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Information Science

Dissertation thesis

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Empirical research on the representation of historical information in the medium of computer games, their user reception, and intrapersonal learning outcomes

Empirický výzkum reprezentace historických informací v médiu počítačových her, jejich vnímání uživatelem a jejich intrapersonální vzdělávací výsledky

Supervisor: Mgr. Vít Šisler, Ph.D

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Acknowledgments

It is important for me to dedicate this space to my two colleagues and supervisors Vít Šisler and Cyril Brom. They created a supportive atmosphere, trusted me and pushed me to achieve the best results. Thanks to their guidance, I was able to approach the scientific work comprehensively with a healthy curiosity. I would not be able to complete this dissertation or continue my scientific work without their support and transferred knowledge. Furthermore, I am grateful that my supervisor was Vít Šisler as I was always able to rely on his willingness to advise me.

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Prohlašuji, že jsem disertační práci napsal/a samostatně s využitím pouze uvedených a řádně citovaných pramenů a literatury a že práce nebyla využita v rámci jiného vysokoškolského studia či k získání jiného nebo stejného titulu.

V Praze dne **1. 6. 2020** ……..……

Lukáš Kolek

Abstract

This dissertation investigates whether video games are able to affect players' attitudes and information behaviour towards depicted historical topics in games over the short- and long-term. We collected data from a sample of 148 young adults. As far as we know, there is currently no study of such a scale focused on historical games. We used, as an intervention tool, a modification of the serious game *Czechoslovakia 38-89: Borderlands* that deals with the expulsion of the Sudeten Germans from the former Czechoslovakia after WWII. The game is based on historical research providing players with multiple perspectives on the depicted topics. Our control group played a similar game, but where the narrative was unrelated to any depicted historical event from *Czechoslovakia 38-89*: *Borderlands*. In the empirical part of the study, we measured explicit and implicit attitude change and information behaviour change towards the expulsion of the Sudeten Germans. Results showed more negative pretest-posttest explicit attitude changes towards the expulsion on a general level (d = -0.34; p = .022) and a specific level (d = -0.53; p = .001) in the experimental group compared to the control group. Over the long-term, group differences in attitude change remained significant for the specific level (d = -0.44; p = .014), but not for the general one (d = -0.16; p = .226). Our results did not demonstrate any short-term or long-term implicit attitude change in the experimental group. Also, information behaviour and information seeking were not affected by the video game intervention. Our study is the first study to confirm empirically the potential of historical video games to affect the formation of society's historical awareness in relation to the specific level of explicit attitudes.

Abstrakt

Tato dizertace zkoumá, zda jsou videohry schopné ovlivnit postoje a informační chování hráčů k vyobrazeným historickým tématům ve videohře v krátkodobém a dlouhodobém časovém horizontu. Sesbírali jsme data od vzorku 148 mladých dospělých. Pokud víme, neexistuje momentálně jiná studie podobného rozsahu zaměřená na historické hry. Jako intervenční nástroj jsme použili upravenou vážnou hru *Československo 38-89: Vnitřní pohraničí*, která se zaměřuje na téma odsunu sudetských Němců z původně československého pohraničí po Druhé světové válce. Hra je založena na historickém výzkumu, skrze který hráči mohou nahlédnout na zobrazovaná témata z různých perspektiv. Naše kontrolní skupina hrála podobnou hru, avšak s odlišným narativem, který nijak nesouvisel se zobrazovanými historickými událostmi v *Československu 38-89: Vnitřní pohraničí*. Změnu explicitních a implicitních postojů a změnu v informačním chování jsme měřili ve vztahu k tématu odsunu sudetských Němců. Naše výsledky prokázaly negativní změnu mezi pretestem a posttestem v explicitních postojích na obecné úrovni (d = -0.34; p = .022) a na konkrétní úrovni (d = -0.53; p = .001) v experimentální skupině ve srovnání s kontrolní skupinou. V dlouhodobém horizontu zůstala signifikantní změna na specifické úrovni explicitních postojů v porovnání mezi oběma skupinami (d = -0.44; p = .014), nikoliv však na obecné úrovni explicitních postojů (d = -0.16; p = .226). Výsledky naší studie neprokázaly žádnou krátkodobou ani dlouhodobou změnu v implicitních postojích v experimentální skupině. Zároveň jsme také nenaměřili žádnou signifikantní změnu mezi skupinami s ohledem na informační chování a hledání informací po intervenci. Tato studie jako první přináší empirické důkazy potvrzující potenciál historických

videoher utvářet historické povědomí společnosti s ohledem na výsledky měření specifické úrovně explicitních postojů.

Keywords:

Video games; Explicit attitudes; Implicit attitudes; Information behaviour; Information seeking; Representation of history; APE model; Media in education; Digital Game-Based Learning

Klíčová slova:

Videohry; Explicitní postoje; Implicitní postoje; Informační chování; Hledání informací; Reprezentace historie; APE model; Média ve vzdělávání; Učení pomocí digitálních her

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Foreword

This dissertation thesis was developed as part of cooperation between Charles University's Faculty of Arts and its Faculty of Mathematics and Physics.

The empirical research presented in this study was supported by funds from the PRIMUS/HUM/03 project at Charles University and by the FF/VG/2017/115 project at the same university's Faculty of Arts. The original game *Czechoslovakia 38-89: Borderlands*, which was modified for the purpose of this dissertation, had been developed by Charles University's Faculty of Arts and its Faculty of Mathematics and Physics and the Institute of Contemporary History of the Czech Academy of Sciences. Development of the original game was supported by the grant project NAKI DF11P01OVV030 "Příběhy z dějin československého státu: výzkum a experimentální vývoj softwarových simulací pro výuku historie českých zemí ve 20. století" financed by the Czech Ministry of Culture from 2011-2014. My supervisor Vít Šisler and I are members of the game's development team. Charles University plans on receiving revenues from a significantly enhanced commercial version of the game that is to be released in 2020. However, none of these factors influenced how this dissertation was elaborated at any stage of its implementation.

So far, I have presented and published the preliminary results of this thesis at the European Conference on Game-Based Learning in October 2017 (Kolek & Šisler, 2017; approx. 2000 words) and also at the Games and Learning Alliance Conference in December 2018 (Kolek, Šisler, & Brom, 2019; approx. 1050 words). An article summarizing the main empirical results of this dissertation is currently being reviewed by journal editors (Kolek, Šisler, Martinková, & Brom, 2020; approx. 8000 words). The theory and empirical data related to the research of information behaviour used in this dissertation have not yet been published.

The concept of this dissertation and all the publications were regularly consulted with my supervisor Mgr. Vít Šisler, Ph.D. Also, doc. Mgr. Cyril Brom, Ph.D. took part, as a consultant, in the creation of all articles mentioned. At the same time, Cyril Brom provided laboratory facilities for carrying out the experiment. All the statistical procedures were consulted and supervised by RNDr. Patrícia Martinková,

Ph.D. who created Tables 6-14 and Figures 10-13 and parts of the Chapter 4 and 5 concerning the Data Analysis. Those materials were originally created for the purposes of the submitted publication (Kolek, Šisler, Martinková, & Brom, 2020) and they are used in this dissertation. Beyond that, the results presented in Table 16 were created for the purposes of this dissertation and consulted with Patrícia Martinková.

Lastly, the content of the Chapter 3.1, Context of the Historical Topic Depicted in the Intervention, was consulted with PhDr. Stanislav Kokoška, Ph.D. and Mgr. Jaroslav Cuhra, Ph.D. from the Institute of Contemporary History of the Czech Academy of Sciences.

Within the dissertation, I use the term "we" in relation to the presented findings and interpretations. It should be noted that some parts of the dissertation stem from the direct cooperation with the previously mentioned researchers. Those parts are described in detail in the previous paragraphs. However, I was the main author of all the published articles, administrator of the project, main author of the methodology and conceptualization, investigator, developer, and creator of the modified version of the game *Czechoslovakia 38-89:Borderlands*, creator of all questionnaires used in this dissertation[1] including the modified software for implicit attitude measurement, data curator and author of the preliminary statistical analysis. The term “we” used throughout the dissertation should indicate that many of my mental processes were inspired or influenced by my long-term collaboration with the researchers mentioned. Despite the support and input of all the above persons, the content and shortcomings of the thesis remain wholly my own responsibility.

[1] With the exception of PANAS questionnaire (Watson, Clark, & Tellegen, 1988)

1 Introduction

Many scholars and game designers share a conviction about video games' major influence on mainstream culture and art in this century (Muriel & Crawford, 2018; Flanagan & Nissenbaum, 2014; Zimmerman, 2013). According to a Newzoo report from 2019, there are currently more than two and half billions gamers worldwide from across all age groups.

Within the scope of information science, this dissertation approaches video games as information spaces representing information in a way that allows for a dynamic relation between the player and the game, i.e. players can react to the represented information, perceive outcomes from their actions, and interact again with the transformed game environment (Smethurst & Craps, 2014). This research examines how various game elements affect players' learning experience. Digital game-based learning deals comprehensively with video games' effects on learning outcomes for particular topics (Brom et al., 2016; Wouters et al., 2013; Sitzmann, 2011). However, less is known about video games' ability to affect intrapersonal learning outcomes, specifically attitudes. The particular focus of this dissertation is based on players' meaning-making process within games and their related information behaviour. In this context, attitudes play a significant role when someone processes complex information (Sanbonmatsu & Fazio, 1990); they (attitudes) influence our information selection and the way we interpret obtained information (Pratkanis, 1989; Case & Given, 2016; Vogel & Wanke, 2016); they have also an effect on our evaluation of the credibility of our information sources (van Strien et al., 2016) and on the time we devote to a particular source (van Strien et al., 2016; Brannon, Tagler & Eagly, 2007). At the same time, information processing forms the core mechanism of attitude formation and attitude change (Vogel & Wanke, 2016; Pratkanis. 1989). Therefore, the theoretical standpoints of this dissertation combine approaches from information science with a theory related to attitude research originating from social psychology.

Video games reach broad segments of the population and depict various areas of human life, including historical topics. They are mostly perceived as a source of entertainment (Flanagan, 2009), but they cannot be separated from their function as a source of information. Video games dealing with, or inspired by, historical events were

among the top selling titles in 2018 (for example, the *Assassins Creed* series, *Civilization VI*, and *Kingdome Come: Deliverance*; see Steam, 2018). Games focusing on recent and still sensitive historical events are increasingly popular, as is evident from the commercial success of *This War of Mine* or media coverage for the recently released *Through the Darkest of Times* (de Smale, Kors & Sandovar, 2019; Paintbucket Games, 2019; Yin-Poole, 2014). Can we consider history-focused video games to be agents that shape our historical awareness and attitudes?

Several scholars suggest the importance of history-focused video games for the formation of historical awareness: especially among the younger generation (Chapman, 2016; Kapell & Elliott, 2013). Players often spend dozens of hours enjoying these games in which they are exposed to real or fictitious historical narratives that invite certain understandings of the past.[2] Furthermore, games provide players with the agency needed to interact with the represented historical narratives; thus allowing them to challenge those representations and form their own conclusions (Pötzsch & Šisler, 2019). The relationship between players and game narratives is dynamic. Similar to a few other pop culture media, players can react to the depicted information, shape the game world and environment, perceive outcomes from their decisions, and once again react to changes made (Smethurst & Craps, 2014). Hence, video games have significant potential to serve as instruments affecting players' attitudes and information behaviour towards the depicted topics.

There is extensive empirical research about the effect of narratives on attitudes within various non-interactive formats: such as written text, radio or film (see Green et al., 2019). Yet, less is known about the effects of interactive narratives (such as video games) on attitudes. Empirical research about the effect of historical video games or video games in general on attitudes has shortcomings, and large gaps in knowledge exist. For instance, little is known about historical games' differential impact on implicit vs. explicit attitude evaluations. In this sense, implicit attitudes are derived from associative evaluations, which are immediate affective evaluative reactions to the

[2] Average playtimes for games are not public information, but unofficial estimates from Steam data (including only PC and Mac players) are available. For example, according to AStats.nl, the average playtime on 20 June 2019 for *Civilization VI* was 43.8 hours and the average playtime for *Assassins Creed Origins* was 41.7 hours.

object based on the object's relatability or familiarity with other concepts in our memory. Explicit attitudes are derived from propositional reasoning, which is based on logical conclusions derived from information related to the object in question (Gawronski & Bodenhausen, 2014; Bohner & Dickel, 2011).

Existing studies focus mostly on short-term explicit attitude change evaluations measured through self-reports (e.g. Hawkins et al., 2019; Pentz, et al., 2019; Peña et al., 2018; Cuhadar & Kampf, 2014; 2015). A few studies deal with an implicit attitude change over the short-term. However, they lack data from a control condition (e.g. Alhabash & Wise, 2012; 2015; Gerling et al., 2014) or they collect data using posttest-only design (e.g. Yang et al., 2014; Saleem & Anderson, 2013). We found only one study using pretest-posttest design with a control group examining implicit attitudes (Alblas al., 2018); but its intervention lasted no more than 10 minutes. To our knowledge, there are only two studies examining long-term explicit attitude evaluations having a control condition (Kampf, 2016; Ruggiero, 2015). As far as we know, there is no study measuring implicit attitude change over the long-term, while having a control condition.

At the same time, empirical research on video games' effects on information behaviour is scarce. There are only a few studies dealing with video games and their ability to create an information need. Most studies deal with players' information needs, seeking and sharing in relation to improvement of their gaming skills or in relation to their success in a game. (Srinivasan et al., 2019a; Bebbington & Vellino, 2015, Adams, 2009; Raptis et al., 2016a; 2016b). Only two studies collected long-term data about participants' information behaviour (Fields et al., 2017; Khalil et al., 2016). Both of them, however, focused on the impact of particular games on participants' information seeking as relates to the depicted health-related topics. With the exception of the study by Khalil and colleagues (2016), no study has dealt with the video games' effect on information seeking when unrelated to succeeding at playing a game. Furthermore, no study has focused on video games' effects on information behaviour towards historical topics.

With regard to current knowledge in the field, this dissertation investigates two broader research questions:

RQ1: Does current empirical knowledge suggest that games are able to change players' attitudes and information behaviour?

RQ2: Can historical video games change players' short-term and long-term attitudes and information behaviour towards the depicted content?

This dissertation aims to answer these questions and address the current research gap. With the exception of its theoretical background, this dissertation consists of two main parts.

The first one consists of two systematic database reviews of current empirical knowledge regarding methodological approaches and research design of studies dealing with video games and a) attitude change or b) information behaviour. The aim of these reviews is to identify current knowledge and potential limits stemming from empirical research in the respective areas. Also, these reviews analyse findings in the identified studies with regard to their research design so as to place them in a broader context. As far as we know, there are currently no other up-to-date systematic reviews of these research areas. The outcomes of these reviews provide answers for the first research question (RQ1) and define missing evidence in the field that will play a key role in the design and implementation of an empirical study in the subsequent part of the dissertation.

The second part of this dissertation is shaped by the long-term empirical study. It investigates the effects of historical video games on their players' explicit and implicit attitude evaluations and information behaviour towards the represented topic over the long-term using a sample of 148 young adults. This study employs, as an intervention tool, a modified version of the video game *Czechoslovakia 38-89: Borderlands*, depicting, from various perspectives, the expulsion of the Sudeten Germans from the Czechoslovak borderlands after WWII. It is an adventure and narrative video game. The original version of the game is based on historical research and currently serves as a successful educational tool in the Czech high school system. The game depicts sensitive historical topics from various actors' multiple perspectives

on the portrayed events. Thus, perspective-taking represents one of the crucial game design elements. Participants in this empirical study were randomly assigned to two groups. One group played the modified version of *Czechoslovakia 38-89: Borderlands*, the second group played games from a series *Trader of Stories* using the same game mechanics, but with the narrative unrelated to any depicted historical event from *Czechoslovakia 38-89: Borderlands*. The study collected data about participants' attitudes and information behaviour: during the initial pretest before the intervention, immediately after the intervention in the posttest, and also one month after the intervention in the delayed posttest. There are currently no other empirical studies of such a scale.

The theoretical basis of the work is defined within Chapters 2 to 2.6. First, Chapter 2.1 characterises video games within the scope of information science. Next, the dissertation introduces theoretical approaches to research on attitude change with a particular focus on the stability of attitudes and differences between implicit and explicit attitude measurements (Chapter 2.2). The Associative-Propositional Evaluation model is analysed in Chapter 2.3. The model serves as a framework for interpretation of attitude change in this research. This dissertation deals with the representation of historical and socially sensitive topics within the medium of video games and the games' subsequent effect on players. The specifics and challenges of video games as media able to represent historical information are described in Chapter 2.5. As some studies suggest the effect of players' moods on attitude changes, we address, in Chapter 2.6, the use of positive and negative affect measurement.

A literature review of the effects of video games on players' attitudes is introduced in Chapters 2.7-2.10.4. It consists of selection methodology, inclusion criteria applied to the identified studies (Chapter 2.7.1) and identification of the relevant studies (Chapter 2.8). Then, Chapters 2.9 to 2.9.4. analyse methodological design and the limitations of the identified empirical studies with a particular focus on their data collection design, participant selection and profiles, and control group characteristics. Chapters 2.10-2.10.4 analyse the evidence used by these studies on short- and long-term explicit and implicit attitude change in the context of their methodological approaches. Chapters 2.11 to 2.11.2 demonstrate the link between

information behaviour and attitudes in the areas of information processing and selection and put them in the context of the Associative-Propositional Evaluation model. Chapter 2.12 represents a literature review and an analysis of studies dealing with the effects of video games on information behaviour.

The empirical part of this dissertation, the specificity of the depicted historical theme in our intervention tool, and the relevant hypotheses are introduced in Chapters 3 to 3.2. Chapters 4 to 4.5 describe the chosen methodological approaches, intervention tools, lessons learnt from our pilot studies, questionnaires and software used for measurement of attitudes and information behaviour, and the relevant methodology for their analysis. This study's results are analysed in Chapters 5 to 5.6 in conjunction with their relevant hypotheses. The importance of the results within the field and their possible implications are discussed in Chapters 6 to 6.4. In the context of the identified studies in our literature review, we discuss, in Chapters 6.5 to 6.5.2, prospects for future research; especially with regard to player characteristics and particular game mechanics.

2 Theoretical Background

2.1 Video Games and Information Science

Video games are researched from various perspectives within the information science domain. Lee, Clarke, and Kim (2016) characterized four main areas of research on video games within the scope of information science. First, research has been conducted on using and building collections of games in libraries (e.g. Levine, 2006; Nicholson 2008) and the preservation and archiving of games (e.g. McDonough et al., 2010; Winget and Sampson, 2011; Lowood et al., 2009). Second, studies have dealt with game players' typology, characteristics and motivations, and the subsequent effect on their game behaviours and preferences (e.g. Schuurman et al., 2008; Bartle; 2014; 2004). Third, they identify broad segments of research approaching games as information spaces; thus dealing with how various game elements affect the learning experience, how players search and approach in-game information and share it with other players (e.g. Nardi, 2008; Caroline, 2011, Harviainen & Savolainen, 2014).

Fourth and lastly, they identify a few studies focusing on information behaviour and video games. This area deals with information behaviour, motivation to play games, information sharing and the meaning-making process within games, means of acquiring information to progress in games, the effects of demographics and player characteristics on information behaviour, and the applicability of this empirical data for information behaviour in general (e.g. Adams, 2005; 2009; Martin, 2012; Getomer et al., 2012). This dissertation partially expands (adds to) knowledge within the third segment focused on information spaces and, in particular, within the fourth segment about information behaviour.

Video games are mostly perceived as a source of entertainment or leisure (Flanagan, 2009), but they cannot be separated from their function of a source of information; especially, when they deal with historical or socially sensitive topics. From the information science perspective, a video game is a "dynamic system of information representation… [that] can attribute sound and visual characteristics to specific details, portray inter-relations of its subsystems and simulate its behaviour in various situations" (Buchtová, 2014, pp. 8). Beyond their function as a medium representing information, virtual game environments provide players with information often facilitating or even enabling further play. Games are systems requiring players to seek and process information in order to proceed further in a game story or to accomplish game's objectives. This process is highly related to information literacy as defined by Martin (2011, pp 268.): "Information literacy is the intellectual process of recognizing the need for information to solve a problem or issue regardless of the setting; this while working through a process that provides information which fulfils the given need to the seeker's satisfaction." Games introduce their basic mechanics and features to their players, but they do not necessarily explain advanced gameplay strategies. In order to gain expertise or to master a particular game, missing information about any aspect of the game may create an information need, thus forcing players to find the missing information. In such a case, players use and refine their skills in information seeking, processing and acquisition. Those processes are human cognitive tasks (Raptis et al., 2016a) which are transferable to non-virtual environments as also suggested by Srinivasan et colleagues (2019a; 2019b).

2.2 Theoretical Standpoints for Attitude Change Research

As early as 1935, Allport considered attitudes to be the most distinctive concept in contemporary social psychology, and they have remained a key concept in social psychology to this day. Possessing an attitude towards an object allows us to avoid "the energy-consuming and sometimes painful process of figuring out de novo how we shall relate ourselves to [the object]" (Smith, Bruner & White, 1956, p.41). As Vogel and Wanke (2016, p.3) argued, attitude is "a summary evaluation of an object of thought". Its objects may be abstract or concrete. Attitudes affect our information processing and behaviour (Vogel & Wanke, 2016; van Strien et al., 2016; Brannon, Tagler, & Eagly, 2007; Pratkanis, 1989).

One group of scholars considers attitudes to be stable over time (e.g. Eagly & Chaiken, 2007; Fazio, 2007; Petty, Briňol, & DeMarree, 2007). According to them, attitudes are retrieved from information in our long-term memory whenever we evaluate an object. Another group of scholars perceives attitudes to be a concept created "on the spot". Such attitudes are dependent both on information retrieved from our long-term memory and on context-dependent information people have at hand during the evaluation (e.g. Schwarz, 2007; Gawronski & Bodenhausen, 2007). Until recently, researchers accessed attitudes mostly through self-report scales. Self-report scales examine participants' explicit (deliberate) attitude evaluations towards the measured phenomena through introspection. Newer measurements allow researchers to examine implicit attitudes (Bohner & Dickel, 2011; Greenwald & Banaji, 1995). Those are most commonly accessed through measurements of response times in categorization tasks (Greenwald & Banaji, 1995; Greenwald, McGhee, & Schwartz, 1998).

Explicit and implicit attitude change is guided by different, and often interplaying, processes. Long-term attitude measurement may reveal a more complex explanation of attitude change and its context-dependency (Bohner & Dickel, 2011; Gawronski & Bodenhausen, 2006). Nevertheless, in many studies, there is a low correlation between explicit and implicit attitude measurements (see Payne, Burkley & Stokes, 2008; Nosek, 2007). At the same time, a meta-analysis by Hofmann and

colleagues (2005) shows that the correlation between explicit and implicit attitude measurements towards socially sensitive topics (e.g. stereotypes) is lower compared to the correlation of explicit and implicit attitude measurements towards common merchandise brands. We explain these findings using the Associative-Propositional Evaluation (APE) model (Gawronski & Bodenhausen, 2014; 2007; 2006).

2.3 APE Model

The dual process APE model assumes that attitudes are derived from associative evaluations and propositional reasoning (see Figure 1). Both processes are qualitatively distinct yet interconnected.

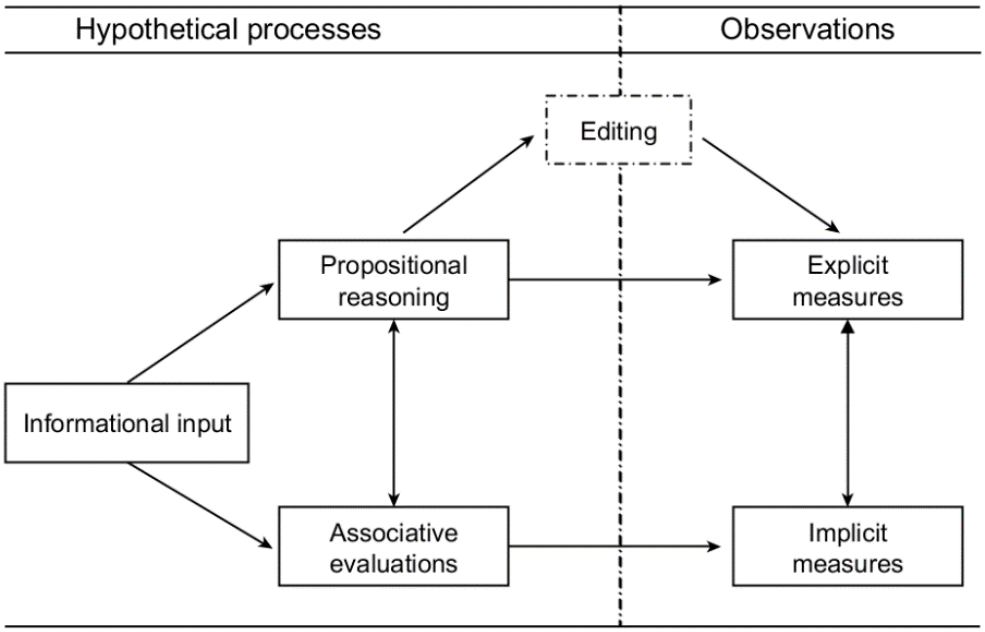


Figure 1. Associative evaluations and propositional reasoning in the APE model (Bohner & Dickel, 2011).

Within the model (Gawronski & Bodenhausen, 2014; 2006), associative evaluations can be examined through implicit attitude measurements. Associative evaluations form the basis for implicit attitudes and represent a spontaneous affective response to an object (e.g. positive evaluations recalled from memory when exposed to activities related to a healthy lifestyle). The model posits that associative evaluations are "defined as the activation of mental associations on the basis of feature similarity and spatio-temporal contiguity." (Gawronski & Brannon, 2019, pp. 167). In other

words, implicit attitudes are derived from associative evaluations, which are immediate affective reactions to the object based on the object's relatability or familiarity with other concepts in our memory. This model assumes the existence of a structure for these mental associations in the long-term memory (Gawronski & Payne, 2010). This structure may be changed by frequent co-occurrence of two concepts in one's environment. This co-occurrence either strengthens an associative link (if it already exists) or creates a new one. Stronger links are easier to activate (Gawronski & Brannon, 2019; Gawronski & Payne, 2010). Also, associative evaluations are highly contingent on "on the spot" context-dependent information needed to decide which of these stored associations will be activated; that is, recalled from our long-term memory. For example, exposing participants to pictures of successful African-Americans prior to an implicit attitude test measuring racial attitudes will result in temporary more favourable attitudes towards African-Americans (see, g., Banaji & Greenwald, 2013). Associative evaluations function independently of what one consciously considers to be the truth.

Within the APE model, propositional reasoning is deliberate and forms the basis for explicit attitudes (Bohner & Dickel, 2011). It functions as the validation of information suggested by associative evaluations. It is based on logical conclusions derived from information related to the object in question (e.g. exercising is healthy, thus good). The conclusions therefrom are formed based on their consistency with other relevant conclusions related to the object: those stored in our short- and long-term memory. Unlike associative evaluations, propositional reasoning must be in line with what one consciously considers to be the truth in relation to knowledge at his/her disposal. One cannot have two contradictory propositional reasonings about the same object over the long-term (Gawronski & Bodenhausen, 2014; Bohner & Dickel, 2011). Therefore, if new propositional reasoning is not consistent with an older version thereof, it will lead to cognitive dissonance and a subsequent motivation to restore the consistency. This can happen by rejection of one of the propositions or by acquisition of new information to resolve the created dissonance (Festinger, 1958) resulting in a revision of one's beliefs. However, changes in propositional reasoning may not always be reflected in explicit attitude measurements, because self-reports (used to assess

them) are limited by participants' ability and willingness to share attitudes. This limitation is depicted in Figure 1 by the 'Editing' process.

The interplay between associative evaluations and propositional reasoning (Bohner & Dickel, 2011) is an example of a mechanism through which these two processes may influence each other (Gawronski & Bodenhausen, 2006). For instance, assume a participant activates and recalls (from his/her memory) positive associative evaluations relating to environmentally friendly or healthy lifestyle activities. Next, assume this participant has contextually associated vegan food with these activities. One the one hand, these contextual associations may form a direct positive associative evaluation of vegan food. On the other hand, these contextual associations may, to varying degrees, cause the formation of a proposition that "vegan food is good". At the same time, propositional reasoning may have an effect on the activation of associative evaluations. Assume that a participant acquires new propositional information about the possible health risks of eating an unbalanced diet of vegan food. This information may not only affect explicit evaluations of the object, but this possible effect on explicit evaluations could also mediate a corresponding change of implicit evaluations related to vegan food (Gawronski & Bodenhausen, 2014).

2.4 Narrative Video Games and the APE Model

Video games represent a unique format allowing their players to interact with content through various mechanisms, incorporate multiple means of storytelling, and affect player's emotions. They are one of few media that allow you to feel guilty in relation to your gameplay decisions (Farber & Schrier, 2017).

Our empirical study focuses on narrative-driven video games. Game narratives are carriers of meaning that have the potential to shape players' attitudes towards the story learned or experienced (Steinemann et al., 2017; Green & Jenkins, 2014; Maio & Haddock, 2010). Similar to some other pop culture media, narrative video games are interactive in the sense that players can shape game narratives and game worlds, perceive the outcomes of this interaction, and also react to these outcomes (Smethurst & Craps, 2014). Thus, the relationship between the players and the game narrative is dynamic: It provides them with agency and an active role in influencing the game

environment. Players must deal with game challenges and make their own decisions in tasks often radically different to their regular lives.

This type of interactivity may increase players' ability to consider actively other people's points of view, their subjective experiences and motivations, and thus their perspective-taking (Steinemann, Mekler & Opwis, 2015). A study by Peng, Lee, and Herter (2010) suggests that games' interactivity results in players' higher perspective-taking in relation to depicted events when compared to the consumption of the same content through video or text. The review by Todd and Galinsky (2014), though unrelated to video games, also found an effect of perspective-taking on a change in intergroup attitudes. Their review suggests that taking on someone else's perspective results in more favourable explicit and implicit intergroup evaluations towards that specific person.

Narratives based on real experiences or narratives that are credible enough to actually happen can effectively influence attitudes (Green & Brock, 2002). Empirical evidence suggests that the more a person is invested in the story, the more difficult it becomes for that person to consider counterarguments to those presented in the narrative (Dal Cin et al., 2004; Green & Brock, 2002; 2000). Also, narrative video games may be able to overcome biased processing (Petty & Cacioppo, 1986). This process is activated in reaction to persuasive messages that are not in line with our attitudes. In that moment, we may neglect the content of the received persuasive message, question its source, or look for counterarguments. Thus, we experience biased processing. However, if we do not feel we have been persuaded, these mechanisms of biased processing are not active. Since video games are not primarily perceived as persuasive attempts (since we mostly expect to be entertained by them), they can limit occurrences of biased processing.

As a result, narrative video games can affect explicit and implicit attitude evaluations: Even of those players holding strong attitudes toward the depicted themes. Seeing and influencing the consequences of their own actions may create associative links between the narrative and the subsequent outcome for players. At the same time, historical games provide players with representations of certain historical events.

Players may then challenge this representation in the game in a meaningful way and thus challenge their propositional reasoning related to the depicted event.

2.5 Measuring Attitudes towards Historically or Socially Sensitive Topics

Games about historical or socially sensitive topics are becoming more and more popular.[3] Developers of these games form digital representations of the depicted historical or social topics and necessarily frame them in a certain way (Kolek & Šisler, 2017). They may support or question generally accepted narratives about the depicted historical or social topic. We can observe this, for example, in the series *Heroes of 71*, idealistically and schematically representing the war of independence in Bangladesh to promote "the base of culture and heritage of Bangladesh" (Portbliss Games, 2016). The historical topic represented plays a significant role in contemporary Bangladeshi politics. The game was sponsored by Bangladeshi government agencies and one of its ministries and has reported more than 4 million downloads (Joehnk, 2017). Therefore, the effects of these games on players' attitudes are a highly relevant topic for research, as they may increasingly affect our social realities.

There are two main issues to take into account when addressing socially or historically sensitive topics in attitude measurement. First, these topics usually represent a complex attitude object, which we are unable to evaluate reliably through single-item measures. Second, participants in a study may tend to avoid giving an undesirable impression. Thus, they may present themselves in a way they feel will gain social approval (Albarracin, Johnson & Zanna, 2014; Bohner & Dickel, 2011; Crowne & Marlowe, 1964). They may even be unable to share their attitudes as described in the APE model in Chapter 2.3. Considering these two conditions, it seems to be advisable to measure attitudes with multiple tools in order to observe participants' explicit and implicit attitudes.

Attitudes affect how we behave towards a given object. Beyond that, they also have a symbolic function affected by our self-perception and our values (Vogel &

[3] See, for example, the database of the annual Games for Change Festival focused on this type of games http://www.gamesforchange.org/games/ (last access 24. 2. 2020)

Wanke, 2016). On the one hand, attitudes' function lies in the expression of our allegiance towards some highly valuable group facilitating our positive self-evaluation (Prentice & Carlsmith, 2000). On the other hand, we also observe how expression of distaste for other persons or groups could enhance our own self-esteem. As evidenced in works on Terror Management Theory (Greenberg, Solomon, & Pyszcynski, 1997), when the threat against self is evident, the positive evaluation of one's own culture and in-groups (members of the same group with whom a person identifies him-/herself) increases. This is because it provokes a negative evaluation of out-groups and their culture and values.

As argued by Banaji and Greenwald (2013), our brain is evolutionarily predisposed to judge new people according to their group membership. It allows our brain to extract quickly stored information about whether a new human being represents a danger to us based on previous experiences with the group to which that human being belongs. This stereotypical knowledge leads to unconsciously biased decisions. It also often forms a dissonance between our beliefs on an explicit level and our implicit biases, even though we willingly want to reject them. Implicit association measurements allow us to detect those biases. Results from implicit association measurements cannot be willingly influenced by participants (Egloff & Schmukle, 2002) unless they are familiar with the methodology (Fiedler & Bluemke, 2005; Steffens, 2004). Therefore, using both explicit and implicit attitude measurements in studies of attitude change towards socially or historically sensitive topics is beneficial. It provides studies with comprehensive data that allows a deeper analysis of the effects of a particular intervention on participants' cognition.

2.6 Video Games, Attitudes and Players' Moods

Video games in general can affect players' moods (Granic, Lobel, & Engels 2014). We have not come across any study focused on games depicting socially or historically sensitive games and their effect on players' moods. However, several studies indicate that persuasion and information processing related to some particular object may be affected by mood (e.g. Bohner & Dickel, 2011; Schwarz & Clore 1983), especially when the evaluation of an object requires more effort in processing (Vogel

& Wanke, 2016). When dealing with mood and attitude change, we must distinguish between pre-existing mood state and the direct reaction to the attitude object. Concerning the pre-existing mood state, several studies indicate (Bless et al., 1990; Hullet 2005; Wegener et al., 1995) that participants in a negative mood are more affected by a persuasive message using strong arguments compared to weak ones. On the other hand, participants in a positive mood spend less effort on processing information carefully. Their positive mood reduces the impact of message quality on persuasion. Another study by Wegener, Petty, & Klein (1994) indicates that participants' positive moods may lead to a message's greater persuasiveness when it is framed positively compared to situations when participants are in a negative mood. It works the opposite way when the message is framed negatively.

2.7 Studies about Video Games and Attitude Change

Despite the growing empirical research on attitudes, the role of video games in attitudinal change has not been explored much. To our knowledge, there is currently no relevant, up-to-date, systematized review of the effects of video games on attitude change. The most relevant review is from Soekarjo and Oostendorp (2015). Those authors focused on studies about serious games and their effect on attitude change. First, they identified all the serious games released as of mid-2014; counting 60 games total. Subsequently, they reviewed existing research using these games. In their review, they found 6 related studies focused on attitude change and the effect of serious games on their players. Five of those six studies measured a significant attitude change after playing the serious game.

There are three limitations to this study. First, the inclusion of studies for the analysis was based on the pre-identified games and not on a systematic search of databases. Second, the review was focused solely on serious games with no attention given to commercial video game production. Third, the study reviewed games that were more than 5 years old. Due to the current, historically unprecedented emergence and evolution of the video game market and experimental video game development (Grayson, 2020; Statista, 2019a; 2019b; 2019c), there is a need for a new review summarizing the current state of empirical knowledge.

In the following chapters, we aim to review current empirical knowledge about video games and attitude change. We look to answer two questions. First, are there any limitations in current empirical knowledge based on research design used in the studies? Second, does current empirical knowledge suggest that games are able to change players' attitudes?

2.7.1 Selection Methodology

2.7.1.1 Collecting the Pilot Sample of Studies Focused on Video Games and Attitude Change

In the first phase, we searched extensively databases with the operator "attitude* AND game*". On 1 September 2018, this search operator pulled up 6,256 articles in the Scopus database alone, which was beyond our analytical capabilities. This operator was too broad to allow for a comprehensive review, but it was suitable for a pilot collection for our research sample of studies. However, this pilot sample could have been used later during the creation and verification of a more precise search operator. Therefore, we used this broad search operator to find relevant studies in three databases: Web of Science, Google Scholar and Scopus. As of September 2018, we had analysed the first 1,000 most relevant studies in Google Scholar, the first 1,500 most relevant studies in Web of Science, and the first 500 most relevant studies in Scopus. These numbers were chosen arbitrarily, so as to meet our maximum time limit for the task. We also examined references in the found articles to find information on other relevant studies. In the end, we identified 26 studies meeting our basic criteria as described in the following chapter.

The results of this pilot search could not be used for conclusive outcomes since their selection was not based on the exhaustive, replicable analyses of all studies in the databases mentioned. Thus, the role of this pilot sample in our review is a control one in relation to the creation of our final search operator.

2.7.1.2 Research Sample Inclusion Criteria

Our aim was to overcome the previously mentioned limitations in the review by Soekarjo and Oostendorp (2015) and design and conduct a comprehensive, manageable review of video games' effects on attitudes. To be able to do so, our review

sample needed to meet all of these three conditions: 1) cover all studies dealing with an attitude change; 2) cover all studies dealing with video games; and 3) cover all studies collecting empirical data on players. We elaborate these conditions in the following paragraphs.

2.7.1.3 Attitude Change

For the purposes of this review, attitudes were defined broadly: As explained by Vogel and Wanke (2016, pp. 2), attitude is a „summary evaluation of an object of thought. An attitude object can be anything a person discriminates or holds in mind". The term attitude change includes all effects, impacts, changes or evolutions of attitudes in relation to the experimental intervention; e.g. playing the game. In the context of this review, attitude change should be considered a dependent variable.

Two additional conditions needed to be met to include a study in the sample of analysed studies. First, attitudes examined in the study had to be measured towards game content in relation to its narrative as expressed through contained fiction or mechanics. We approach video games as models of experience operated through playing (Bogost, 2011). As such, we evaluate their persuasiveness as means of expression. Therefore, we excluded all studies focusing on general attitudes towards a) games, b) playing games, or c) towards any other activity related to the actual playing of the game but not relevant for the games' expressive potential, e.g. attitude towards socialization, attitude towards the friends with whom one plays games, or attitude towards competitiveness or risk taking. Second, we excluded all studies measuring learning attitudes and attitudes towards the subject of the intended learning activity, e.g. attitude towards math in a game with the sole purpose of teaching knowledge about mathematics and having no other added value.

2.7.1.4 Video Games

Video games are based on the interaction between rules and a fictional world (Juul, 2005). Narrative videogames represent a unique format with a dynamic relationship between the player and the game narrative. These games allow players to react to the depicted information, experience the outcomes of their decisions, and react

to changes in the game world (Smethurst & Craps, 2014). As such, they can affect attitudes. Therefore, we are focusing our analysis on narrative games.

Beyond this condition, we set several limitations on the inclusion of studies in our research sample. First, we excluded all trivia games; thus, games involving only the answering of knowledge questions about a certain topic, since they do not possess any expressive and persuasive potential (Bogost, 2011). Second, we did not include studies focused on particular game elements not related to the game narrative (e.g., game based-learning elements) in our sample. However, we did incorporate studies dealing with the effects of game elements possessing any potentially significant meaning for a game narrative, e.g. the visual design or a dress-code for game characters.

2.7.1.5 Empirical Study

Studies in our research sample had to collect empirical data about players. At least one experimental group in the study had to experience intervention through the video game. Again, we set three limitations for including a study in the sample. First, intervention through a video game must be the only intended element affecting a player's attitude towards the topic. If not, we would not be able to separate from one another the effect(s) of various elements on players' attitudes. Based on this reasoning, we excluded studies with intervention phases which were preceded or accompanied for example by a seminar, workshop or collective debate about the topic.

Second, we excluded studies containing games with an external element that purposefully affected players within the study's research design, e.g. driving a car in a video game while telephoning in real life or while being sprayed with water. These elements are undesirable for the purpose of this review since they may act as intrusive elements for causality between the game intervention and the attitude change. Along to the same line of reasoning, we also excluded so-called "exergames", e.g. games combining playing with physical activity as a form of exercise.

Third, we also eliminated studies about the effectivity of "advergames"; that is, games promoting a product or a brand. They represent an edge case since they fit our inclusion criteria. However, their main purpose is to change attitudes or brand

awareness. Those games' commercial interest is rooted in their persuasiveness, and the latter is a distinguishing factor compared to other games in our study.

2.7.1.6 Formation of the Final Search Operators

We created a functional operator to cover all the requirements from previous chapters in several iterations. Beyond those requirements, we also included two practical limitations: The study should be accessible in English, and it must share the relevant data about its examined groups and participants.

For reasons of review feasibility, we restricted the maximum number of analysed studies to 1,500. Therefore, we limited the database search to the Scopus database only; the source in which sixteen of the previously identified twenty-six studies were evidenced. Google Scholar is not suitable for this kind of research as it restricts accessible articles for any search to 1,000: No matter how many studies meet the search criteria. Our preliminary operator "attitude* AND game*" discovered 6,258 studies in the Scopus database and 4,368 studies in the Web of Science database in mid-2019. Both numbers were unmanageable for the analysis. The Scopus was chosen as the option with more studies matching the original broad operator.

Our final search operator was designed as follows:

TITLE-ABS-KEY ((attitude* OR stereotype*) AND (change OR effect OR significant* OR impact) AND (game*) AND (experiment* OR empirical* OR intervention)).

The first part of the operator reflects the first condition to cover all studies on attitudes. The word "Stereotype" was also included as it substituted a concept of attitudes in several studies from our control sample in the way we had defined it. The second part of the operator was also designed to meet the first condition; in particular, the requirement to seize the part about the evolution or change of an attitude. According to the second predefined condition, intervention should be executed by the game as expressed in the third part of the search operator. The last part of the operator limits the search to empirical studies. As of 15 September 2019, the search operator discovered 1,267 studies: Including all the 16 studies from our control sample which were evidenced in the Scopus database at the time of our analysis.

2.8 Identification of Relevant Studies

We read the abstracts and keywords for all the 1,267 studies to detect the relevant ones. After this first filtration, we identified 65 studies possibly meeting our criteria. Subsequently, we read those studies for a more detailed evaluation.

At that point, we started to apply the criteria specified in the previous chapters; thus, those studies should contain empirical data about attitude change in relation to a video game intervention. We intended to define effect sizes in these studies. If they were not explicitly available in the empirical study, the study needed to contain a Mean and a Standard Deviation for respective groups affected by the game intervention. We also accepted studies providing data that allowed us to calculate a respective Mean or Standard Deviation. Several studies from our pilot sample did not meet this criterion.

Exactly twenty articles met all our criteria; they contained 21 empirical studies. Eleven of those studies were from 2015 or later, and thus they were possibly not included in the work by Soekarjo and Oostendorp (2015). The oldest study in the review sample dates from 2011 (see Table 1).

Table 1.

List of Studies Meeting All the Criteria for Further Analysis

n.	Study	Name	Game	Data Collection
1	Alhabash & Wise, 2012	PeaceMaker: Changing Students' Attitudes Toward Palestinians and Israelis Through Video Game Play	Peacemaker	pretest-posttest
2	Alhabash & Wise, 2015	Playing their game: Changing stereotypes of Palestinians and Israelis through videogame play	Peacemaker	pretest-posttest
3	Cuhadar & Kampf, 2015	Does Conflict Content Affect Learning from Simulations? A Cross-National Inquiry into the Israeli-Palestinian and Guatemalan Conflict Scenarios	Global Conflicts	pretest-posttest
4	Cuhadar & Kampf, 2014	Learning about Conflict and Negotiations through Computer Simulations: The Case of PeaceMaker	Peacemaker	pretest-posttest
5	Kampf & Cuhadar, 2015	Do computer games enhance learning about conflicts? A cross-national inquiry into proximate and distant scenarios in Global Conflicts	Global Conflicts	pretest-posttest
6	Klisch, Miller, Beier, & Wang, 2012a	Teaching the Biological Consequences of Alcohol Abuse through an Online Game: Impacts among Secondary Students	N-Squad	pretest-posttest
7	Klisch et al., 2013	The Impact of Science Education Games on Prescription Drug Abuse Attitudes Among Teens: A Case Study	CSI Web Adventures: Bitter Pill and Fatal Interactions	pretest-posttest
8	Klisch, Miller, Wang, & Epstein., 2012b	The Impact of a Science Education Game on Students' Learning and Perception of Inhalants as Body Pollutants	Uncommon Scents	pretest-posttest
9	Pentz et al., 2019	A videogame intervention for tobacco product use prevention in adolescents	PlayForward: Smokescreen	pretest-posttest

10	Schroth, Dulic & Sheppard, 2014	Visual Climate Change Communication: From Iconography to Locally Framed 3D Visualization	Future Delta	pretest-posttest
11	Alblas et al., 2018.	Investigating the impact of a health game on implicit attitudes towards food and food choice behaviour of young adults	Sky Islands	pretest-posttest with a control group
12	Kampf, 2015*	Computerized Simulations of the Israeli-Palestinian Conflict, Knowledge Acquisition and Attitude Change	Peacemaker / Global Conflicts	pretest-posttest with a control group
13	Peña et al., 2018	Game Perspective-Taking Effects on Players' Behavioral Intention, Attitudes, Subjective Norms, and Self-Efficacy to Help Immigrants: The Case of ''Papers, Please''	Papers, please	pretest-midtest-posttest with a control group
14	Price et al., 2015	Casual Games and Casual Learning about Human Biological Systems	Code Fred	pretest-posttest with a control group
15	Duncan et al., 2018	Preliminary investigation of a videogame prototype for cigarette and marijuana prevention in adolescents	smokeSCREEN	pretest-posttest-delayed posttest
16	Kampf, 2016	Long-term Effects of Computerised Simulations in Protracted Conflicts: The Case of Global Conflicts	Global Conflicts	pretest-posttest-delayed posttest with a control group
17	Smith et al., 2017	Evaluation of two different poverty simulations with professional phase pharmacy students	SPENT	pretest-posttest-delayed posttest
18	Barthel, 2013	PRESIDENT FOR A DAY: Video games as youth civic education	President for a Day	posttest-only with a control group
19	Saleem & Anderson, 2013	Arabs as Terrorists: Effects of Stereotypes within Violent Contexts on Attitudes, Perceptions, and Affect	Counter Strike: Condition Zero	posttest-only with a control group
20	Teng et al., 2011	Grand Theft Auto IV Comes to Singapore: Effects of Repeated Exposure to Violent Video Games on Aggression	GTA IV	posttest-only with a control group

Note. * This paper contains two methodologically similar studies

2.9 Are there any limitations to current empirical knowledge based on the research design used in the studies?

2.9.1 Data Collection

Nineteen studies, the vast majority, were conducted in a controlled, laboratory environment. One of the remaining two studies collected pretest and posttest data online with an in-laboratory intervention; the other one collected pretest data in the laboratory and conducted an online intervention and posttest. We have identified four possible points of data collection in the analysed studies (see Figure 2).

1) Pretest - data collection up to one week before the intervention;
2) Middle test – data collection during the course of the intervention;
3) Posttest – data collection up to one week after the intervention;
4) Delayed posttest – more than one week after the intervention.

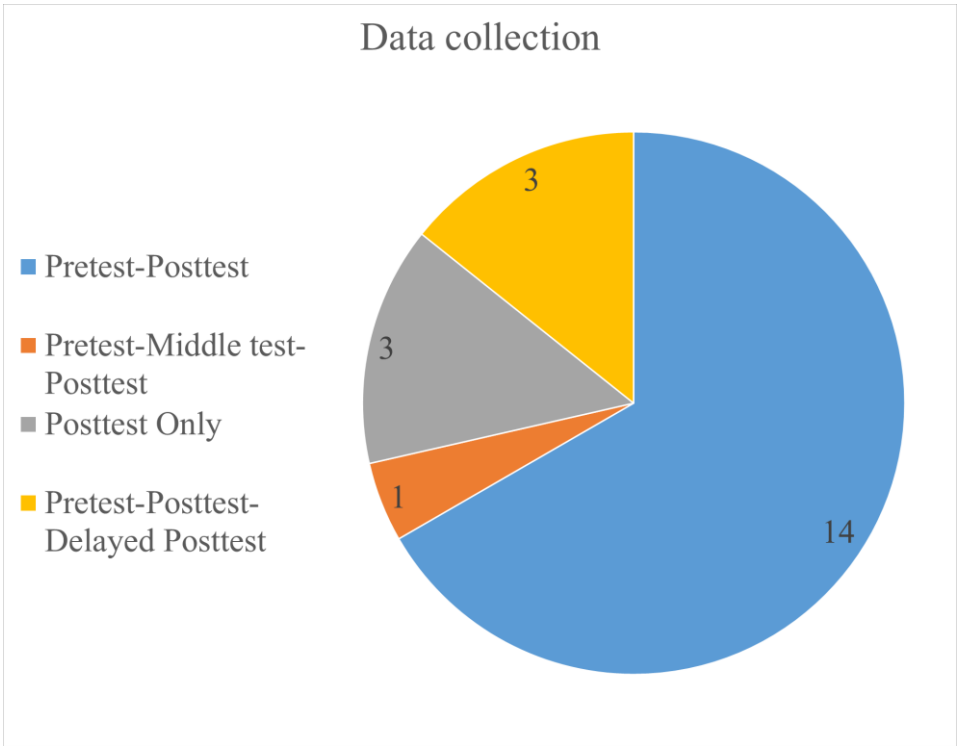


Figure 2. Distribution of the analysed empirical studies on attitude change by number of data collection points

Most of our studies (n. 1.-14.) collected data through pretest-posttest design. Only 3 studies collected data solely through a posttest (n. 18.-.20.). A pretest-middle test-posttest design was implemented only once (n. 13.). A pretest-posttest design with a delayed posttest was used in three instances (n. 15.-17.). In those cases, delayed posttests were scheduled 12 weeks (n. 15.), 9 months (n. 17.), and 12 months (n. 16.) after the intervention. Only one (n. 16.) of these three studies incorporated a control group in its design. All three studies measured only explicit attitudes.

2.9.2 Participants

Apart from the one study focused on children (n. 14.), all the studies collected data only from students. The available data does not allow us to confirm conclusively whether the students in all 21 studies were part of the same class in the respective experiments, or whether they came from the same field of study in the case of university students. Thus, we were unable to determine to what extent the groups in the respective studies were heterogeneous. However, we have some data suggesting participants' homogeneity due to their affiliation with one class or educational institution. From the available data, we know that nine studies (n. 1.; 2.; 10; 13.; 15.; 17.; 18.; 19.; 20.) used participants from only one institution, or a particular course, or a class; suggesting the potential for participants' homogeneity. Three studies used multiple teachers with their classes (n. 6.-8.) and one study hired participants at a public museum (n. 14.). Six studies (n. 3.-5.; 12.; 16.) used participants from specific courses, but from at least two or more universities. One study hired participants from community afterschool programs (n. 9). Only one study did not specify its participants' backgrounds (n. 11.).

Participants in eleven studies (n. 1.-5.; 12.; 13.; 16.; 17.; 19.) were rewarded for their time by gaining university credits or the experiment formed an obligatory part of their courses at their educational institutions. Another three studies (n. 6.-8.) financially remunerated teachers for organizing the study as part of their classes. Money or free lunch were provided to participants in only four studies (n. 10.; 11.; 14. 20): In one instance, together with university credits (n. 20.). The type of reward for participation was unclear in one study (n. 9.).

All studies but one (n. 13.) specified the numbers of participants in each group. Only two studies used less than 25 participants (n. 10.; 15.). The gender of all participants was not clarified in one study (n. 10.).

2.9.3 Control Group

Only eight of all the 21 studies contained any kind of control group (n. 11.-14.; 16.; 18.-20.). Interventions in control groups had mostly a non-playing character, such as a lecture unrelated to the measured concept (n. 12.;16.) or participants only filled in questionnaires with no previous activity (n. 18.; 20.) in the studies with a posttest-only design. Four studies used video games in their control conditions that were different from those in the experimental one (n. 11.; 13.; 14.; 19.). Three of these games shared game mechanics with the game in the experimental intervention (n. 11.; 14; 19.); differing only in some particular game element such as visuals or a depicted theme.

2.9.4 Summary and Implication of Limitations to Current Empirical Knowledge Based on the Research Design Used in Empirical Studies

We can conclude from our research sample that there is a significant research gap concerning the long-term effects of video games on attitude change. As demonstrated in Chapter 2.3 discussing the APE model, attitude change may be to some extent context-dependent. Also, narrative persuasion in general is capable of causing long-term attitude change (see Green et al., 2019). However, empirical evidence on the long-term persistence of possible attitude change is missing. Also, due to the context-dependency of attitudes, the contribution of posttest-only studies (n. 18.-20.) is limited.

At the same time, as many as 95% of all studies focused on attitude change among students and at least 43% of all studies focused only on participants from one class or one particular educational institution. Due to the focus on students, most of the rewards for participants were course credits or meeting conditions for completing the course. There is a significant lack of knowledge about the effects of video games on parts of population other than students.

From the perspective of attitude change research, the absence of control groups is problematic in the context of an ongoing debate about the nature of attitudes and

their context-dependency (See Chapter 2.2). At the same time, empirical evidence suggests that self-reports' wording and format may affect the results of explicit attitude measurements (Crano & Prislin, 2008). Also, participants' implicit attitude evaluations can be affected by exposure to stimuli related to the measured phenomenon immediately before the measurement (see, for example, Banaji & Greenwald, 2013). In this context, studies without a control group and with only one experimental group can have a limited contribution to the research field (n. 6.; 8.; 9.; 10.; 15.; 17.). To gain maximum validity for research with respect to video games' interactivity and players' agency, at least one control group should provide a game experience to its participants similar to those in the experimental group. Only three studies from our sample ensured (n. 11., 14., 19) that at least two groups played the same game as relates to game mechanics.

Current empirical knowledge about attitude change is limited due to insufficient evidence about long-term attitude change, the effects of video games on attitudes of non-students, and the existence of only a few studies using control groups with a similar activity to the experimental group.

2.10 Does current empirical knowledge suggest that games are able to change players' attitudes?

2.10.1 Short-Term Implicit Attitude Change

There were only four studies using any type of implicit attitude measurement. Studies n.1. and n.2. examined participants using the Affect Misattribution Procedure (Payne, Cheng, Govorun, & Stewart, 2005). These studies used a pretest-posttest design with no control group. They reported that they did not measure any significant implicit attitude change in their experimental groups. However, they did not disclose any data beyond this statement in their studies. Study n.11. and n.19. used an Implicit Association Test (Greenwald & Banaji, 1995; Greenwald, McGhee & Schwartz, 1998).

Study n.11. used a pretest-posttest design with a control condition. The group difference between the experimental and the control group was small (d = 0.248). It should be noted that their study did not reveal any significant effect of a video game

on implicit attitudes in the experimental group (d = 0.181), but a significant implicit attitude change was measurable in the control group (d = 0.405).

Study n.19. used a posttest-only design with two experimental groups and one control group. It revealed small to medium between-group differences among two experimental groups in a comparison with the control group (d = 0.506; d = 0.283).

2.10.2 Short-Term Explicit Attitude Change

With the exception of study n.11., all studies in our sample used some type of explicit attitude measurement. Twelve studies did not include any type of control group. The effect sizes in their experimental groups ranged from marginal to large (See Table 2).

Table 2.

Measured Effect Size in Studies Using Explicit Attitude Measurements with a Pretest-Posttest Design with No Control Group

Marginal effect size	Small effect size	Medium effect size	Large effect size
Klisch et al., 2012a	Klisch et al., 2012b	Alhabash & Wise, 2012	Cuhadar & Kampf, 2014
Schroth et al., 2014	Alhabash & Wise, 2015	Klisch et al., 2013	Cuhadar & Kampf, 2015
Smith et al., 2017	Duncan et al., 2018	Pentz et al., 2019	Kampf & Cuhadar, 2015

Note.

Marginal	d = 0.00 – 0.19
Small	d = 0.20 – 0.49
Medium	d = 0.50 – 0.79
Large	d = 0.8 and higher

However, in studies without a control group, we cannot exclude effects of external factors. Therefore, we will focus our further analysis on studies using a control condition. We have identified five studies using pretest-posttest design in four papers (12.-14.; 16.).

Kampf's study (2015; n.12.) contains two experiments: One using the game *Peacemaker* as an intervention tool focused on the Israel-Palestine conflict; the second experiment uses the game *Global Conflicts* which is also thematically situated in the Israeli-Palestinian conflict. Both games incorporate perspective-taking in their design, thus supporting an understanding of the groups for which they are measuring attitude change. In the first experiment, the author measured a small explicit attitude change between the pretest and the posttest in the experimental group. The small effect was evident in the questionnaire focused on attitudes towards key issues in the Israeli-Palestinian conflict (d = 0.212) and in the questionnaire focused on attitudes towards operations in Gaza (d = 0.205). No explicit attitude change was present in the control group. The author did not share any more data about the results in the control group beyond this statement. Therefore, we cannot calculate between-group differences. The second experiment showed larger pretest-posttest differences towards key issues in the Israeli-Palestinian conflict (Experimental group d = 0.719) and towards the Gaza conflict (Experimental group d = 0.628). Similar to the first experiment, no explicit attitude change was observed in the control group; but again, we have no data beyond this statement.

The second study by Kampf (2016; n.16.) also used the *Global Conflicts* game focused on the Israeli-Palestinian conflict. In this study, they measured the effect of the video game on intergroup attitudes, i.e. how this game affects short- and long-term explicit attitudes of Israeli-Jews and Palestinians towards the perception of how right each side is in the Israeli-Palestinian conflict. Concerning the Israeli-Jews' attitude change, the measurements revealed large attitude change in the experimental group (d = 2.143) and insignificant attitude change in the control group (d = 0.17). The pretest-posttest group differences were also large (d = -1.857). Concerning the Palestinians' attitude change, the effect was large in the experimental group (d = 1.488) and insignificant in the control group (d = 0.091). These numbers were also supported by the large group differences (d = 0.974).

Peña and colleagues (2018; n.13.) focused on the effect of the game *Papers, Please* on attitudes towards helping immigrants. They used a pretest-middle test-posttest design with a control group. They did not observe any significant attitude

change: Neither in the experimental group (d = 0.128), nor in the control group (d = 0.051). Group differences in the pretest-posttest were also insignificant (d = -0.183).

The study by Price and colleagues (2015; n.14.) used the educational game *Code, Fred* (about the human body) as an experimental intervention tool. They used a pretest-posttest design with a control group. They measured attitude change using two questions on a five-point Likert scale; 1) I know about what is happening inside my body and 2) It is important to know what is happening inside my body. They measured significant attitude change in the experimental group for the first question (d = 0.284), which was supported by the significant group difference (d = 0.360). Attitude change in the control group was not significant (d = 0.082). The second question measuring attitude change did not reveal any significant change in the experimental group (d = 0.082), but it did in the control group (d = 0.227). However, mostly due to the attitude change in the control group, group differences remained significant (d = 0.283); also for the second question.

2.10.3 Long-term Attitude Change

We did not identify a single study that dealt with long-term implicit attitude change. Therefore, we will focus only on long-term explicit attitude changes.

In total, there were three studies (15.-17.) that collected explicit attitude change data over the long term. Two of those used pretest-postest-delayed posttest design with no control group (15.; 17.). Both did not reveal any significant attitude change between pretest-delayed posttest or posttest-delayed posttest.

The remaining study (Kampf, 2016; n.16.) was analysed in the previous Chapter. It used a pretest-posttest-delayed posttest design with a control group. Concerning the attitude change among the Israeli-Jewish research sample, there was a small between-group difference between posttest-delayed posttest (d = 0.311) and a large between-group difference between the pretest-delayed posttest (d = -1.644). Concerning the attitude change among the Palestinian research sample, we observed a small between-group difference between posttest-delayed posttest (d = 0.257), and,

again, the between-group difference between the pretest-delayed posttest was large (d = 2.000).

It should be noted that our original sample contained one more study using a pretest-posttest-delayed posttest design with a control group (Ruggiero, 2015). This study was not included in the analysed sample as it does not provide data about the standard deviation during the posttest measurement. However, as far as we know, it was the largest study so far to have been conducted on video games and explicit attitude change (5,139 students from multiple schools between the ages of 12-18 years). It collected data about the change in attitudes towards homelessness. The study observed no significant attitude change between pretest-posttest in the experimental group compared to the control group. Nevertheless, the attitude changes between the posttest and the delayed posttest were more significant with respect to the attitude change in the control group than they were in the experimental group.

2.10.4 Summary of the Empirical Evidence on Video Games and Attitude Change and Its Implications

Most of the empirical studies that deal with the subject (e.g. Pentz et al., 2019; Cuhadar & Kampf, 2015; 2014; Klisch et al., 2013) measured attitudes primarily through self-report scales and revealed short-term changes in participants' explicit attitudes. Only a few studies examined attitude change through self-report scales over the long term (e.g. Duncan et al., 2018; Smith et al., 2017), but they were lacking control groups. To our knowledge, only two of those using long-term measures included a control condition (Kampf, 2016; Ruggiero, 2015). Kampf's study revealed a large effect of its game on its players in comparison to the control group over the short and long term. Ruggiero's study did not measure any significant, short-term attitude change: Only long-term attitude changes due to gains in the control group. Both studies collected data solely from secondary and tertiary students. Since the introduction of implicit attitude measurements, studies measuring both implicit and explicit attitude change have started to appear. However, they generally lack data from a control condition (e.g. Alhabash & Wise, 2015) or they focus on college students or psychology students in a posttest-only design (e.g. Saleem & Anderson, 2013). The

only study with a pretest-posttest design and with a control group (Alblas et al., 2018) dealing with implicit attitudes did in fact measure a significant group difference. However, the latter was caused by a significant change in the control group. Similar to Gerling et al. (2014), we assume that the lack of studies using implicit measurements is due to the limited availability of free software for measuring implicit attitudes and the relatively demanding requirements for the analysis of the obtained data.

Current empirical knowledge is fragmented due to large variations in methodology and approaches to attitude measurements. To our knowledge, there are no studies using both explicit and implicit attitude measurements over the long term with heterogeneous samples and data from a control condition.

2.11 Theoretical Background for Research of Attitudes and Information Behaviour

When speaking about information behaviour, we approach it as defined in Case and Given (2016, pp. 6): "Information behaviour encompasses information seeking as well as the totality of other unintentional or serendipitous behaviours (such as glimpsing or encountering information), as well as purposive behaviours that do not involve seeking, such as actively avoiding information."

Attitudes represent a key concept explored in this thesis. Apart from their importance in social psychology, attitudes' functions may play a significant role in the study of information behaviour as well. However, the effect of attitudes in relation to information behaviour and video games has not yet been much explored. As evident from the review by Case and Given (2016), attitudes are included in only two of the twelve most developed information models. The first one, the Byström and Järvelin Model (Byström & Järvelin, 1995), mentions attitudes as a part of other personal factors influencing an information need. The role of attitudes is not elaborated further. In the second model, the Savolainen Model of everyday life information seeking, attitudes are considered to be one of the social and cultural factors influencing our information selection and processing (Case & Given, 2016; Savolainen, 1995).

2.11.1 Information Processing and Selection

According to Vogel and Wanke (2016, pp. 7), "Identifying good and bad or categorizing the environment into friendly and hostile seems to be the most obvious and essential function, and, not surprisingly, it is part of all analyses of attitude functions." In case of a lack of motivation and opportunity to process complex information about various options, people rely more on their attitude towards an object than on the newly acquired information (Sanbonmatsu & Fazio, 1990).

As reviewed in Pratkanis (1989), attitudes determine our information processing related to the attitude object. People seek information coherent with their attitudes. As such, attitudes provide us with a scheme for how we interpret social information obtained in our environment and how we deal with it. The more interested I am in a topic, the more I will tend to expose myself to information coherent with my attitudes (Case & Given, 2016). Furthermore, the results from the study by van Strien et al. (2016) reveal that our attitude towards a topic affects how we evaluate the credibility of information sources on the particular topic. If the information source provides us with an attitude-inconsistent fact, we tend to consider it to be less credible and vice versa. This effect correlates with the strength of the attitude.

According to a study by van Strien et al. (2016) and a study by Brannon, Tagler, & Eagly (2007), we tend to devote more time to information sources providing us with attitude-consistent information than to other sources. A study by Maier and Richter (2013) suggests that attitude-inconsistent information will not be completely ignored, as assumed by cognitive dissonance theory (Festinger, 1958). Rather it will affect our evaluations of a topic less than the attitude-consistent information. When people acquire new information open to multiple interpretations, they tend to interpret it in an attitude-consistent way. Thus, attitude's function may be also heuristic. This effect is stronger among people holding highly accessible attitudes; i.e. attitudes easily recalled in our mind (Vogel & Wanke, 2016). The broader outcomes of this phenomenon are evident, for example, in audiences' preference of more polarizing media over moderate ones in the United States (Vogel & Wanke, 2016; Prior, 2005).

Although the relationship between attitudes and information behaviour is intertwined, information processing still forms the core mechanism of attitude formation or attitude change: Persuasion. “Persuasion research deals with the formation or change of attitudes through information processing, usually in response to a message about the attitude object” (Crano & Prislin, 2008, pp. 162). However, when the attitude is contradictory to the obtained information, its persuasive potential is much lower than in other circumstances; as has already been mentioned.

2.11.2 Information Behaviour and APE Model

In order to gain information needed to advance the game or to master some particular expertise, players may explore the game itself, its tutorials, controls and user interface, and information resources (e.g. non-playing characters). As Gumulak and Webber (2011, pp. 243) put it, “The gamers have to discriminate between information sources to solve problems.”

Furthermore, multiplayer games offer players the possibility to share learning experience with other players, learn from them, and become part of social structures (Squire, 2006). In their information seeking, players also often rely on sources external to the game, such as online forums or fan pages containing information about the game and providing players with a platform to ask questions and discuss related topics. Many games, e.g. *Minecraft* (Bebbington & Vellino, 2015) or *Playerunkown’s Battleground* (forums.pubg.com), have hundreds of thousands of posts in their community-driven forums created by actual players. Martin (2012) focused, in her study, on discussion forums created about the game *World of Warcraft*. These forums serve as platforms with “collective intelligence” (Martin, 2012, pp. 94) where users helping each other with their need for knowledge.

Based on the popularity of these forums, the information need induced by a video game often arises out of an effort to improve one’s game skills or to advance in the game story. In many cases, however, people just search for information to satisfy their curiosity (Holm, Wadenholt, & Schrater, 2019). However, it is unclear what can trigger such information needs merely related to curiosity about non-life sustaining needs beyond a general state of uncertainty (ibid.). As described in Chapter 2.3 about

the APE model, it may be to some extent related to attitudes and propositional reasoning. Any new propositional reasoning must be in line with other conclusions stored in our short- or long-term memory about a subject. Otherwise, it would cause cognitive dissonance potentially leading to the creation of an information need that would have to be satisfied. Video games represent a unique format allowing them to affect players' attitudes towards a depicted topic through their means of information representation. This was described in detail in Chapters 2.1 and 2.4. Video games about historically or socially sensitive topics provide players with information about topics that still arouse passions. These video games can deliver topic-related information inconsistent with players' attitudes. For that reason, it is legitimate to examine whether socially or historically sensitive topics represented in a game can have an effect on the formation of players' information-seeking behaviour about the represented topics.

2.12 Studies about Video Games and Information Behaviour

There are only a few studies dealing with the effect of video games on the change of information behaviour or information seeking towards the represented socially or historically sensitive topics over the long term. We created a broad search operator to analyse existing empirical studies. We had two main criteria. First, the study should be focused on video games. For the purposes of this review, we have excluded board games and trivia games. Second, the study should deal with information behaviour or information seeking in relation to video games. Therefore, we created the following search operator to search through study titles, abstracts, and keywords in the Scopus database:

TITLE-ABS-KEY ((games OR game) AND ("information behaviour" OR "information seeking"))

We had discovered 177 studies as of 3 March 2020 in the Scopus database. After the analysis of these studies' abstracts, we identified 16 studies relevant for our field of study for deeper review.

From the sample of 16 studies, eight of those studies did not match our criteria (Salado, Morelock, & Lakeh, 2017; Gumulak & Webber, 2011; Harviainen &

Lieberoth, 2012; Holm, Wadenholt, & Schrater, 2019; Kachergis, Rhodes, & Gureckis, 2017; Sevim-Cirak & Yıldırım, 2019; Cates et al., 2018; Lee, Clarke, & Kim, 2015).

We have identified only a few studies dealing with games and their ability to create information need or affect information behaviour. Three of those studies were focused on players' information seeking and the information sources chosen and used to gain information about progressing or gaining advantage in the game played. The first (Srinivasan et al., 2019a; 2019b[4]) examined how information need is triggered among players of *Pokémon Go*, how they fulfil their information needs, and how they share acquired information. The authors did their investigations using semi-structured interviews. They found out that players were mostly interested in information related to progress or improvements in the game, e.g. where to find rare Pokémons?; When will special events happen?; or information about various fighting strategies. They gained information mostly from friends, official game websites, *Google*, or social media. They all shared their information with others; with the exception of one player. Second, other authors (Bebbington & Vellino, 2015) focused on analysis of players' information needs and sharing by studying the behaviour of *Minecraft* players, the *Minecraft* community forum or wiki, and other sources like *YouTube* or *Google*. They concluded that *Minecraft*'s game design supports finding new knowledge as players set up their goals themselves. To do so, they often need new information to achieve the goals. Third, Adams (2009) collected data about the information needs of players of the online multiplayer game *City of Heroes*. She used a participatory research method aimed mainly at exploring ways of gaining information about the played game.

Two studies by Raptis and colleagues (2016a; 2016b) collected and analysed empirical data through semi-structured interviews about players' behaviour, understanding, and information seeking in the game *Time Explorer*. The studies examined what players did in order to succeed in gameplay. Study results suggest that human cognitive differences do have an impact on players' information seeking, processing, and acquisition from games (Raptis et al., 2016a; 2016b). As such, game

[4] Study by Srinivasan et al. (2019) was published twice in different journals with only minor differences. Therefore, we analyze it as one study.

designers are able to personalize game experience for particular groups, e.g. different nations/cultures having various cognitive style abilities (Raptis et al., 2016a).

The most relevant studies for our research were the following two, especially as both studies collected long-term empirical data. The first one, a study by Fields and colleagues (2017) was focused on the virtual world *Whyville* founded by *Numedeon*. The game targets a younger audience between 8-16 years of age and has millions of users. Users/players in this virtual world can participate in various educational activities through games or by role-playing with their avatars. Players are rewarded for their participation in various educational games with virtual salaries that allow them to personalise their avatars and game property. For the purpose of their study, the authors inserted a virtual virus into the game. It spread among players' avatars causing an epidemic similar to those in real life. To trigger emotional engagement, the impact of the virus on players' avatars was meant to affect things players care about most: Money supplies, possibilities to socialize, and the visual design of avatars expressing visible symptoms of the virus. The authors launched an outbreak of a viral epidemic twice in one year to track players' behaviour through in-game data and questionnaires. The authors found that players significantly increased their in-game information seeking as relates to the epidemic by visiting a centre providing information about diseases (35.7 %), game forums (31.3 %), the game website (25.5 %), and a specific page created about the virus (40.8%). After the second outbreak, the authors reported that those numbers were higher (specific data was not provided). At the same time, after the second outbreak, self-reported data that was collected proved for the first time a correlation between players' liking the virus epidemic situation and their information-seeking behaviour. Liking a virus resulted in information seeking outside the game; e.g. about real life epidemics, infections, or diseases. However, information seeking about epidemics could have been caused merely by efforts to succeed at the game and deal with the epidemic situation: Not just out of pure curiosity.

The second one was a study by Khalil et al. (2016) evaluating, among other factors, the impact of the challenge in the *Re-Mission* game on engagement in information-seeking behaviour. Their hypothesis was based on the protection motivation theory. According to this theory, the more threatening a health message one

receives, the more one encourages protective behaviour. This behaviour is demonstrated, among other means, by seeking information about the threatening topic. The experimental intervention using the more challenging version of the *Re-Mission* game that involved fighting cancer should encourage participants to engage in more information-seeking behaviour compared to the experimental group using the less challenging version of the *Re-Mission* game. Intervention in both these experimental groups was hypothesized to have significantly more positive effect on information-seeking behaviour compared to the control group. Data showed that both experimental groups were more likely to increase their information-seeking behaviour compared to the control condition: Both 10 days after the intervention and 20 days after the intervention. There were no significant differences between the low- and the high-challenge interventions.

With the exception of the study by Khalil and colleagues (2016), we have not identified any research dealing with the effect of video games on players' information seeking about game topics that are unrelated to success or advancement in the respective game. Only two studies focused on health-related topics. Other than those, there were no studies dealing with historically or socially sensitive topics in video games and their effects on players' information behaviour towards the represented topics.

Similar to Wilson (1999), the author agrees that understanding people and how they deal with information plays an essential role in research on information behaviour. Attitudes are highly relevant for the information-seeking and exploration phases and also for the effect of selective exposure to information as already described. This thesis project uses a narrative video game about sensitive historical content as an intervention tool in its empirical study. Therefore, we also evaluate, in our study, to what extent information behaviour will be affected by our video game intervention during the one-month period between the intervention and our one-month delayed-posttest. We evaluate the possible formation of information need related to the represented historical topic in our game and participants' possible seeking of new information related to our intervention through the self-report questionnaire. Our intention is to find a pattern or

correlation between possible changes in information behaviour and attitude change towards the topic depicted in the game.

3 Experimental Study

The empirical study presented in this dissertation investigates a historical video game's impact on information behaviour and attitude change towards the historical events depicted in the game using explicit and implicit attitude measurements. When designing this study, we were aware of the shortcomings of current empirical knowledge in the field related to the lack of long-term studies, the nature of control groups lacking activities similar to experimental groups, and also the dominant focus on students (see Chapter 2.9.4). Therefore, this study did not focus exclusively on students, and it also collected long-term data from participants. It had a pretest-posttest design with a delayed posttest one month after the intervention. The study had one Control and one Experimental group. The Control group used a game with similar mechanics to the Experimental group, while differing mostly in the depicted theme. Participants included Czech-speaking citizens who had completed Czech primary school and were no older than 30 years of age. Our research outcomes are applicable to narratives and narrative game research and their effects on players' attitudes and information behaviour. However, the results also contribute to research on attitude change and information behaviour in general.

Czechoslovakia 38-89: Borderlands is a narrative adventure game developed through cooperation between Charles University's Faculty of Arts and Faculty of Mathematics and Physics and the Institute of Contemporary History of the Czech Academy of Sciences. It is used as an educational tool in history classes in the Czech high school system. The game is based on historical research and real testimonies, but its characters and their stories are fictitious. In its narrative, the game depicts key events in Czechoslovak history after WWII. It is set in a small village in the Czech borderlands. For the purpose of our study, we created a modified version of the game *Czechoslovakia 38-89: Borderlands* as an intervention tool for the Experimental group. This modified game deals only with the expulsion of the Sudeten Germans. It uses perspective-taking in its game design: Allowing players to consider the interests of

other groups or people (Davis et al., 1996). Due to this game mechanic, it portrays the expulsion from various points of view; thus challenging the popular historical narrative about the justified expulsion as described in the following chapter.

In the Control group, participants played two games from the *Trader of Stories* series; these are narrative, point-and-click adventures involving a fantasy world. The *Trader of Stories* series has game mechanics similar to *Czechoslovakia 38-89: Borderlands* but contains neither sensitive material nor historical references.

As outcome variables, we measure explicit and implicit attitude evaluations: Both immediately after the intervention and one month later. We also measure effect on information behaviour one month after the intervention. As control variables, we measure explicit and implicit attitude evaluations before the intervention; together with participants' positive and negative affect and their characteristics such as gender, age, and education.

3.1 Context of the Historical Topic Depicted in the Intervention

Germans were invited to settle in the mountainous border regions of the Czech lands during the 12th and 13th centuries by Czech monarchs (Ryback, 1996). The topic of their post-WWII expulsion is still a sensitive one in the Czech Republic. The act of the expulsion remained mostly unchallenged in prevailing historical narratives on the Czech lands during the last century (see below). Up to 3,000,000 Germans, representing over a quarter of the entire population of then Czechoslovakia, were forced to leave the country after WWII (Staněk, 2005; Glassheim, 2000; Abrams, 1995; Czech Statistical Office, 2018). It is also estimated that 15,000 – 40,000 Germans died during the expulsion process in marches, in internment camps, or during executions or massacres (Staněk, 2005; Glassheim, 2000; Abrams, 1995).

In his most influential writing, Benedict Anderson described nations as "Imagined Communities". They were imagined because "the members of even the smallest nation will never know most of their fellow-members, meet them, or even hear of them, yet in the minds of each lives the image of their communion." (pp. 6) And they were imagined as a community, because "regardless of the actual inequality and

exploitation that may prevail in each, the nation is always conceived as a deep, horizontal comradeship." (pp. 7)

To various extents, Germans settled in the Czechoslovak territories were a nation, among and within other nations, in the Central Europe. One of the most crucial and challenging turning points for Czech Germans' identity came with the fall of the Habsburg empire in Central Europe after WWI (Bahm, 1999). This geopolitical change led to the formation of new nation states in the region: Czechoslovakia being one of them. Czechoslovakia was officially a supranational state. However, as put by Zahra (2010), Czechoslovakia was conceived as a nation state based on a kinship between the Czechs and Slovaks. After the creation of Czechoslovakia in 1918, Czech Germans were considered outsiders or immigrants (outgroups) by many Czechs in the new republic. This was true despite Czech Germans making up about a third of Czechoslovakia's population at the time (Glassheim, 2000; Ryback 1996; Rothschild, 1974). It should be noted that the Czechoslovak constitution was rather liberal for that period: Guaranteeing civic equality and protection of minorities (Bruegel, 1973). However, several discriminatory acts aroused passions among Czech Germans against the central authorities. For instance, this included land reforms disproportionately benefiting Czechs, transformation of several German schools to Czech ones, and language laws preventing Germans from being proportionally represented in state administrative structures (Glassheim, 2016; Bruegel, 1973). To various extents, this caused many Czech Germans with different regional identities to unify as Sudeten Germans in order to oppose the state apparatus (Glassheim, 2016). In this context, it is important to mention the existence of a significant nationalist indifference in the interwar period. Before the Great Depression, 75% of the Czech German population voted for parties that were not organised around nationalist issues (Zahra 2010). Their predominant allegiance to the nationalist Sudeten German party began after the Great Depression (ibid.).

Until the fall of the communist regime in 1989, official Czech historiography argued mainly in moral or legal favour of the expulsion: Considering it inevitable due to the Czech Sudeten German party's collaboration with the Nazi occupants of Czechoslovakia during WWII (Glassheim, 2000; Abrams, 1995). During and after the

Velvet Revolution in 1989, attempts to oppose and condemn the principle of collective guilt remained the exception in contemporary Czech political representation. Such efforts provoked many protests (Kunštát, 1998). For instance, at the end of the Velvet Revolution, citizen and later successful presidential candidate Václav Havel apologized for the expulsion, meeting with loud disagreement from part of the Czechoslovak population (Houžvička, 2005). Even several years after the Velvet Revolution, the topic was again passionately debated between representatives of the Sudeten-German exile organisation in Germany, the German government and representatives of the Czech government. These negotiations were accompanied by several mutual stalemates and provocations (Ryback, 1996). However, political representatives of the Czech Republic and the Federal Republic of Germany signed the Czech-German Declaration in 1997 aiming to improve mutual relations and alleviate the tension between the two countries originating from WWII (Novotný, 2012).

Nevertheless, the expulsion is still considered justified in general historical discourse. Likewise, the topic arouses passions to this day and plays a role in political struggles within the Czech Republic. It was evident during several recent events; for example, during public debate on ratification of the Lisbon Treaty in the Czech Republic. At that time, the Czech president refused to sign the treaty until the Czech Republic received an opt-out from the Charter of Fundamental Rights. This opt-out was meant to ensure that property claims by Czech Germans expelled after the WWII could not be judged under the jurisdiction of European courts (Cienski, 2009; Euroactiv 2009). The Czech president's actions, upon closer analysis, seem to have been motivated more by his political attitudes towards the EU than by his attitudes towards the issue of the expulsion (Kořan et al., 2010). Nevertheless, the topic was again brought to the fore and publicly debated (ibid.). Another example is the escalation of public debate after a speech of Angela Merkel in 2018, in which she condemned the expulsion as immoral (Kenety & Janzer, 2018). According to sociological research by the Public Opinion Research Centre among 1,021 Czech respondents carried out in October 2019 (CVVM, 2019), 41% of respondents thought the expulsion was justified; 25% considered it unjustified, but said it was a matter of the past; 9% considered it unjustified and thought that the Czech Republic should apologise for it; and 4%

considered it unjustified and thought that the Czech Republic should apologise and compensate victims.

Therefore, we consider the expulsion to be a historically sensitive topic in the Czech socio-cultural environment: One that affects Czech intergroup attitudes towards Sudeten Germans. We expect study participants to have a rather positive attitude towards the expulsion due to the prevailing historical narrative.

3.2 Hypotheses

We formed the following eight hypotheses. The initial six are related to attitudes and attitude change:

H1: Immediately after exposure to the game, we will measure significant negative explicit attitude change (i.e., negative pre-post difference) towards the expulsion of the Sudeten Germans in the Experimental group. Furthermore, we will measure significantly more negative pre-post change in the Experimental group than in the Control group.

Rationale for H1: Due to the perspective-taking, high plausibility of the game narrative and revelation of new, topic-related information in the game (which is new in relation to the prevailing historical narrative), we expect that the intervention may affect propositional reasoning leading to more negative explicit attitudes towards the expulsion.

H2: In the Experimental group, we will measure significant negative explicit attitude change towards the expulsion of the Sudeten Germans for the period from the pretest to the one-month delayed posttest (i.e., negative pre-del difference). Furthermore, we will measure significantly more negative pre-del difference in the Experimental group than in the Control group.

Rationale for H2: Propositional reasoning must be in line with other propositions and in line with what one considers to be the truth (Gawronski & Badenhausen, 2014). Potential explicit attitude change would mean a revision of one's beliefs about the topic (Gawronski & Brannon, 2019). A similar process does not occur

with implicit attitudes. Therefore, possible immediate change in explicit attitudes will last (i.e. become long-term) due to the newly acquired information about the topic in the persuasive narrative format (see Figure 3).

H3: Immediately after exposure to the game, we will measure significant negative implicit attitude change (i.e., negative pre-post difference) towards the expulsion of the Sudeten Germans in the Experimental group. Furthermore, we will measure significantly more negative pre-post change in the Experimental group than in the Control group.

Rationale for H3: The game contains historical perspectives on the expulsion which are not present in the prevailing historical narrative. Activation of associative links is highly contingent on context-dependent information. We assume that the intervention will activate associative links between stored concepts in memory due to new information contained in the narrative. These are links that had previously been rarely used. This will result in a temporary change of implicit attitudes.

H4: There will not be any significant pre-del change in implicit attitudes in the Experimental or Control groups.

Rationale for H4: We assume that the length of our intervention will not cause frequent co-occurrence of any two related concepts. So neither is a new associative link created in the mental association structure of one's long-term memory, nor is an existing one strengthened. Therefore, implicit attitudes will not change over the long term, but only immediately after the intervention. They are unlike explicit attitudes that do not need frequent co-occurrence of two concepts to change over the long term (Gawronski & Badenhausen, 2014).

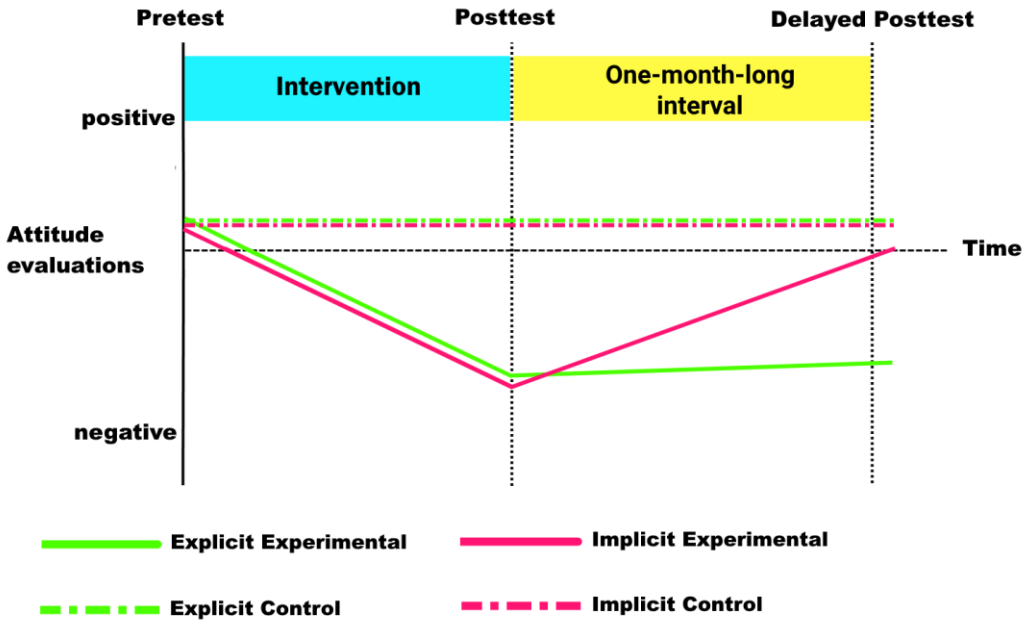


Figure 3. Expected change in implicit and explicit attitude evaluations over time

H5: Participants' explicit and implicit attitude evaluations towards the expulsion of the Sudeten Germans will not correlate before the intervention.

Rationale for H5: The expulsion of the Sudeten Germans represents a sensitive topic in the Czech context. For socially or historically sensitive topics, explicit and implicit attitude evaluations do not often correlate (Hofmann et al., 2005).

H6: Participants' moods during the pretest will be a significant predictor for implicit and explicit attitude change during the posttest.

Rationale for H6: Measuring the relation between participants' moods and possible attitude change is not central to this study, but we have collected data to detect possible sources of irregularities among our participants. Several studies indicate that attitudes and possible changes therein may be affected by participants' moods (e.g. Schwarz & Clore 1983); especially when dealing with objects requiring more processing effort (as in our case) (Wegener, Petty & Klein, 1994). Therefore, we assume that the initial values for participants' moods will, to some extent, predict attitude change in our explicit and implicit attitude measurements.

In relation to information behaviour, we have formed the following two hypotheses:

H7: One month after the intervention, participants in the Experimental group will seek more information about the expulsion of the Sudeten Germans compared to the Control group.

Rationale for H7: Similar to a study by Khalil et al. (2016), we assume that *Czechoslovakia 38-89: Borderlands* will affect information behaviour in the sense that it will cause significantly more information seeking by the Experimental group compared to the Control group; this as relates to the topic of the expulsion of the Sudeten Germans. The topic itself arouses passions in the Czech Republic and is one that has not been exhausted in public debate. Therefore, we assume it will trigger further curiosity among study participants.

H8: Participants in the Experimental group showing a measurable, long-term, explicit attitude change will seek more intensively new information related to the topic of the expulsion compared to participants in the Experimental group with no long-term attitude change; and also compared to participants in the Control group.

Rationale for H8: The APE model suggests that newly acquired information inconsistent with a person's attitude may result in the creation of information need. Our video game represents a historical event from multiple perspectives; among others, also from the perspectives of those who actively expelled the Sudeten Germans. This does not, however, reflect majority discourse about the event among the general Czech public. Therefore, we assume that, during our intervention, there is a high probability of acquiring new information inconsistent with participants' attitudes. This will lead to the creation of information need during the month prior to the delayed posttest, thus resulting in attitude change.

4 Methods

4.1 Participants

The optimal sample size for the study was estimated to be 64 persons per group so as to detect medium between-group-difference effect size (Cohen's d = 0.5) of attitude change using a two-sample t test with a significance level $\alpha = .05$ and power $1-\beta = .80$. We collected data from 148 participants during 19 interventions: of this group, 141 participants were recruited through portals offering short-term jobs in Prague. The advertisement stated that we were seeking participants for a study dealing with video games and their influence on game players. The participants were rewarded financially for their time (500 CZK: approx. 18 EUR). The remaining seven participants were college students who were offered extra credit for their coursework.

We further excluded two participants who were not Czech speakers and one participant who had already played an earlier version of our game. The remaining 145 participants' ages ranged from 15 to 30 years (M = 20.9; SD = 3.9; Women: 42.1%) and they had various levels of completed education (elementary: 25.5%; high school: 54.5%; university: 20%). We assigned participants randomly to the Experimental (n = 81) and Control (n = 64) groups. This sample was used to evaluate hypotheses one, three, five and six.

One hundred twenty-four participants arrived for one of the 29 second-round testing sessions that occurred one month later after the respective first testing sessions. From those 124, we further excluded five participants resulting in 119 participants taking part in the second testing session (Experimental group: n = 73, Control group: n = 46) for the purposes of evaluating hypotheses two and four. Those five excluded participants were strongly affected by Angela Merkel's speech on 21 June 2018 delivered on the occasion of World Refugee Day. The speech dealt, in part, with the topic of the expulsion of the Sudeten Germans. At the same time, they had also been impacted by the subsequent public debate in Czech media during the period between their initial posttest and the one-month delayed posttest (see Kenety. & Janzer, 2018).

For the purposes of hypotheses seven and eight, we did not exclude those five participants. Participants willing to look for more information about the topic of the expulsion of the Sudeten Germans had a high probability of encountering Angela Merkel's speech and the subsequent debate. Even though the situation may have affected participants' attitudes, it would have been counterproductive to exclude them for the purposes of analysis of their information behaviour and information seeking. This is because changes could have been an outcome of their information seeking provoked by the experiment. However, we did have to exclude three other participants who did not get the questionnaire about information behaviour due to technical reasons. Our research sample for hypotheses seven and eight thus differed slightly (Experimental group: $n = 74$, Control group: $n = 47$) from that for hypotheses two and four.

4.2 Materials – Video Games

4.2.1 Experimental Intervention

Our intervention tool in the Experimental group was a modified version of the game *Czechoslovakia 38-89: Borderlands* (http://cs3889.com). The original game is a single-player narrative video game from the *Czechoslovakia 38-89* series. It provides players with a story based on historical research and the personal testimonies of eyewitnesses to specific historical events during the years 1945-1948, i.e. the expulsion of the Sudeten Germans from then Czechoslovakia, the resettlement of the Czechoslovak borderlands, and the communists' rise to power. It is a dialogue-based, full motion video adventure. The game has two different time dimensions: the present and the past. In the present, players take on the role of an administrative official deciding on the preservation of a school building in a village in the Czech borderlands. The players' goal is to learn as much as possible from the game characters (eyewitnesses to events from the years 1945-1948), so as to decide on the school building's fate. As players interact with the eyewitnesses in the present (Figure 4), these eyewitnesses provide the players with fragments of the past through video sequences, comics (Figure 5), and thematic mini-games (Figure 6). In the past, players cannot change the history depicted in the game; they can only interact with it. Within the game,

players approach historical events from various perspectives to uncover different characters' points of view and motivations.

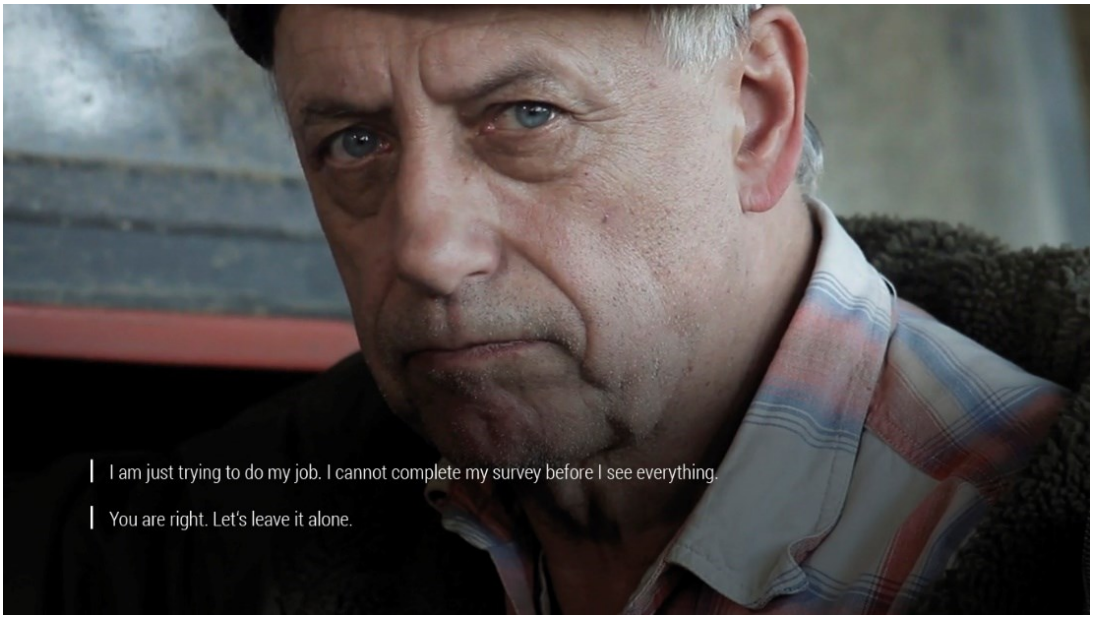


Figure 4. An example of interaction with an eyewitness from the present in *Czechoslovakia 38-89: Borderlands*

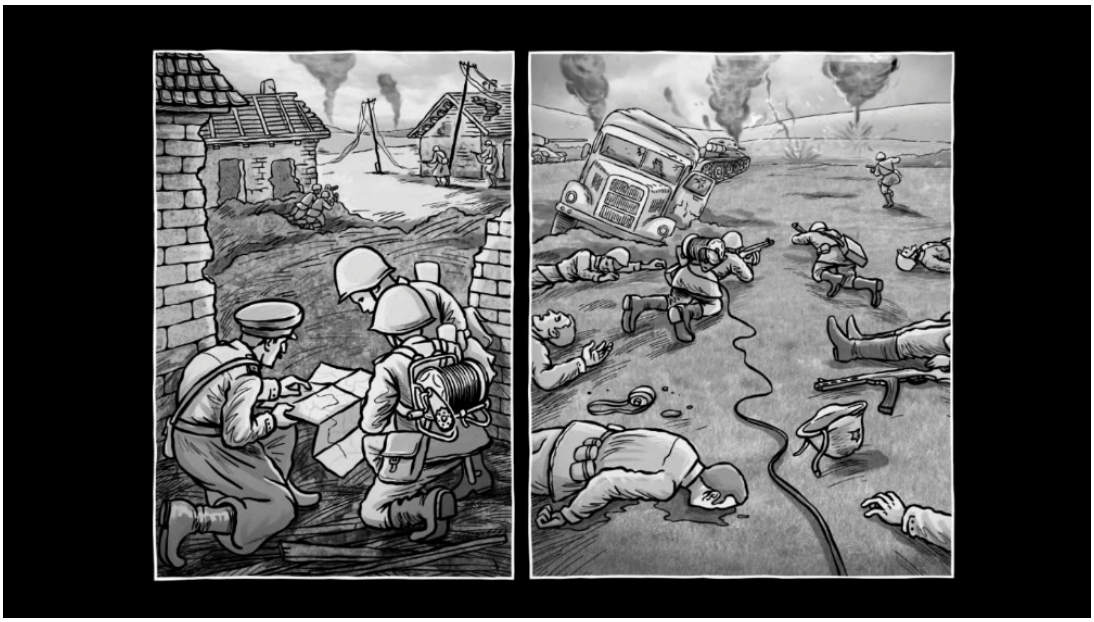


Figure 5. A demonstration of the interactive comics from *Czechoslovakia 38-89: Borderlands*

Figure 6. A demonstration of a point-and-click mini-game focused on exploring attics in the modified version of *Czechoslovakia 38-89: Borderlands*.

In this study's game version, players interact with seven characters: 1) a Volhynian Czech who was given a farm in the Czech borderlands after WWII, 2) an entrepreneur who is the son of a former, high-level communist functionary, 3) and 4) siblings of Sudeten German origin who were separated after one was expelled and the other escaped the expulsion, 5) a local amateur historian living in the school building, 6) a former member of the National Security Corps and an anti-Nazi resistance fighter, and 7) a Holocaust survivor of Jewish origin.

The game was divided into two parts. The first part was approximately 28 minutes long and contained the introduction to the whole story (provided by game character 1); a point-and-click mini-game exploring the school attic (Figure 6) with its historical items; and stories about the expulsion of the Sudeten Germans offered by the game characters affected mostly negatively by the event (game characters 3, 4 and 7).

The second part was approximately 22 minutes long, and it focused on the stories of those who took an active part in the expelling the Sudeten Germans (game characters 2 and 6) or those who perceived the act as inevitable (game character 5).

Game characters also provided players with interactive comics as part of their narration of historical events (see Figure 5).

We modified the original game in order to ensure that participants always encountered all key information about the expulsion, with the game still providing them different walkthroughs to finish it. Thus, we created a standardized gaming experience for all players; without apparent limitations on players' agency.

4.2.2 Control Intervention

The intervention tool used in our Control group included two games from the *Trader of Stories* series (Trader of Stories, 2017): *A Grain of Truth* and *Trader of Stories Chapter 1*. These games are unrelated to the expulsion of the Sudeten Germans. They were chosen because they share several game design principles with *Czechoslovakia 38-89: Borderlands*. They are strongly narrative, point-and-click adventures. The gameplay in both games consists of collecting items; discovering new locations, people and creatures; and collecting their stories through a dialogue system and mini-games. The first game used in the Control group is about a woman named Myosotis who collects stories from others to regain her lost memory. The second game released in the series is a prequel to the first game: It focuses on the moment when the main character lost her memory in a magical forest. The series was chosen in order to provide players in the Control group with relatively the same game experience with respect to game mechanics; albeit with a different narrative.

Gameplay in the Control group was defined by our Experimental group's average play times during the pilot studies: 28 minutes for the first part and 22 minutes for the second part. To ensure a standardized course for the experiment, participants played the first game from the series during the first part. They played the second game in the second part.

4.3 Measures

All our empirical data was collected through pen-and-paper-type questionnaires except for during the computer-administered Single-Category Implicit Association

Test (SC-IAT). All the questionnaires are attached as Appendices to this paper (in the original Czech version).

4.3.1 Pilot Studies

In April and May 2017 we conducted the first of our pilot studies (n = 18, M age = 23.9; Women = 22.22%). Participants in this pilot study were university students from Charles University's Faculty of Mathematics and Physics. They took part in order to complete a compulsory section of one of their courses. We collected data for the first pilot during six sessions. The aim of the first pilot study was to evaluate four aspects of our experiment: (1) the feasibility of an experiment of such a scale on the organizational level; (2) design of questionnaires, including the suitability of the chosen evaluation adjectives for explicit attitudes measurement through focus groups; (3) verification of the functionality of developed software for implicit attitude measurement SC-IAT (see Chapter 4.3.2) and the functionality of the newly modified version of *Czechoslovakia 38-89: Borderlands*; and (4) the game's ability to change participants' attitudes when exposed to historical topics from various perspectives in different order. As a result of this experiment, we standardized and documented well the experimental procedure within the team. The latter consisted of me and my main administrator. We improved the wording of our questionnaires and also significantly improved our game's user experience. The biggest challenge was improvement of implicit attitude measurement through SC-IAT. In our former design of this test, we chose adjectives and nouns easily categorized by word structure rather than their meaning, i.e. all the negative adjectives in this time-response test used the prefix "ne" as it is a common beginning of negative adjectives in the Czech language (unlike in the English language). Therefore, most participants focused only on the "ne" prefix as an indicator of a word's negative meaning. During July and August, we fixed the tests and developed an improved version of our game.

The second pilot study was organized during August and September 2017 (n = *31;* M age = 22.1; Women = 41.9%) Participants were mostly recruited from platforms offering part-time jobs, or they were students taking courses at Charles University's Faculty of Mathematics and Physics. The objective of the second pilot study was once

again to evaluate four aspects of our experiment: (1) assess the process and conditions for recruiting participants for such a study; (2) iterate one more time our improved questionnaires and computer software for measuring attitude change using SC-IAT and also iterate the improved version of *Czechoslovakia 38-89: Borderlands*; (3) define average play times for both parts (sections) of *Czechoslovakia 38-89: Borderlands* in order to define the play times for our Control group; and (4) collect enough data to complete our final research design as relates to the number of groups and participants.

As a result, we modified two more adjectives in our explicit attitude measurements, thus reflecting the feedback of participants in our qualitative focus groups. Apart from the replacement of the two adjectives used in the SC-IAT, all the developed software proved stable with no need for significant changes. As a result of these pilot studies, we decided not to expose participants to the historical topics in various orders. Thus, our final experimental research design consisted of only two groups instead of three; creating two larger groups for comparison.

This study's preliminary methodology based on the described pilot studies was presented and published as a short conference paper at the European Conference on Game-Based Learning in October 2017 (Kolek & Šisler, 2017) and also at the Games and Learning Alliance Conference in December 2018 (Kolek, Šisler & Brom, 2019).

4.3.2 Measurements and Questionnaires

Background demographic questionnaire. The demographic questionnaire yielded data about participants' gender, age, and education.

PANAS. To evaluate participants' positive and negative affect, we used the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). It contained two, 5-point Likert item mood scales. One scale was for positive affect; the other was for negative affect. Each scale contained 10 adjectives: Each of them coded on a scale from 1 to 5 with smaller values indicating less positive / more negative affect (total score: 10 – 50). Several studies indicated that attitudes, and possible changes therein, may be affected by mood (e.g. Schwarz and Clore, 1983). We therefore used this scale as a control variable.

Single Category Implicit Association Test (SC-IAT). The most common indirect attitude measurement, Implicit Association Test (IAT), compares relative attitudes towards two complementary attitude objects (e.g. male and female, war and peace, etc.). This feature is a powerful component of many research designs. However, we intended to measure players' attitudes towards one historical concept (the expulsion of the Sudeten Germans). Given that there is no relevant counterpart to our historical concept that could be used in an IAT measure, we worked with a modification of the Implicit Association Test (Greenwald & Banaji, 1995; Greenwald, McGhee, & Schwartz, 1998) from Karpinski and Steinman (2006). It is known as the Single Category Implicit Association Test and measures participants' reaction times. We used a computer-based version of the test. Of all the options (Wigboldus, Holland, & van Knippenberg, 2005), SC-IAT appears to be the most reliable method for implicit attitude measurement towards a single concept (Karpinski & Steinman, 2006).

The SC-IAT reveals participants' positive or negative associative evaluations towards the measured phenomenon. The test measures participants' response times when they are categorizing words into three categories: negative evaluations, positive evaluations, and the category containing concepts related to the measured phenomenon. The latter, in our case, was the Expulsion of the Sudeten Germans category. The test's assumption was that relative response times would reveal participants' positive or negative associative evaluations of the expulsion of the Sudeten Germans. Participants' objective is to categorize words appearing in the middle of the screen into the correct categories on the sides of the screen as fast as possible (see Figure 7 and Table 3). Participants implicit attitudes are revealed by the comparison of response times in categorization of the words into the respective categories between the Blocks 2 and 3 (see Figure 8 and Table 4). For instance, as illustrated in the Figure 8, assume that participants are significantly faster in categorizing word Decrees to the category Expulsion of Sudeten Germans on the right side of the screen in the Block 2 than to the left side of the screen in the Block 3. It would reveal that for participants it is easier to categorize the word when associated with positive adjectives than when associated with negative adjectives, i.e. participants link the concept of the expulsion with positive evaluations and the link between the

positive evaluations is stronger with the expulsion than the link with the negative evaluations, which is revealing positive implicit attitudes towards the concept.

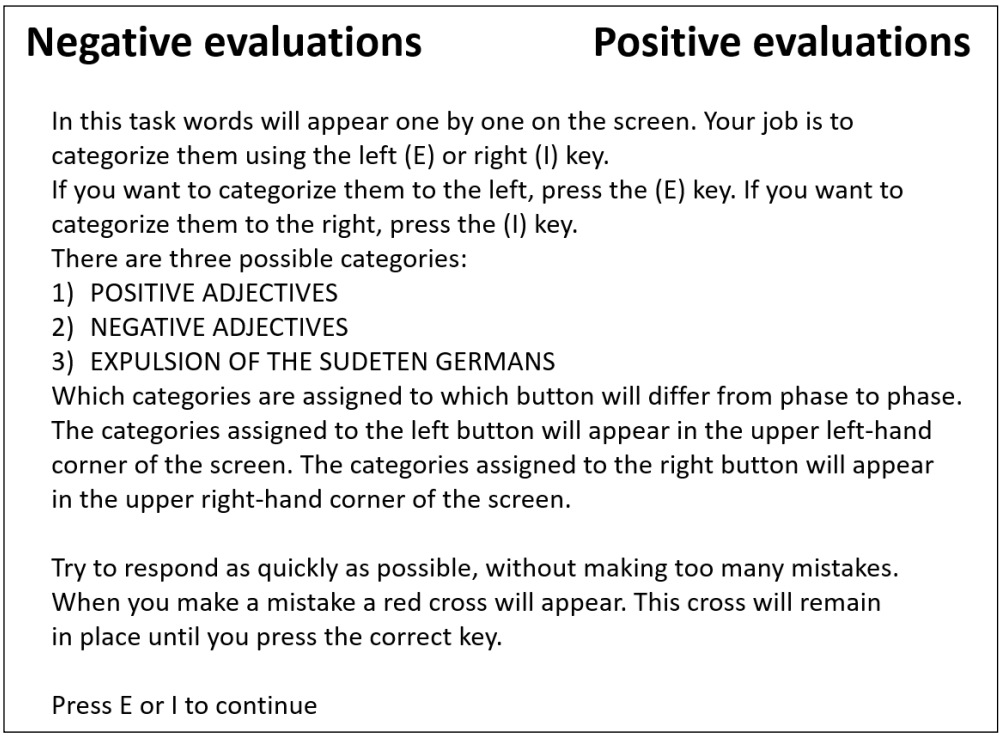


Figure 7. SC-IAT initial instructions

Table 3.

List of SC-IAT Words in Three Categories

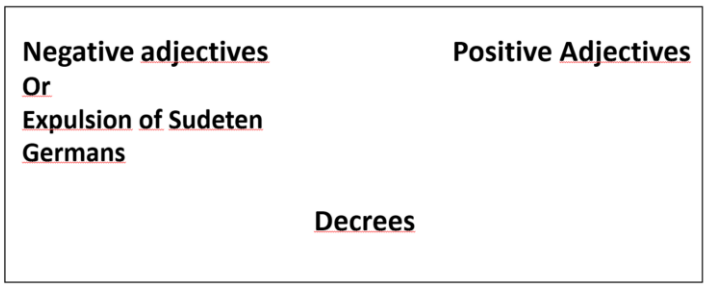
Positive adjectives	Negative adjectives	Expulsion of the Sudeten Germans
Just	Criminal	Germans
Good	Wrong	Borderlands
Right	Bad	Sudetenland
Fair	Evil	Decrees
Well-managed	Humiliating	Deportation
Merciful	Unfair	Displacement
Moral	Disgusting	German
Honest	Shameful	Expulsion

Table 4.

Blocks in the Single Category Implicit Association Test

Block	Words	Function	Left-key response categories	Right-key response categories
1	32	Practice	Negative adjectives	Positive adjectives
2a	24	Practice	Negative adjectives	Positive adj. + Expulsion
2b	72	Test	Negative adjectives	Positive adj. + Expulsion
3a	24	Practice	Negative adj. + Expulsion	Positive adjectives
3b	72	Test	Negative adj. + Expulsion	Positive adjectives

Block 2



Block 3

Figure 8. Demonstration of the categorization of the word Decrees in the Block 2 and the Block 3 of the SC-IAT

Apart from the practice section, there are always two categories on one side of the screen and one category on the other. What category is on which side depends on the test phase as explained below. We used eight words for each of the three categories (Positive adjectives, Negative adjectives, and the Expulsion of the Sudeten Germans; see Table 3) and respected the methodology proposed by Karpinski and Steinman (2006). The routine consisted of instructions (see Figure 7) followed by three activity

blocks (see Table 4 and Figure 8), in which participants categorized words into two categories. The three main activity blocks were separated by instruction screens giving instructional guidance for the subsequent block.

In the first practice block, participants had to categorize eight words from the Negative adjectives category and eight words from the Positive adjectives category twice (2x2x8 = 32 words in total). This was the only block not used in the evaluation. In the second block, participants categorized eight words from each of the three categories four times (3x4x8 = 96 words in total). The third block also consisted of eight words from each of the three categories; those words also appeared four times (3x4x8 = 96 words in total). The first 24 words in the second and the third blocks were considered practice: They were included in the calculation of the final score, but they were calculated separately from the remaining 72 words in each block.

We made two modifications to the original methodology proposed by Karpinski and Steinman (2006). All the odd-numbered participants in our study followed the routine described in the previous paragraph. With an aim of minimizing the task order effect, the order of our blocks two and three was switched for each even participant. Another modification involved our first block where participants categorized only positive and negative adjectives (as a means of familiarizing themselves with the process). Our computer-based measurement tool was created using *PsychoPy2 Experiment Builder* (Peirce, 2007; 2009) and by modifying Hussey's (2016) existing script.

Macro and Micro explicit attitudes measurement. The chosen concept for this study (the expulsion of the Sudeten Germans) represents a complex topic. Similar to the study by Soekarjo and van Oostendorp (2015), we approach it using two explicit attitude constructs, evaluated with two questionnaires. The first one, Macro explicit attitude measurement, pinpoints attitudes towards the expulsion as a whole by asking participants about their general opinion about the event. The second one, Micro explicit attitude measurement, focuses on participants' attitudes towards micro-level (specific) topics regarding the expulsion (e.g. confiscation of the Sudeten Germans property or the necessity of the expulsion). In the **Macro** questionnaire, participants were asked to

evaluate the event of the expulsion of the Sudeten Germans on a macro (general) level using a five-point, semantic differential scale (Osgood, Suci, & Tattenbaum, 1957) with seven pairs of bipolar adjectives. Each item consisted of five squares positioned between two bipolar adjectives. Each item was coded as -2 – +2. The word pairs included the following: unnecessary-necessary, wrong-correct, inadequate-adequate, criminal-righteous, shameful-honest, unfair-fair, unfounded-justified (i.e., total possible score: –14 – +14). In the **Micro** questionnaire, participants assessed ten evaluative statements about the specific topics related to the expulsion forming the construct. These statements were ranked on a seven-point Likert scale (Likert, 1932) coded 1 to 7; with smaller values meaning less positive / more negative attitude towards the expulsion. Answers could yield a total score on a scale from 10 to 70.[5] We specifically asked to what extent participants agreed with the following statements, e.g. "The Sudeten Germans were displaced justifiably" (see Table 5 for a complete list).

Table 5.

Phrases Used in the Micro Explicit Attitude Measurement

Item	Phrase
1	The expulsion of the Sudeten Germans from the borderlands was the right decision.
2	The Czechs behaved harshly towards the Sudeten Germans after the war.
3	The displacement of the Sudeten Germans was historically necessary.
4	The deportation of the Sudeten Germans was a crime.
5	The Sudeten Germans were displaced justifiably.
6	Unjustifiable violence was committed against the Sudeten Germans during the post-war arrangements.
7	Sudeten Germans were undeservingly accused of crimes committed by Nazi Germany.
8	The Czechoslovaks' confiscation of Sudeten German property after the war was fair.
9	The post-war handling of matters in the borderlands resulted in an unnecessary number of casualties among the Sudeten Germans.
10	Borderland evictions were carried out fairly.

[5] Negatively formulated items were reverse-coded for the purpose of the analysis.

Behaviour change measurement. The questionnaire measured self-reported change in participants' information seeking and behaviour. It contained two open-ended and eight closed questions about participants' information seeking and behaviour related to the expulsion and was distributed after the one-month period between the first and the second testing session, i.e. only during the second testing session. Four of the closed questions focused on self-reported information seeking (e.g. After the experiment, did you look, out of your own curiosity, for information about the expulsion of the Sudeten Germans from the Czechoslovak borderlands?) and the other four closed questions measured the intervention's self-reported effect on information behaviour (e.g. Do you think that this experiment has increased the chance of you joining the debate on the expulsion of the Sudeten Germans?) (see Table 15). Questions P2 and P3 were four-point scales ranging from "No/Never" to "More than four times". Question P2a was a five-point scale ranging from "I talked about it a lot less often." to "I talked about it much more often.". Questions P5, P6, P6a, P7, and P7a were five-point scales ranging from "Definitely no" to "Definitely yes". Open-ended questions focused on participants' perceived benefits of their participation in the experiment in relation to the expulsion (P1) and on their perceived attitude change towards the expulsion after they finished the experiment (P4).

4.4 Procedure

The study included two testing sessions; always conducted between 9:00 AM and 12:15 PM (see Figure 9). Participants were tested in groups of three to 12 persons, each sitting at a separate computer in a lab. The numbers varied as we always confirmed up to 14 participants in advance for each session, but some of them ultimately did not arrive to the experiment. We began sessions with standardized instructions about the course of the experiment and by signing informed consent forms about participation in the study. Experiments were always led by one main experimenter and one administrative assistant. We regularly exchanged these roles between my main research assistant and myself to avoid potential disruptive effects created by the main experimenter.

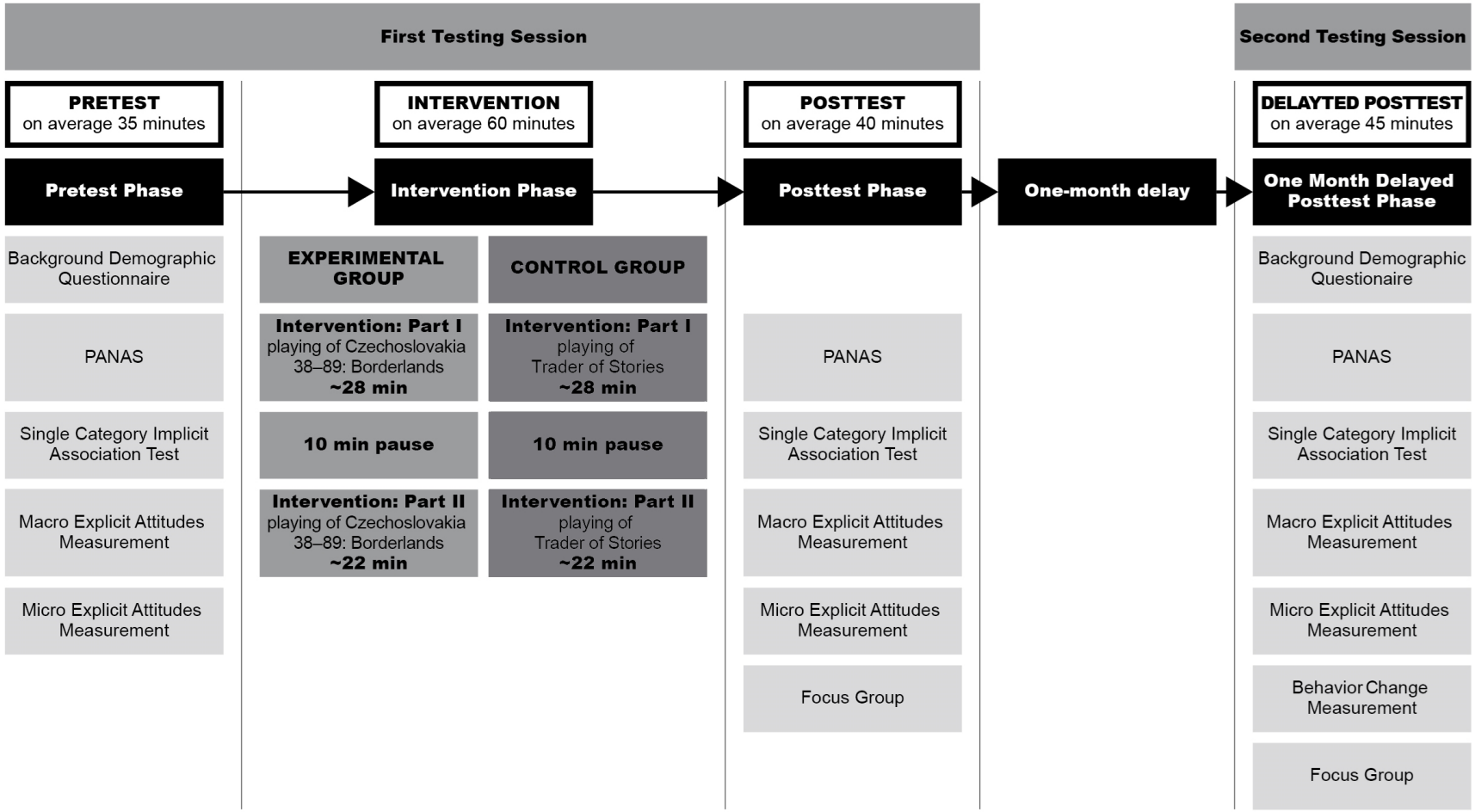


Figure 9. Experiment procedure

The pretest phase of the first testing session consisted of the following steps (see Figure 9). Firstly, we collected basic demographic data and data on participants' initial positive and negative affect. Next, we evaluated participants' initial implicit attitudes towards the expulsion of the Sudeten Germans using SC-IAT. Then, we collected data on Macro and Micro explicit attitudes.

After the pretest phase of the data collection, participants were exposed to the approx. 28-minute-long intervention of playing *Czechoslovakia 38-89: Borderlands* (Experimental group) or the game *A Grain of Truth* from the *Trader of Stories* series (Control group). After a ten-minute break, they played the second part of the *Czechoslovakia 38-89: Borderlands* game or *Trader of Stories Chapter 1* for approx. 22 minutes. Faster participants were instructed to wait until the last participant finished the game.

The posttest phase of the first testing session followed the same pattern as the pretest phase; apart from the absence of the questionnaire collecting demographic data. Afterwards, we organized focus groups with participants to detect any potential disruptive elements that might have affected their results. This data did not reveal any important factors, and we have not used it in our further analysis.

We organized our second testing session three to five weeks after the first intervention. It followed the same pattern as the pretest and afterwards included one extra questionnaire: Behaviour change measurement, with ten questions collecting data about participants' information behaviour. Then, we collected qualitative data through focus groups: This time we focused on participants' activities related to the topic of the expulsion (this was done in order to consider whether or not to exclude participants from the delayed testing session). Apart from the possible impact of Ms. Merkel's speech about the topic on five of the participants during the monitored period, this data did not reveal other important factors and it was not analysed further. In the end, we debriefed our participants.

4.5 Data Analysis

The reliability of the research questionnaires was assessed in terms of internal consistency using Cronbach's alpha. All the questionnaires in the experiment had a high degree of reliability ($\alpha \geq 0.8$; see Table 6).

Table 6.

Internal Consistency of Measurement Scales

Measurement	Phase	Number of items	Cronbach's alpha		
			alpha	LCI	UCI
Macro explicit	Pretest	7	.88	.84	.90
	Posttest		.88	.84	.91
	Delayed		.84	.80	.88
Micro explicit	Pretest	10	.82	.77	.86
	Posttest		.87	.83	.90
	Delayed		.85	.81	.89
PANASp	Pretest	10	.82	.78	.86
	Posttest		.85	.80	.88
	Delayed		.87	.83	.90
PANASn	Pretest	10	.80	.74	.84
	Posttest		.83	.78	.87
	Delayed		.81	.76	.85

Note. LCL/UCL - lower/upper confidence limit, i.e. lower/upper bound of 95% confidence interval

We used an X^2 test for binary variables (gender) and two-sample *t* tests to compare the Experimental and Control groups on the baseline.

We used paired *t* tests to analyse changes in explicit and implicit attitudes towards expulsion between the pretest and posttest, as well as changes between the pretest and delayed posttest. We used two sample *t* tests to compare the Experimental and Control groups in their changes. Further, to account for respondent characteristics and initial PANAS (which may have influenced changes in respondents' implicit and explicit attitudes), we fit linear regression models in which post-intervention explicit/implicit attitude score (Micro, Macro, SC-IAT) was modelled by the following: Its pre-intervention counterpart, PANAS (positive and negative), age, education, gender and group membership (Experimental/Control), and interactions

with the pretest score. We then excluded insignificant effects one by one and checked for significance of group effect and its interactions in the final models.

In all statistical tests related to hypotheses one to six, we used the Benjamini-Hochberg correction (Benjamini & Hochberg, 1995) to account for multiple comparisons. Analyses were performed using R version 3.6.0 (R core team, 2019) software and its expansion packages: ShinyItemAnalysis 1.3.3 (Martinková & Drabinová, 2018).

Concerning the analysis of data from the Behaviour change measurement, we used the following procedure. The questionnaire measured two constructs: a) self-reported information seeking (questions P2, P3, P6, and P7; see Table 15) and b) self-reported effect of the intervention on information behaviour (questions P2a, P5, P6a, and P7a, see Table 15). Both constructs were analysed separately. The results of the analysis of the former construct constituted the basis for evaluation of Hypotheses 7 and 8, which are related to information seeking after the video game intervention. These findings were supplemented by the results from the latter construct to provide a broader context. To test the between-group differences, we again used *t* tests with Benjamini-Hochberg correction for multiple comparisons (Benjamini & Hochberg, 1995; for the analysis of suitability see Chen, Feng, & Yi, 2017).

Data was analysed using the *Excel Analysis Toolpak* in the *Microsoft Office 2016* product suite (Microsoft, n.d.). The Benjamini-Hochberg correction was calculated using the Multiple Comparisons Calculator statistical tool (Coppock, 2020). Data in open-ended questions in the Behavior change measurement was analysed using the inductive framing method (Entman, 1993). Data from these questions served as a control for other questionnaires.

5 Results

There were no significant between-group differences in any of the respondent characteristics and the initial PANAS, even though there was a trend towards difference in age (Table 7). In pretests, all attitude measurements were close to the midpoints in both groups (i.e.: Macro explicit: 0; Micro explicit: 40; SC-IAT: 0).

5.1 Hypotheses 1 & 2: Explicit Attitude Change

As expected, we found significant between-group difference in explicit attitude pre-post change towards the expulsion of the Sudeten Germans: Both in the Macro (d = -0.34, p = .022*)* and Micro measurements (d = -0.53, p = .001), thus supporting Hypothesis 1. In both groups, the posttest Macro attitude measurements showed significant negative shift in attitudes towards the expulsion compared to the pretest, while the shift in Micro attitude measurements was significant only in the Experimental group (see Table 8). Significant group differences were supported by regression models accounting for both respondent characteristics and pretest scores (see Tables 12, 13, and 14 and Figures 11, 12, and 13). This points to more complex relationships between pretest and posttest values by also uncovering gender effect and interaction between gender and the pretest value. We nevertheless conclude that Hypothesis 1 was supported.

Negative between-group differences remained significant in the Micro explicit attitude measurements when considering the shift from the pretest to the one month delayed posttest (d = -0.44, p = .014; see Table 9), however, these between-group differences were not significant for Macro explicit attitude measurements (d = -0.16; p = .266; see Table 9). Therefore, we can partially confirm Hypothesis 2: with respect to Micro rather than Macro attitudes.

Our results for the long-term attitude change are further supported by the data from the open-ended questions in the Behaviour change measurement (see Table 17). The data revealed that approx. 53% of participants in the Experimental group responded that, due to their participation in the experiment, they changed their opinion about the expulsion compared to approx. 9% in the Control group. Therefore, we can partially confirm Hypothesis 2: With respect to Micro rather than Macro attitudes.

Table 7.

Descriptive Statistics for the Experimental and the Control Group in Pretest

	Experimental group			Control group			Experimental vs. Control group				
	n	*M*	SD	*n*	*M*	SD	diff	SD	*d*	*t*	*p*
Gender (female ratio)	81	0.49	0.50	64	0.33	0.47	0.17	0.50	0.33	3.38	.204
Age	81	20.17	3.26	64	21.77	3.66	-1.59	3.52	-0.45	-2.73	.058
Education (1 ES, 2 HS, 3 U)	81	1.86	0.68	64	2.05	0.65	-0.18	0.67	-0.27	-1.64	.204
PANAS+	80	29.54	5.76	63	27.96	6.36	1.58	6.06	0.26	1.53	.204
PANAS-	80	15.41	5.16	63	14.70	4.07	0.71	4.71	0.15	0.92	.405
Macro explicit	81	-0.42	5.02	64	-1.32	5.75	0.90	5.36	0.17	0.98	.405
Micro explicit	81	35.15	8.28	64	32.61	9.56	2.54	8.93	0.28	1.68	.204
SC-IAT	81	-0.26	0.26	63	-0.30	0.32	0.04	0.29	0.14	0.83	.405

Table 8.

Differences between the Experimental and the Control Group in Posttest-Pretest

	Experimental group							Control group							Experimental vs. Control group			
		PRE	POST	PRE-POST difference					PRE	POST	PRE-POST difference							
	n	*M*	*M*	*M*	SD	*d*	*p*	*n*	*M*	*M*	*M*	SD	*d*	*p*	diff	SD	*d*	*p*
Macro	81	-0.42	-2.10	-1.67	3.62	-0.46	<.001	64	-1.32	-1.95	-0.63	2.00	-0.32	.021	-1.04	3.05	-0.34	.022
Micro	81	35.15	31.48	-3.67	5.98	-0.61	<.001	64	32.61	31.78	-0.83	4.04	-0.21	.105	-2.84	5.38	-0.53	.001
SC-IAT	81	-0.26	-0.24	0.03	0.33	0.08	.764	63	-0.30	-0.17	0.13	0.34	0.40	.008	-0.11	0.33	-0.32	.029

Table 9.

Differences between the Experimental and the Control Group in Delayed Posttest-Pretest

	Experimental group						Control group						Experimental vs. Control group			
		PRE	DEL	PRE-DEL difference				PRE	DEL	PRE-DEL difference						
	n	*M*	*M*	*M*	SD	*d*	*p*	*n*	*M*	*M*	*M*	SD	*d*	*p*	diff	SD	*d*	*p*
Macro	73	-0.20	-2.07	-1.87	4.00	-0.47	<.001	46	-0.84	-2.09	-1.25	3.50	-0.36	.059	-0.62	3.82	-0.16	.266
Micro	73	35.56	32.15	-3.41	6.42	-0.53	<.001	46	33.40	32.51	-0.89	3.98	-0.22	.207	-2.52	5.72	-0.44	.014
SC-IAT	72	-0.27	-0.27	-0.01	0.35	-0.02	.881	43	-0.31	-0.25	0.07	0.39	0.19	.213	-0.08	0.37	-0.22	.266

Table 10.

Differences between the Experimental and the Control Group in Delayed Posttest-Posttest

	Experimental group						Control group						Experimental vs. Control group			
		POST	DEL	POST-DEL difference				POST	DEL	POST-DEL difference						
	n	*M*	*M*	*M*	SD	*d*	*p*	*n*	*M*	*M*	*M*	SD	*d*	*p*	diff	SD	*d*	*p*
Macro	73	-1.92	-2.07	-0.15	2.77	-0.05	.877	46	-1.61	-2.09	-0.48	3.60	-0.13	.388	0.33	3.11	0.11	.900
Micro	73	31.68	32.15	0.47	4.56	0.10	.877	46	31.96	32.51	0.55	4.31	0.13	.388	-0.08	4.45	-0.02	.919
SC-IAT	72	-0.23	-0.27	-0.04	0.29	-0.14	.877	43	-0.16	-0.25	-0.08	0.40	-0.20	.388	0.04	0.34	0.12	.900

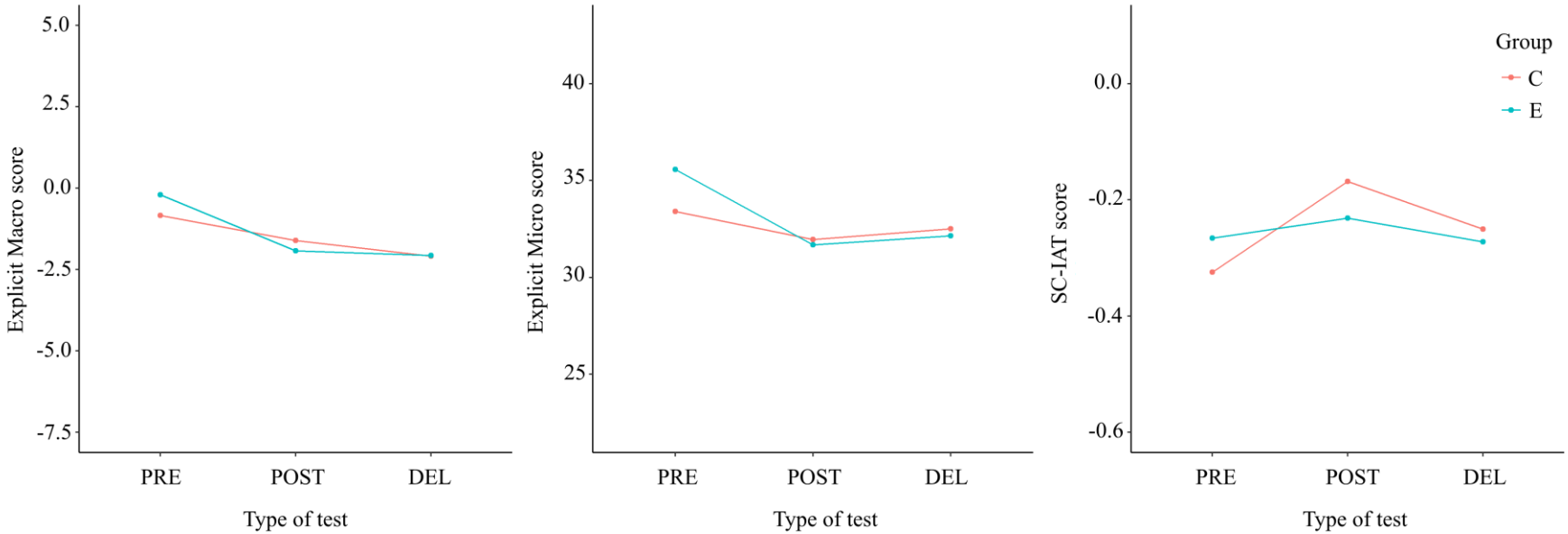


Figure 10. Means in Macro explicit (A), Micro explicit (B), and implicit attitudes (C). These figures depict only respondents who took the pretest, posttest, AND also the delayed posttest. Thus, they differ slightly from the results in Tables 8, 9, and 10.

5.2 Hypotheses 3 & 4: Implicit Attitude Change

Despite the fact that implicit evaluations differed significantly in pre-post comparisons between the Experimental and the Control groups (d = -0.32, p = .029), there was no significant pre-post change in the Experimental group itself (d = 0.08, p = .764) and the between-group difference was rather due to changes in the Control group (see Table 8). Thus, we cannot conclude that Hypothesis 3 was supported. There was neither a significant pre-post, nor pre-del within-group change in implicit attitude measurements in the Experimental group and no significant pre-del change in the Control group (Tables 9). Therefore, our results support Hypothesis 4.

5.3 Hypothesis 5: Correlation between Explicit and Implicit Attitudes

While the Micro and Macro explicit attitude measures correlated highly in the pretest (r = .81) and also in time (r = .72 – .84), this was not the case for the implicit attitude measure. The SC-IAT correlated weakly and insignificantly: Both for Micro and Macro explicit measures in pretests (r = .03 in both cases). The SC-IAT correlations in time were also weaker (.32 between posttest and delayed posttest, .29 between pretest and posttest) (see Table 11). Therefore, our results confirm Hypothesis 5.

5.4 Hypothesis 6: Participant Mood as an Attitude Change Predictor

Measurements of initial positive and negative affect via PANAS were used in regression models as one of the parameters. Both were included in a composite model of the regression models for the posttest Macro explicit measurement, the posttest Micro explicit measurement, and the posttest SC-IAT. However, according to the results, positive and negative PANAS were not proven to be predictors of Macro explicit, Micro explicit, or implicit attitude change after our intervention. Therefore, we have to reject our Hypothesis 6 (see Tables 12, 13, and 14 and Figures 11, 12, and 13).

Table 11.

Pearson Correlations between the Explicit and the Implicit Attitude Measurements

	Macro Pretest	Macro Posttest	Macro Delayed	Micro Pretest	Micro Posttest	Micro Delayed	SC-IAT Pretest	SC-IAT Posttest	SC-IAT Delayed
Pre Macro	1	.84	.72	.81	.68	.59	.03	-.07	.06
Post Macro	.84	1	.81	.79	.83	.73	.03	0	.02
Del Macro	.72	.81	1	.79	.81	.83	-.09	-.07	-.05
Pre Micro	.81	.79	.79	1	.83	.78	.03	-.03	-.01
Post Micro	.68	.83	.81	.83	1	.88	.08	.05	.03
Del Micro	.59	.73	.83	.78	.88	1	-.02	-.06	-.05
Pre SC-IAT	.03	.03	-.09	.03	.08	-.02	1	.29	.17
Post SC-IAT	-.07	0	-.07	-.03	.05	-.06	.29	1	.32
Del SC-IAT	.06	.02	-.05	-.01	.03	-.05	.17	.32	1

Table 12.

Parameter Estimates in the Final Regression Model for Posttest Macro Explicit Measurement

	Estimate	SE	*t*	*p* value	
Baseline (Group C, Gender M, Pretest Macro 0)	-0.35	0.38	-0.93	.354	
Pretest Macro explicit	1.03	0.07	15.58	<.001	***
Group Experimental	-0.90	0.47	-1.92	.056	.
Gender Female	-1.22	0.47	-2.57	.011	*
Pretest Macro: Group Experimental	-0.22	0.09	-2.57	.011	*
Pretest Macro: Gender Female	-0.23	0.09	-2.57	.011	*

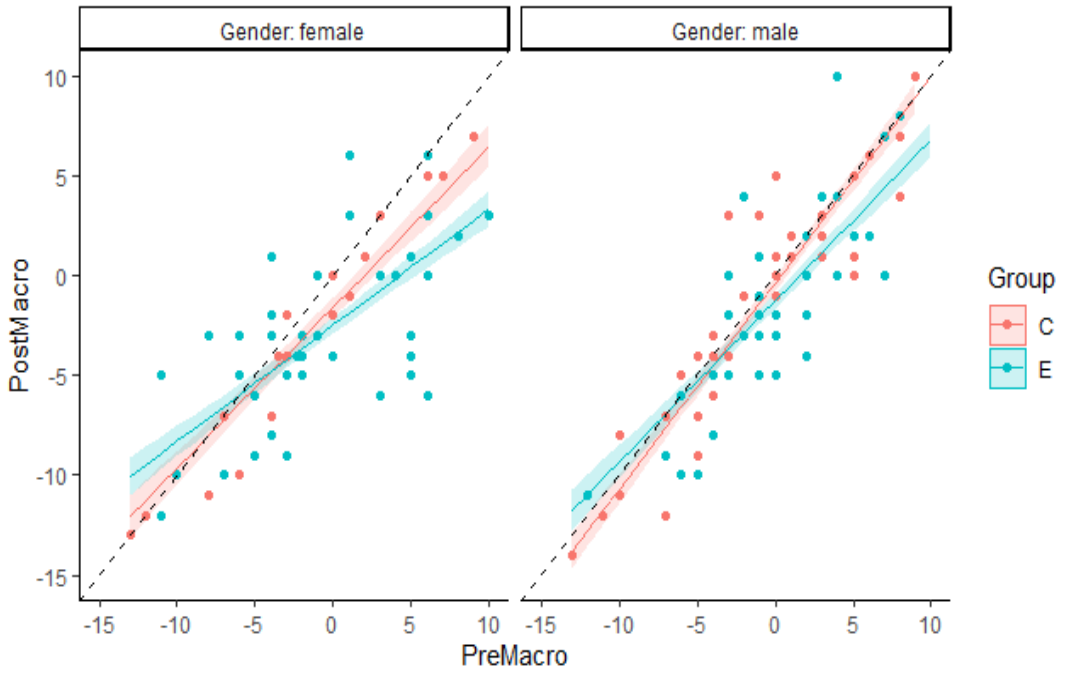


Figure 11. Graphical interpretation of the final regression model for posttest Macro explicit measurement

Table 13.

Parameter Estimates in Final Regression Model for Posttest Micro Explicit Measurement

	Estimate	SE	*t*	Pr(>|t|)	
Baseline (Group C, Gender M, Pretest Micro 0)	-1.67	2.23	-0.75	.455	
Pretest Micro	1.03	0.06	16.59	<.001	***
Group experimental	-2.26	0.85	-2.66	.009	**
Gender Female	9.65	3.26	2.96	.004	**
Pretest Micro : Gender Female	-0.33	0.09	-3.54	.001	***

Note.
Full model: PostMicro ~ PreMicro + Gender + Age + Education + PrePANASp + PrePANASn + Group + Gender: PreMicro + Group: PreMicro
Final model: PostMicro ~ PreMicro + Gender + Group + Gender: PreMicro
Multiple R-squared: 0.736, Adjusted R-squared: 0.729

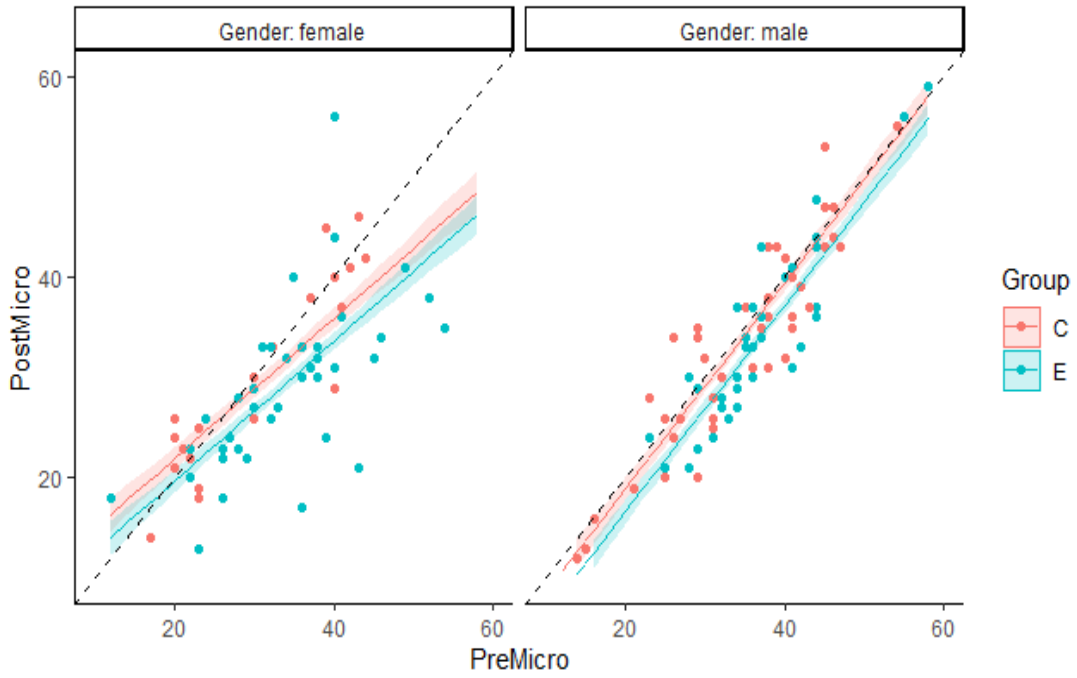


Figure 12. Graphical interpretation of final regression model for posttest Micro explicit measurement.

Table 14.

Parameter Estimates in the Final Regression Model for Posttest Implicit Measurement (SC-IAT)

	Estimate	Std. Error	*t*	Pr(>|t|)	
Baseline (Group C)	-0.08	0.04	-2.12	.036	*
Pretest SC-IAT effect	0.28	0.08	3.77	<.001	***
Group Experimental	-0.08	0.04	-1.77	.079	.

Note.
Full model: PostIATeffect ~ PreIATeffect + Group + Gender + Age + Education + PrePANASp + PrePANASn + Group: PreIATeffect + Gender: PreIATeffect
Final model: PostIATeffect ~ PreIATeffect + Group
Multiple R-squared: 0.104, Adjusted R-squared: 0.092

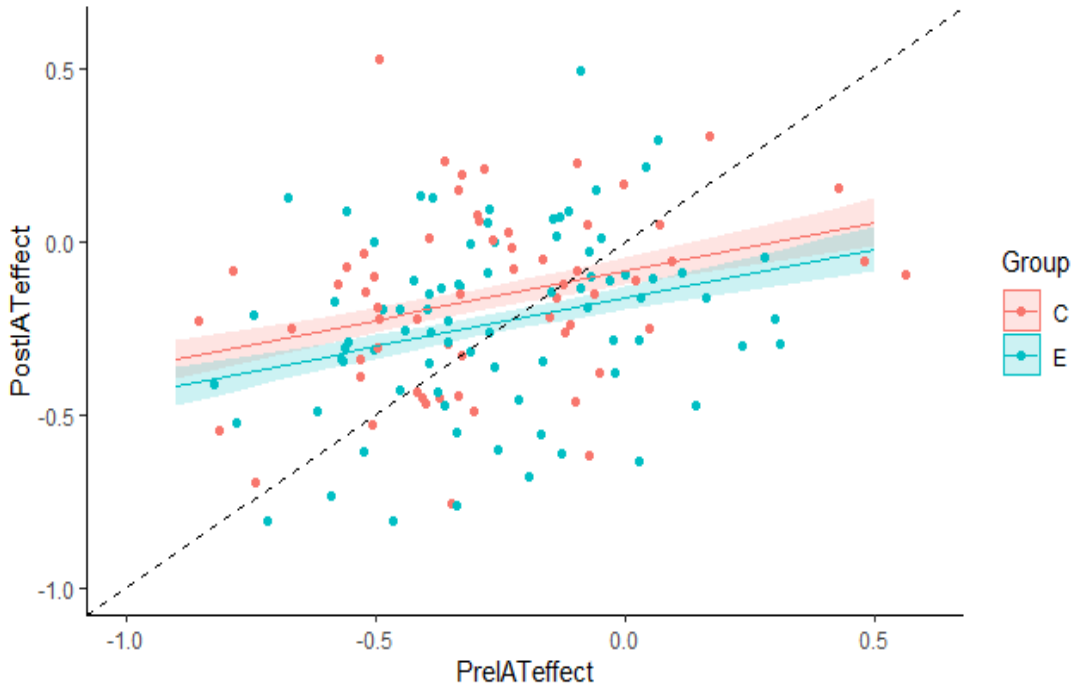


Figure 13. Graphical interpretation of the final regression model for posttest implicit measurement (SC-IAT)

5.5 Hypothesis 7: Information Seeking and Behaviour after the Intervention

Our results confirmed only negligible effect size difference in the self-reported information-seeking construct between the groups one month after the intervention; even though they were statistically significant ($d = 0.197$; $p = .046$). Also, our data did not confirm a statistically significant difference between the groups concerning self-reported information behaviour (see Tables 15 and 16).

When we look in detail at each question making up our self-reported information-seeking construct, the group difference was significant for the question about the frequency of active talking with someone about the topic during the last month (P2; $d = 0.44$, $p = .045$). The other three questions in the construct had insignificant results. No particular questions in the self-reported information behaviour construct revealed a significant difference between the groups. Our results from an analysis of responses to open-ended questions P1 and P4 additionally support that there was no significant difference in information seeking or behaviour related to the topic between the groups

(see Table 18). Approx. 24% of participants in the Experimental group and approx. 30% of participants in the Control group reported an increase in their interest in the topic as the result of participation in the experiment. Therefore, our results do not confirm Hypothesis 7.

5.6 Hypothesis 8: Information Behaviour in Relation to Attitude Change

The long-term effects of explicit attitude change and change in the self-reported information-seeking construct were not of such a magnitude to allow for meaningful analysis of their correlation with respect to our sample size. Therefore, we cannot evaluate this hypothesis.

Table 15.

Questions Used in the Behaviour Measurement Questionnaire with IDs Used in Table 16

Question ID	Question
P2	In the last month, how often have you talked to someone about the expulsion of the Sudeten Germans?
P2a	If you compare this to how often you talked about the issue of expulsion of the Sudeten Germans before participating in the experiment, have you been talking about it in the last month:
P3	Did you look, out of curiosity, for information about the expulsion of the Sudeten Germans from the Czechoslovak borderlands after the experiment?
P5	Did your participation in the experiment spark more interest in the topic of expulsion of the Sudeten Germans?
P6	If a debate on the expulsion of the Sudeten Germans was initiated in your surroundings, would you join the debate?
P6a	Do you think that the experiment has increased the chance of you joining a debate on the expulsion of the Sudeten Germans?
P7	Imagine that you come across a film about the expulsion of the Sudeten Germans. Would you watch it?
P7a	Do you think that the experiment increased the chance that you would watch a film about the expulsion of the Sudeten Germans?
P2; P3; P6; P7	Self-reported information seeking - construct of P2; P3; P6; P7
P2a; P5; P6a; P7a	Self-reported effect of the intervention on information behaviour - construct of P2a; P5; P6a; P7a

Table 16.

Results of the Effect of the Intervention on Self-Reported Information Seeking and Self-Reported Information Behaviour

	Control			Experimental			Control vs. Experimental		
Question ID	*M*	SD	*n*	*M*	SD	*n*	*d*	*t* test	*p*
P2	0.68	0.69	47	1.00	0.75	74	0.438	-2.40	.045
P2a	0.19	1.14	47	0.26	1.10	74	0.064	-0.34	.366
P3	0.49	0.59	47	0.51	0.66	74	0.037	-0.21	.418
P5	0.26	1.22	47	0.53	1.16	74	0.229	-1.22	.148
P6	0.62	1.11	47	0.84	1.07	74	0.207	-1.10	.227
P6a	0.57	1.17	47	0.92	1.08	74	0.310	-1.64	.131
P7	0.68	1.24	47	0.83	0.94	74	0.139	-0.70	.302
P7a	0.70	1.25	47	0.97	1.20	74	0.223	-1.19	.148
Inf. seeking (P2; P3; P6; P7)	0.62	0.94	47	0.80	0.89	74	0.197	-2.09	.046
Inf. behaviour (P2a; P5; P6a; P7a)	0.43	1.21	47	0.67	1.17	74	0.203	-2.17	.076

Table 17.

Results of Self-Reported Participant Perception of Benefits and Their Attitude Change in Relation to the Experiment

	P1		P4	
	Yes	No	Yes	No
EXP	85.53 %	14.47 %	52.63 %	47.37 %
CTRL	42.55 %	57.45 %	8.51 %	91.49 %

Note:

Question P1 – Retrospectively, do you feel that you have benefited from your participation in the experiment or that your relationship to the expulsion of the Sudeten Germans has changed in some way? Describe it:

Question P4 - Did your opinion about the expulsion of the Sudeten Germans change after the experiment? Describe it:

Table 18.

Identified Frames in Participant Responses to Open Questions P1 and P4 about the Main Benefits of Participation in the Experiment in Relation to the Expulsion

	Personal stories	Information / context	Interest	Compassion	Perspective-taking
EXP	17.11 %	60.53 %	23.68 %	25.00 %	22.37 %
CTRL	0.00 %	0.00 %	29.79 %	2.13 %	6.38 %

6 Discussion

This study investigated a video game's effect on Czech young adults' implicit and explicit attitude change and information behaviour towards a depicted historical event over the short and the long term. The video game we used as the experimental intervention was a modified version of *Czechoslovakia 38-89: Borderlands*, which deals with the expulsion of the Sudeten Germans from Czechoslovakia after WWII. So far, research on attitude change towards the depicted topic in video games has predominantly focused on a specific demographic group. As much as 95% of all previous studies identified in our literature review collected data only from students. Our study is one of the few to focus not only on students, but also to have more heterogeneous demographics and to collect long-term data.

6.1 Main Findings

First, the results confirm a short-term (H1) negative explicit attitude change in the Experimental group and a greater attitude change in comparison to the Control group: both in Macro and Micro attitude measurements. In other words, playing a serious historical game presenting the personal accounts of expelled persons, as well as those actively engaged in the expulsion, immediately negatively affected attitudes towards both the expulsion as a whole as well particular aspect thereof: deportations, property confiscations, and violence.

Second, the results confirm a long-term (H2) negative explicit attitude change, albeit in Micro attitude measurements only. In other words, in the long term, being exposed to the personal accounts of the expulsion in a video game seemed to affect negatively the evaluation of its particular aspects, yet not the expulsion as a whole.

Third, implicit attitude measurements did not significantly change in the Experimental group from the pretest to the posttest (H3) and from the pretest to the delayed posttest (H4). In other words, being exposed to the serious historical video game about the expulsion changed the deliberate logical conclusion about the expulsion, yet not the spontaneous affective response thereto.

Fourth, initial implicit and explicit attitude evaluations of the expulsion of the Sudeten Germans did not correlate in our groups (H5). Also, our study did not prove any significant effect of participants' initial moods: Neither on explicit, nor on implicit attitude evaluations (H6).

Fifth, experiencing the video game about the expulsion did not result in more intensive information seeking compared to the Control group according to the results from our self-reported questionnaires (H7). The effect was noticeable only in a question focused on the frequency of actively speaking to someone about the expulsion during the last month. There was no significant difference in self-reported effect of the intervention on information behaviour between the Experimental and the Control group. Due to the insignificant between-group difference, we were unable to evaluate the correlation between the long-term attitude change and self-reported information seeking (H8).

6.2 Interpreting the Results

There is no study of a similar scale. Nevertheless, as we have already mentioned in our review in Chapter 2.10.4, there exist several studies that provide partial data about video games and attitude change: Studies to which we can relate our findings.

Regarding short-term explicit attitude change, there exist several studies measuring it while using a pretest-posttest design with a control group. To our knowledge, three of these studies (Kampf, 2015; 2016; Price et al., 2015) confirm explicit attitude change in accordance with our study. These three studies all communicate a persuasive message. Similar to our study, both of Kampf's studies (2015; 2016) incorporate perspective-taking into their design. Price et al.'s study (2015) uses various game mechanics with meaningful choices in relation to the measured phenomenon. Video games in the other studies probably do not include a clear, persuasive message, and they do not confirm video games' abilities to change attitudes (for a broader analysis, see Chapter 6.5.2). Overall, evidence indicates that whether or not video games change explicit attitudes over the short term depends on the chosen game and its content.

Regarding long-term explicit attitude change, to our knowledge there exist only two studies that measure it while having a control group (Ruggiero, 2015; Kampf, 2016). Neither of them focuses on attitudes towards historical topics. One examines attitudes towards homelessness (Ruggiero, 2015); the other towards Israelis and Palestinians in their ongoing conflict (Kampf, 2016). Similar to our study, they both confirm the persistence of explicit attitude change over the long term. However, these studies collected data only from homogeneous samples: Secondary school students and students studying political science. We extended these findings to a more general, young adult audience. In our study, we observed smaller explicit attitude change in the Experimental group compared to Kampf's study (2016), which used game design principles similar to those in our intervention. At the same time, our game intervention was shorter than Kampf's study game intervention.[6] Plus, our study confirmed significant differences in comparison to the Control group in Micro attitude measurements in pretest-delayed posttests, but not in Macro attitude measurements. Thus, the results so far indicate that the length of the intervention could play a key role in a long-term explicit attitude change; but this idea needs further examination.

Concerning the measured long-term between-group attitude change in Micro explicit attitudes and not Macro explicit attitudes, our assumed explanation is as follows. Historical narrative in Czech lands during the last century was mostly in favour of the expulsion and framed it as inevitable. It affected the socio-cultural perception of the event, mostly on the general level as the topic was not discussed in comprehensive detail by public. Also, the concept of the expulsion on the general (Macro) level is to some extent abstract. Agreeing or disagreeing with something on the abstract level is less likely causing a dissonance in one's propositions about the topic. The attitudes on the specific (Micro) level focused on concepts which are more relatable for one's evaluations, i.e. participants at some point of their lives already formed attitudes towards those relatable concepts. Furthermore, the game itself used personal relatable stories about particular issues depicting their effects on real people. For that reasons,

[6] The length of the video game intervention is not specified, but the whole experiment took three hours: including two short questionnaires, a short demo introduction to the game, and the video game intervention. Therefore, we contextually assume that the video game intervention was significantly longer than 50 minutes.

we assume the effect of our intervention on the Macro level was weaker in a short-term and not significant in the long-term while it was significant on the Micro level.

Regarding implicit attitude change, there exists, as far as we know, only one study measuring it while using a pretest-posttest design with a control group (Alblas et al., 2018). In agreement with our study, it does not show significant implicit attitude change in the experimental group. Surprisingly, we found implicit attitude change (pre-post) in the Control group in our study, similar to Alblas and colleagues (2018). We assume that our game did not affect implicit attitudes as it was only 50 minutes long. It was longer than Alblas et al.'s intervention lasting just 10 minutes, but not long enough to create new associative evaluations. Concerning the unexpected findings in the Control group compared to the Experimental group, we see two possible explanations for it. First, participants in the Control group may have lost their motivation to be fully devoted to completing the SC-IAT as fast as possible during the posttest; this since their activities during the experiment did not involve anything related to the expulsion. Second, it may also be the case that the effect of measurement shifted both groups positively towards the neutral middle point. At the same time, the effect of our intervention in the Experimental group caused shifting the implicit attitudes more negatively (similar to explicit attitudes). As a result, this training effect caused by the filling of two response time questionnaires in a short time was annulled by the effect of the intervention in the Experimental group, which was missing in the Control group. The implicit attitudes in the both groups did not differ significantly in the pretest-delayed posttest measurement, which is indirectly supporting our assumption about the training effect. Significant difference between the two groups in pretest-posttest comparison could then be considered proof that our video game has the ability to affect implicit attitudes. However, we are not aware of any study confirming this training effect. So far, there has been no empirical evidence suggesting video games' ability to affect implicit attitudes.

Regarding the correlation of explicit and implicit attitude evaluations, the obtained results suggest that the expulsion of the Sudeten Germans still represents a socially sensitive topic in the Czech context. These findings are in accordance with the results of a survey by the Public Opinion Research Centre from October 2019 that

collected data from a representative sample of the Czech population (CVVM, 2019). Our data was collected from participants between 15-29 years of age, suggesting that the topic is also a sensitive one among the younger population.

Regarding the effect of mood on attitude change, our data does not confirm any significant effect. However, these results should be considered with caution as they were not the main focus of our study. Also, there are no other studies evaluating this effect in the context of video games and attitudes. More studies directly focused on this issue should be conducted before making any generalisation.

Regarding the intervention's insignificant effect on self-reported information seeking and behaviour, the effect of our video game intervention did not affect information behaviour. However, individual results from one question on the construct of self-reported information seeking significantly suggested that participants in the Experimental group were willing to engage more in talking about and debating the issue of the expulsion; thus, sharing and obtaining information from other people or friends. Participants in the Experimental group did not significantly look for information on their own. This fact is to some extent consistent with the findings of Srinivasan et al. (2019a; 2019b) about the preferred way of information seeking in relation to the game *Minecraft*. Studies by Srinivasan et al. (2019a; 2019b) found in their explorative interviews that players were mostly interested in information seeking related to the progress of, or success in, the game. This was also empirically confirmed in a study by Fields et al. (2017). However, the study by Khalil et al. (2016) confirmed that participants' information-seeking behaviour was affected by the game. The topic of their study was cancer. They hypothesised and confirmed, according to the protection motivation theory, that receiving threatening health information results in information seeking on the topic. Thus, the reasons why information behaviour in our study was not affected could have been due the fact that information about the expulsion of the Sudeten Germans had no further use for gameplay and also could not be considered a threatening message. Also, *Czechoslovakia 38-89: Borderlands* was originally designed as a complex educational game providing complex information on a specific topic, with potentially no further need to search for other information. However, these are all just assumptions that need more empirical data to be proven.

6.3 Implications

Several scholars have suggested on a theoretical level that historical video games have the potential to determine how we think about, understand, and negotiate the past (Chapman, Foka, & Westin, 2017). Given that historical video games have become one of the most widespread and successful forms of telling popular history (Chapman, 2016), they could indeed play an important role in the formation of society's historical awareness (Chapman, 2016; Kapell & Elliott 2013). Nevertheless, despite the importance of these claims, there has not been, until recently, enough empirical evidence to support them.

A review by Todd and Galinsky (2014) suggested that perspective-taking results in a more favourable attitude towards the group whose perspective was taken. For example, studies by Kampf (2015; 2016) using games depicting a recent conflict from multiple perspectives caused more moderate attitudes among participants. On the level of explicit evaluations, our study does not support these findings: The intervention led to an even more negative attitude towards the expulsion. Our results suggest that the effect of perspective-taking is not universal and that the context of the depicted historical narrative should be taken into account.

On the empirical level, our study (as far as we know) is the first to provide empirical evidence that historical video games are capable of changing both short- and long-term explicit attitudes towards the historical events they depict. As such, it confirms that video games play a role in the construction of our social and cultural realities. Nevertheless, it should be noted though that, over the long term, we confirmed this change in the Micro attitude measurement only.

6.4 Limitations

There were several limitations to our empirical study, which should be taken into consideration when interpreting and generalising our conclusions. First, our experimental intervention with a video game lasted only approximately 50 minutes. However, narrative historical video games are often played for dozens of hours.

Second, our number of participants decreased between the first (Experimental group n = 81; Control group n = 64) and the second data collection (Experimental group n = 73; Control group n = 46). The decrease was more pronounced in the control group.

Third, we required that all our participants have at least intermediate knowledge of the English language since the *Trader of Stories* game only has an English version. For this reason, people without English language skills are not represented in our sample.

Fourth, the whole study was conducted in Prague, which might possibly be more liberal compared to the rest of the country. Also, Prague was not directly affected by the expulsion of the Sudeten Germans.

Fifth, the data for this study was collected as part of a laboratory experiment, which is not a natural environment for playing games. As is generally true for laboratory experiments with video games, our participants were not in control of choosing the exact time when they felt like playing a game. Players also often choose to play a single game during multiple sessions. Whereas, during our intervention, they played the entire game in one session with only a ten-minute break.

Sixth, we have only limited information about our participants' playing habits and preferences. We did not collect comprehensive data about our participants' profiles as it would have prolonged the intervention length and increased the risk of loss of concentration.

Lastly, data about participants' information seeking and information behaviour was only self-reported. Since our study focused primarily on attitude research, we decided to collect data on information behaviour and information seeking only during our one month delayed posttest. We did this so as to not affect the measurement of attitudes. In our opinion, all these limitations are important for future studies of the experiment's subject matter and for the replication of this study. However, their effects do not undermine the key message of the dissertation in any way.

6.5 Perspectives for Future Research on Video Games and Attitude Change

Research on attitudes and attitude change is still a developing field that is introducing new methodologies and theories. Our empirical study revealed several theoretical and methodological implications for the future study of video games and their effects on attitude change. Some of these implications also stem from our published articles on the topic (Kolek, Šisler & Brom, 2019; Kolek & Šisler, 2017).

6.5.1 Participants Characteristics in the Current Empirical Research

As already mentioned in Chapter 2.9.4, most studies we identified collected data from students: Often from only one class or institution. Current studies are not providing data about the possible diverse effects of video games on other age segments in the general population; especially not about older players. At the same time, very few studies focus directly on how the measured effect of video games is mediated or influenced by participants' specific characteristics, e.g. gender, player profile, or relation to the depicted topic. More research on participants' specific characteristics should be conducted.

However, multiple studies have dealt with attitude change within particular national or ethnic groups of participants. (Alhabash & Wise, 2012; 2015; Cuhadar & Kampf, 2014; 2015; Kampf & Cuhadar, 2015; Kampf, 2015; 2016). For instance, a study by Cuhadar & Kampf (2014) discovered that the game *Peacemaker* had a significant effect on attitudes towards the Israeli-Palestinian conflict for those players who were not of the nationalities directly involved in the conflict; e.g. on Turks and Americans. At the same time, this game did not affect Israeli-Jewish or Israeli-Palestinians players' attitudes. Ethnocentric attitudes are an important aspect of peace-keeping and in conflict resolution (Halperin, Sharvit, & Gross, 2011). Therefore, it may be assumed that to mediate the conflict, it is important to decrease these attitudes.

One study (Teng et al., 2011) also discovered a different effect of violent games on attitudes towards the violence among females in comparison to males. This outcome was explorative and needs more research. Our study also revealed some effect of

gender on attitude change (see Tables 12 and 13 and Figures 11 and 12). However, our study did not focus on this issue, and its outcomes are also explorative in this area. Therefore, we cannot draw conclusions from these results; more data is needed.

6.5.2 Type of Games Assessed in Empirical Research

In order to be able to evaluate empirically video games as a medium affecting players' attitudes towards the depicted content, we should also not, in future research, assess video games as a uniform category. As noted by Kowert and Quandt (2016), when speaking about the impact of video games on their players, we should take into consideration the variety of game genres and mechanics as they share mostly just one function: Being a form of interactive entertainment. Therefore, empirical research on the effects of computer games on their players should necessarily define the characteristics of games researched. Our sample of studies used 15 different video games. The games *Peacemaker* (Alhabash & Wise, 2012; 2015; Cuhadar & Kampf, 2014; Kampf, 2015) and also *Global Conflicts* (Cuhadar & Kampf, 2015; Kampf & Cuhadar, 2015; Kampf, 2015; 2016) were the only ones used in multiple studies. They were also used simultaneously within some studies.

6.5.2.1 Game Theme

Concerning game themes (see Figure 14), the games in our research sample dealt mostly with recent conflicts and intergroup attitudes (Alhabash & Wise, 2012; 2015; Cuhadar & Kampf, 2014; 2015; Kampf & Cuhadar, 2015; Kampf, 2015; 2016). Namely, they focused on the Israeli-Palestinian conflict using the game *Peacemaker* and the specific regional scenario included in the game *Global Conflicts*. Two studies (Cuhadar & Kampf, 2015; Kampf & Cuhadar, 2015) in this category also focused on war in Guatemala using *Global Conflicts'* specific scenario about that event. These studies measured game effects on attitudes towards the respective sides of the Israeli-Palestinian or Guatemalan conflicts. Both games incorporate perspective-taking in their design. However, they focus on different levels on actors involved in the conflicts. *Peacemaker* provides its players with the possibility to experience events in the Israeli-Palestinian conflict from the perspective of the Israeli Prime Minister or the Palestinian

president. On the contrary, *Global Conflicts* present wars from the perspective of regular participants in a given conflict.

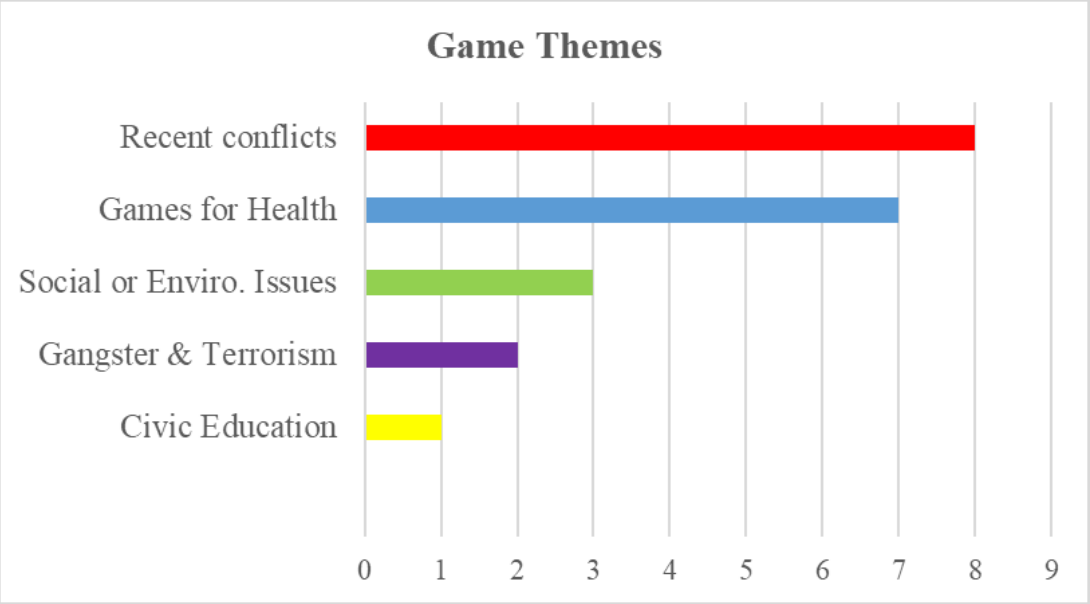


Figure 14. Distribution of depicted topics in video games analyzed in the research sample (Table 1)

Another significant group (Klisch, Miller, Beier, & Wang, 2012a; Klisch, Miller, Wang, & Epstein, 2012b; Klisch et al., 2013; Pentz et al., 2019; Alblas, 2018; Price et al., 2015; Duncan et al., 2018) involved games about health; e.g. games promoting healthy behaviour or the prevention and treatment of various diseases. These titles address the topics of healthy nutrition (Alblas et al., 2018) and healthy behaviour (Price et al., 2015), prevention of drug or alcohol abuse (Klisch, Miller, Beier, & Wang 2012a; Pentz et al., 2019; Duncan et al. 2018), or drug abuse (Klisch, Miller, Wang, & Epstein, 2012b), and drug-related crimes (Klisch et al., 2013). The respective empirical studies examined attitude change towards those topics.

Apart from these two large groups, other games were more fragmented in the themes they addressed. There were three games about social or environmental issues: *SPENT* is a game simulating life in poverty (Smith et al., 2017); *Future Delta* focuses on environmental issues (Schroth, Dulic, & Sheppard, 2014); and *Papers, Please* is a game about immigration from the perspective of an immigration officer (Peña et al., 2018). Attitudes were measured towards all these phenomena.

Two video games represented the genre of violent shooting games. The first, *Grand Theft Auto IV* (Teng et al., 2011), is a game in which players perform tasks in a violent world full of gangsters. The respective study was focused on players' attitudes towards violence. The second game was *Counter Strike: Condition Zero* (Saleem & Anderson, 2013), a first person shooter game in which a team of terrorists is in an open conflict with an anti-terrorist unit. In this case, attitudes were measured concerning negative stereotypes about Arabs.

One study dealt with political attitudes and used the game *President for a Day* (Barthel, 2013). It aimed to provide players education in civics and, particularly, about the budgetary policies of the United States' Congress.

Within our sample, the games covered various topics. However, the strong focus is clearly on recent conflicts; especially, on the theme of the Israeli-Palestinian conflict. It stems from the broad research done involving the games *Peacemaker* and *Global Conflicts*. These studies offer rich data about ethnocentric attitudes and about the effect of the games on various samples of participants; especially since they both deal with the topic differently. There is also a significant amount of research on health-related games dealing mostly with prevention of drug use and drug abuse. Although these studies address the same topic, they cover a wide scope of areas that do not allow for generalization. The effect of games on attitudes about the other themes has been explored to much lesser degree. We can also confirm that none of the studies focuses on historical topics, e.g. evaluating the effect of video games on historical awareness, like our study did.

6.5.2.2 Controlled Gameplay

Conducting research on attitude change in video games is difficult due to the interactivity of the medium: Individual players can have radically different gameplay experiences based on their unique choices. This essential video game characteristic does not limit studies focused on a particular game and the game's effects on players in general; especially, when various gameplay experiences are inherent to research aims and design. However, studies focused on the effect of a particular game or storytelling mechanics on attitude change may be limited by variations of players'

gameplay experiences in experimental interventions. If, in these cases, researchers do not modify the game content in order to limit extraneous factors influence on players' gameplay decisions, they (the researchers) may struggle to maintain the internal validity of their research (Waiguny, et al. 2014). To ensure the reproducibility of this type of research, video game interventions must provide all participants with a standardized experience with no obvious limitations to players' agency. This aim cannot always be fully achieved due to the essential attributes of video games. For instance, it is possible to design a text narrative adventure with absolute respect to this aim, but it is harder to ensure a standardized experience for players in open-world RPG. Nevertheless, in the latter case, gameplay can be limited to some particular location or mission. Such a limitation in this type of research, i.e. coming from players' agency, can be addressed as follows. Researchers a) design their own video game with the mentioned issue in mind, b) modify or artificially limit the existing game, or c) choose a video game meeting these requirements with respect to their research aims.

Eighteen studies in our sample (Table 1) used serious or educational games as an experimental intervention. They mostly involved linear progress within the gameplay or they ensured a similar experience for all players. Of those 18 studies, nine studies used games specifically created or modified for the purpose of the experiment (Klisch, Miller, Beier, & Wang, 2012a; Klisch, Miller, Wang, & Epstein, 2012b; Klisch et al., 2013; Pentz et al., 2019; Schroth, Dulic, & Sheppard, 2014; Alblas et al., 2018; Price et al., 2015; Duncan et al., 2018; Barthel, 2013). Only three studies used commercial, non-educational, or serious games in their experimental interventions (Peña et al., 2018; Saleem & Anderson, 2013; Teng et al., 2011). All of the commercial games provided all their players approximately the same experience in relation to the measured phenomena; with the exception of *Grand Theft Auto IV* (Teng et al., 2011). In that game, players enjoyed an open world with no limits on agency and no control on the part of the researchers. This poses a risk for research validity as each player may have a different experience. Nevertheless, the research measured attitudes towards violence, and the game is designed to implicitly guide players to use violence to progress in the story. It is rather unlikely that a significant amount of players played the game for 8-12 hours as a walking simulator.

Our research sample does not have any significant problem with controlled gameplay. This is mainly caused by a selection of games in respective studies since almost all of them are educational or serious games. There is a lack of studies using commercially distributed games played by broad audiences for dozens of hours; specifically, ones that tackle various topics related to human experience. These kinds of studies are needed, as they could potentially provide new data on how video games have already affected our historical or social perceptions.

6.5.2.3 Games and Persuasion

According to the APE model, long-term explicit and implicit attitude changes are caused by different processes. It is therefore appropriate to assume that various game genres and their mechanics may affect attitudes differently. There were nine studies with a control condition using nine different games, which we analysed further in relation to their persuasive potential towards the depicted topics.

Peacemaker (Kampf, 2016) is a top-down simulation of a state government. Players play as one side in the ongoing conflict: The Palestinian National Authority or the Israeli president. Their gameplay reflects interests and arguments from the field in their decisions. It is a turn-based strategy game in which players react to news and developments in the area according to their roles. The game combines real graphical and video assets with game graphics. Players' decisions have a significant effect on the game world. Gameplay runs for 60 minutes total (approximately 30 minutes for each side). The main persuasive element is represented by perspective-taking in the game design. As evidenced by Davis et al. (1996), perspective-taking allows us to consider the interests of other groups or people. Experiencing other people's perspectives allows one to consider others' feelings and thoughts as one's own. (Davis et al., 1996). Games like *Peacemaker* or *Czechoslovakia 38-89: Borderlands* provide players with multiple perspectives about the depicted topic; possibly increasing empathy towards the engaged sides.

Global Conflicts: Palestine (Kampf, 2015; 2016) is an adventure game about the political reality of the Israeli-Palestinian conflict. In contrast to *Peacemaker's* top-down approach, this game tells stories from the perspectives of people in the area

representing the engaged groups. Players take on the role of a journalist collecting stories from various actors in the Israeli-Palestinian conflict. They must decide what information and which framing of information to publish in news articles as that affects credits earned among informants and parties engaged in the conflict in the area. Similar to *Peacemaker*, the game incorporates perspective-taking and allows players to collect information and think about the motivation of all actors in the conflicts. The more the depicted topic is related to one's self concept, the more difficult it is to change attitudes about the topic (Pomerantz, Chaiken, & Tordesillas, 1995). Despite that fact, this video game and its persuasive message were able to change significantly the attitudes of players with backgrounds related to the two nations involved in the depicted Israeli-Palestinian conflict.

Sky Islands (Alblas et al., 2018) is a 2D strategic game in which players have to supply islands with as much healthy food as possible in order to maintain a healthy population. Players face a game-controlled opponent delivering unhealthy food to the island. There were three levels in this game; each with increasing difficulty. The game aimed to create a positive association with healthy food and a negative association with unhealthy food. It did this by associating the type of food with game progress or failure. The game was played for 10 minutes. In relation to attitude change, the game uses evaluation conditioning (Vogel & Wanke, 2016) as a main mechanism; that could possibly affect implicit attitudes.

Code Fred (Price et al., 2015) is a narrative game about a character Fred who must survive in the forest. Players do not control the character and his movements in the forest. Agency is provided rather when the running sequence is interrupted by various accidents endangering Fred's life, e.g. he gets a respiratory tract infection, a wolf bites him, etc. In those situations, players control various mechanisms in the human body to cope with those injuries in mini-games. The challenge to succeed in these mini-games is minimal; the games are more illustrative instead. Attitude measurements in this game's respective experiment focus on questions of how important it is to know these processes. The game design itself does not provide persuasive content for questions on the importance of knowledge of these processes as they are all automatic in the human body.

Papers, please (Peña et al., 2018) is a commercially successful game. Players control an immigration officer in a fictional Eastern Bloc country; the officer operates a border checkpoint. The players' objective is to keep up with ever-changing immigration policies while deciding who can enter the country. Any mistakes are reflected in the players' character's salary; thus affecting their family and well-being. Players face moral dilemmas in their judgments. The respective study using this game focused on attitudes towards helping immigrants. The game provides, to some extent, perspective-taking in its persuasive content. However, much more space is given to the emotional impact of players' decisions on their families than on the emotional dimensions of the random encounters with immigrants. The impact of players' decisions on their families is caused, in this case, by their mistakes. However, the latter are caused to varying degrees (directly or indirectly) by immigrants in the game. The persuasive message is unclear as relates to immigration.

President for a Day (Barthel, 2013) is a game specifically created for the experimental intervention. It is a simulation/strategic game. Players choose various policies and look to get support for these policies from the U.S. federal budget. They do so despite obstacles, e.g. some of the policies are expensive. The goal is to be able to submit a budget that Congress decides to support. "The pedagogical goal was to show how budgetary choices are constrained by limited resources and political pressures." (Barthel, 2013, pp 33.) Unfortunately, the game is not available to the public for further analysis and assessment of its persuasive content. However, the authors assume that the objective to pass a budget in Congress will result in meaningful choices and interactions during the budget drafting process. Attitudes measured in the experiment focused on political trust and a stealth democracy.

Grand Theft Auto IV (Teng et al., 2011) is a role-playing open world game. Players play as Niko, a character who recently arrived to Liberty City. Niko gets quickly involved with local gangs and their turf wars. Following the game's plot, players have to engage in various violent acts and missions to succeed. In this case, players' violent actions are associated with a success in the game. However, players can choose not to proceed with game missions and explore the open world environment

using (or not using) violence according to their own will. Still, the game is not primarily designed as a walking simulator. The experiment was designed to measure the change in attitudes towards violence when there is no controlled gameplay. As the game provides players with various, possible gameplay styles, its persuasive content is harder to define since the latter is mainly related to players' game styles. However, most of the game mechanics and the game environmental rules are designed to respond to a player's aggressive or illegal behaviour. As such, it benefits him/her with new impulses and agency for violent actions. The latter represents the strongest persuasive content in a relation to the measured phenomena.

Counter Strike: Condition Zero (Saleem & Anderson, 2013) is an action shooter game with two teams competing against each other. One team represents a counter-terrorism task force trying to protect a military base from the second team, a terrorist force, which is trying to plant a bomb or eradicate the first team in a specific amount of time. The study by Saleem & Anderson (2013) used this game in two modifications in its experiment. In both versions, players act as a counter-terrorism task force protecting their base. The difference between the two games is that in the first (experimental) group, players face a terrorist team in a stereotypical Middle Eastern environment and the terrorist force is also composed of stereotypical Arab representations of terrorists. The second game takes place in a typical Russian environment with stereotypical Russian representations of terrorists. The experiment compared how these experimental games change attitudes towards Arabs compared to the control group. Thus, the study compares two games' visual storytelling persuasion where the games use identical mechanics on players' attitudes.

The analysed games used various game design elements as intentional persuasive content impacting the measured phenomena. Perspective-taking is the most common one used in four studies and is manifested in various modifications (Kampf, 2015; 2016; Peña et al., 2018) providing complex data about the game mechanics. However, the effectiveness of perspective-taking was unclear in the study by Peña and colleagues (2018). Evaluation conditioning was assessed in one study (Alblas et al., 2018) where it measured implicit attitudes; and also to some extent in the study by Teng et al. (2011). The last study (Saleem & Anderson, 2013) measured the effect of

visual storytelling on attitudes. To sum up, the identified studies that involved a control condition evaluated only three game mechanics for attitude change. More studies are needed to cover a broader spectrum.

7 Conclusion

The broad objective of this dissertation was to investigate whether historical narrative video games are able to affect historical awareness in a society. To be able to do so, we formed two research questions that guided our research.

First, we analysed whether current empirical knowledge about video games' effects on players' attitudes and information behaviour suggests that video games have a role in the formation of historical awareness. As evidenced by our literature review, current research on video games and attitudes and information behaviour is limited. Even though we have seen a rise in the popularity of commercial historical video games or video games depicting socially sensitive topics, their effects on players have been examined by almost no research studies. Nevertheless, reviewed empirical evidence on the other depicted topics can be related to our case.

Concerning the identified limits of current empirical knowledge about video games and attitudes, the literature review revealed a significant research gap for the long-term effects of video games on attitudes. There are very few long-term studies. Also, current empirical evidence has been predominantly collected from students. Lastly, only three studies from our sample used control groups containing a video game providing a comparable playing experience to ensure the maximum validity of the research.

Concerning the findings from previous studies, most of them focused on short-term explicit attitude change. Also, only one study measured implicit attitude change in pretest-posttest design with a control group. Findings on the ability of video games to change attitudes are diverse as games' persuasive mechanics, research designs and methodological approaches differ significantly. Based on the knowledge from previous studies, perspective-taking as a persuasive mechanic is the one that has been most explored and shown to have significant effects on explicit attitude change in relation to depicted topics.

Concerning video games and information behaviour, we have identified very few studies dealing with this topic. They mostly focused on players and their information needs. Their results suggested that players look for information mostly to gain advantage in a game or to progress further in a game; thus they do not look for information about the theme represented in the game itself. We identified only two long-term studies about video games' effect on information behaviour in relation to the topic depicted in the game. The first one confirmed positive effect of the game on information behaviour. However, increased information seeking could have been caused by an effort to succeed in the game, given that information about the topic was beneficial to game progress. The second one also confirmed positive effect of the video game on information behaviour. The acquired information was unrelated to game progress, but it was related to the game's messaging on health threats; possibly encouraging protective behaviour as intentionally measured by the study. Ultimately, there was no study evaluating whether a video game can trigger information need for a topic based on mere curiosity and with no relation to threats or in-game progress. Previous studies suggest that video games are able to affect attitudes and information behaviour.

Second, we analysed, using a long-term empirical study, the effect of the modified video game *Czechoslovakia 38-89: Borderlands* on players' attitudes and information behaviour in the context of the research field. To our knowledge, it is the first study of such a scale to use both explicit and implicit attitude measurements over the long-term. In our study, we focused on the particular effect of a video game on attitude change and information behaviour towards the history represented in the game *Czechoslovakia 38-89: Borderlands*. The modified version of the original game created for the purposes of this experiment focused on the topic of the expulsion of the Sudeten Germans from Czechoslovakia's borderlands after WWII. Its core game mechanic is multiperspectivity, thus providing players with various perspective-taking on the depicted event as relates to the actors involved. Aware of the limits of current empirical knowledge as defined by our literature review, we collected data from a heterogeneous sample of young adults aged between 15-29 years. In our Control group, we used a game comparable to the game in the Experimental group differing only in the depicted

topic. Lastly, we collected long-term data. Therefore, data provided by this study is unique in relation to the described effect of video games on players' cognition; in particular, on explicit and implicit attitudes and information behaviour.

Using the APE model, our study is the only one to offer significant statistical evidence supporting the premise that historical video games can change players' attitudes on the level of explicit attitude measurements in the short term. The historical game we studied can do so on the Micro and Macro level compared to the Control group. Our study also confirms that changes in Micro explicit attitudes (but not in Macro attitudes), compared to the Control group, were stable in the long term. As far as we know, no other study confirmed a long-term effect of historical video games on explicit attitudes. Thus, our study is the first to empirically confirm the potential of historical video games to affect the formation of society's historical awareness. To our knowledge, our study is currently the only one using implicit attitude evaluations for long-term measurement. However, it did not demonstrate video games' effects on implicit attitudes.

According to the APE model, long-term explicit and implicit attitude changes are caused by different processes. For explicit attitude change, our study results suggest that balanced perspective-taking provided through personal stories included in game mechanics is an effective game design principle affecting explicit attitudes. At the same time, our study did not confirm the effect of historical video games on information behaviour towards a depicted topic. Their potential to seek more knowledge about the theme represented in our game did not provide participants any advantage in the game. This is because our game intervention was clearly a time-limited gaming experience. We assume that a lack of motivation of this kind can be crucial for positive effect on information behaviour; however, more data is needed.

From the perspective of information science, understanding people and how they deal with information play an essential role in research of information behaviour. Attitudes are highly relevant for information seeking and exploration and also for the effect of selective exposure to information. The link between information behaviour and attitudes has, to our knowledge, not been researched in relation to video games.

Video games are a medium accessed by billions of people and they depict various topics in informal settings. This study provides the first, long-term empirical data about the medium; giving more insight into how video games can affect our lives and the way we handle information.

Future research should collect more long-term empirical data on the research field; especially in relation to implicit attitudes. Also, there are currently very few studies utilising commercially distributed video games, i.e. such as those played by most audiences for dozens of hours in informal settings. Beyond that, video games represent a category including various genres and game mechanics. We currently know very little about the effects of various video game elements on player's attitudes and information behaviour. More studies should focus on the effects of particular game mechanics on players. Furthermore, very few studies collect more complex data on participants' characteristics and playing styles; the latter may possibly have an effect on players' experience with games. For instance, the replication of our study with a different research sample could provide valuable data in this area.

Video game development is becoming more democratised than ever before. Development tools, software, and instructions for their use are available to anyone with access to the internet and a computer. The growing number of video games created has resulted in more games dealing with various aspects of human life. Players are exposed to dozens of hours of information represented in these games. As video games have become a worldwide phenomenon affecting whole societies regardless of social status or age, this study offers new perspectives for our understanding and interpretation of the formation of historical narratives for society in general. Therefore, the results of this dissertation could be of interest to developers, game designers, game scholars, and historians for further research of the role of video games in society and culture. Moreover, they could be also used in the domains of peace studies and conflict mediation.

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List of Abbreviations

APE model - Associative-Propositional Evaluation model

IAT – Implicit Association Test

SC-IAT - Single-Category Implicit Association Test

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Appendix A. Demographics Questionnaire

Prosím, vyplňte následující údaje:

Pohlaví:	
Věk:	
Nejvyšší dosažené vzdělání:	

Appendix B. List of SC-IAT Words in Czech

Slova v kategorii Pozitivní přídavná jména	Slova v kategorii Negativní přídavná jména	Slova v kategorii Odsun Sudetských Němců
Spravedlivý	Zločinný	Němci
Dobrý	Chybný	Pohraničí
Správný	Špatný	Sudety
Férový	Zlý	Dekrety
Povedený	Ponižující	Deportace
Milosrdný	Neférový	Vysídlení
Mravný	Odporný	Němčina
Čestný	Hanebný	Odsun

Appendix C. Positive and Negative Affect Scale

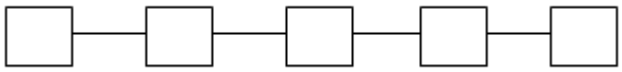
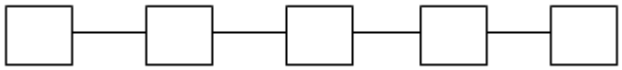
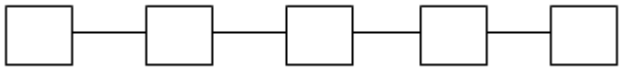
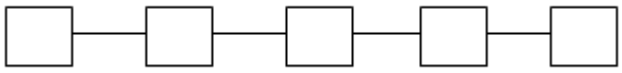
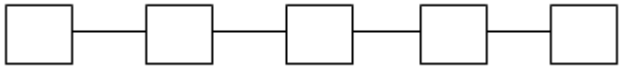
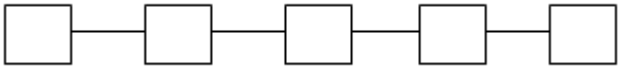
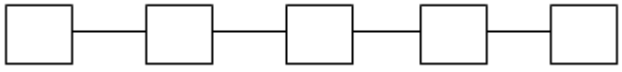
DATUM: POŘADOVÉ ČÍSLO DOTAZNÍKU: CS1 **A1** OSOBNÍ ČÍSLO:

1. Následující slova popisují různé **pocity a emoce.** Přečtěte si každou položku a označte, do jaké míry máte tyto pocity **právě teď**. K zaznamenání odpovědi, prosím, použijte **stupnici 1 (velmi málo nebo vůbec) – 5 (extrémně hodně):**

	Velmi málo nebo vůbec	Trochu	Středně	Hodně	Extrémně hodně
Zvídavý/á, zaujatý/á	1	2	3	4	5
Zdeptaný/á	1	2	3	4	5
Vzrušený/á	1	2	3	4	5
Znepokojený/á	1	2	3	4	5
Silný/á	1	2	3	4	5
Provinilý/á	1	2	3	4	5
Vyděšen/á	1	2	3	4	5
Nepřátelský/á	1	2	3	4	5
Nadšený/á	1	2	3	4	5
Hrdý/á	1	2	3	4	5
Podrážděný/á	1	2	3	4	5
Ostražitý /á	1	2	3	4	5
Stydící se	1	2	3	4	5
Inspirovaný/á	1	2	3	4	5
Nervózní	1	2	3	4	5
Odhodlaný/á	1	2	3	4	5
Pozorný/á	1	2	3	4	5
Ztrémovaný/á	1	2	3	4	5
Aktivní	1	2	3	4	5
Mající obavy	1	2	3	4	5

Appendix D. Macro Explicit Attitude Questionnaire

Označte, prosím, křížkem na každém řádku **jeden** čtverec, který se dle vašeho názoru nejvíce shoduje svou pozicí na dané ose s vaším hodnocením pojmu *Odsun sudetských Němců z českého pohraničí po druhé světové válce*. Čím blíže tedy bude na každém řádku označený čtverec danému slovu na kraji, tím více se s daným hodnocením pojmu ztotožňujete.

Odsun sudetských Němců		
Zbytečný		**Nutný**
Chybný		**Správný**
Neadekvátní		**Adekvátní**
Zločinný		**Spravedlivý**
Hanebný		**Čestný**
Neférový		**Férový**
Bezdůvodný		**Odůvodněný**

Appendix E. Micro Explicit Attitude Questionnaire

Zakroužkujte, prosím, pro každé tvrzení **jedno** číslo popisující, do jaké míry souhlasíte s daným tvrzením **ve vztahu k Odsunu sudetských Němců** po druhé světové válce.

Škála je následující:

1 = s tímto tvrzením **rozhodně nesouhlasím**
2 = s tímto tvrzením **nesouhlasím**
3 = s tímto tvrzením **spíše nesouhlasím**
4 = **Nemám** na toto tvrzení **silný názor**
5 = s tímto tvrzením **spíše souhlasím**
6 = s tímto tvrzením **souhlasím**
7 = s tímto tvrzením **rozhodně souhlasím**

	Tvrzení ve vztahu k odsunu sudetských Němců z českého pohraničí po druhé světové válce	**Rozhodně nesouhlasím**	**Nesouhlasím**	**Spíše nesouhlasím**	**Nemám na toto tvrzení silný názor**	**Spíše souhlasím**	**Souhlasím**	**Rozhodně souhlasím**
1	Odsun sudetských Němců z pohraničí byl správným krokem.	1	2	3	4	5	6	7
2	Češi se po válce vůči sudetským Němcům chovali tvrdě.	1	2	3	4	5	6	7
3	Vysídlení sudetských Němců bylo historicky nutné.	1	2	3	4	5	6	7
4	Deportace sudetských Němců byla zločinem.	1	2	3	4	5	6	7
5	Sudetští Němci byli odsunuti odůvodněně.	1	2	3	4	5	6	7
6	Během poválečného uspořádání došlo k bezdůvodnému násilí vůči sudetským Němcům.	1	2	3	4	5	6	7
7	Sudetským Němcům byly nezaslouženě vyčítány činy nacistického Německa.	1	2	3	4	5	6	7
8	Zabavení sudetoněmeckého majetku Čechoslováky po válce bylo férové.	1	2	3	4	5	6	7
9	Poválečně uspořádání pohraničí si vyžádalo zbytečné množství obětí na životech sudetských Němců.	1	2	3	4	5	6	7
10	Vyklizení pohraničí proběhlo spravedlivě.	1	2	3	4	5	6	7

Appendix F. Questionnaire on Behaviour Change Measurement

P1. Máte zpětně pocit, že vám experiment něco přinesl, nebo že se nějak změnil váš vztah k tématu odsunu sudetských Němců? Popište to:

.....
.....
.....
.....
.....

P2. Jak často jste se za poslední měsíc s někým bavil(a) o tématu odsunu sudetských Němců? *(zakroužkujte jednu možnost)*

a. Nikdy
b. jednou nebo dvakrát
c. třikrát či čtyřikrát
d. více než čtyřikrát

P2a. Když byste to srovnal s tím, jak často jste se o tématu odsunu sudetských Němců bavil(a) před účasti na experimentu, tak jste se o tom v posledním měsíci:
(zakroužkujte jednu možnost)

a. bavil výrazně méně často
b. bavil méně často
c. bavil zhruba stejně část
d. bavil častěji
e. bavil výrazně častěji

P3. Dohledával(a) jste si po skončení experimentu sám(a) z vlastního zájmu informace o odsunu sudetských Němců z českého pohraničí ? *(zakroužkujte jednu možnost)*

a. ne
b. jednou nebo dvakrát
c. třikrát či čtyřikrát
d. více než čtyřikrát

P4. Změnilo se po experimentu vaše vidění odsunu sudetských Němců? Popište to:

.....
.....
.....
.....
.....

P5. Vyvolala ve Vás účast na experimentu větší zájem o téma odsunu sudetských Němců? *(zakroužkujte jednu možnost)*

a. určitě ne
b. spíše ne
c. nevím
d. spíše ano
e. určitě ano

P6. Pokud by se nyní ve vašem okolí spustila debata na téma odsunu sudetských Němců, zapojíte se do ní? *(zakroužkujte jednu možnost)*

a. určitě ne
b. spíše ne
c. nevím
d. spíše ano
e. určitě ano

P6a. Myslíte si, že experiment zvýšil šanci, že se do debaty na téma odsunu sudetských Němců zapojíte? *(zakroužkujte jednu možnost)*

a. určitě ne
b. spíše ne
c. nevím
d. spíše ano
e. určitě ano

P7. Představte si, že nyní narazíte na film o tématu odsunu sudetských Němců. Podíváte se na něj? *(zakroužkujte jednu možnost)*

a. určitě ne
b. spíše ne
c. nevím
d. spíše ano
e. určitě ano

P7a. Myslíte si, že experiment zvýšil šanci, že se na film o tématu odsunu sudetských Němců podíváte? *(zakroužkujte jednu možnost)*

a. určitě ne
b. spíše ne
c. nevím
d. spíše ano
e. určitě ano