, cinematics and other non-playable content appears directly within the gameplay and thus disturb the experience and the players opportunity to act.

The above-mentioned is in contrast with other game genres, such as adventure games, which are more dominated by dialog, cutscenes, video sequences and other non-playable content, that can take players out of the game experience (Adams, & Rollings, 2007). Here cutscenes, cinematics and other non-playable content such as dialog can occur directly in the middle of a gameplay, which forces the players to wait and see what happens, before they can act freely again within the gameplay (Adam and Rollings, 2007). But in any case it is clear that it is preferable that a user interfaces offer a button or an option to interrupt cutscenes, cinematics and other non-playable content if players want it.

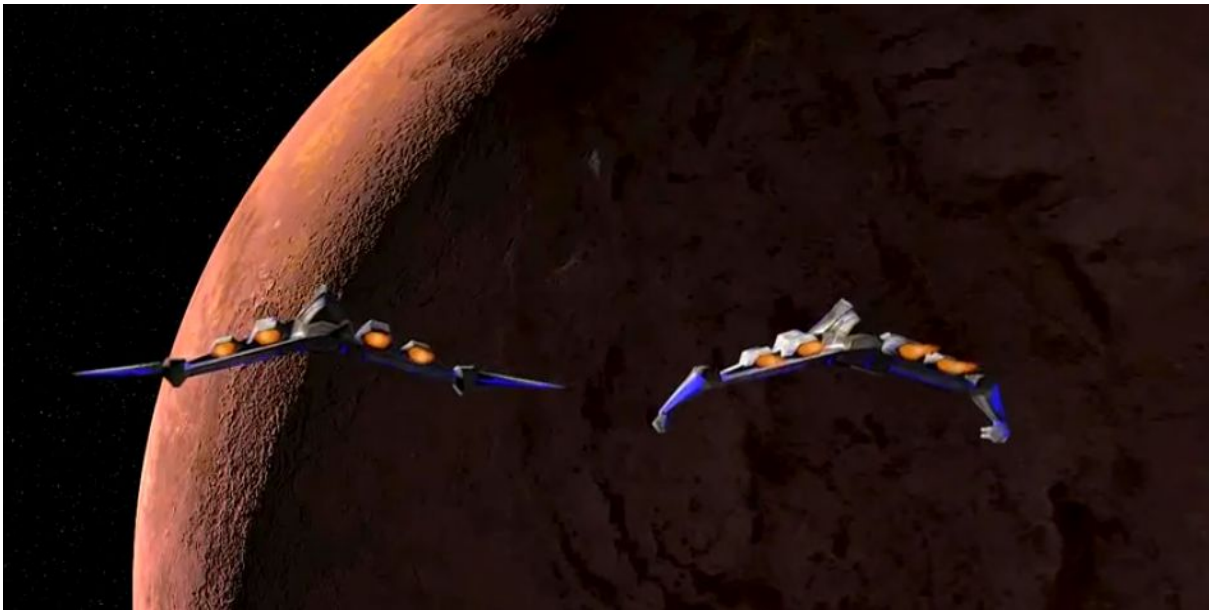
Most of the cutscenes, cinematics and other non-playable content, that is found in strategy games, are also for the most part used to promote the game narrative or to convey some less important information to the players (Sweetser, & Wyeth, 2005; Bateman, 2007). The length of cutscenes, cinematics and other non-playable content are also mostly kept short to around few minutes to keep the players engaged in the gameplay and game experience (Adam and Rollings, 2007).

My results show (table 3) that problems with the skip content problem category only represent 0.6 percent of all the usability problems found in strategy games. This result is also very close to the study by Pinelle et al. (2008b), where there are not found any problems with this category.

According to Pinelle et al. (2008a) there are generally two typical issues in relation to the skip content problem category. The first is when players cannot skip video and audio clips in video games, while the other issue occur, when a video game frequently repeat certain sequences as part of the gameplay (Pinelle et al. 2008a).

A closer examination of the individual descriptions in the game reviews reveals (Appendix 3.22), that the only usability problem regarding skip content in my analysis occurred, when a particular reviewer was not able to skip certain cappendixntent in Shattered Suns (Clear Crown Studios, 2011; Todd, 2008; Appendix 3.22), which the following quote illustrates:

"Scenes meander for many, many minutes, and you're stuck waiting for every single line to slowly pop up onscreen because you can't skip ahead" (Todd, 2008).



Picture 8: In Shattered Suns (Clear Crown Studios, 2011) the pilots of two spacecrafts have a dialog in an animated video sequence about what is going to happen, before they engage the enemy in battle.

5.1.3 Input mapping

Having an effective system, that can handle both input mapping, support different devices and have control customization is vital as it allow the players to play and customize video games as they want (Pinelle et al. 2008a). Most video games including strategy games requires players to issue commands in a quick and effective manner (Pinelle et al. 2008a). If players want to issue commands quickly and effectively they need good input mapping, that is both easy to learn and easy to use, which is not always easy to achieve design-wise (Pinelle et al. 2008a). Within some game genres they adopt input mapping from similar games to cover this need, but that does not necessarily mean, that any problems are automatically resolved (Pinelle et al. 2008a).

Another big challenge with input mapping is, that this technology often also needs cater to different players, who have different wishes for what they can change within games for example to support their devices and playing style (Pinelle et al. 2008a). But without effective input mapping there is a chance that players feel a lose of control and which could be devastating for the general user experience of players (Sweester & Wyeth 2005).

In connection to this problem category, my expectation of a small share was due to the fact, that the artificial intelligence normally takes over the control of the individual unit, once a command have been given by the player, whereas games such as sports games requires more rapid responses and a high level of interaction form the players to function effectively.

My results in table 3 show, that problems with the input mapping category only represent 4.8 percent of the registred problems in the strategy games included in my analysis. Like the previous two categories, this is close to the 3.9 percent that Pinelle et al. (2008b) find in their study.

According to Pinelle et al. (2008a) there are three typical issues related to the problem category. The first issue is when a video game include bad input mapping, where input mapping denotes the system that supports and provide the possibility for players to execute commands in games quickly and accurately - for example the menus and buttons (Pinelle et al., 2008a).

The second issue, that can cause usability problems, is when a video game have a limited device support, where the term device support denotes whether a system or a game control can be properly set up and integrated into different game systems (Pinelle et al. 2008a).

The last issue is when a video game have limited control customization, whereby the video game in question do not have the necessary settings to support input devices and provide shortcuts for expert players (Pinelle et al. 2008a).

A closer examination of the individual descriptions of the game reviews reveals (Appendix 3.2, 3.17, 3.18, 3.21, 3.24, 3.25, 3.37 and 3.50), that the usability problems that occur most in strategy games in connection with the input mapping problem category, is when games include bad input mappings in their design. An example of this is highlighted in the following quote in the review of Conquest Earth (Data Design Interactive, 1997; Kasavin, 1997; Appendix 3.18):

"The combat interface is so cryptic that you'll need to glean the tiny black and white manual several times before you can figure out how to perform even the most rudimentary functions such as ordering a troop to defend itself in a dangerous situation." (Kasavin, 1997).

Picture 9: Within some strategy game like Conquest Earth (Data Design Interactive, 1997), the user interface can be very cryptic and difficult to understand.

To sum up on the first hypothesis (H1), the results of the analysis are clearly consistent with the hypothesis as these problem categories are among the four types of problems that occur the least, as can be seen in table 3. Moreover, the shares in my analysis is about the same as in the study by Pinelle et al. (2008b). Hence, the results of the analysis provide rather clear support for H1.

5.2 Hypothesis 2

The second hypothesis (H2) is: Problems regarding consistency, customizability and visual representation will neither occur frequently or seldom in strategy games. The percentage share of problems I have registered from these problem categories combined totals 26.6 percent in comparison with 21.5 percent in the study by Pinelle et al (2008b) as shown in table 3.

At first glance, this difference in the percentage shares seems to be in good accordance with my expectation, which to a great extent was based on the previous results from Pinelle et al. (2008b). Nonetheless, a closer look at the individual results for each problem category reveals some variation. Specifically, it appears that the problems with consistency and visual representation appear more frequently than expected, while the problems with customizability appears a little less than expected, which is evident in table 3. Hence, and in contrast to the first hypothesis, the support for this hypothesis is not as clear. In the following I will elaborate further on the results for the specific problem categories included in hypothesis 2.

5.2.1 Consistency

Consistency is important because players need to have a knowledge and an ability to predict what is going to happen prospectively in order to effectively act on these things (Pinelle et al. 2008a). Therefore, game mechanics such as hit detection, game physics, character movement, and enemy behavior needs to function appropriate or in a predictable manner for the situation that the player face and meet in games (Pinelle et al. 2008a).

I expected that usability problems in connection with the consistency problem category would not occur as much in strategy games, since the in-game physics - which are one of the three typical problems within this category - is not as a prominent factor in strategy games in comparison to other games genre such as action and adventure games, where the gameplay to a higher degree requires flawless movement of avatars in full 3D environments (Adams, & Rollings, 2007).

I find that the usability problems that exist in relation to the consistency problem category represent 12.1 percent of all the usability problems found in strategy games. This result is more than the 7.8 percent which Pinelle et al. (2008b) find is the total percentage share of all the usability problems found in strategy games connected to this problem category.

According to Pinelle et al. (2008a) there are typical three factors in video games, that can lead to usability problems within the problem category (Pinelle et al. 2008a). The first is when there are problems with poor hit detection in a video game (Pinelle et al. 2008a). Hit detection refers to the process, that determine whether user-controlled cursors such as a mouse click intersects with a graphical object on the screen, e.g menus on user interfaces (Hughes, 2014). Moreover, it also refers to the process called collision detection, that is the process in which a program inside a video game detects and decides what happens, when two or more graphical object intersects with each other (Yang, Cheng, & Pan, 2005), e.g. when two units are fighting each other in a strategy game.

The second problem is when a video game have poor in-game physics (Pinelle et al. 2008a). Game physics refers to a system usually found within the game engine, that controls the laws of physics inside video games in order to make movement and animations within a video game more effective and realistic for the players (Millington, 2007).

The third and last factor which can cause usability problems in connection with the consistency problem category is inconsistent responses to input in video games, which in layman terms means, that there are no logical connection between input and output in a video game (Pinelle et al. 2008a).

A closer examination of the individual descriptions in the game reviews reveals (Appendix 3.1, 3.2, 3.3, 3.5, 3.6, 3.8, 3.11, 3.12, 3.13, 3.15, 3.16, 3.21, 3.23, 3.26, 3.27, 3.28, 3.30, 3.31, 3.32 and 3.43), that the problems with the consistency category is not - as expected - caused by the in-game physics. Instead, the problems are mainly related to inconsistent responses to input in the examined strategy games. An example of an inconsistent response to input in a strategy game can be found in Demonworld: Dark Armies (Ikarion Software GmbH, 2002; Beers, 2002; Appendix 3.2), where the reviewer writes:

"Sometimes your troops will briefly, suddenly move at three times their normal speed. When fighting, half a unit will engage in combat while the other half just stands there". (Beers, 2002).

Picture 10: In strategy games such as Demonworld: Dark Armies (Ikarion Software GmbH, 2002), where players command sevel units, it is essential, that they know, that the units do, what they are expected they do every time.

5.2.2 Customizability

Customizability relates to having the ability to create your own gameplay and game experience within a game by tweaking existing settings to the player's own specifications and satisfaction (Pinelle et al. 2008a).

I expected that problems with customizability would not occur very much in strategy games, since this problem rarely occurs across the different game genres (Pinelle et al. 2008b). The illustrated results in table 3 support this expectation.

I find that the usability problems that exist in relation to the customizability problem category represent 3.0 percent of the total percentage share of all the usability problems found in strategy games. This result is a bit less than the 5.9 percent which Pinelle et al. (2008b) find in their study.

In accordance with to Pinelle et al. (2008a), I also find that the typical issues within this problem category is, when video games do not allow players to change video and audio settings, difficulty and game speed in video games (Appendix 3.1, 3.5, 3.14, 3.17 and 3.35). An concrete example of a problem with customization of the graphics is seen in Stalin vs Martians (Black Wing Foundation, 2009; Appendix 3.1), where the reviewer writes:

"There are no graphics options whatsoever in the game menus-- no antialiasing or anisotropic filtering, not even an option to change the resolution." (VanOrd, 2009).

Picture 11: In strategy games such as Stalin vs. Martians (Black Wing Foundation, 2009) changing the graphics options can be a useful tool in order to make the game experience better for the players.

5.2.3 Visual representations

The term visual representations generally cover all of the different representations that players can see on a screen and on a user interfaces in games such as radar views, maps, icons, and avatars (Pinelle et al. 2008a). These representations convey information about the game and the current status of the game, which reduces the need for unnecessary micromanagement (Pinelle et al. 2008a). Again, based on the existing results in the field found by Pinelle et al. (2008b), I expected a medium share of problems with visual representations in strategy games.

In my own analysis the share of problems connected to issues with visual representations is 11.5 percent (table 3). This share is above the 7.8 percent found in study by Pinelle et al. (2008b).

On one hand, the higher share can be argued to be a bit surprising, as Pinelle et al. (2008b) only find a few issues with this category both for strategy games and across the different genres. On the other hand, the rather high percentage share makes relatively good sense considering that Pinelle et al. (2008b) also find that the occurrence of problems connected to visual representation is the second highest in strategy games - even though problems within the category occurs seldom across the genres and in comparison with the other problem categories (figure 2).

According to Pinelle et al. (2008a) there are four factors, which typically cause usability problems in connection to the visual representations problem category. The first is when games include bad visualization of information, which mean that the information in the game is not displayed in a way, that allows players to interpret and understand the information correctly (Pinelle et al., 2008a).

The second is, when there is a clutter of information on the screen, which can lead to the players using their overview of what is happening on the screen (Pinelle et al., 2008a).

The third is if too much information, like characters or game elements, is displayed on the screen simultaneously, which reduces the player's ability to focus on what is important in the game (Pinelle et al., 2008a).

The fourth factor is when it get too difficult for players to distinguish interactive content from non-interactive content (Pinelle et al., 2008a).

A closer examination of individual descriptions in the game reviews reveals (Appendix 3.7, 3.8, 3.10, 3.11, 3.13, 3.14, 3.15, 3.16, 3.17, 3.19, 3.20, 3.23, 3.24, 3.25, 3.33, 3.37, 3.38, 3.42, 3.43 and 3.49), that the main problem with visual representations in strategy games stems from players having difficulty visually distinguishing interactive content from non-interactive content. This is for example evident in the following quote from the review of Alliance: Future Combat (Gameyus Interactive, 2006; Todd, 2006; Appendix 3.8)

"Almost all of the maps in Alliance are composed of pixelated, muddy terrain (that, incidentally, looks more like Western Europe than anything in the Middle East) and grimy towns that make it very tough to spot enemy units. Soldiers are so tiny and dark that they vanish into the landscape like camouflage-wearing Waldos. Vehicles like personnel carriers, tanks, and mortar trucks are a bit easier to eyeball but still blend into the background, as they are clothed in slate gray and brown. Many missions take place at night, as well (particularly in the DRND campaign), which doesn't exactly improve the situation." (Todd, 2006).

Picture 12: Distinguish interactive content from non-interactive content can sometimes be very difficult in strategy games such as in Alliance: Future Combat (Gameyus Interactive, 2006).

To sum up on hypothesis 2, the results of my analysis are not entirely in accordance with the expected frequencies from the hypothesis. This is especially clear regarding the problem categories consistency and visual representation, where the analysis' results indicate, that the problems actually occur more frequently than the results from Pinelle et al. (2008b) seems to suggest (table 3).

5.3 Hypothesis 3

The third hypothesis (H3) is as follows: Problems regarding artificial intelligence, command sequences, training and help and game status will occur most frequently in strategy games. The percentage share of problems I have registered from these problem categories combined totals 44.9 percent, which is a bit from the 54.9 percent in the study by Pinelle et al (2008b).

More specifically, it appears that the problem category about training and help appear more frequently than expected, while the problems with artificial intelligence, command sequences are quite similar to what I expect, which is evident in table 3. In other words, the lower combined share is mainly due to the relatively few instances of problems with training and help.

In the following I will elaborate further on the results for the specific problem categories included in hypothesis 3.

5.3.1 Artificial Intelligence

Artificial intelligence is important because it simulates human-like intelligence and supports units, characters and avatars in finding their way (Pinelle et al. 2008a). Hence, it is essential that the artificial intelligence functions in a predictable fashion, that ensures that players do not need to issue extra commands in order to correct errors caused by faulty artificial intelligence (Pinelle et al. 2008a).

As mentioned in the theoretical section, a high frequency and percentage share regarding this problem category is expected, because the gameplay in strategy games often demands, that the player takes control over a large number of units in. Furthermore, these units also need to interact with other computer controlled units and elements, which makes it vital, that the artificial intelligence supports them effectively. Hence, I expected that problems with artificial intelligence would occur frequently.

I find that the usability problems with artificial intelligence represent 15.2 percent of all the usability problems found in strategy games. This result is in accordance with my expectation and furthermore close to the 13.7 percent, which Pinelle et al. (2008b) find in their study (table 3). More specifically, this is the problem category with the largest individual share in my analysis.

A closer examination of individual descriptions in the game reviews reveals (Appendix 3.1, 3.2, 3.4, 3.5, 3.6, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.16, 3.17, 3.20, 3.21, 3.23, 3.27, 3.28, 3.30, 3.32, 3.33, 3.36, 3.39, 3.47 and 3.50), that the most frequent problem with artificial intelligence in strategy games is with the pathfinding, which is the application in video games, that helps units and characters find the shortest and most effective route between two points (Tekinbaş, & Zimmerman, 2003; Adams, & Rollings, 2007). This is for example described in the following quote from the game review of the game Pirates of Black Cove (Nitro Games Inc, 2011; VanOrd, 2011; Appendix 3.13):

"The pathfinding is a disaster. Units get caught up on rocks, have trouble navigating around turns, and sometimes run around in circles." (VanOrd, 2011).

Picture 13: Artificial intelligence is important in any game including strategy games like Pirates of Black Cove (Nitro Games Inc, 2011), so units and avatars can find the way in games and get from A to B in the most effective manner.

5.3.2 Command sequences

Command sequences have a significant role in most video games, since they literally control and facilitate the number and order of actions, that can be made by the players.

I expected this problem category to be highly relevant in strategy games based on the high requirements for micro management in strategy games, where players need to manage many resources, devices, supply lines, etc.

My results show (table 3) that problems with command sequences represent 9.7 percent of the usability problems found in strategy games. This result is near the share of 11.8 percent, which is the percentage share of problems with command sequences found in the study by Pinelle et al. (2008b).

There are quite often three typical issues, that can cause a problem with the command sequences in video games according to Pinelle et al. (2008a). One type of issue occurs, when the learning curve is too steep making it too hard for players to understand, what they should do in a game (Pinelle et al. 2008a).

The second type of issue occurs, when there is too much micromanagement involved forcing the players to closely observe and control all the subordinate processes in the video game (Pinelle et al. 2008a).

The third and last issue occurs if the command sequences are complex, lengthy, and awkward which makes the game difficult to play (Pinelle et al. 2008a).

A closer examination of individual descriptions of the game reviews reveals (Appendix 3.2, 3.3, 3.9, 3.11, 3.15, 3.18, 3.26, 2.29, 3.34, 3.35, 3.36, 3.37, 3.40, 3.41, 3.47 and 3.48), that the most frequent problem in the examined strategy games is, when the command sequences are too complex, lengthy, and awkward. An example of a problem with this type of issue is seen in World of Magic (Wastelands Interactive, 2015; Starkey, 2015; Appendix 3.3), where the reviewer writes:

"Cities are at the heart of Worlds of Magic. They are your only means of border expansion, production, and resource generation. Cities are also the source of most of the problems. In a normal 4X game, cities are somewhat malleable. You found them, build a few structures or improvements nearby, and tailor them to what you need at any given point. Worlds of Magic doesn't permit such flexibility, however. You still found cities wherever you please, but their borders never expand, you can't construct any tile improvements, and you can't micromanage any piece of them beyond how many citizens are dedicated to food, production, or research. City buildings also follow a complex unlock tree that require you to build too many structures that don't relate to your chosen focus. It is feasible, for example, to build a city near a rare resource and then push a city towards economic output. Doing so, however, requires that you build structures that offer no benefit beyond unlocking buildings that you need, making them effective dead weight." (Starkey, 2015)

Picture 14: In World of Magic (Wastelands Interactive, 2015) and other strategy games command sequences have a significant role, since it allow players to carry out actions.

5.3.3 Training and Help

As mentioned several times, a common characteristic for strategy games is the management of many different units' actions. Intuitively, one may argue that this demand for making the complexity in strategy games relatively high compared to other game genres. Hence, I - in accordance with the results from the study by Pinelle et al. (2008b) - expected a rather high share of problems related to training and help.

The problem category training and help accounted for the highest share of an individual problem category in the study by Pinelle et al. (2008b) with 17.8 percent. In contrast, I only find problems related to this problem category to account for 8.5 percent share. As such, the findings in this regard is a bit surprising, and there is not a clear argument that explains the difference at first sight.

However, a potential explanation for the higher share in the study by Pinelle et al. (2008b) might be a result of an overweight of TBS games in their sample. This reasoning is based on my own analysis' results, when I distinguish between RTS games and TBS games. Here I find, that the majority of the registred problems (nine out of fourteen) for this problem category occurs in TBS games. Theoretically, this makes sense if TBS games are more complex than RTS games. Therefore, an answer to this question calls for further research investigating whether TBS games are more complex than RTS games. Furthermore, it is not possible to see how games are either turn-based or real time in the study by Pinelle et al. (2008b).

There is a number of issues that Pinelle et al. (2008a) refers to when talking about usability problems with training and help. Some of the usability problems occur, when the games do not provide default and recommended choices (Pinelle et al. 2008a). Other usability problems occurs, when the games do not provide suggestions and help to the players (Pinelle et al. 2008a). Usability problems also occurs, when games do not provide adequate documentation, instructions, tutorials, or training mission to the players (Pinelle et al. 2008a).

A closer examination of individual descriptions in the game reviews reveals (Appendix 3.5, 3.8, 3.18, 3.20, 3.21, 3.26, 3.35, 3.39, 3.45, 3.48 and 3.49), that the most frequent problem in strategy games in connection with the training and help problem category are insufficient documentation, instructions, tutorials, or training mission to the players. An example of this is shown in the following quote in the review of Conquest Earth Seven Kingdoms: Conquest (Enlight Software Ltd, 2008; Todd, 2007a; Appendix 3.5), where focus is on the tutorial mission:

"The human tutorial mission is so messed up that it's unplayable due to scripting errors, such as a gate that refuses to open." (Todd, 2007a)

Picture 15: In order for players to understand games like Seven Kingdoms: Conquest (Enlight Software Ltd, 2008), they need tips and tutorials, that provides them with the necessary information, they need to complete the game.

5.3.4 Game status

The final problem category in the third hypothesis concerns game status, which I expected to be appearing frequently in strategy games since it is essential that the players have a clear overview of the many units in the game and a general understanding understanding on what is happening in the game.

I find that the usability problems that exist in relation to the game status problem category represent 11.5 percent of all the usability problems found in strategy games. This result is more or less identical to the share of 11.8 percent which is found in the study by Pinelle et al. (2008b) in relation to problems with game status. Moreover a share of 11.8 percent is rather high.

Problems with game status usually refers to inadequate information on character, game world and enemies or due to inadequate visual indicators, icons, and maps in the game (Pinelle et al., 2008a). In that connection, my own examination of the individual descriptions in the game reviews reveals (Appendix 3.1, 3.2, 3.9, 3.10, 3.17, 3.19, 3.20, 3.21, 3.26, 3.27, 3.29, 3.34, 3.38, 3.45, 3.48 and 3.49), that the most common reason for usability problems related to the game status problem category is inadequate information on character, game world and enemies. An example of this is registred in Global Domination (Impressions Games, 1993; Krol, 1998; Appendix 3.19), where the reviewer writes:

"As mentioned earlier, the manual is fairly poor - it manages to explain everything you don't really care about, while skimming over the important information. The first few missions will be spent simply trying to figure out exactly how to play the game and what all the symbols and graphs mean." (Krol, 1998)

Picture 16: In order for players to clearly understand what happens in video games such as Global Domination (Impressions Games, 1993), the game status which is also a central part of video games also need to be manageable.

To sum up on the third hypothesis (H3), the results of my analysis is once again not entirely in accordance with the expected shares. This is especially clear regarding the problem category training and help, which accounts for a much higher share in the study by Pinelle et al. (2008b) in comparison to the results in my own empirical analysis (table 3). That being said, the percentage shares regarding the three other problem categories artificial intelligence, command sequences and game status is however in clear accordance with my initial expectations - and the results found by Pinelle et al. (2008b)

5.4 Hypothesis 4: RTS games and TBS games - Different problem profiles

The two remaining problem categories that I haven't addressed yet is control and response times. In connection to these problem categories, I argued in the theoretical section, that the difference in pace and time pressure between RTS games and TBS games would likely lead to some differences in the frequency and the percentage share of the problems. Specifically, this lead to the final and fourth hypothesis (H4): Problems regarding controls and response times will be more frequent for real time based strategy games in comparison with turn-based strategy games.

5.4.1 Control

The feeling of control is important, because it gives players a very essential ability to control and decide their own actions within video games (Sweester & Wyeth 2005). In order to create this very important feeling of control, it is crucial, that game designers provide the players with a flawless control system, that efficiently provide the players with the necessary tools to carry out actions. Hence, it is vital that the game designers know and recognizes the factors, that can cause problems with the control in order to avoid them during a design process and in the finished product of course. I argued that the surprising low frequency and percentage share of usability problems related to the control problem category, which Pinelle et al. (2008b) found in his research, could possibly be explained by the fact, that they did not distinguish between real time and turn-based strategy games. Moreover, I argued, that it is more nuanced to distinguish between RTS games and TBS games, when it comes to usability problems in the control problem category.

Firstly, the frequency and share of usability problems related to the control problem category (see table 3) are way higher in my analysis compared to the results from Pinelle et al. (2008b). This indicates, that problems with controls might actually be more pronounced that assumed initially based on previous results.

Secondly, and more interestingly, table 4 below clearly illustrates, that there is a difference in the registered problems with control, depending on whether the game is RTS or TBS. Specifically, the frequency and percentage share of problems are more than double as high in RTS games compared to TBS games. Hence, this result is in accordance with my expectation and the result therefore supports my theoretical argument.

Problem category	Frequency (count)		Percentage share (pct.)	
	RTS	TBS	RTS	TBS
1: Consistency	14	6	14.7	8.6
2: Customizability	5	0	5.2	0
3: Artificial Intelligence	17	8	17.9	11
4: View Mismatch	5	4	5.2	5.7
5: Skip Content	1	0	1.1	0.6
6: Input Mapping	4	4	4.2	5.7
7: Control	16	5	16.8	7.1
8: Game Status	7	12	7.3	17.1
9: Training and Help	5	9	5.2	12.9
10: Command Sequences	6	10	6.3	14.3
11: Visual Representations	11	8	11.6	11.4
12: Response Times	4	4	4.8	5.7
Total	95	70	100	100

Table 4: Frequency of usability problem for RTS and TBS (Appendix 2).

Going into more detail with the registred problems, Pinelle et al. (2008a) emphasize a number of typical issues associated with the control problem category. The first type is, when video games have over-sensitive controls, meaning that the control responds to the slightest movement or touch resulting in a player activating incorrect functions.

The second type occurs, when video games include unnatural controls, meaning that the controls is configured in an inappropriate way preventing players from performing their actions in an effective way.

Finally, the third typical type of issue relates to when video games include unresponsive controls, meaning that the control do not respond appropriately to players' input to carry out certain actions in a game.

In that regard my own more detailed examination of the individual descriptions from the game reviews reveals, that the most typical problem in the problem category within the analysed strategy games is with unresponsive controls, which is exemplified in the following quote from the review of the Blitzkrieg 2: Fall of the Reich (Nival Interactive, 2007; Todd, 2007b; Appendix 3.21).

"Awkward controls make things even tougher. A single enemy light tank, partially hidden behind a collapsed building or a wall, can often blast an advancing column of a dozen or more tanks into scrap metal because it's hard to navigate through narrow town streets. These cramped conditions also wreak havoc on targeting, with tanks stubbornly refusing to fire on enemies that they are right on top of when they are near a building or wall. This makes it tough to coordinate an effective town assault." (Todd, 2007b)

Picture 17: In order to command units effectively around on large game maps in video games such as in Blitzkrieg 2: Fall of the Reich (Nival Interactive, 2007), it requires that players have a efficient control system, that supports each of their actions.

5.4.2 Response times

I also expected, that the higher pace in RTS games would lead to more problems with response times in RTS games. Here the results in table 3 firstly show that the percentage share of usability problems related to the response times category are lower in the analysis, than the results Pinelle et al. (2008b) find in their research. More specifically, I found the share to be 4.8 percent, while the share is 11.8 percent in the study by Pinelle et al. (2008b).

In connection to the expected difference between RTS games and TBS games, my analysis' results also show, that four issues with response times have been registered in RTS games and TBS games respectively. This is unexpected, since the movement pattern is more free and unrestricted in RTS games compared to TBS games, where the movement patterns is controlled by turns and movement limitations. Hence, one should expect, that there is more pressure on response times in RTS games compared to TBS games, because the players need to be more aware and alert of what happens in these games in order to be ready to respond effectively with a very short notice. Yet, this expectation is not supported by the results.

Finally, it should also be emphasized, that the distinction made between RTS games and TBS games in my analysis also shows some interesting differences among other problem categories. This is for example evident regarding the problem categories consistency and artificial intelligence, which is clearly seen in table 4. For both categories the frequency and the percentage share of registred problems are clearly higher in RTS games. Therefore, I will briefly discuss possible explanations for the difference with these two problem categories in question.

The artificial intelligence only really comes into play in TBS games, when the players or opponents make direct actions or interactions in these game. Hence, the need for an artificial intelligence is very limited, because all elements of these games are very structured and confined in their form by the limitations, that these games contain as previously described.

RTS games on the other hand have practically non or very few limitations about how long players and opponents can move their units, and where players and opponents can move their units on the game map. This naturally raises the requirements for an artificial intelligence, that can both support these elements and the players interactions in general. Therefore, it is also very natural and logical, that a greater amount of usability problems can be seen in RTS games rather than in TBS games, because RTS games are more dependent on an effective artificial intelligence to play the game effectively.

A possible explanation why there are slightly more cases of usability problems in relation to the consistency problem category in RTS games in comparison with TBS games may again be, that the pacing is higher in RTS games than in TBS games. Because actions are going faster in RTS games than in TBS games, it could become more important, that there are a consistency fit with the pacing and the ever changing situations with players in RTS games. In other words, a higher pacing can possibly lead to higher demands for the well-functioning connection between the input and the output.

6. Conclusion

The key aim in the thesis is to contribute to the existing literature on the optimization of user interfaces in video games by identifying and examining the most common usability problems in strategy games. Hopefully, this can give game designers additional knowledge regarding the problems, that they should pay special attention to during the developmental process and in order understand the nature of the problems themselves.

The analysis' results are summed op in the following table 5, where I have ranked the problem categories according to their individual percentage share - overall and depending on real time vs. turn-based. In general, the results of this master thesis supports the majority of my theoretical expectations, while other results are not in accordance with my initial expectations and the existing results on the field from the study by Pinelle et al. (2008b).

Ranking according to percentage share	Strategy game overall	Real time	Turn-based
1.	Artificial Intelligence	Artificial Intelligence	Game Status
2.	Control	Control	Command Sequences
3.	Consistency	Consistency	Training and Help
4.	Visual Representations	Visual Representations	Visual Representations
5.	Game Status	Game Status	Artificial Intelligence
6.	Command Sequences	Command Sequences	Consistency
7.	Training and Help	Customizability	Control
8.	View Mismatch	View Mismatch	View Mismatch
9.	Input Mapping	Training and Help	Input Mapping
10.	Response Times	Response Times	Response Times
11.	Customizability	Input Mapping	Customizability
12.	Skip Content	Skip Content	Skip Content

Table 5: Ranking of problem categories based on their percentage share of registered problems in the analysed game reviews.

Firstly, the analysis' results gives quite clear support in connection to the problem categories, that I expected would account for the smallest share of problems in strategy games. More precisely, this is problems with view mismatch, skip content and input mapping. As mentioned in the analysis, when these problems do occur, it is mainly due to issues with a) views and camera angles do not adjust fast enough to player's actions, b) players are not able to skip certain content in a particular game and c) when games include bad input mappings in their design.

Secondly, I expected that problems with consistency, customizability and visual representation would form a middle group in terms of their appearance/share in strategy games. Here problems occurred more frequently with consistency and visual representation than expected, while the share of problems with customizability is somewhat as expected. As mentioned in the analysis, when these problems occur, it is mainly due to issues with a) inconsistent responses to input, b) when players are not allowed to change video and audio settings, difficulty, or game speed in video games and c) bad visual representation where players have difficulty visually distinguishing interactive content from non-interactive content.

Thirdly, I expected that problems with artificial intelligence, command sequences, training and help and game status would occur the most in strategy games. Again the support for these expectations varies between the problem categories with most support for a high share of problems with artificial intelligence and control. In contrast, I find a much lower share of problems with training and help than initially expected. As mentioned in the analysis, when these problems occur, it is mainly due to issues with a) insufficient pathfinding, b) too complex and lengthy command sequences, c) inadequate documentation, instructions, tutorials, or training mission for the players and finally d) lacking information on character, game world and enemies.

Finally, I deduced the expectation, that the share of the registred problems related to the categories of control and response time will vary as a result of differences in the time pressure and pace in games, that are either real time or turn-based. In that regard, the results find support for the expectation regarding control, while I do not find any clear difference in connection with the response time category. Moreover, the analysis shows that there are several other differences in the share of problems, depending on whether the game is RTS or TBS.

In sum, the results indicate that certain usability problems have a bigger importance for the players' user experience than others, since some issues are mentioned far more frequently in game reviews in connection to strategy games (artificial intelligence, control, consistency and visual representation). Furthermore, it seems to be relevant for game designers to consider, whether the game is real time based or turn-based, since the occurring problems within these two subgenres varies a bit. These findings may have practical value for game designers, as knowledge about the key usability problems in strategy games can allow developers to more effectively streamline their workflow, and prioritize their tasks during the game development.

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8. List and description of the appendix

All appendix are attached as independent files:

- **Appendix 1**: Robustness test of data sources GameSpot vs Metacritic
- **Appendix 2:** Overview and calculations of data
- **Appendix 3:** Data sets for each game used in connection with the analysis
- **Appendix 4:** Dispensation to write the master thesis in English