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Abstract. Identifying with video game characters is one potentially important process in game enjoyment. Based on a theoretical model of video game identification as transformed self-perception, cognitive processes in video game identification were explored. An experiment with N = 60 male players revealed that increased cognitive accessibility of character-related concepts should be considered as element of the identification process. Moreover, shifts in players' self-perceptions were observed so that players of a shooter video game (*Call of Duty 2* ™) described themselves as less gentle and more soldier-like than a control group. Overall, the study suggests that shifts in self-related cognition occur as part of the gaming experience. Implications for future research on game enjoyment and long-term game effects are discussed.

Keywords: Video games, entertainment, identification, priming, experiment, lexical decision task

* This research was funded by the European Commission, project "FUGA: The fun of gaming" (NEST-PATH-IMP 28765). We thankfully acknowledge the Commission's support.

1 Introduction

Many contemporary video games contain rich narratives and offer a specific character (e.g., a war hero) or a certain role (e.g., military commander) to players. In the scientific discussion of the remarkable fascination and enjoyment of video games, such narrative elements have been suggested to facilitate emotional player responses because of processes of identification [1-3]. While the term identification has been used quite differently across studies, media types (e.g., novels versus TV), most scholars would agree that identification refers to cognitive and emotional bonds media users (such as gamers) develop with a target media character such as their avatar in a video game. Oatley has proposed a simulation metaphor of identification which suggests that media users imagine the story events 'through the character's eyes', which leads to cognitive and affective responses in media users that are similar to what the character her-/himself is experiencing [4]. In a similar fashion, Cohen has defined identification as strong empathetic response to a media character combined with a loss of self-awareness in media users [5]. Metaphorically speaking, video game players who are identifying with their game character or role 'become one' with the character.

A recent theoretical account of video game identification by Klimmt, Hefner & Vorderer has translated the notion of users 'melting' with their game character into a social-psychological process of transformed self-perception [1]. Based on basic research by Goldstein and Cialdini, they argue that identifying with a game character becomes manifest in a modified self-perception so that the player sees (some of) the attributes of the character also as element of her/his current self [6]. Identification, in this sense, would thus mean transformed self-perception. Because many game characters display extreme attributes, such as great physical strength or moral superiority, it is likely that adopting character attributes into one's self-perception (e.g., perceiving oneself as more courageous than in everyday situations) reduces self-discrepancies [7]. Players who experience reduced self-discrepancies, that is, who perceive themselves to get closer to their preferred, "ideal" self, typically respond with positive emotions that feed into overall game enjoyment [1]. Bessiere, Seay, and Kiesler found, for instance, that many MMO players design their avatars in a way that represents (parts of) their ideal selves; an empirical observation that directly supports the present theoretical account of video game identification [8].

2 Video Game Identification and Cognition

The purpose of this study was to explore the cognitive processes involved in video game identification as transformed self-perception. One mode of cognition that should occur as a consequence of the theorized identification phenomenon is an increased accessibility of character-related concepts as implicit cognitive prerequisite of identification. Close identification with, for instance, a soldier role in a first-person shooter should come along with 'thinking in a soldier's categories', such as friend or foe, attack and withdraw, weapons, tactics, camouflage, tanks, explosions, et cetera. To the extent that a player identifies with a character or role, concepts that are related to

the character or role should thus be activated frequently in the player's mind during game play. As a consequence, these concepts should be more salient and more accessible for automatic processing during and immediately after game play. Implicit measures addressing accessibility of concepts should thus reveal cognitive traces of identification. Accordingly, we hypothesize that players of a military first-person shooter video game display greater cognitive accessibility of soldier-related concepts than players of a non-military video game (H1).
From the perspective of Klimmt et al.'s model, such cognitive accessibility of character-related concepts should be considered as necessary, but not sufficient condition of identification [1], because strong involvement [9] without identification could also result in higher accessibility of concepts related to the character or game world. Still, concept accessibility is theoretically linked to identification, and its empirical occurrence would be interpretable as a milestone on the way towards full video game identification.

In addition to concept accessibility, residuals of changed self-experiences through video game identification should be observable in players' self-descriptions after game play. Goldstein and Cialdini (study 1) found that people who read an interview with a target person and were instructed to empathize with that person described themselves as more similar to that target person afterwards than a control group [6]. Klimmt et al. interpret this finding as a result of merged identities between observer and target person [1]. In the video game context, then, we assume that players who identify with a video game character during game play should describe themselves as more similar to the game character than a control group, due to the merger of their own and the character's identity, which is a change of players' 'normal' self-image. For instance, players of military first-person shooters who identify with a soldier character should describe themselves as braver, more courageous, loyal etc. than a control group. Accordingly, we assume that players of a military first-person shooter video game describe themselves as more similar to a soldier immediately after playing than players of a non-military video game (H2).

The identification process that leads to such changes in self-description may be automatic and not accessible or noticeable for players; the altered self-description may thus serve as an implicit measure of a cognitive residual of video game identification. This means that while players explicitly describe themselves, they are not necessarily aware of the reason why they assign certain attributes to themselves (i.e., prior identification with a game character).

3 Method

An experiment with 60 voluntary university students aged between 20 and 34 years (M = 24.97, SD = 3.32) was conducted to test the hypotheses. All respondents played videogames at least sometimes ("2" on a scale from "1" = never to "5" = very often), 72% of them even played videogames often or very often. For two reasons

only male students were recruited: First, male students are more likely to be familiar with first person shooter games and second, the limitation leads to a more homogenous sample. This is beneficial with regard to the internal validity of our experimental approach. Participants were randomly assigned to either play a military first person shooter (*Call of Duty 2*™, a popular World War II shooting game), which was intended to facilitate identification with an infantry soldier, or the popular puzzling game *Tetris* that did not include any military content at all, and certainly no soldier character to identify with. Randomization procedure was only partly successful. While participants in the two conditions did not differ concerning their use of video games, World War II shooting games or *Call of Duty 2*™, there was a significant difference concerning participants' age (M_{CoD} = 24.0, *SD* = 2.4; M_{Tetris} = 26.0, *SD* = 3.8). In order to account for the unequally distributed age, this variable was used as a covariate in each of the following statistical tests.

To examine the accessibility of soldier-related concepts (H1), players were confronted with a Lexical Decision Task after ten minutes of game play [10, 11]. This implicit procedure presents letter sequences on a screen and requires participants to decide whether the letters make a real word or not as fast as possible. Letter sequences that do not make real words (non-words) could be a word at first sight. They are made up of a real word with one letter exchanged (e.g., "Morch" instead of "March"). Concept accessibility is measured by the time participants need to identify words semantically related to the concepts under study in comparison to words unrelated to that concept. For instance, strong accessibility of the concept 'soldier' should result in very fast decision times for words such as rifle, mine or tank but not speed up decision times for unrelated words such as elephant, coffee or cake. Following the procedure described by Macrae et al., a lexical decision task was implemented to measure cognitive accessibility of soldier-related concepts [10]. It presents words that reflect soldier-related contexts or are unrelated to that context (for the purpose of comparison). Specifically, a set of 14 words with connection to the soldier role and 14 words unrelated to that role were presented to participants in random order.[1] The same number of 28 non-words was added to the list of target words appearing on screen. Each word / non-word was visible on screen for 75 milliseconds. Participants were requested to press either 'd' on a computer keyboard if the presented word was a real word or to press 'k' if the word was a non-word. Response times between target word onset and press of the key was measured in milliseconds (with the Inquisit 2 software by Millisecond, Inc.). H1 was thus translated into the prediction that players of the shooter game will display greater cognitive accessibility and thus faster decision times if words related to the soldier role appear on screen (compared to words unrelated to the solider role and in comparison to players in the *Tetris* control group).

Following standard procedures for LDT measures [12], we eliminated five participants from the data set due to their performance (they had assorted more than 25% of

[1] Words reflecting a soldier-related context (translated from German): to attack, bunker, defilade, explosion, firing, cannon, rifle, grenade, helmet, mine, to reload, tank, soldier, to blow up (Reaction time: *M* = 624.2 ms, *SD* = 91.1). Words reflecting a soldier-unrelated context: to bake, to shop, elephant, bottle, spring, to water, cellphone, to marry, coffee, chamber, cake, bar, street, to perform magic (Reaction time: *M* = 634.6 ms, *SD* =83.7).

the words incorrectly, too fast (<300 ms) or too slowly (>1400 ms ≈ 2 standard deviations above the mean).

To test H2, the self-description procedure applied by Goldstein and Cialdini (study 1) was adapted to the present context [6]. Participants were given an attribute list and asked to rate each attribute concerning the extent to which it was true for themselves. Ratings were made on an 11-point scale with 1 meaning "the attribute describes me much less than the average person" and 11 meaning "the attribute describes me much more than the average person". The scale mid-point 6 was labeled "the attribute describes me about the same as the average person." Half of the attributes were soldier-related (e.g., brave, patriotic, assertive), the other half was semantically distal to the soldier concept (e.g., warm-hearted). Following H2, it was predicted that identification with the infantry soldier should lead to higher ratings of soldier-related attributes and lower ratings of distal attributes in players of *Call of Duty 2*™ than in *Tetris* players.

Upon entering the laboratory, participants first played the game that was randomly assigned to them (*Call of Duty 2*™ or *Tetris*) on a laptop computer with a 17 inch display, headphones, and external mouse device. After ten minutes of game play, the experimenter kindly interrupted game play by pausing the game and invited the participant to perform the LDT on a second laptop computer. After completion of the LDT, participants were asked to resume game play for another ten minutes (to re-establish identification). Afterwards, the experimenter finished the game and handed a questionnaire to participants that included the self-description task as described above, an item to measure prior use of world war games similar to *Call of Duty 2* ™, various other brief questions and some demography items. Finally, participants were thanked, offered information on study results, and received 10 EUR as financial compensation.

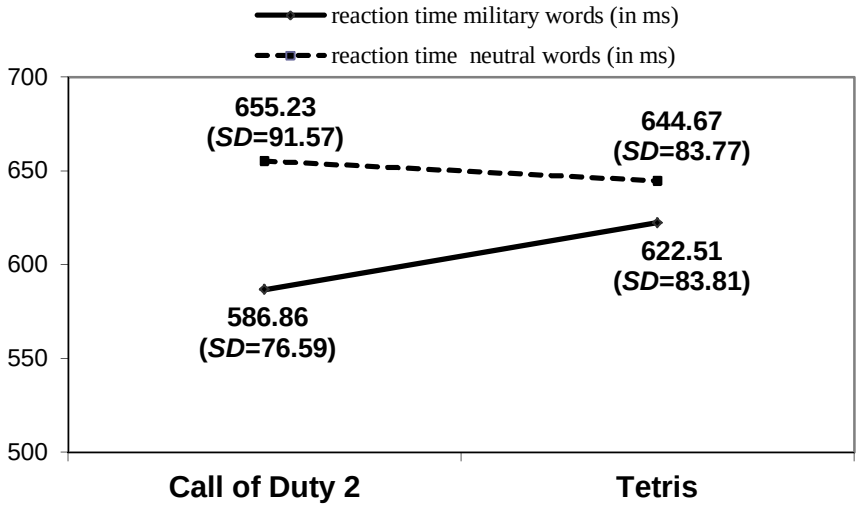
4 Results

To test H1, experimental groups were compared in LDT performance. Specifically, the average response times for those target words were analyzed that had a semantic connection to the soldier role. Following H1, the prediction was tested that players of *Call of Duty 2* ™ would display greater cognitive accessibility and thus faster decision times (compared to *Tetris*-players) for this kind of target words. In reverse, words unrelated to the soldier role (neutral words) should not produce significant differences in the mean reaction time between the two experimental groups.

A repeated measure ANCOVA with the word category (soldier-related vs. neutral) as within-subjects factor and the experimental condition (Game played: *Call of Duty 2* ™ or *Tetris*) as between-subjects factor was conducted (see figure 1). Age was included as a covariate due to its unequal distribution between the two experimental groups. The hypothesized interaction effect for word category and game occurred ($F(1,52) = 12.97$; $p<.01$; $\eta^2 = .20$). There was no main effect for the within-subjects factor word category ($F(1,52) = 0.20$; *ns*).

The interaction of game and word category occurred because reaction times to soldier-related words were significantly faster in players of the shooter game than in *Tetris* players while there was only a marginal difference concerning the neutral words between the two groups. H1 thus received empirical support: Players of the military shooter game displayed substantially greater accessibility of soldier-related concepts compared to the control group of *Tetris* players.

Fig. 1. Effect of the stimulus game (Shooter: *Call of Duty 2*™ versus *Tetris*) on reaction times for military words and neutral words (N=55).



In order to test H2, the items of the self-description scale were submitted to a factor analysis first (principal component analysis with VARIMAX rotation). For various reasons, 11 of the 26 items were removed step-by-step (because of factor loadings < 0.5, bad interpretability along with other items in a factor, and/or lack of semantic clarity). The final factor solution was based on 15 items and comprised four dimensions explaining 58.68% of the variance (see table 1). All factors had an eigenvalue of at least 1.7 after rotation and 1.4 before rotation. Three factors reflected typical soldier-attribute dimensions (factor 1: tenacity and discipline; factor 3: aggressiveness, and factor 4: courage) and one attribute-dimension contrasted typical soldier attributes (factor 2: gentleness).

A MANCOVA with "game played" as between-subjects factor, age as covariate and the factor values of the four dimensions as dependent variables was then conducted to test H2 (table 2). Results lend partial support to H2: While those participants who played *Tetris* display higher values for the factor "gentleness", respondents who played the shooter game held higher values on the dimensions "tenacity-and-discipline" and "aggression", which implies a greater tendency to ascribe soldier-related attributes to themselves. A marginally significant multivariate group differ-

ence across all four dimensions was observed. Factor-wise analysis revealed that the experimental group difference was only significant for the second factor “gentleness” (table 2). Thus, H2 received modest empirical support.

Table 1. Extracted personality trait dimensions

	Factor 1	Factor 2	Factor 3	Factor 4
disciplined	.772			
tough	.735			
persevering	.604			
proactive	.587			
persistent	.523			
kind		.850		
helpful		.797		
warm-hearted		.614		
aggressive			.712	
courageous			.632	
adventurous			.628	
assertive			.560	
anxious				-.738
composed				.641
brave				.553

Principal component analysis with VARIMAX rotation. Factor loadings < .51 are not displayed. Rotation converged in 5 iterations. Excluded items: cultivated, easygoing, tolerant, loyal, trusting, patient, chaotic, imaginative, sportive, lame, shy.

Table 2. Effects of the stimulus game on the self-assessment of certain attributes

Stimulus game	Factor 1: Tenacity and discipline Mean (*SD*)	Factor 2: Gentleness Mean (*SD*)	Factor 3: Aggressiveness Mean (*SD*)	Factor 4: Courage Mean (*SD*)
Call of Duty	0.11 (0.94)	-0.34* (1.03)	0.11 (1.22)	0.02 (0.88)
Tetris	-0.11 (1.06)	0.34* (0.86)	-0.11 (0.73)	-0.02 (1.12)

Multivariate effect: $F(1,52) = 2.11$; $p<.10$; $\eta^2 = .14$

*Univariate effect for “gentleness”: $F(1,55) = 6.91$; $p< .05$; $\eta^2 = .11$

An explanation for the observed moderate effect might be that not only the experimental stimulus but also prior experience with similar world war games affects participants' self-perception. This could result in within group variance that suppresses the experimental effect on the three soldier-attribute dimensions. In order to check this, another MANCOVA including prior use of world war games (yes / no) as a second factor besides the experimental manipulation was conducted. Age was controlled by including it as a covariate. Results neither yielded a main effect of prior use of war games on the four personality dimensions, nor an interaction effect between "game played" and prior experience with war games.

5 Discussion

The experiment was designed to search for traces of video game identification manifest in players' cognitive accessibility of role-related concepts and in post-game self-descriptions. Findings from the Lexical Decision Task suggest that playing a soldier role indeed increases cognitive accessibility of soldier-related concepts. In the context of the model of video game identification (see above), the cognitive salience of words connected to the protagonist or role that a player is identifying with is an empirical confirmation of automatic processing of character-related information as part of the identification process during game play. The LDT cannot reveal automatic shifts in self-perceptions (as expected by the model), but already demonstrates that video games affect players' cognitive processing in a way that prepares actual identification by increasing salience of character-relevant concepts. Players 'think in the categories of' or 'from the perspective of' the game character or role they are adopting during game play, and we suggest interpreting concept salience as measured by the LDT as a cognitive prerequisite of this pre-stage of video game identification.

The self-description task used to test H2 revealed only limited experimental support for our assumptions. Identifying with a video game character seems to affect players' self-rating in a post-game questionnaire only marginally. However, we suggest an optimistic interpretation of this result, because in the situation of inquiry, participants were likely to take some time to reflect about themselves, which renders (implicit) effects of the prior game experience less relevant. Therefore, no strong effect of the prior video game identification should be expected. In the foundational study by Goldstein and Cialdini (study 1, see above) [6], a very similar measure also produced rather small group differences (with $\eta^2 = .03$). From this perspective, we consider the occurrence of even small experimental differences as indication that the contention of identification as change of self-perception holds empirical relevance.

While there is a need to continue empirical testing of the theoretical account of video game identification as transformed self-perception, the present results suggest that basic cognitive processes, priming and transformation of self-perceptions, are involved in players' responses to character-based video games. Of course, the generalizability of our results is limited due to the specific group of respondents (male university students) and the chosen stimulus genre (a first-person shooter). Nevertheless, related work applying the Implicit Association Test recently found automatic

associations between character attributes and players' self-concept for a racing game as well [13]. The mentioned study compared players of *Need for Speed: Carbon* with *Call of Duty 2* ™ players concerning the associations between racing- vs. military-related concepts and players' self: While associations between self-concept and military words were stronger compared to those between self-concept and racing-related words in players of the military game, the opposite pattern emerged for players of the car-racing game. Thus, there is empirical evidence suggesting the applicability of the theoretical approach to a greater variety of genres than the one that was chosen in this study.

In line with similar lines of research [8, 14], the self-relevance of digital characters emerges as an important aspect of the video game experience. Further research is needed to explore the implications for game enjoyment [1] as well as the long-term implications of game players' transformed self-perceptions. It is, e.g., highly plausible that identification with self-selected favorable roles in digital games facilitates game enjoyment via mitigating self-discrepancy at least during gaming. A relevant follow-up question would of course be if resp. how long this reduced self-discrepancy persists. Does it – in the long run – foster self-esteem of, e.g., adolescent males striving for the feeling of strength and masculinity? Or does it – contrary to that – even lead to a reduced self-esteem after playing, because players then 'return' to their own life and self?

Another effect could be the long-term incorporation of role-attributes into one's self-construal, e.g. of more aggressive concepts [15] or the adoption of high moral standards of a favorite policeman game character. For the moment, video games emerge as machines of effective temporary self-alteration, with potentially interesting implications for short-term fun and long-term (self-)development.

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