Enjoying My Time in the Animus: A Quantitative Survey on Perceived Realism and Enjoyment of Historical Video Games

Abstract

This study investigates players' perceived realism of historical video games. Perceived realism is understood as a multidimensional concept, going beyond the more traditional use of 'realism' in historical game studies, where it often refers to the plausibility/accuracy of historical reconstructions. The study further examines how perceived realism relates to players' enjoyment of historical games. Specifically, this study analyzes *Assassin's Creed*, *Assassin's Creed Unity* and *Assassin's Creed Odyssey*. Through an online survey among 1317 respondents, this study found that the five-dimensional structure of perceived realism holds for historical games. The three games differed in their perceptions of social realism, perceptual pervasiveness, freedom of choice and enjoyment. Finally, perceptual pervasiveness and character involvement were identified as strong predictors of enjoyment in historical games. This study contributes towards further validation of the perceived realism scale across game genres and pleads for a systematic use of the multidimensional term 'realism' in historical game research.

Keywords: Assassin's Creed; game enjoyment; historical video games; perceived realism; survey research

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Historical video games, described as video games that "ha[ve] to begin at a clear point in real world history, and that history has to have a manifest effect on the nature of the game experience" (MacCallum-Stewart & Parsler, 2007, p.204), are a very popular form of video games (Chapman, 2016). Early examples include *The Sumerian Game* (Addis, 1964) and *The Oregon Trail* (Rawitsch et al., 1971), and as recent successes, both critical and financial, like *Ghost of Tsushima* (Sucker Punch Productions, 2020) or *Assassin's Creed Valhalla* (Ubisoft Montreal, 2020) indicate, the genre shows no signs of slowing down. Academic interest in historical games has also grown in recent years (Chapman, 2020) and is primarily focused within the field of historical game studies which, at its core, aims to study "those games that in some way represent the past or relate to discourses about it, the potential applications of such games to different domains of activity and knowledge, and the practices, motivations and interpretations of players of these games and other stakeholders involved in their production or consumption" (Chapman et al., 2017, p.362).

Scholarship on historical games has often focused on how historical periods, characters, events, or other aspects of history are represented and simulated (e.g., Bondioli et al., 2019; Chapman, 2016; Politopoulos et al., 2019), as well as on these games' potential for education (e.g., Gilbert, 2017; McCall, 2011; Metzger & Paxton, 2016). Not much research, however, is available regarding audiences (Chapman et al., 2017), although an exception can be made for studies on players' (learning) experiences while playing (e.g., Copplestone, 2017; Gilbert, 2019; Hatlen, 2012).

Drawing on previous conceptualizations of 'perceived realism', the current study focuses on the audience of historical video games by examining how the *Assassin's Creed* games (one of the most successful series of historical games) are perceived by their players,

as well as how the perceived realism of *Assassin's Creed* relates to players' enjoyment of these games. Although perceived realism has not been explicitly applied to the investigation of historical games, it is related to several theoretical constructs that have frequently been debated within this context, such as historical accuracy (e.g., Burgess & Jones, 2021). We conducted an online survey among 1317 participants to not only investigate players' realism perceptions and enjoyment experiences, but also to validate the multidimensional operationalization of perceived realism in the context of historical games, which until now has predominantly been used in the context of shooting games (Daneels et al., 2018; Ribbens et al., 2016).

Perceived Realism in Games: A Multidimensional Construct

Perceived realism, referring to the extent to which an audience evaluates how realistic a media text or message is, has been forwarded as an important concept to understand the gameplay experience, both regarding its effects (Malliet & Ribbens, 2012) and its attractions (Daneels et al., 2018). While initial operationalizations of perceived game realism have mainly highlighted the graphical qualities of games (e.g., McGloin et al., 2011), subsequent research has shown that narrative and ludic characteristics should be attributed equal importance (Breuer et al., 2012; Lin & Peng, 2015; Ribbens, 2013). For instance, the consistency of the virtual game world and the credibility of dialogues or events have been identified as important additional constituents of perceived game realism (Malliet, 2006). These observations have led to the assertion that perceived game realism is a multidimensional construct: players engage in a complicated mental process of evaluating a game's realism according to several criteria simultaneously.

Therefore, Ribbens et al. (2016) proposed a five-dimensional structure of the concept and validated this scale in the context of shooting games. Their model forwards five dimensions of perceived game realism: *character involvement* (the degree to which players

consider their avatar an extension of their real-life selves), *perceptual pervasiveness* (the absorbing qualities of graphics and audio), *social realism* (the degree to which in-game characters and events resemble real-life people and events), *freedom of choice* (the extent to which game choices reflect real-life choices) and *simulational realism* (how the programmed rules of a game facilitate virtual behavior that resembles real-life behavior).

This multidimensional structure of perceived realism has been identified in a wide variety of shooting game genres, ranging from shooting games in general (Ribbens & Malliet, 2010), over fantasy-themed and military-themed shooting games (Ribbens et al., 2016) to specific game titles (Ribbens, 2013) such as *Half-Life 2* (Valve, 2004), indicating that the proposed structure is robust and valid. Malliet & Ribbens (2012) exposed that this conceptualization can help uncover the cognitive learning processes that occur while playing shooting games such as *America's Army* (United States Army, 2002-2013), and can also help explain the attractions and enjoyment of both military and science fiction shooting games (Daneels et al., 2018). These findings lead to the question whether similar processes can be observed in the context of historical video games, which often also feature considerable amounts of action and exploration of elaborate virtual worlds. Can perceived realism – or at least some of its dimensions – indeed be constructive of player enjoyment in the context of historical games, and how do the dimensions of perceived realism hold up in this specific genre of games? The next section provides a theoretical elaboration of this line of thought, pleading for an integrative approach in the analysis of realism in historical games.

Realism in Historical Game Studies

When the term 'realism' is applied to historical video games, it usually points to how a game presents the historical aspects of a game (e.g., the setting, characters, etc.) as plausible recreations of actual, historical entities (e.g., Shaw, 2015). For instance, one aspect of historical game research has focused on how forms of cinematic realism are often used to

make a video game simulation of the past seem 'authentic' (cf. below), by drawing on the players' prior media knowledge or past film experiences (e.g., Campbell, 2008; Chapman, 2016; Salvati & Bullinger, 2013). While not necessarily (Chapman, 2016), realism in this context can also go together with considerations of historical accuracy, for example of historical events (e.g., Hatlen, 2012; Shaw, 2015) or weapon design (e.g., Machin & Suleiman, 2006). This understanding of 'realism' seems to be most connected to the aforementioned notion of social realism.

A frequently used concept related to realism is authenticity. Several authors have explored the experiential or subjective nature of authenticity in historical video games, thereby similarly connecting the game to the experience of the player. For example, Zimmerman (2021) found that authenticity can be evoked by a game's (subjectively experienced) atmospheric qualities, which seems to correlate mostly with the dimensions of perceptual pervasiveness and social realism (Ribbens et al., 2016). Furthermore, authenticity has been examined through five "strategic experiential modules" of *sense*, *feel*, *think*, *act*, and *relate* which have been employed in the contexts of historical heritage sites and historical video games by Mochocki (2021, pp.956-957). Most of these modules compare to several perceived realism dimensions individually: 'sense' (how audiences sensorially experience a historical site/game) may be compared to perceptual pervasiveness, 'feel' (how audiences are emotionally/affectively immersed in a historical reconstruction) to a combination of character involvement and social realism, 'act' (how audiences interact with heritage/games) to both simulational realism and freedom of choice, and 'relate' (how audiences connect with historical and/or non-historical agents, such as other game players) is connected in part to character involvement. The category of 'think' refers to a cognitive process of critical distancing and reflection that is not inherently tied to perceived realism, but may follow it. It is worth pointing out that, in previous research on perceived realism, "authenticity" was

included as a specific, sixth dimension (Ribbens & Malliet, 2010; Ribbens, 2013), referring to the internal consistency of the game world. However, it was omitted later in the context of shooting games, as it cross-loaded with other dimensions (primarily perceptual pervasiveness and social realism; Ribbens et al., 2016).

The construct of *perceived* realism, however, is less concerned with the *historical* authenticity, accuracy or realism of the game simulation, and instead investigates whether the in-game simulation – 'inaccurate' or 'inauthentic' as it may be – is perceived by its players as realistic or not. As such, it combines and overlaps with several of the aforementioned concepts and aims to explain how, in this case, virtual game simulations are experienced by players in terms of their relationship to reality.

We may also point to Adam Chapman's distinction between games with a "conceptual simulation style" in their recreation of history, and those with a "realist simulation style" (Chapman, 2016). The former applies to video games such as *Sid Meier's Civilization* (MicroProse, 1991), which present abstracted systems of history and allow the player to create their 'own' history (cf. Sid Meier in Kushner, 2001). The latter is used for games that claim to simulate the past "how it was" (Chapman, 2016, p.61) and offer the player the role of one of the people that lived through a particular historical period. They generally revolve around a (group of) character(s) in a specific narrative and include impressive audiovisual details (Chapman, 2016), often belonging to the action-adventure or shooting genres. The *Assassin's Creed* games (the current case study) belong to this second category: they present detailed reconstructions of history with an engaging narrative set throughout history. They are not 'accurate' – they contain anachronisms, additions, omissions, and compressions (Politopoulos et al., 2019) – but they are, in Chapman's (2016) terms, characterized by their "realist" style.

The way in which players perceive the experience of gameplay as realistic (which we could understand as perceived realism, although the specific term is not used) is sometimes

included in studies on historical games (e.g., Machin & Suleiman, 2006). The present study, however, goes further by examining the multidimensional complexity of how historical simulations are perceived realistically, and by advocating a more systematic usage of the term 'realism' in historical game studies. Starting from the structure of perceived game realism in shooting games (Ribbens et al., 2016), our first research question is as follows:

RQ1: *How does the dimensional structure of the perceived game realism scale, validated for shooting games (Ribbens et al. 2016), hold for historical video games?*

Since the release of the first *Assassin's Creed* game, the series has undergone significant transformations (for an overview, see *Methods*). To understand how players' realism perceptions have similarly evolved, as well as how this relates to their enjoyment (cf. the next section), we propose the following research question:

RQ2: *How do participants' evaluations of perceived game realism and enjoyment differ across different* Assassin's Creed *games?*

Enjoying (History in) Video Games

Enjoyment of media entertainment, including video games, has been studied extensively from multiple theoretical approaches. The mood management theory (Zillmann, 1988) and affective disposition theory (Zillmann & Cantor, 1976), for example, conceptualized media enjoyment as pleasure reached through positive emotions. Furthermore, the self-determination theory has described media enjoyment as the satisfaction of basic needs of competence, autonomy, and relatedness (Ryan et al., 2006; Tamborini et al., 2010).

Prior research has also identified how enjoyment is an important motivation to play games, including genres such as massively multiplayer online (MMOs) games (Yee et al., 2012) and online first-person shooters (Jansz & Tanis, 2007). Furthermore, research has found multiple aspects of games to elicit game enjoyment, including successful competitive outcomes and competing against other human players (Caroux et al., 2015; Vorderer et al.,

2003), control and character customization (Kim et al., 2015; Klimmt et al., 2007), suspense (Klimmt et al., 2009), and character identification (Bowman et al., 2016; Hefner et al., 2007). More recently, Daneels et al. (2018) found that perceived realism, specifically the dimensions of perceptual pervasiveness and character involvement, was predictive of the enjoyment of shooting games.

Historical game studies have also discussed enjoyment, albeit not extensively (cf. Chapman et al., 2017 for the lack of audience studies in historical game studies). One aspect that players find enjoyable in a historical video game is having the sense of being immersed in a detailed, 'correct' or 'authentic' display of history (Gilbert, 2017; Hatlen, 2012; Köstlbauer, 2013; Uricchio, 2005) – which best resembles the dimension of social realism in the perceived game realism model – although the enjoyment of historical 'accuracy' does not necessarily seem to trump the importance of enjoying the game in itself (Copplestone, 2017; Hatlen, 2012). In his interview-based audience study of the experiences of Norwegian history students with *Rome: Total War* (Creative Assembly, 2004), Hatlen (2012) found that players seemed to enjoy "the idea of being a Roman, being a commander and actually conquering land, wealth and fortune" (p.185), which seems to respond primarily to the perceived realism dimensions of simulational realism and freedom of choice. Hatlen also found that character involvement was less important to players, but this may be explained by the fact that *Rome: Total War* does not feature a pronounced fictional player persona, in contrast to the *Assassin's Creed* games. The question however remains whether perceived game realism is also an important aspect that predicts the enjoyment of historical video games, similar to shooting games (Daneels et al., 2018). Therefore, we formulate a final research question:

RQ3: *How do the dimensions of perceived game realism predict the enjoyment of historical video games?*

Methods

Procedure

We conducted an online survey study to examine how realistically players perceive historical video games and which aspects of perceived realism are important in historical games. All data and analysis files are available on OSF.

Participants completed the questionnaire with measures on socio-demographic characteristics, game enjoyment, and perceived game realism (see *Measures* for more details). After the socio-demographic items, we asked which of three historical video games they had played before. We focused on three games in the *Assassin's Creed* series ('*AC*'): *Assassin's Creed* (Ubisoft Montreal, 2007; '*AC1*'), *Assassin's Creed Unity* (Ubisoft Montreal, 2014; '*ACU*'), and *Assassin's Creed Odyssey* (Ubisoft Quebec, 2018; '*ACO*'). When participants had played more than one of these games, they were assigned to questions on only one of the games to avoid within-subjects effects. Before answering the game-related survey items, participants were shown a cinematic trailer of their respective game (see OSF) to recall their play experience. Furthermore, perceptions of realism were measured at the game (rather than genre) level, as this affects realism judgements (Popova, 2010; Ribbens et al., 2016).

Game Selection

We chose to examine the *Assassin's Creed* series (2007-), one of the most popular historical video game franchises. By June 2019, the series had sold over 140 million copies (Tyrer, 2019). Several installments have received critical acclaim: for example, *ACO* was one of the contenders for Game of the Year at the 2018 Game Awards (Grant, 2018). Gameplay-wise, the *AC* games can be categorized as third-person action-adventure games with stealth, free-running/parkour and assassination elements. Each installment is situated in a different historical time period within the larger main premise of a perennial conflict between the Brotherhood of Assassins and the Knights Templar. The series is renowned for its detailed reconstructions of historical periods and locations (e.g., Politopoulos et al., 2019), which

players may perceive as 'accurate' depictions of history. This makes it a compelling case study for an analysis of perceived realism in historical video games.

To briefly introduce the chosen games: *AC1* is set in the Middle East during the Third Crusade around the year 1191, where players fight against the Templars as the assassin Altaïr. *ACU* tells the story of Arno Dorian, a noble man-turned-assassin living in Paris (France), who has to deal with Templars during the first five years of the French Revolution (1789-1799). Finally, *ACO* is set in Ancient Greece during the first nine years of the Peloponnesian War (431-404 BCE) between Athens and Sparta, where the player controls the mercenary Alexios or Kassandra (depending on which gender the player chooses for the protagonist) in their quest to reunite with their family and rid the Greek world of the sinister Cult of Kosmos.

We selected *AC1*, *ACU* and *ACO* for several reasons. Apart from the series' high popularity and critical acclaim, the chosen *AC* games also stem from different eras within the series. For this study, we organized the series' twelve main games into four different clusters based on their settings, mechanics, and stylistics. Our organization is similar to the categorization made on the fan-made *Assassin's Creed Wiki* (under 'Games'): the first cluster (2007-2011) comprises *AC1* and the 'Ezio Trilogy', and revolves around the Middle Ages and the early modern period (the *Assassin's Creed Wiki*, however, separates *AC1* from the trilogy). The second is the 'Kenway Saga' (2012-2014), set in Middle and North America between the early and late modern periods. Important mechanical changes were made, such as the inclusion of naval combat which featured in each game of this cluster. The third is the 'Initiate Duology' (2014-2015), which takes place in large European capitals during the late modern period, and includes *ACU* in Paris during the French Revolution. The fourth cluster, the 'Layla Saga' (2017-2020), travels further back in time, to antiquity (such as *ACO*, set during the Peloponnesian War in Ancient Greece) and the early Middle Ages. This cluster adopted the genre and mechanics of role-playing games and has, since *ACO*, even allowed

players to choose their character's gender and customize them to an extent not seen before. Dialogue trees were also added, and players' choices may change the course of the game. Although key narrative themes (e.g., freedom vs. oppression) and gameplay aspects (e.g., parkour) have remained, the series has evolved from action-adventure games with basic combat and free-running gameplay to role-playing games with leveling systems, dialogue options, and character customization. We considered it important to stay in the same game franchise (facilitating game comparison), yet also to select diachronically different games from various clusters. Our selection therefore includes early, middle and recent installments of *AC*.

Third, due to their highly detailed reconstructions of historical settings, the *AC* games have been noted for their educational potential (e.g., Gilbert, 2017; Karsenti & Parent, 2020; Rassalle, 2020). Since the Layla Saga (fourth cluster), the games have also included a *Discovery Tour* mode which removes all of the game's combat segments and transforms the game world into a virtual museum to which academic historians have contributed (cf. Poiron, 2021) and which includes designated tours where players can learn about the game's historical background. Insight into players' perceptions of *AC*'s realism might further help and improve the potential of these games for educational applications.

Sample

Participants were recruited through several gaming forums and social networks (e.g., Reddit, or the Facebook group 'Historical Game Studies Network'). The final sample consisted of 1317 respondents. The mean age was 24,5 (SD = 4.43). 86% of the respondents were male, 13% were female, and 1% indicated either another gender representation or did not want to answer this question. As the survey was distributed internationally, 81 nationalities were registered in our survey, with the USA (34%), the UK (11%), Germany (5%), Canada (5%), and Belgium (4%) providing the most respondents. Our sample was

divided into 41% with a high school degree, 40% with a Bachelor's degree, 13% with a Master's degree, and 6% with various other degrees. Finally, distribution between games resulted in *AC1* delivering 996 respondents, *ACU* 194 and *ACO* 127.

Measures

Perceived realism was operationalized using the multidimensional 20-item scale developed and validated by Ribbens et al. (2016). The five dimensions of 'simulational realism' (5 items, α = .83), 'freedom of choice' (5 items, α = .76), 'perceptual pervasiveness' (3 items, α = .76), 'social realism' (3 items, α = .74), and 'character involvement' (4 items, α = .81) were measured using a 5-point Likert scale (1= strongly disagree; 5= strongly agree). Cronbach's alpha values for the individual games can be found on OSF. As this scale was developed for shooting games, we adapted a small set of items to better reflect historical games. For example, one item for 'simulational realism' changed from "learning something about the real world" to "learning something about the history of the world". Similar small changes were made with several items in the social realism dimension (e.g., from "events in game bear similarities with events in real life" to "similarities with events in history").

Enjoyment was measured using the interest/enjoyment subscale of the Intrinsic Motivation Inventory scale (Ryan, 1982), previously used in research on perceived realism and enjoyment (Daneels et al., 2018), and adapted to playing video games. On a 5-point Likert scale (1= strongly disagree; 5= strongly agree), participants answered 7 items such as "I enjoyed playing this game very much" and "I thought this was a boring game" (reverse coded). The subscale was internally reliable, with satisfactory Cronbach's alpha ratings both overall (α = .90) as well as for the individual games (*AC1*: α = .89; *ACU*: α = .92; *ACO*: α = .84).

Finally, we included questions on socio-demographic characteristics such as age, gender, country of residence, ethnicity, and educational degree.

Analysis

To determine whether the dimensional structure of perceived game realism also held for the investigated historical video games, we conducted a confirmatory factor analysis (CFA) using AMOS 26. Cut-off values used for assessing model fit include the Comparative Fit Index (CFI > .90), the Tucker-Lewis Index (TLI > .90) and the Root Mean Square Error of Approximation (RMSEA < .08) (Bowman & Goodboy, 2020; Ribbens et al., 2016).

To examine differences between the *AC* games regarding both perceived game realism and enjoyment, we compared mean scores by conducting a one-way ANOVA using the answered game as the grouping variable and both the realism dimensions and enjoyment as the dependent variables.

Finally, we also performed a stepwise hierarchical regression model using experienced enjoyment as a function of the different dimensions of perceived realism, to observe which aspects of perceived realism predict the enjoyment of historical video games. We also included age and gender as control variables for the regression model.

Results

Factorial Structure of Perceived Historical Game Realism (RQ1)

The CFA with maximum likelihood estimation yielded a model fit slightly below the proposed cut-off values for the TLI and CFI indices: χ^2 (160) = 1289.44, p < .001, TLI = .860, CFI = .894, RMSEA = .073, 90% CI [.070, .077]. Factor loadings for this model ranged from .552 to .856, with two items loading poorly (.331 and .348; see Table 1). The regression weights of all 20 items were significantly (p < .001) associated with their respective latent dimension.

[Insert **Table 1** here]

Differences between *AC* Games on Perceived Realism and Enjoyment (RQ2)

Descriptives can be found in Table 2 (means, standard deviations) and Table 3 (correlations) for both the perceived game realism dimensions and experienced enjoyment. Overall, participants perceived the included games the most realistically on the dimension of social realism (M = 3.94; SD = .77). All other dimensions also scored above average: character involvement (M = 3.90; SD = .82), perceptual pervasiveness (M = 3.84; SD = .86), freedom of choice (M = 3.04; SD = .85), and simulational realism (M = 2.78; SD = .80).

[Insert **Table 2 and 3** here]

We found significant differences (see Table 2) between the three games with regards to social realism ($F(2,1310) = 6.026$, $p = .002$), perceptual pervasiveness ($F(2,1309) = 71.535$, $p < .001$), freedom of choice ($F(2,1312) = 81.056$, $p < .001$), and enjoyment ($F(2,1305) = 16.968$, $p < .001$). In order to determine which games scored differently on the realism dimensions and enjoyment, we conducted several post-hoc tests: Games-Howell tests for perceptual pervasiveness, freedom of choice, and enjoyment, as their Levene's test proved to be significant ($p < .05$) and equal variances were not assumed, and Bonferroni correction for social realism, where the Levene's test was not significant and equal variances were assumed.

The Bonferroni post-hoc test revealed that, for social realism, there was a significant difference between *AC1* and *ACU* ($p = .020$) as well as between *ACU* and *ACO* ($p = .003$). Mean scores (see Table 2) revealed that *ACU* scored highest on social realism compared to *AC1* and *ACO*. There was no significant difference between *AC1* and *ACO* ($p = .225$). The Games-Howell tests showed that, for perceptual pervasiveness, there were significant differences between *AC1* and *ACU* ($p < .001$), *AC1* and *ACO* ($p < .001$), and between *ACU* and *ACO* ($p = .004$). *ACO* scored highest on perceptual pervasiveness, with *ACU* scoring higher than *AC1* on this dimension. Furthermore, for both freedom of choice and enjoyment, there were significant differences between *ACO* and *AC1* ($p < .001$) as well as between *ACO*

and *ACU* ($p < .001$). Mean scores suggest that *ACO* scored significantly higher on both dimensions compared to the other two games.

Perceived Game Realism as a Predictor of Historical Game Enjoyment (RQ3)

The stepwise regression model suggests game enjoyment as an outcome of the different perceived realism aspects (see Table 4). With no multicollinearity problems registered (as the highest VIF value is 1.50), the model explains 27% of variance in game enjoyment. Results show that the dimensions of perceptual pervasiveness ($\beta = .248$; $p < .001$) and character involvement ($\beta = .204$; $p < .001$) are good predictors of enjoyment of the *AC* games. Furthermore, the dimensions of simulational realism ($\beta = .139$; $p < .001$) and freedom of choice ($\beta = .123$; $p < .001$) were found to be significant predictors of enjoyment. Only the dimension of social realism, which was found to be scored highest of all perceived realism dimensions (see Table 2), was not found to be a significant predictor for enjoyment ($\beta = .005$; $p = .891$).

[Insert **Table 4** here]

Post-hoc analysis

In a post-hoc analysis of the factorial structure of the perceived realism scale, we conducted a CFA with an 18-item model of perceived realism (after deleting the two items with poor factor loadings) to see whether this results in a better fit. The CFA revealed a good model fit (χ^2 (125) = 699.26, $p < .001$, TLI = .919, CFI = .941, RMSEA = .059, 90% CI [.055, .063]; factor loadings ranging from .550 to .862; see OSF for more details on factor loadings for this post-hoc model). Furthermore, we performed post-hoc analyses for RQ2 and RQ3 and found only marginal differences in using the 20-item and 18-item scale of perceived realism (see OSF for these post-hoc analyses). In the discussion section below, we further address the merits and concerns of such a respecification of the scale.

Discussion

Regarding the dimensional structure of perceived game realism in historical video games (RQ1), the confirmatory factor analysis showed an insufficient global model fit when using the 20-item operationalization of Ribbens et al. (2016). While there were two items that loaded poorly, the five-dimensional structure of perceptual pervasiveness, character involvement, freedom of choice, simulational realism, and social realism was retained when examining the *AC* games. Although Bowman and Goodboy (2020) suggest that a respecification of the scale – such as deleting items with poor factor loadings – goes beyond the purpose of a CFA (i.e., testing a specific model and not exploring which model fits best), we performed a post-hoc CFA with an 18-item model of perceived realism by deleting the two items with poor factor loadings to see whether this results in a better fit. We argue these two items could be deleted based on interpretative and modification reasons (Heggestad et al., 2019). The first item ("I felt I determined the outcome of the fight"; *freedom of choice* dimension) could be removed since combat and gameplay in *AC* is often felt to be repetitive by players (Hill, 2021; Politopoulos et al., 2019; Thattonedude, 2021), therefore not giving players the sense that their in-game fighting actions have much consequence or challenge. The second item ("By playing this game, I can learn something about the history of the world"; *simulational realism* dimension) could be removed because the item's wording was modified to fit the questioned genre of historical video games, which was previously formulated as "learn something about the real world". Post-hoc analysis revealed a good model fit for the 18-item scale. Furthermore, we found only small differences between using the 20-item and 18-item scale of perceived realism with regards to differences between *AC* games and enjoyment. However, following Bowman and Goodboy's (2020) argument that "major modifications to an existing measure (e.g., deleting items from a scale in a CFA to obtain model fit) should not be trusted as the true representation of the construct being

measured" (p.229), we recommend that future research test this adjusted scale in a new, independent sample of players to validate its factorial structure.

Our study found that, overall, players rated the games the highest on social realism, or how the games' events and characters resemble real-world events and characters. Furthermore, character involvement and perceptual pervasiveness were also rated highly in the *AC* games. The importance of social realism can be explained through *AC*'s conception of history, which does not focus on grand conquest narratives but rather shows the human experience of a vivid, living place concerned with 'ordinary' aspects of daily life, as has been noted by scholars (Casey, 2021; Gilbert, 2019) and confirmed by the developers (Guesdon, 2018). This also links back to Chapman's (2016) categorization of the *AC* games as having a "realist simulation style". As far as the high score of character involvement is concerned, Hatlen (2012) found that this aspect of realism was not rated as important by players of historical games. However, Hatlen studied *Rome: Total War* where players are in control of entire armies, while the *AC* games provide players single-player narratives from the perspective of (usually) one character. Moreover, *ACO* includes aspects such as character creation (e.g., choice of gender) and customization (e.g., different fighting styles), which contributes to character involvement. Compared to shooting games (Daneels et al., 2018), only perceptual pervasiveness has been found important in both shooting and historical video games, which is remarkable given that a multidimensional approach to perceived game realism aims to explain all dimensions of the concept and not only audiovisual realism (Daneels et al., 2018; Ribbens et al., 2016).

Regarding the differences between the specific *AC* games (RQ2), findings indicated that players' perceptions of social realism, perceptual pervasiveness, and freedom of choice as well as players' enjoyment experiences differed between the three games. Regarding social realism, the analysis revealed that *ACU* scored significantly higher compared to the other two

games. One explanation for this might be that, out of the three games examined, the world of *ACU* (eighteenth-century Paris) is the one that most closely resembles the respondents' own world, compared to medieval Middle East (*AC1*) and Ancient Greece *(ACO*). Moreover, *ACO* was found to score significantly higher on perceptual pervasiveness, freedom of choice, and enjoyment compared to the other two games. *ACO*'s high perceptual pervasiveness is not surprising, as it is the most recent and therefore most graphically advanced out of the three games examined (similarly, *ACU* scored significantly higher than *AC1*). Since *ACO* was the first *AC* game to include dialogue trees, meaningful choices, and different endings, its high freedom of choice is equally unsurprising. *ACO*'s high enjoyment is in line with the highly positive reception of the game: out of the three examined games, *ACO* received the best reviews on Metacritic and IGN, and second best on GameSpot.

Finally, the regression model shows that realism perceptions on both character involvement and perceptual pervasiveness are significantly and strongly positively related to the enjoyment of the *AC* games (RQ3). The importance of both dimensions is in line with prior research on video game enjoyment in general (Bowman et al., 2016; Hefner et al., 2007; Skalski & Whitbred, 2010) as well as with shooting game enjoyment in particular (Daneels et al., 2018), which implies that both aspects of perceived realism are stable predictors of players' enjoyment. Simulational realism and freedom of choice were also significantly and positively associated with experiencing enjoyment – although with lower predictor values (β) compared to character involvement and perceptual pervasiveness – which was not found in the study of shooting game realism and its link with enjoyment (Daneels et al., 2018). More so, the only realism dimension that did not come out as an important predictor of enjoyment is social realism, which is remarkable as it is the dimension that players deemed as the most realistic aspect of the *AC* games compared to the other dimensions. This corresponds with Hatlen's (2012) observation that the enjoyment of a historical game is not primarily defined

by the accuracy of the in-game historical environment. Overall, although the model explains a lower amount of variance of experienced enjoyment (27%) compared to shooting game enjoyment (41%; Daneels et al., 2018), it still shows that perceived realism is an important aspect that predicts players' enjoyment experiences.

Limitations and Future Research

The current study has some drawbacks that need to be taken into account and warrant several future research endeavors. First, participants between the three *AC* games were unevenly distributed, with *AC1* representing 75% of the sample compared to *ACU* (15%) and *ACO* (10%). Although participants who had played more than one of the three games were supposed to be assigned randomly to only one game, this randomization was unsuccessful during data collection. Instead, a 'cascade randomization' occurred, where participants were automatically assigned to the first game (*AC1*), even if they had played any of the other two games. Only when they had not played *AC1* would they be assigned to the second game (*ACU*) or – when they had not played *ACU* – to *ACO* as the third game in line. This failed randomization could have impacted the results, not only when comparing the three games (RQ2), but also due to *AC1*'s strong representation in the overall sample for RQ1 and RQ3.

Second, the cross-sectional design of our study – which is commonly used for scale validation – limited us in determining causal relationships between the perceived realism dimensions and enjoyment (RQ3). For example, players who enjoy themselves might, in turn, perceive the *AC* game as more graphically realistic and/or are more involved with their character, instead of the other way around. Future research could therefore conduct experimental research, where participants provide their opinions on realism and enjoyment after they played a historical video game, in order to assess a clear cause and effect. Similarly, we did not consider respondents' gameplay motivations or orientations (cf. Bartle, 1996; Holl et al., 2022; Tondello & Nacke, 2019) and how this relates to their realism perceptions. Future

scholarship should include players' motivations and orientations when studying perceived game realism, by taking various play styles into account.

Third, the current study takes the *AC* series as a prime example of historical video games. However, this limits us to just one specific type of game (i.e., an action-adventure game) and excludes other forms of historical video games, such as those with a conceptual simulation style (Chapman, 2016). To assess the external validity of the perceived game realism scale and the generalizability of our current findings, future research should focus not only on different types of historical video games (such as *Civilization*), but also look towards other genres (e.g., sports games or MMOs).

Conclusion

The goal of this study was to assess how players of historical video games perceive this game genre as realistic – using the scale of perceived game realism which was developed and validated in the context of shooting games (Daneels et al., 2018; Ribbens et al., 2016) – and how these realism perceptions are related to their experience of enjoyment. Examining how realism perceptions for historical video games can be studied is relevant to gain insight into players' experiences of history in games which, in turn, might be used to further improve historical games' (specifically, the *AC* games') educational potential, as well as for addressing the current lack of audience research in historical game studies. By questioning 1317 players of the *Assassin's Creed* games through an online survey, the five-dimensional structure that was previously validated was also found valid for historical video games, despite losing two items in the validation process. Furthermore, all dimensions besides social realism were found to be positive and significant predictors for the enjoyment of historical games. These findings indicate that especially perceptual pervasiveness and character involvement are good realism predictors of enjoyment across game genres, as they were also found to be significant predictors in previous research on shooting games (Daneels et al., 2018).

Despite some limitations, this study manages to determine that the perceived game realism scale can be used in more than just the shooting game genre and that perceived realism has been found in both shooting games and historical games to be an important predictor of players' experiences of game enjoyment, which contributes to the ongoing research on video games and realism perceptions.

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Tables

Table 1

Factor Loadings of CFA on Perceived Game Realism

No	Item	**Factor**				
		SocR	CI	PP	FoC	SimR
1	The things that happened in the game were plausible to have happened in history	.552				
2	I perceive similarities between the events that occurred in this game and events that occurred in history	.811				
3	The events in this game bear similarities with events in history	.824				
4	While playing this game, I felt that the character was a part of me		.598			
5	While playing this game, I felt like I was present in the video game world		.796			
6	While playing this game, I felt as if I was a part of the action		.713			
7	While playing this game, I felt that I was part of the video game world		.851			
8	The picture quality of the game was overwhelming			.613		
9	Graphically, the game looked very impressive			.801		

10	This game created an absorbing visual experience	.795			
11	I felt I determined the course of the game		.629		
12	I felt I determined the outcome of the fight		.331		
13	While playing this game, I felt I was creating my own story		.767		
14	I felt that I could choose my own path in the game world		.669		
15	In this game, I felt I was pulling the strings		.690		
16	By playing this game, I feel better prepared for certain lifelike situations				.776
17	By playing this game, I can learn how to control certain real-world situations				.856
18	By playing this game, I can learn how certain problems in the real world are solved				.747
19	By playing this game, I can learn how to behave in real life				.787
20	By playing this game, I can learn something about the history of the world				.348

Note. N = 1317; SocR = Social realism; CI = Character involvement; PP = Perceptual pervasiveness; FoC = Freedom of Choice; SimR = Simulational realism

Table 2

Differences in AC Games on Perceived Realism Dimensions and Enjoyment

		Assassin's Creed 1		Assassin's Creed Unity		Assassin's Creed Odyssey	
	F-score	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Social realism	6.026**	3.93	.76	4.09	.75	3.80	.79
Character involvement	.525	3.91	.80	3.85	.86	3.93	.93
Perceptual pervasiveness	71.535***	3.69	.87	4.22	.68	4.44	.53
Freedom of choice	81.056***	2.94	.81	2.99	.82	3.90	.63
Simulational realism	1.604	2.78	.82	2.84	.75	2.67	.73
Enjoyment	16.968***	4.33	.68	4.24	.75	4.66	.42

Note. N = 1280 (overall), 970 (AC1), 185 (ACU), 125 (ACO) (listwise deletion of missing cases); *p < .05; **p < .01; ***p < .001

Table 3

Correlations between Perceived Realism Dimensions and Enjoyment

	1	2	3	4	5	6
1. Social realism	1					
2. Character involvement	.361**	1				
3. Perceptual pervasiveness	.185**	.356**	1			
4. Freedom of choice	.229**	.446**	.317**	1		
5. Simulational realism	.446**	.426**	.168**	.382**	1	
6. Enjoyment	.193**	.421**	.412**	.352**	.292**	1

Note. *p < .05; **p < .01

Table 4

Stepwise Regression Model for Perceived Realism and Game Enjoyment

	B^1	$SE\ B^1$	β^2	*T-score*
Predictors 'Perceived realism'				
Social realism	.004	.029	.005	.137
Character involvement	.164	.028	.204	5.813***
Perceptual pervasiveness	.190	.024	.248	7.810***
Freedom of choice	.097	.026	.123	3.685***
Simulational realism	.115	.029	.139	4.024***
Control				
Age	.014	.004	.091	3.048**
Gender	.051	.042	.035	1.216
Model fit				
R^2		0.272		

Note. Dependent variable is ‘game enjoyment’; N = 896 (listwise deletion of missing cases); Significance: *p < .05; **p < .01; ***p < .001; 1= unstandardized coefficients with estimator (B) and standard error (SE B); 2= standardized coefficient estimator (β)