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Information Science

Thesis of dissertation

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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

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2020

1 Introduction

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 *Kingdom Come: Deliverance*; see Steam, 2018). 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). Can we consider history-focused video games to be agents that shape our historical awareness and attitudes?

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. For instance, little is known about historical games' differential impact on implicit vs. explicit attitude attitudes. In this sense, implicit attitudes are derived from associative evaluations, which are immediate affective evaluative reactions to the 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). 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. Furthermore, no study has focused on video games' effects on information behaviour towards historical topics.

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?

The first part of this dissertation 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 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. There are currently no other empirical studies of such a scale.

2 Summary of the Current Empirical Knowledge

Concerning the preliminary literature review about video games and attitudes, we analysed articles in three databases using the broad search operator: 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. The role of this preliminary sample in our review is a control one in relation to the creation of our final search operator for the replicable analysis. As of 15 September 2019, our final search operator discovered 1,267 studies in the Scopus database, which were analysed in our literature review. Exactly twenty articles met all our criteria; they contained 21 empirical studies, which were relevant for our deeper review.

As evidenced by our literature review, current research on video games and attitudes and information behaviour is limited. Our review revealed a significant research gap for the long-term effects of video games on attitudes. Also, current empirical evidence has been predominantly collected from students. Lastly, we have identified only three studies in our review using 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 the video games and information behaviour, 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. Those studies 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 (Fields et al., 2017) 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 (Khalil et al., 2016) 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. 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.

3 Empirical Study

We have analysed the effect of the modified video game *Czechoslovakia 38-89: Borderlands* on players' attitudes and information behaviour towards the history represented in the game. The modified version of the original game *Czechoslovakia 38-89: Borderlands* 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 data in the pretest before the intervention, in the posttest immediately after the intervention and also in the delayed posttest one month after the intervention. 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.

We have used the Associative-Propositional Evaluation model (APE model) for interpretation of attitude change (Gawronski & Bodenhausen, 2014; 2006; Bohner & Dickel, 2011). 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.

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. Associative evaluations function independently of what one consciously considers to be the truth.

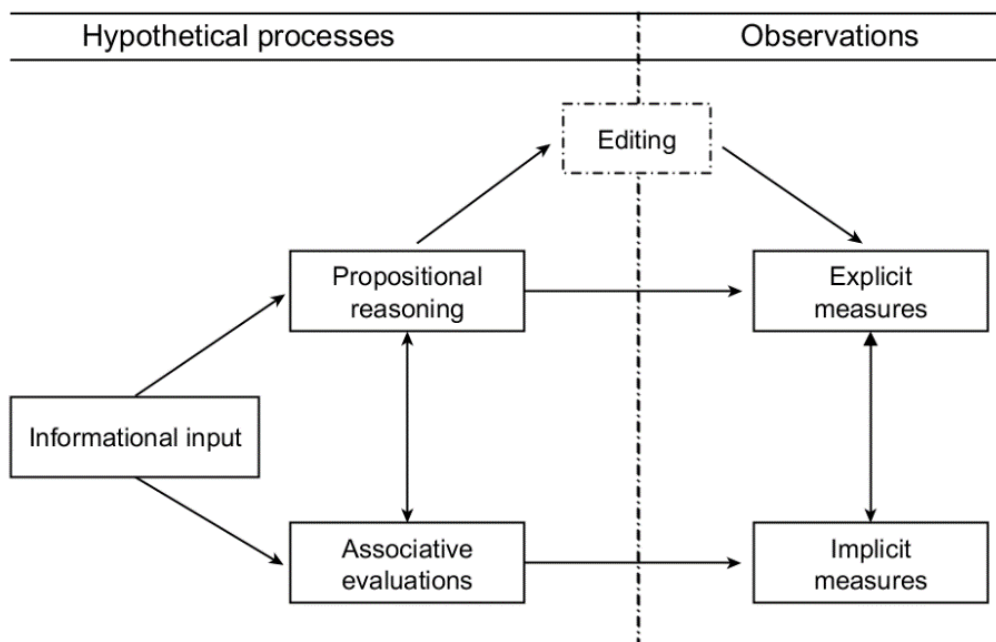


Figure 1. Associative evaluations and propositional reasoning in the APE model (Bohner & Dickel, 2011).

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 (Gawronski & Bodenhausen, 2014). Unlike associative evaluations, propositional reasoning must be in line with what one consciously considers to be the truth in relation to knowledge at their 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.

3.1 Hypotheses

We formed the following eight hypotheses.

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 & Badenhause, 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.

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 & Badenhause, 2014).

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). Therefore, we assume that the initial values for participants' moods will, to some extent, predict attitude change in our explicit and implicit attitude measurements.

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

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 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 (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. 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

Our intervention tool in the Experimental group was a modified version of the game *Czechoslovakia 38-89: Borderlands*. The original game *Czechoslovakia 38-89: Borderlands*, 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. 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 2), these eyewitnesses provide the players with fragments of the past through video sequences, comics, and thematic mini-games (Figure 3).

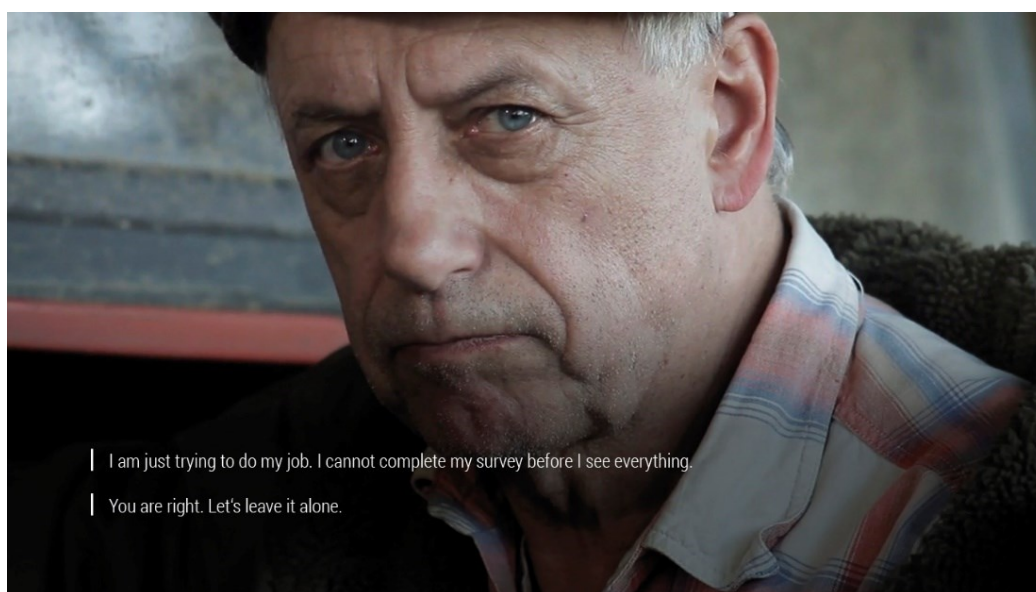


Figure 2. An example of interaction with an eyewitness from the present in Czechoslovakia 38-89: Borderlands

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. In our modified version, the game depicted only one event - the expulsion of the Sudeten Germans from various perspectives, thus using perspective-taking as a game mechanic.

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*. They were chosen because they share several game design principles with *Czechoslovakia 38-89: Borderlands*. They are strongly narrative, point-and-click adventures. 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.



Figure 3. A demonstration of a point-and-click mini-game focused on exploring attics in the modified version of *Czechoslovakia 38-89: Borderlands*.

4.3 Measures

All our empirical data was collected through pen-and-paper-type questionnaires except for the computer-administered Single-Category Implicit Association Test (SC-IAT).

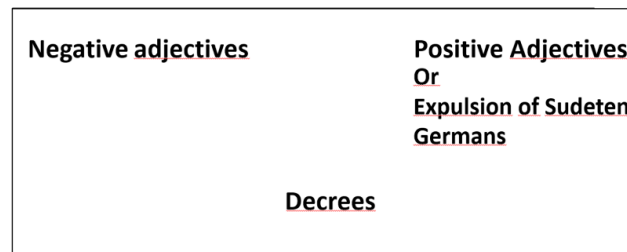
Background demographic questionnaire. The demographic questionnaire yielded data about participants' gender, age, and education.

PANAS. To evaluate participants' positive and negative affect, we used the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988).

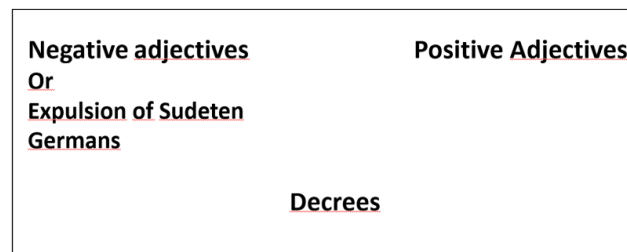
Single Category Implicit Association Test (SC-IAT). SC-IAT is a computer-based questionnaire (Karpinski & Steinman, 2006). It reveals participants' positive or negative associative evaluations towards the measured phenomenon. The test measures participants' response times when they are categorizing words 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. 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 4).

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).



Block 2



Block 3

Figure 4. Demonstration of the categorization of the word Decreases in the Block 2 and the Block 3 of the SC-IAT

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,

4.4 Procedure

The study included two testing sessions; always conducted between 9:00 AM and 12:15 PM. Participants were tested in groups of three to 12 persons, each sitting at a separate computer in a lab. The procedure of the empirical study is demonstrated on the Figure 5.

4.5 Results

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 (see Table 1). 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 (see Table 2). 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) (see Table 1 and Table 2). 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). 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).

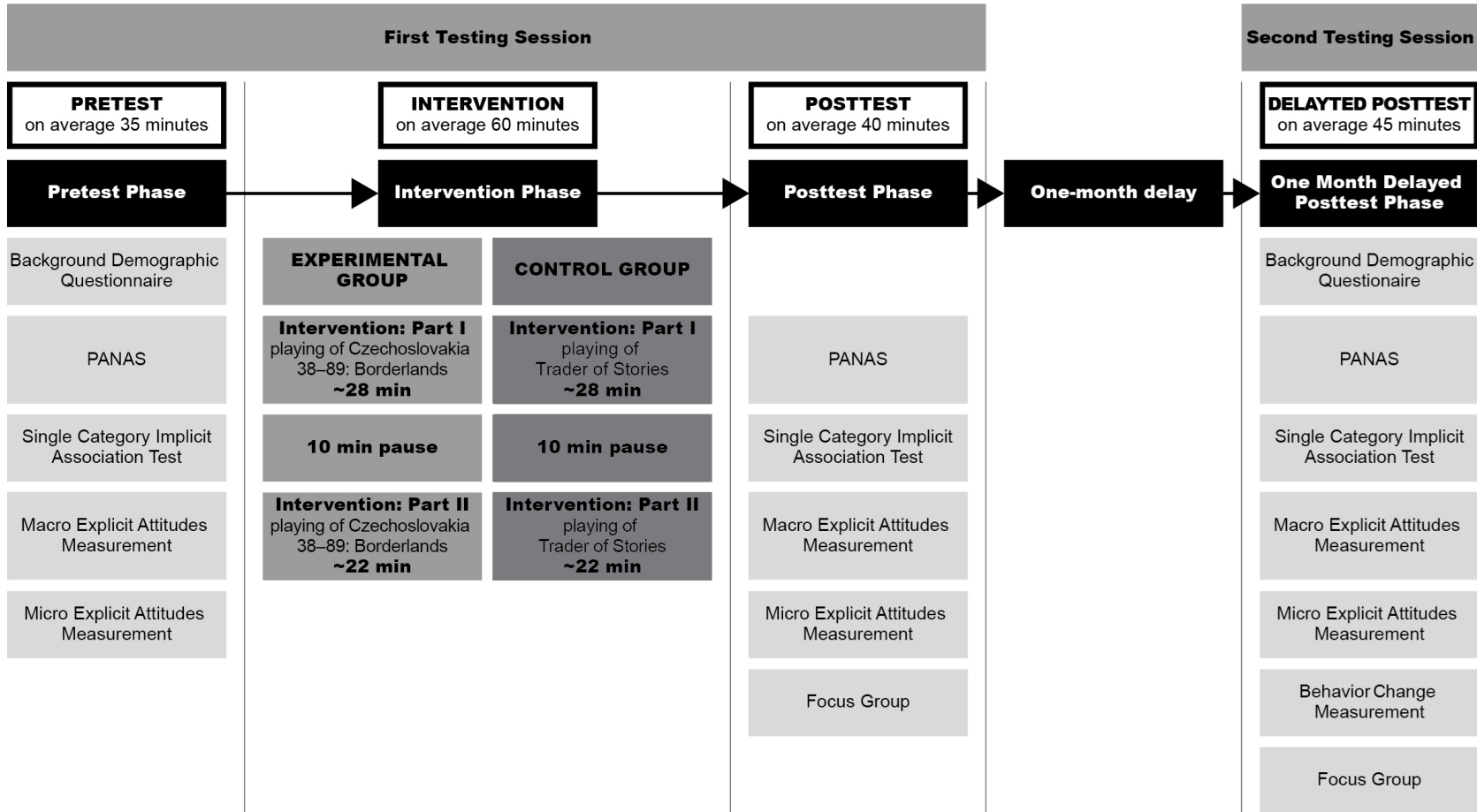


Figure 5. Experiment procedure

Table 1.

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							
	<i>n</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>p</i>	<i>n</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>p</i>	diff	<i>SD</i>	<i>d</i>	<i>p</i>
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 2.

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							
	<i>n</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>p</i>	<i>n</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>p</i>	diff	<i>SD</i>	<i>d</i>	<i>p</i>
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

5 Discussion and Conclusion

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.

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. 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.

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. 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.

6 References

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ACADEMIC WORK

PUBLICATIONS

- Kolek, L., Šisler, V., Martínková, P. & Brom, C. (2020). Can Video Games Change Attitudes towards History? Results from a Laboratory Experiment Measuring Short- and Long-term Effects. Manuscript submitted for publication
- Gemrot, J., Kolek, L. (2020) Charles University Input. In G. Çatak et al. *GAMEHIGHED Initial Report: Output 1: Initial Research & Analysis Report. Higher-ed Programmes for Careers in Game Design & Development (2019–2022)* (pp. 69-128.). Kazimierz Wielki University. <https://gamehighed.ukw.edu.pl/zdj/ftps/193/GAMEHIGHED-Initial-Report.pdf>
- Kolek, L., Šisler, V., & Brom, C. (2019). Video Games and Attitude Change—Can We Reliably Measure This? The Challenges of Empirical Study Design. *In Lecture Notes in Computer Science, Vol. 11385, International Conference on Games and Learning Alliance* (pp. 445-448). Springer.
- Kolek, L. & Šisler, V. (2017). Representation of history in computer games and attitude change: Empirical study design. *Proceedings of The 11th European Conference on Game-Based Learning ECGBL 2017* (pp. 829-834): Academic Conferences and Publishing International.
- Kolek, L. (2017). *Vliv Evropské unie na legitimitu marockého režimu*. In J. Antal (editor) *Recenzovaný sborník sylabů nejlepších diplomových prací s tematikou Evropské unie* (pp 99-112). Praha: Vysoká škola ekonomická v Praze, nakladatelství Oeconomica.

RESEARCH GRANTS

Ongoing

- | | |
|-------------|---|
| 2020 – 2020 | TAČR – GAMA, “Komericializace výsledků projektu Czechoslovakia 38-89: Exil 1968” (TP01010040, 201904, co-investigator) |
| 2019 – 2022 | Erasmus+ Programme K2 Strategic Partnership Project, “Higher-ed Programmes for Careers in Games Design & Development” (2019-1-PL01-KA203-065694, co-investigator) |
| 2017 – 2021 | Charles University Primus Research Programme, “Advanced Multimedia Learning Laboratory” (Primus/HUM/03, researcher) |

Finished

- | | |
|-------------|---|
| 2018 – 2019 | TAČR GAMA, "Komericializace druhého dílu projektu Československo 38-89 (Revoluce 1945)" (TG01010108, 20180502, co-investigator) |
| 2017 – 2018 | Charles University – Internal grants of Faculty of Arts, “Jak ovlivňuje interpretace historických událostí v počítačových simulacích postoje hráčů k těmto událostem? Empirická studie” (FF/VG/2017/115, main investigator) |

2016 – 2017 TAČR GAMA, “Komerzializace výsledků projektu Czechoslovakia 38-89”
(TG01010108, 20160312, co-investigator)”

INVITED LECTURES

2019 Slovak Centre of Scientific and Technical Information
2018 Stanford University
2016 UiT Tromso

ACTIVE TALKS OR POSTER AT THE ACADEMY OR INDUSTRY CONFERENCES

2019 – A Maze, Berlin
2019 – Gamescom, Cologne
2019 – Meet & Build, Charleroi
2018 – Tbilisi Digital Expo, Tbilisi
2018 – Game Developers Conference, San Francisco
2018 – The Games and Learning Alliance conference, Palermo
2018 – Game Connection America, San Francisco
2018 – Casual Connect, London
2017 – CEEGS, Trnava
2017 – Cyberspace, Brno
2017 – Games for Impact, Warsaw

ORGANIZATION OF INTERNATIONAL CONFERENCES

2018 – Central and Eastern European Game Studies Conference (CEECS), Prague, Czech Republic

INNOVATION OR DESIGN

2020 Charles Games s.r.o.– Co-founder of the first spin-off of the Charles University Innovations Prague s.r.o., Charles University’s subsidiary

2017 Attentat 1942 – Game Designer and Developer.
Awards: Best Learning Game at Games for Change 2018, New York; Most Amazing Game at A-Maze Festival 2018, Berlin; Finalist in Independent Games Festival (IGF) 2018, San Francisco; Best Educational Game at TIGA Awards, London; Czech Game of the Year 2017, Prague)

PEDAGOGICAL ACTIVITY

2018-2019 - Practical Course on Game Development (0/1, winter and summer semester)
2019-2020 - Practical Course on Game Development (0/1, winter semester)
2017-2020 - Supervisor of 4 bachelor theses, Consultant of 1 diploma thesis, Opponent of 3 diploma theses