Increasing Donating Behavior Through a Game for Change: The Role of Interactivity and Appreciation

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ABSTRACT

Games for change have attracted the interest of humanitarian aid organizations and researchers alike. However, their effectiveness to promote behavior such as donating remains unclear. Furthermore, little is known about how key game properties interactivity and presentation mode impact the effectiveness of these games, or how player attitudes and experiences relate to the interplay between game properties and donating behavior. In this study, experimental conditions were systematically varied in their interactivity and presentation mode. Thereby, 234 participants played, watched, or read through one of six variations of the narrative of the game *Darfur is Dying*. Following this, they were asked to choose the percentage of an unexpected bonus to donate to a charity. While interactivity increased donating by an average of 12%, presentation mode had no significant impact on the percentage donated. Thus, between presentation mode and interactivity, interactivity was found to be the more impactful game property. Moreover, appreciation fully mediated the relationship between interactivity and donating, hinting at its relevance for the evaluation of the effectiveness of games for change.

Author Keywords

Games for change, persuasive games, appreciation, donating

ACM Classification Keywords

J.4 Social and Behavioral Sciences:: Sociology, Psychology; K.8.0 Personal Computing Games

INTRODUCTION

For organizations focused on humanitarian aid, the rise of new media and technology brings with it the potential for creating new ways to make the world a better place. Most such organizations depend on reaching the public and persuading individuals to help [39]. Working on a limited budget, finding ways to do this in a way that is both efficient and effective is pivotal [42]. An interesting option, which in recent years has caught the attention of both humanitarian aid organizations and researchers alike, are games for change [7, 35].

Games for change, also known as social impact games or serious games for social change, are digital games with the purpose of not only entertaining, but reaching players and ideally animating them to support the social change the game is advocating [31, 36]. *Darfur is Dying* for example confronts players with the fear and constant lack of security facing Darfurian refugees, by forcing the player to attempt to bring water back to their camp, while avoiding the patrolling Janjaweed militia. Meanwhile, *Spent* illustrates how quickly poverty can spiral into homelessness by having players try to survive on a minimal income, while being faced with choices such as deciding whether to get an expensive treatment for a dental infection for half their monthly income or to buy numbing cream and try to ignore the pain. The appearance of games for change can vary greatly, from high-quality video games, to simple cartoon-like animation, to text-based gameplay [22]. The vast majority of these games however have in common that no matter how simple the design, they force players to face challenges and make difficult choices they would not have to in their regular life. This aspect of interactivity also sets these games apart from other forms of media conveying similar messages.

While interest in various types of serious games has been on the rise in recent years, little is known about the effectiveness of these games in achieving the goals for which they were designed [26, 44]. Especially in the context of games for change, effectiveness can be hard to discern, as their purpose may not be clearly defined or it may be difficult to distill their success down to measurable values [21, 28, 36]. However, as argued by Iacovides and Cox [21], despite these added difficulties it is especially vital to evaluate the experience invoked by games that go beyond fun, to understand whether they are effective facilitators of social change.

Related to the question of the overall effectiveness of games for change is the examination of how individual game properties, such as interactivity or presentation mode, contribute to this effect, as understanding the specific impact of individual game properties can help organizations create impactful games efficiently, by focusing on the most effective properties. Although still a very sparse field of research, the few studies that have aimed to evaluate the effectiveness of games for change have found support for their impact on a number of factors such as player attitudes or knowledge gain [34] and some have even found effects on attitudes weeks later [20, 38].

However, so far very few studies have examined the impact of games for change on behavior-related variables. The only

studies that have to our knowledge touched on behavior did this by asking participants about their willingness to show a certain behavior or via self-reports, for example by asking how willing participants would be to donate money [34] or asking them a week after the study, whether they had shared the game with a friend [12]. So far to our knowledge no studies have explored the impact of games for change on directly measurable behavior.

The goal of the current study is first and foremost to examine the effectiveness of a game for change on impacting behavior, specifically donating. In particular, we wish to understand how two specific game properties contribute to the effectiveness of these games by analyzing the impact of systematically changing presentation mode or adding and removing interactivity, while keeping the information content itself constant. Beyond that, we also wish to gain insight into how role-taking, willingness to help, enjoyment, and appreciation are affected by playing a game for change and how they relate to donating. Examined together, these questions should help us improve our understanding of how games for change can impact player attitudes, experience, and behavior and thereby further understand these games' value as a tool for meaningful social change.

RELATED WORK

A key game property, both for games as a whole and for games for change in particular, is interactivity [36]. Klimmt and Vorderer [23] defined interactivity in the context of digital games as the game property that gives the player the ability to interact with and influence the story told in the game. Previous research in the context of games for change, other serious games, and in the broader field of game research, has identified the interactivity of a game as a factor, which contributes to different attitudinal and motivational changes, as well as to knowledge gain.

Peng, Lee, and Heeter [34] for example had participants either play Darfur is Dying, watch a recording of the gameplay (but not play the game themselves), or read a text describing the same events as were played out in the game. They found that, compared to the other two conditions, playing the game led to significantly higher role-taking with the character and willingness to help people, who, like their character, were affected by the crisis in Darfur. Similarly, Ruggiero [38] found that playing Spent led to participants improving their attitude towards homelessness more than a control group and more than a group that read an article about homelessness. The effects were weaker three weeks later, but had decreased less for the game group than for the control or reading group. Ritterfeld et al. [37] also compared an interactive serious game, in this case for education, with the noninteractive recorded gameplay and found a significant effect for interactivity on knowledge gain in the game's subject of the human digestive system. Further, while not exclusively focusing on interactivity, a meta-analysis of games for education by Wouters et al. [44] found games to be more effective at encouraging learning and retention than conventional, mainly non-interactive instructional methods. An explanation for this finding could be the ability of interactive games to allow players to expe-rience and manipulate the game's material and outcome in ways other instructional methods cannot [19]. While this effect may be especially relevant in the context of games for learning, this aspect, of seeing the consequences of certain actions and the therewith connected learning experience, may well also hold importance for the creation of new or adapted attitudes and thereby also be of significant importance for games for change. In the wider game context, interactivity has also been examined, as Lin [24] compared an interactive violent video game with the noninteractive recorded gameplay and a noninteractive corresponding scene in a movie, on which the game was based. Lin found interactivity to have a significant short-term effect on both aggressive affect and cognition. Once again however, the impact on behavioral measures remains unclear.

Another important property of games is their presentation mode and their ability to incorporate different forms of sensory input, such as visualizations and audio tracks [36]. This combination of different sensory perceptions in one presentation mode is referred to as multimodality [4]. Past research has shown that the use of multimodality can impact the way information is processed. For example, using multiple modalities, distributed over separate sensory channels in parallel, as by supplementing a lecture with descriptive images, can improve information processing [26, 40]. However, relaying two pieces of information simultaneously over the same channel can lead to inferior processing [4]. Simply changing the presentation mode can also have consequences on attitudes, as for example presenting a political debate either in a single-screen view or a split-screen view can significantly impact the way viewers process the debate issues and evaluate candidates [10]. Findings on the impact of presentation mode and modality in the context of serious games have been mixed. For example, Ritterfeld et al. [37] found that using combined images and sound instead of text in a game for education significantly increased knowledge gain and interest in learning. Conversely, Peng et al. [34] found no significant difference between the recording of the cartoon-like animation supplemented by sound in the game Darfur is Dying and a text telling the same story regarding their impact on role-taking and willingness to help.

While several studies have examined the effects of interactivity and presentation mode and some, such as Peng et al. [34], have even included them in the same design, the effect of interactivity has to our knowledge never been systematically examined across different presentation modes. Peng et al. [34] for instance did not include an interactive equivalent of the text, meaning that any findings on the effectiveness of the interactive game could not be completely attributed to interactivity, as it might have been an effect of the interaction between interactivity and the presentation mode of the game.

Aim of this study

In this study, our goal was to firstly examine the individual effects of interactivity and presentation mode on a measurable behavioral variable, namely donating, considering the importance of donations for humanitarian aid [39]. The effects of interactivity and presentation mode were examined by com-

paring interactive and noninteractive versions of three different presentation modes. As research on games for change has so far lacked examination of the impact of game properties on behavior, it will be interesting to see whether the link found between interactivity and willingness to donate [34], can also be found between interactivity and donating behavior. As attitudes are generally connected to corresponding behavior [1, 18], we hypothesize that as with willingness to donate:

H1: Interactivity will lead to increased donations.

As findings on the effectiveness of presentation mode in the context of serious games have been mixed [34, 37], no specific hypotheses will be proposed regarding its impact. As the study design will however allow a systematic examination of the impact of presentation mode, as with interactivity, results regarding the effectiveness of presentation mode will nevertheless be of interest.

Of further interest is the question of how subjective player ratings are impacted by interactivity and presentation mode and how they relate to donating. This will allow the findings of this study to be compared to previous research examining subjective ratings. In the following sections we will therefore focus on four factors shown to be of importance in recent serious game and media research.

Role-Taking and Willingness to Help
Empathy has long been associated with prosocial behavior [17]. Role-taking refers to a specific form of empathy whereby a person temporarily imagines themselves as another person and takes on their perspective [14]. In the context of media, role-taking is closely related to identification, which effectively describes role-taking specifically with a mediated character, such as a character in a book, movie, or game [13, 34].

In their study, Peng et al. [34] argued that due to the game's interactivity, playing as a character in a game could lead to an increase in role-taking with that character more than noninteractive forms of media could. In line with this expectation, they found that interactivity led to an increase in role-taking. Similar results are expected for this study:

H2: Interactivity will lead to more role-taking.

Furthermore, Peng et al. [34] also found that an increase in role-taking led to an increase in self-reported willingness to help a cause that would benefit people like the character they had just played. It remains to be seen how role-taking and willingness to help translate into donating behavior, however, considering the well-established links between empathy and prosocial behavior [17] as well as research linking attitudes with related behavior [1, 18], we hypothesize that:

H3: Role-taking will be positively correlated with donating behavior.

H4: Willingness to help will be positively correlated with donating behavior.

Peng et al. [34] did not find an impact of presentation mode on role-taking or on willingness to help. As their design however did not allow for a clear distinction between the impacts of interactivity and presentation mode, it is possible that isolating the effects of presentation mode may yield different findings.

Enjoyment and Appreciation
A key aspect of games, which should not be neglected, is their capacity to be entertaining and enjoyable [27]. Of special interest in the context of games for change is the concept of eudaimonic entertainment [33]. This describes entertainment, which leads to gratification not necessarily by being fun, but by being thought-provoking and meaningful [6, 25]. Examples of media that are in this way appreciated, but not necessarily enjoyed, are films such as Schindler's List, which may not be considered fun, but is widely appreciated for its ability to make the audience think [33]. It is important to bear in mind that media can be simultaneously appreciated and enjoyed [33]. Accordingly, while the game may be appreciated for its message, the gameplay may still be enjoyable. Specifically, the interactivity of a game has in the past been linked to enjoyment [23]. We therefore assume that:

H5: Interactivity will lead to more enjoyment.

Appreciation has been linked to the degree to which media is moving and thought-provoking [5, 6, 33]. A recent study by Bopp et al. [8] found games to be an effective medium for inspiring both strong emotions and reflective thoughts. Interestingly, players often especially appreciated game situations where both positive and negative emotions were elicited, such as when the player won, but only after having made a sacrifice. This may be especially relevant for games for change, such as Darfur is Dying, where the player is likely to be confronted with negative emotions when contemplating the humanitarian crisis the game is illustrating. While the resulting game experience may not necessarily be fun, this does not have to make it a bad experience or one that game designers should avoid designing for. As Marsh and Costello [25] have argued, other forms of media such as literature or film are often acclaimed for their ability to portray suffering and adversity and that limiting their storytelling to be only positive or fun would be considered a serious restriction. Marsh and Costello advocate that there is no reason why games should not similarly aim to be moving and thought-provoking. Considering the above-mentioned research by Bopp et al. [8] and other recent findings on the ability of games to promote affective learning [38] and stronger affective reactions [24], it could be postulated that games may even be uniquely qualified to facilitate moving experiences. As a game property, interactivity in particular has been associated with stronger cognitive and affective reactions [24]. We therefore hypothesize that:

H6: Interactivity will lead to more appreciation.

Lastly, moving media, distinguished by the presence of both positive and negative emotions, has been associated with an increased likelihood of participants performing prosocial behavior, such as sharing an informational video with others to spread awareness around skin cancer prevention [30]. Additionally, past research has highlighted the importance of meaningfulness for people engaging in prosocial behavior,

such as donating blood [2, 3]. Considering this, we propose that:

H7: Appreciation will be positively correlated with donating behavior.

It is yet to be seen how presentation mode affects enjoyment and appreciation or how enjoyment impacts donating behavior. Finally, it will be interesting to explore whether any of these subjective ratings for player attitudes and experiences will be able to mediate the effect of interactivity and presentation mode on donating behavior.

METHOD

The experiment had a 2x3-between-subject design. The independent variables were interactivity with two levels (interactive, noninteractive) and presentation mode with three levels (text, text with pictures, (recorded) gameplay). The primary dependent variable was percentage donated. Further dependent variables were role-taking, willingness to help, enjoyment, and appreciation. To control for confounding effects, the covariables empathic concern, general involvement with international humanitarian affaires, and previous knowledge of the crisis in Darfur were also included.

Participants

Participants were recruited on the crowdsourcing platform Crowdflower. Participants were only allowed to participate once, any repeated participations were excluded from the dataset (73 participants). We also excluded participants who did not complete the survey (19 participants) or had technical difficulties, which led to them being unable to experience the experimental condition they were assigned to (3 participants). We also excluded participants who were unable to correctly answer an open-ended question about what had happened in the experimental condition (6 participants) or obviously had randomly answered multiple choice questions (8 participants). As only the game condition included the option of winning, we excluded participants, who indicated they had won (5 participants), to keep the outcome consistent across conditions.

After data cleanup, a sample of 234 participants (121 female) remained: 29 in the gameplay condition, 31 in the interactive text with pictures condition, 43 in the interactive text condition, 40 in the noninteractive recorded gameplay condition, 39 in the noninteractive text with pictures condition, and 52 in the text condition. The mean age was 38 with a range from 16 to 79. After conducting a pilot study, we realized that good English skills were essential for understanding the questionnaires and the text conditions. Therefore for the main study we restricted recruitment to countries with English as an official language. Despite this constraint, participants came from a fairly broad range of nationalities; 35% identifying as American, 23% as British, 22% as Canadian, and the remaining 20% identifying as from one of 28 other nationalities. 49% were full-time employed, 19% were unemployed, 13% were part-time employed, 8% were students, and the remaining 11% identified as either stay-at-home parents, self-employed, retired, or preferred not to say. Participants received $1 for their participation, which they were assigned after entering a code on Crowdflower that they were awarded at the end of the study.

Materials

Stimuli

We partially replicated the design of Peng et al. [34], using the same two presentation modes as they had. These were the interactive web-based video game Darfur is Dying, which has been previously used in research on games for change (e.g., [12, 31, 34]), a recorded gameplay video of Darfur is Dying, and a text, recounting the narrative of the game. While there were several characters available, we asked participants – similar to Peng et al. [34], – to play as the little girl Poni, for the sake of consistency across the other conditions, which only offered the option of playing as Poni. Likewise, we excluded participants, who won (i.e., successfully brought water back to their camp without getting caught) to keep the outcome consistent across conditions.

We furthermore supplemented Peng et al.'s study design with an additional three conditions. The first was an interactive version of the text adapted from Peng et al. ([34], p. 741). This interactive text was a simple form of interactive fiction or text adventure, which allowed the reader to make choices as to how the story would progress. The interactive text condition was created by modifying the noninteractive text in Twine, a software, which allows the creation of hypertext-based interactive stories. Where the noninteractive text condition described the decisions Poni made when running across the landscape to get to the well, the interactive text condition let the participants choose in which direction Poni should run. The player would make their choice by clicking on their preferred answer and were then taken to a new page in the browser with a text reflecting their choice (see also Figure 1).

To keep the experience consistent with the noninteractive text, the interactive text told the same story, independently of the choices the player made, although the players did not know this. While the player would choose a direction in which to run and the next page would give feedback about the direction they ran in (e.g., "Poni runs east, away from the oncoming jeep"), the rest of the text would be the same for each option. The only exception was if participants chose an option that took them towards the jeep, in which case they were captured immediately. If they did not run towards the jeep, players went through eight pages, on seven of which they were given a section of the story and had to choose which way to run. To keep the story consistent across conditions, the final choice always lead to Poni being captured on the eighth page.

While interactive fiction may be visually very different to a video game such as Darfur is Dying, it can nonetheless be defined as a form of game [29]. Considering the substantial visual difference between an interactive text and a video game, a third presentation mode of a text with pictures using screenshots from the game (see Figure 1) was included, to allow a more nuanced examination of the impact of different forms of presentation mode. The three presentation modes also varied in their use of modality, as the gameplay offered visual information, as well as auditory information (e.g., Poni's footsteps, motor sounds of nearby militia jeeps),

Poni runs east, away from the oncoming jeep. She successfully avoids the Jeep. Perhaps there will not be any more patrols, she thinks, but that familiar whine is heard in the distance to the north once again. Now she is in a bad position, as she has gone further away from the rocks and has no place to hide.

What should Poni do?

Run north, towards the well
Run east, away from the well
Run south, towards camp
Run west, towards the well

Figure 1. A section of the interactive text with pictures condition. The image is a screenshot of *Darfur is Dying* taken by the first author.

making it multimodal. Meanwhile, the text offered information only through written language as a single modality and the text with pictures offered information through written language and images, meaning that two pieces of information had to be transferred over the same processing channel.

Measures
To measure donating behavior, participants were given a $1 bonus in addition to the $1 that they were already receiving as compensation for taking part in the study. While $1 may not seem to be a large amount, several studies have previously employed this or similar amounts (e.g., [9, 16, 41]). Participants had to choose which percentage of this $1 they wanted to have paid to them and which percentage should be donated for them to the charity Save Darfur. Using a dropdown menu, participants selected the amount to be donated in 10-percent increments between 0% and 100%.

Cohen's identification scale [13] was used to measure role-taking, with the name of the character of the game, Poni, inserted in the item statements (Cronbach's α = .90). Participants were asked to use a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree) to rate six statements, such as "I was able to understand the events in a manner similar to that in which Poni understood them" or "When Poni failed, I was sad; when Poni succeeded I felt joy".

While role-taking is a measure for the empathy felt towards a specific individual, or in this case character, it is reasonable to assume that a person's general tendency towards empathy may also impact prosocial behavior such as donating. To control for this potentially confounding factor, the Empathic Concern subscale developed by Davis [15] was utilized (Cronbach's α = .86). Participants rated seven statements, such as "When I see someone taken advantage of, I feel kind of protective towards them" on a 7-point Likert scale from 1 (does not describe me well) to 7 (describes me very well).

Besides empathic concern, it is also plausible that a person with an interest in following news about humanitarian issues or someone with previous knowledge of the crisis in Darfur

would be more likely to donate money to this cause. To measure general involvement with international humanitarian affaires, participants were asked the same four questions used in Peng et al. [34], such as "I pay attention to news about human rights", on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree, Cronbach's α = .92). To measure previous knowledge of the crisis in Darfur, one item was used similar to Peng et al., asking whether the participant had heard of the crisis in Darfur.

Four dependent variables focusing on willingness to help were measured using the same four questions used by Peng et al. [34]. The participants were asked to rate how likely on a 7-point Likert scale from 1 (very unlikely) to 7 (very likely) it was that they would (a) donate money to help fund crucial awareness and advocacy programs needed to end the crisis in Darfur; (b) sign a petition to build the political pressure needed to end the crisis in Darfur; (c) discuss the situation in Darfur with their friends or family; and (d) forward the link of the game/video/text/interactive text to their friends to disseminate the message about Darfur. It is important to note that, as in Peng et al. [34], these four questions were not used as a scale measuring one variable, but as four separate variables measuring four separate forms of willingness to help.

Enjoyment and appreciation were measured using the scale developed by Oliver and Bartsch [33], which consists of three items each for enjoyment (Cronbach's α = .90) and appreciation (Cronbach's α = .87). To accommodate the different media used in this study, statements were slightly modified depending on the condition. For example, a statement for appreciation in the game condition was formulated as "I found this game to be very meaningful", while in the recorded gameplay condition it was written as "I found this video to be very meaningful" (7-point Likert scale, 1 = strongly disagree, 7 = strongly agree).

Procedure
Participants began the online survey after following a link from Crowdflower. After being informed about the rough procedure and length of the study, participants filled out questionnaires for empathic concern, as well as general involvement with international humanitarian affaires, and knowledge of the humanitarian crisis in Darfur. Next, participants were randomly assigned to one of the six experimental conditions, each of which told Poni's story through a different form of presentation mode (text, text with pictures or (recorded) gameplay) in either an interactive or noninteractive version. Participants completed the various experimental conditions (e.g., playing the game) in between five and seven minutes.

Immediately after the experimental condition, participants filled out questionnaires for role-taking, willingness to help, appreciation, and enjoyment. Then, participants were told that they would be receiving a bonus of $1, in addition to the $1 they were already receiving for participating in the study. They were then given the choice to keep the entire bonus for themselves or to donate up to 100 percent to a charity called Save Darfur. Optionally, they could click on a link to find out more about Save Darfur before making their decision. After choosing the amount to donate, participants were asked

Table 1. Descriptive statistics for all dependent variables for all conditions.

	Non-interactive			Interactive		
	Text	Text with Pictures	Recorded Gameplay	Text	Text with Pictures	Gameplay
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Percentage donated	49.42 (41.46)	52.56 (41.15)	50.75 (41.16)	65.12 (35.48)	55.16 (41.38)	66.55 (43.12)
Role-taking	5.11 (1.25)	5.12 (1.36)	4.85 (1.26)	5.75 (1.08)	5.07 (.99)	4.80 (1.27)
Enjoyment	2.73 (1.44)	2.64 (1.29)	2.65 (1.25)	3.93 (1.92)	4.15 (1.73)	3.77 (1.54)
Appreciation	5.31 (1.41)	5.05 (1.58)	4.92 (1.51)	5.90 (1.13)	5.40 (1.24)	5.39 (1.33)
Willingness to help	4.45 (1.62)	4.29 (1.64)	4.47 (1.51)	4.95 (1.62)	4.56 (1.51)	4.47 (1.49)
Empathic concern	3.39 (.62)	3.02 (.86)	3.13 (.63)	3.40 (.79)	3.32 (.77)	3.43 (.75)
Humanitarian involvement	4.88 (1.48)	4.72 (1.47)	4.89 (.97)	5.42 (1.20)	4.94 (1.25)	4.98 (1.35)

to briefly recount what had happened in the story they had read, watched, or played through. This was followed by some quality-check questions to ensure all media in their condition had been presented correctly (e.g., for the text with pictures condition: "In the story you just read, did you see pictures illustrating the story?"). Finally, participants answered demographic questions and three validation questions about the content of the study, which when answered correctly gave them two codes, which when entered on Crowdflower, led to them receiving their compensation and the chosen bonus.

RESULTS

An alpha level of .05 was used for all statistical tests. Across all conditions participants donated an average 56% of their bonus, this amounted to a total of $131 that we consequently paid to Save Darfur. The average percentage donated in each condition is shown in Table 1.

Percentage donated

To examine the effects of interactivity and presentation mode on percentage donated, the data were analyzed using a two-way analysis of variance (ANOVA) for unrelated samples. There was a significant main effect for interactivity ($F(1, 228)$ = 4.427, p = .036, η_p^2 = .019). Percentage donated was significantly higher in the interactive conditions (M = 62.52, SD = 39.45) than in the noninteractive conditions (M = 50.76, SD = 40.98), supporting H1. Neither the main effect for presentation mode (p = .77), nor the interaction effect (p = .53) were significant.

Next, analyses were performed to examine whether empathic concern, humanitarian involvement, or knowledge of the crisis in Darfur might be confounding the effects of interactivity and presentation mode on percentage donated. The results indicated that empathic concern was not significantly correlated with percentage donated (see Table 2). The same analysis for humanitarian involvement similarly revealed no significant relationship between humanitarian involvement and percentage donated. To examine whether participants who had previous knowledge of the humanitarian crisis in Darfur had donated differently than those who had not, an independent t test for equal variances was conducted. Results were significant ($t(232)$ = 2.061, p = .040), indicating that participants

who had known about the crisis in Darfur donated significantly more (M = 62.35, SD = 39.73), than those who had not (M = 51.32, SD = 40.82). A t test was conducted to examine whether the interactive and the noninteractive conditions differed in their previous knowledge of Darfur. The difference between the groups was however not significant (p = .812).

Role-taking and willingness to help

An analysis of the impact of interactivity and presentation mode on role-taking revealed a significant main effect for presentation mode ($F(2, 228)$ = 5.25, p = .005, η_p^2 = .049). As listed in Table 1, role-taking was highest in the text conditions, followed by the text with pictures conditions, and lowest in the (recorded) gameplay conditions. Planned contrasts further revealed that role-taking was significantly higher in the interactive text condition compared to the other five conditions, ($t(228)$ = 3.68, p < .001). Lastly, neither the main effect for interactivity (p = .302), nor the interaction effect for interactivity and presentation mode (p = .068), on role-taking were significant. H2 was therefore not supported.

To examine the relationship between role-taking and percentage donated, the data were analyzed using Pearson's r. As can be seen in Table 2, role-taking was significantly positively correlated with percentage donated. Thus supporting H3. Interestingly, when the data were split by interactivity, the significant positive correlation remained for the noninteractive conditions between percentage donated and role-taking ($r(131)$ = .26, p = .003), but disappeared for the interactive conditions ($r(103)$ = -.05, p = .607).

To allow comparisons with the results reported by Peng et al. [34], a two-way multivariate analysis of variance (MANOVA) was conducted to examine the impact of interactivity and presentation mode on willingness to donate, willingness to sign a petition, willingness to discuss with friends and family, and willingness to forward message. Against our expectations and in contrast to the findings of Peng et al. [34], no significant effects were found for any of the four ratings (p-values between .11 and .85). For this reason and since all four items were moderately to strongly correlated ($r(234)$ = .56 - .81, p < .001), we decided to collapse the four individual items into a single factor "willingness to help" for subsequent analyses (Cronbach's α = .69).

Table 2. Pearson's Correlation for dependent variables and covariables over all conditions.

	Percentage donated	Role-taking	Enjoyment	Appreciation	Willingness to help	Empathic concern
Role-taking	.15*					
Enjoyment	-.03	.29**				
Appreciation	.25**	.76**	.23**			
Willingness to help	.22**	.67**	.30**	.69**		
Empathic concern	.08	.41**	-.01	.50**	.40**	
Humanitarian involvement	.10	.42**	.12	.48**	.58**	.40**

* Significant at p < .05. ** Significant at p < .01.

To examine the relationship between willingness to help and percentage donated, the data were analyzed using Pearson's *r*. In support of H4, the results indicated positive significant correlations for willingness to help with percentage donated, as can be seen in Table 2. Just as had been the case with role-taking, when the data were split by interactivity, the significant positive correlation remained for the noninteractive conditions between percentage donated and willingness to help ($r(131) = .33$, $p < .001$), but not for the interactive conditions ($r(103) = .06$, $p = .532$).

Enjoyment and appreciation

An ANOVA was conducted to examine the impact of interactivity and presentation mode on enjoyment, revealing a significant main effect for interactivity ($F(1, 228) = 33.99$, $p < .001$, $\eta_p^2 = .13$), but no significant effects for presentation mode ($p = .860$), or the interaction between interactivity and presentation mode ($p = .779$), thereby supporting H5. To examine the relationship between enjoyment and percentage donated, the data were analyzed using Pearson's *r*. No significant correlation was found.

An analysis of the impact of interactivity and presentation mode on appreciation likewise revealed a significant main effect for interactivity ($F(1, 228) = 6.05$, $p = .015$, $\eta_p^2 = .026$), but no significant effects for presentation mode ($p = .071$), or the interaction between interactivity and presentation mode ($p = .763$), thereby supporting H6. An analysis of the relationship between appreciation and percentage donated revealed a significant positive correlation ($r(234) = .25$, $p < .001$). Thus, H7 was also supported.

Since appreciation, as the only one of the subjective player ratings, was significantly associated with both interactivity and percentage donated, a mediation analysis was performed to explore whether appreciation mediated the effect of interactivity on percentage donated. To this end, two path-models were set up, as seen in Figure 2. The first path model examined the direct effect of interactivity on percentage donated, while the second path model included appreciation as a mediator variable. As had already been found in the ANOVA, the first path model revealed a significant direct effect of interactivity on percentage donated ($\beta = .14$, b = 11.76, SE = 5.298, t = 2.20, $p = .026$). The second path model revealed significant paths from interactivity to appreciation ($\beta = .17$, b = .49, SE = .182, t = 2.71, $p = .007$) and appreciation to percentage donated ($\beta = .23$, b = 6.69, SE = 1.86, t = 3.561, $p < .001$), while the path from interactivity to percentage donated
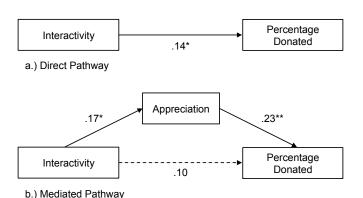

a.) Direct Pathway

b.) Mediated Pathway

Figure 2. The relationship between interactivity and percentage donated, fully mediated by appreciation. * $p < .05$. ** $p < .01$.

was now no longer significant ($\beta = .104$, b = 8.46, SE = 5.24, t = 1.62, $p = .106$), indicating that the effect of interactivity on percentage donated is fully mediated by appreciation.

DISCUSSION

The results of the present study offer further support for the findings of previous research (e.g., [31, 34, 38]) on the effectiveness of games for change, while additionally providing insight into the individual contributions of specific game properties. Furthermore, for the first time effectiveness was examined using both a behavioral measure and ratings of player attitudes and experience, shedding light on the relationship between subjective ratings and donating behavior, as influenced by games for change.

With 63%, participants in the interactive conditions donated a significantly higher percentage of their one dollar bonus than the 51% donated by participants in the noninteractive conditions. Presentation mode on the other hand did not have a significant impact on the percentage participants chose to donate. However, presentation mode did significantly impact role-taking. Specifically, participants showed significantly higher role-taking in the interactive text condition than in the other conditions. Role-taking was also significantly correlated with willingness to help. This is in line with previous findings by Peng et al. [34].

Additionally, the interactive conditions led to significantly more enjoyment and appreciation than the noninteractive conditions, whereas presentation mode had no significant impact on either enjoyment or appreciation. While enjoyment was

not associated with a higher percentage donated, appreciation was. Furthermore, appreciation fully mediated the higher percentage donated in the interactive over the noninteractive conditions.

Due to the systematic experimental manipulation of interactivity across the three presentation modes, conclusions may now be drawn as to their direct effects on the examined dependent variables. Across all dependent variables save for willingness to help and role-taking, interactivity was the relevant game property, while presentation mode had no significant impact. This means that percentage donated, enjoyment, and appreciation were all significantly increased by making participants interact with the media they were consuming. This is in line with previous research on the importance of interactivity as a game property [19, 24, 34, 37, 38], however, this was the first study to examine the effect of interactivity while controlling for presentation mode.

In further support of the findings of Peng et al. [34], higher willingness to help correlated with a higher percentage donated, indicating that willingness to help is related to actual donating behavior. However, the correlation was fairly weak, indicating that other factors besides willingness to help may be involved in the decision to donate. While there was no significant main effect for interactivity on either willingness to help or role-taking, interactivity did have an interesting impact, in the respect that there was a significant positive correlation between role-taking and percentage donated and willingness to help and percentage donated for the noninteractive conditions, but not for the interactive conditions. At the same time, participants in the interactive conditions donated almost 12% more than in the noninteractive conditions. In other words, interactivity seemed to invoke a higher percentage donated regardless of participants' reported willingness to help or role-taking. Beyond further establishing the importance of interactivity, this further implies that role-taking and willingness to help are not the only relevant factors related to increasing percentage donated.

One of these relevant factors appears to be appreciation, which was not only increased by interactivity, but also fully mediated the relationship between interactivity and percentage donated. While the nature of the present study does not allow for any causal inferences, this may suggest that participants found a narrative that they could actively participate in more meaningful than a narrative they were passively consuming and this then possibly encouraged them to donate a larger percentage of their bonus. This is in line with previous research on the ability of games to be thought-provoking [8, 21, 25] and findings on the relationship between meaningfulness and prosocial behavior [2, 3, 30]. However, this is to our knowledge the first study to find evidence for a potential connection between game properties, appreciation, and prosocial behavior. These findings indicate the importance of including appreciation in the examination of the effectiveness of games for change, as well as highlighting its potential for encouraging prosocial behavior, such as donating.

Enjoyment was increased by interactivity, but was not directly associated with a higher percentage donated. This means that while participants clearly enjoyed the interactive conditions more than the noninteractive conditions, this did not necessarily make them donate a higher percentage. This recalls Cohen's findings [12], who found that while enjoyment increased the intention to share a game for change, it was not associated with a higher likelihood of later (self-reported) sharing. A caveat for this study however, is that while interactivity increased enjoyment, the primary goal of the game makers had most likely not been to make the narrative of Darfur is Dying enjoyable [31]. It would be interesting to examine games for change with more enjoyable narratives and explore whether for these games enjoyment might be more likely to impact behavior, as well as investigating how more enjoyable narratives impact appreciation.

Presentation mode did not have a significant impact on any of the dependent variables, except for role-taking, where the interactive text increased role-taking more than the other conditions. That role-taking would be higher for a text condition than for other, more visual conditions may point to the ability of a text to convey the character's thoughts and emotions better than the cartoon-like animation of Darfur is Dying, making it easier to identify with the character when reading the text. Furthermore these findings also indicate that the multimodality of the presentation mode does not play a significant role in increasing factors relevant to the effectiveness of games for change, such as willingness to help, enjoyment, appreciation, or donating. This sets games for change apart from games for education where multimodality had been found to significantly impact knowledge gain and interest in learning [37]. Considering research on the positive impact of multimodality on information processing [40], it is perhaps not surprising that multimodality was more effective in the context of learning.

Implications, limitations and further research

For game designers and organizations aiming to create games for change, the main takeaway from this study is that while interactivity is crucial for the effectiveness of games for change to encourage donating, presentation mode is seemingly less important. Strikingly, in this study this meant that using a simple interactive text was almost exactly as effective at motivating participants to donate, as the video game Darfur is Dying. However, an important limitation of this study is that the effectiveness of the game only refers to the behavior of players after being prompted to play the game. It is very possible that while presentation mode may not be important for increasing donating behavior, it may increase the likelihood of a player noticing or seeking out a game, as a video game may look more interesting than a text-based game. Likewise, participants were instructed to play, watch, or read through the conditions until the end. While none of the conditions took longer than seven minutes to complete, it is possible that without the context of the study, participants may have been more likely to stop playing in the text or text with pictures conditions than in the (recorded) gameplay conditions. Finally, the short play time utilized in this game means that these findings may not be generalizable to games played over a longer course of time. However, the finding that even such

a short play time could lead to significant changes in participant attitudes, experiences, and behavior, is an interesting finding in and of itself. Together, these findings suggest that while further research is necessary to understand the potential and limitations of text-based interactive fiction as games for change, this may be an area worth exploring both in future research and practical work.

Perhaps more importantly, the present study identified appreciation as a potential component of the effectiveness of games for change, as showcased by its mediating the relationship between interactivity and donating behavior. It remains to be seen what game properties other than interactivity may potentially inspire player appreciation and how this subsequently relates to various prosocial behaviors, including but not limited to donating. Iacovides and Cox [21] mention narrative, gameplay, and audio as factors that helped create a meaningful and thought-provoking experience in a game illustrating the dilemmas facing health professionals. Bartsch et al. [6] highlight the role that moving music can play in evoking appreciation for a film. Another interesting approach was highlighted in recent research by Gerling et al. [20], who utilized embodied interaction, which had participants controlling a digital game about living with disabilities by sitting in and operating a wheelchair themselves. This embodied interaction lead participants to reflect more on real-world challenges facing people with disabilities than participants controlling the same game by traditional gamepad. Considering the current findings, further research could investigate how these and other game properties impact appreciation and prosocial behavior in the context of games for change.

A further limitation is that this study only examined results for participants who lost the game. Past research has found that success and failure can lead to considerably different affective responses [32]. In sports, winning has been associated with more positive affect, while losing is more likely to lead to a negative affective response [43]. Considering past findings that media is especially appreciated when it evokes mixed emotions (e.g., [5, 8, 21]), it would be interesting to see how appreciation differs depending on whether participants win or lose at a game for change. Further research on how game outcome and the consequent emotional response impact appreciation and its connection to prosocial behavior could help improve understanding of its importance for games for change.

Having participants donate their bonus was successful in showing differences in prosocial behavior depending on the experimental condition experienced. However, while Clark [11] found that participants tend to give similar amounts of their own money in comparison to an unexpected sum of money given to them during a study, people may still take other criteria into consideration when donating their money to an organisation in a real-world setting than when donating a bonus in a study. Therefore future research should strive to examine donating behavior and other forms of prosocial behavior using more realistic measurements and settings.

Finally, an obvious limitation of this study was the use of only three modes of presentation. These represented only a very

small spectrum of the presentation modes possible in the design of games. While using an animated cartoon-like gameplay may not increase appreciation, enjoyment, willingness to help, or percentage donated compared to an interactive text conveying the same information, these same variables might behave quite differently for other presentation modes, not examined in this study, such as photo-realistic graphics. Similarly, it is possible that cartoon-like presentations might not necessarily be the presentation mode best suited for the context of games for change, but might have a different impact on factors such as enjoyment or other behavioral variables in another context such as games for education or pure entertainment games. Therefore, to explore if these findings can be generalized to other presentation modes and game genres, further research is necessary.

CONCLUSION

The findings indicate that between presentation mode and interactivity, interactivity is the more important property in driving the effectiveness of games for change in increasing enjoyment, appreciation, and donating behavior. Interactive conditions also increased donating independently of role-taking or willingness to help in comparison to the noninteractive conditions. Interestingly, interactivity increased the appreciation players felt for the story being told, which in turn fully mediated the effect of interactivity on donating behavior. Role-taking was the only one of the variables studied, which was significantly affected by presentation mode. It is important however, to keep in mind that these findings do not allow inferences as to the effectiveness in winning or holding players' attention, as well as how these factors may change over a longer play time. It is also possible that other more effective presentation modes exist that were not included in this study. More research is necessary to examine how far these results can be generalized. Finally, the crucial role that appreciation played in mediating the relationship of interactivity on donating behavior, suggests the potential of appreciation as a promising addition to future research on games for change.

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