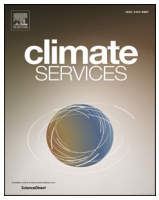
Climate Services 33 (2024) 100429

Contents lists available at ScienceDirect

Climate Services

journal homepage: www.elsevier.com/locate/cliser



Decreasing psychological distance to climate adaptation through serious gaming: Minions of Disruptions

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HIGHLIGHTS

- Despite prevalent climate information, it is not always usable to target audiences.
- While games are effective information vessels, the precise mechanisms are unexplored.
- This study explores communication challenges through psychological distance theory.
- .
- The findings help gain a deeper understanding of the knowledge-action gap.

ARTICLE INFO

Keywords:
Climate change adaptation
Serious games
Gamification
Construal level theory
Distancing

ABSTRACT

A gap between knowledge and adaptive action remains and psychological distancing has been proposed to explain peoples' inaction. This presents a challenge to climate change communication and particularly to the conventional ways of providing scientific information. Serious games have proliferated in the last ten years with a focus on improving the way in which climate change is communicated with different types of audiences. However, empirical evidence for whether serious games focusing on the local understanding of barriers to action offers an opportunity to reduce the psychological distancing from climate change is lacking. This paper presents a case study of Minions of Disruptions, a collaborative board game developed by the Dutch NGO Day of Adaptation, which gamifies climate action by letting the players choose their own adaptation strategy and co-create their organizational story that is based on their local knowledge. The results of this paper show that the game experience succeeds in reducing psychological distance and cultivates agency. This finding provides a pathway toward communication strategies that provide a safe and fun environment in which participants interact to identify organizational and community-based issue areas where more resilience can be built.

1. Introduction

Despite the more detailed scientific understanding and growing awareness of the need for widespread climate change adaptation across multiple domains and sectors, a gap remains between knowledge and adaptive action (Berrang-Ford et al., 2021; Lesnikowski et al., 2015; Eisenack et al., 2014). Merely producing great quantities of knowledge does not automatically lead to its usability (Fox et al., 2020; Hauge et al., 2017; Panenko, George and Lutoff, 2021) and climate services field has to find ways to connect information to users (Vaughan et al., 2016; Ballantyne, 2016; Kumpu, 2022). This calls for an increased attention toward climate communication; a burgeoning field with a focus on studying attitudes to risk and strategies that can be used to trigger behavior change, mental barriers, and predispositions, as well as interactions between scientists, policymakers, and other stakeholders (Nerlich et al., 2010; Moser, 2014).

Psychological barriers affect attitudes and their impact on action (Clayton et al., 2015; McDonald, Chai and Newell, 2015; Brügger et al., 2015; Wolf, 2020). People often experience psychological distance from climate change (Keller et al., 2022; Steynor and Pasquini, 2019; Wolf, 2020), which hinders adaptive action as individuals are more willing to act when perceiving climate change as psychologically proximal (Brügger et al., 2015; McDonald, Chai and Newell, 2015). Psychological distance can be reduced through communication interventions

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https://doi.org/10.1016/j.cliser.2023.100429
Received 5 March 2023; Received in revised form 4 November 2023; Accepted 19 December 2023
Available online 30 December 2023
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(McDonald, Chai and Newell, 2015), yet research shows that the end-users often perceive climate information as unrelatable (Anderson and Maffey, 2021; Ockwell, Whitmarsh and O'Neill, 2009); overly complex (Ereaut and Segnit, 2007; McMahon et al., 2015; Wolf, 2020), overwhelming and unwelcomed (Rayner and Minns, 2015; Moser, 2016); uncertain (Johnson and Levin, 2009; Meyer, 2006, Joslyn and LeClerc, 2016); alarmist and fear-inducing (Dryzek, Norgaard and Schlosberg, 2011; Ereaut and Segnit, 2007; Ockwell, Whitmarsh and O'Neill, 2009; Wolf and Moser, 2011; Leiserowitz and Smith, 2017); coming from untrusted sources (Boykoff, 2011; Heitz et al., 2009; Ockwell, Whitmarsh and O'Neill, 2009); and overly focused on individual instead of collective level action (Anderson and Maffey, 2021; Wolf and Moser, 2011). These can act as barriers to receivers engaging with the information presented, contributing to their psychological distance from the topic.

Serious games have emerged as one tool to communicate climate change (den Haan and van der Voort, 2018; Creutzig and Kapmeier, 2020) and close the knowledge-action gap (Flood et al., 2018). Most of the climate-oriented games have been designed for learning purposes and address heterogeneous target audiences, including students, professionals, or the "general public" (Gerber et al., 2021). These serious games have focused on increasing knowledge by decomplexifying it, and evidence suggests that they have been successful in achieving increasing awareness and intention for pro-environmental behavior (e.g., Wolf, 2020). However, what is still lacking is a robust evidence base for gamification to be effective in addressing the knowledge-action gap and turning intentions into actual behavior. Thus, there is a need to further analyze the types of games that do not explicitly aim to increase scientific understanding but focus the local understanding of barriers to action offering an opportunity to reduce the psychological distance from climate change.

We propose to take the field forward by asking how climate communication via a serious game influences psychological distance? We answer this question by presenting a case study of Minions of Disruptions™, a collaborative board game developed by a Dutch non-governmental organization Day of Adaptation. The results of this paper show that the game experience succeeds in reducing psychological distance and cultivating agency.

2. Previous research and analytical concepts

2.1. Serious games

Recent years have seen a rapid increase in climate adaptation related games (Wu and Lee, 2015; Douglas and Brauer, 2021), ranging from board and card games to roleplays and digital games (Reckien and Eisenack, 2013; Flood et al., 2018; Galeote et al., 2021). These games, including the one studied in this paper, predominantly illustrate how lack of action on greenhouse gas emission reductions results in climate change impacts and the need for adaptation (Juhola et al., 2013, Neset et al., 2020b). Most scientific analyses of games have focused on the development of game mechanics and illustration of how game logics can be used to de-complexify climate. This includes, for example, demonstrating the links between emissions and impacts, linking them to decisions and visualizing the conflicting interests behind those decisions. Most games are targeted towards lay audiences or students, although there are also games exploring the science-policy interface (van Beek et al., 2022), increasingly with a focus on specific social groups, such as the youth (Hügel and Davies, 2022).

Much of the debate regarding climate games is centered around their use in different environments and their effectiveness in achieving what was intended (Flood et al., 2018; Galeote et al., 2021). The empirical work on games' effects has been somewhat sparse (den Haan and van der Voort, 2018; van Beek et al., 2022, Juhola et al., 2013). Studies have observed that playing games has triggered changes in understanding (van Pelt et al., 2015), had an influence on positive affect and competences (Onencan et al., 2016; Bontchev et al., 2021) and functioned as an antidote to fear messaging (Moser and Dilling, 2011). Games also influence the development and facilitation of community relations (Blackett et al., 2022) and help understand the gap between measures taken by individuals and those that should be taken collectively (Neset et al., 2020a; Neset et al., 2020b). Games that choose a theme that is closely relatable to those playing are particularly successful (Fernandez-Galeote et al., 2021).

Participants in games have reported an increase in their confidence in knowledge and engagement in more climate-protective behaviors compared to those who did not participate, yet the psychological process through which this is steered remains unexplored (Druen and Zawadzki, 2021). The effect of games on those playing has been examined with multiple theories in the literature (Krath et al., 2021) and psychological distance is often introduced as a theoretical starting point (van Beek et al., 2022). For instance, Wolf (2020) uses the framework to explain a quantitative shift in pro-environmental behavior. More qualitative studies are, however, necessary to understand the precise mechanisms, as games do not always reach the intended results. This is particularly important if the design of a game does not strike a balance between triggering extrinsic and intrinsic motivation, as well as positive and negative emotions (Ouariachi, Li and Elving, 2020). Excessive emphasis on positive emotions works at the expense of urgency (Ouariachi, Li and Elving, 2020), whereas some designs "zombify" players by only focusing on extrinsic reward systems (Conway, 2014). Neset and colleagues (2021) even report a shift from intrinsic to extrinsic motivation among participants engaging in a gamification of a citizen science climate service.

2.2. Psychological distancing

There is a link between a direct experience with an event, perceived to be caused by climate change, and greater climate concern and action (McDonald, Chai and Newell, 2015; Steynor and Pasquini, 2019), meaning that correlation is expected between future climate impacts and large-scale adaptive action (McDonald, Chai and Newell, 2015). Proactive instead of reactive behavior is, however, indispensable, which motivates inquiries in how to reduce psychological distance. Psychological distance, developed as part of the Construal Level Theory (CLT) is a theoretical construct, which aims to express the magnitude of separation between an object and self (Trope and Liberman, 2010). Psychological distance means that an object is abstracted and seen in high-level terms, whereas psychological proximity refers to perceiving objects in concrete, low-level terms. Act of distancing then can be seen as process of changes in this psychological distance.

Four dimensions of distance are often specified: hypothetical, temporal, spatial and social (Trope, Liberman and Wakslak, 2007). Firstly, hypothetical distance can imply the perceived level of skepticism toward the occurrence of climate change, uncertainty about the extent of its impacts (McDonald, Chai and Newell, 2015; Steynor and Pasquini, 2019), or uncertainty within the three other dimensions (Keller et al., 2022). Secondly, temporal distance expresses how climate action gets discounted as it is perceived as happening too far away in the future (i.e., the present bias) (McDonald, Chai and Newell, 2015). Thirdly, spatial distance implies the perception that the impacts of climate change will be more severe in *other* geographic areas (McDonald, Chai and Newell, 2015; Steynor and Pasquini, 2019). Fourthly, social distance refers to the refusal of the idea that climate change could be a personal threat or a threat to the society one belongs in (Steynor and Pasquini, 2019).

Many studies connect psychological distance to willingness to act for climate argue that high distance inhibits, and low one induces action (McDonald, Chai and Newell, 2015; Wolf, 2020). As Fox and colleagues (2020) point out, however, in the context of immersive experiences such as serious games, making distance too low may lead to dismissive reactions, which could even translate to apathetic attitudes and inaction. Furthermore, while sometimes it is suggested that any distance could be

decreased with the right kind of communication, more recent research suggests that there are both dynamic and stable aspects to the perception of distance: the first being more prone to oscillation than the latter, which is tied to personal worldview, cognitive style and identity (Keller et al., 2022). Finally, there are various other mediators of psychological distance, such as motivation and capacity, which determine action (McDonald, Chai and Newell, 2015; Rodríguez-Cruz and Niles, 2021).

The debates make psychological distance an interesting theoretical construct to shed light on climate communication. On the one hand, when the audience does not trust the source of climate information (Boykoff, 2011; Heitz et al., 2009), the hypothetical distance might increase. On the other hand, one-directional communication, which makes the audience into a passive recipient (Berzonsky and Moser, 2017) might succeed in sharing new information but fails to address the more stable aspects of psychological distance. Further, while psychological distance suggests the need to focus on strategies that make climate change feel close, communication that is not based on dialogue has the tendency to portray information in overly abstract terms, resulting in part from messaging that is overly complex and/or creates uncertainty and the feeling of being overwhelmed (Ereaut and Segnit, 2007), and perceived as unrelatable by the audience (Ockwell, Whitmarsh and O'Neill, 2009). Finally, provided that the communication is framed through negative associations and exclusively individualistic action frames, the motivational aspects important to bridge the knowledge-action gap might not be triggered (Ereaut and Segnit, 2007; Ouariachi et al., 2018; Ruiter et al., 2014; Staats, Wit and Midden, 1996; Wolf and Moser, 2011) and the recipient may be left with feeling apathy or being dismissive.

3. The board game - Minions of Disruptions

Minions of Disruptions™ is an analogue collaborative strategy board game developed by Day of Adaptation, a Dutch non-profit organization. The game is designed as a group learning and engagement activity for organizations and interested community groups/individuals with the aim to "empower communities and organizations to understand, accept, and commit to climate action", see Fig. 1.

3.1. Narrative

The narrative refers to the game narrative in terms of relevance, logics or causality, representation as well as temporal and spatial dimension (Ouariachi et al., 2017). Minions of Disruptions™ is designed to engage existing units, specifically two types of audiences: organizations - including for-profit companies, NGOs, and government agencies - and communities. For organizations, the objective is to communicate impacts of climate change at the organizational level, serving as an opportunity for team engagement, professional and social development, and for the latter, the game brings climate change to a personal level and challenges participants to consider mitigation and adaptation solutions.

3.2. Gameplay

Gameplay here refers to the game design and formal structures, degree of interactivity, missions, feedback, and reward systems (Ouariachi et al., 2017). Each board game *activity* has anywhere between 2 or more *participants*. A *group* forms between 1 and 9 + *teams* of 3–4 *players* per team. The activity consists normally of three hours: after a warm-up and introduction, 60–90 min is used for game play and the remaining time for a post-play discussion.

The game occurs simultaneously for each team, which are all faced with the challenge of protecting their organization/community against accumulating disruptions. The main way to combat disruptions is by taking actions of various sorts, while balancing the finite finances that the team is given. There are interactions between the teams based on the game play: both in terms of spreading disruptions from game board to game board, and possibilities for collaboration for more effective action. Each team aims to win against the clock by protecting enough of their organization/community's essential functions without being overwhelmed by disruptions.

3.3. Content

Content refers to the analysis of the information, terminology, use of

Fig. 1. Minions of Disruptions™ is an analogue collaborative board game that is being played by communities and organizations around the world both physically and on a virtual platform Tabletopia. The game sessions are facilitated by a Dutch nonprofit Day of Adaptation.

concepts and information sources in the game (Ouriachi et al., 2017). The climate information that is presented uses simple terms and language and is easy to understand. The game avoids using words such as "emergency" or "urgency", which arguably have a highly stressful connotation, and, instead, introduces a superhero-narrative circling around action-taking. The game uses both audiovisual messages and kinaesthetic experience in its communication.

3.4. Didactics

Didactics refers to the knowledge, competences and abilities that can be attained, the challenges that can be addressed as well as the learning curve, availability, and didactic guidelines (Ouariachi et al., 2017). Minions of Disruption™ aims to make climate change discussions relevant for each group of participants. Sessions target existing groups with pre-existing relations, such as communities or work teams, and include communication about climate action both at the individual and local level. It encourages dialogue by requesting groups to reflect on their current perceived action level, and to innovate new action points.

Playing the game is intended to be fun as it assumes that lighter interaction can turn public's attitude from fear and confusion to confidence, and thus, increase their ability to take climate action. Furthermore, the game incorporates interactive elements between the teams, and facilitates discussion both within and across teams.

4. Methods

This study takes an iterative approach and utilizes a qualitative approach for data collection (intreview and survey) and analysis. Fig. 2 illustrates the theory influenced research process. The inquiry began by capturing common climate communication challenges identified in the literature (themes 1–5). They were checked against the perception of eight interviewees, and two additional communication challenges were identified by the researchers in the interview material (themes 6–7). These seven themes were then contrasted with literature on psychological distancing and the themes relevant to the theory were included into the scope. Two themes (4: One-directional communication, 5: lack of adaptation communication) were excluded as they were not relevant. The first did not fit the format of communication examined here and the second was related to the specific content being conveyed, as in the whole study is about adaptation communication. The included themes were used to analyze interview and survey data to see how Minions of Disruptions™ game influences psychological distance. Once having gone through all the themes, the findings were synthesized.

4.1. Data collection

4.1.1. Interviews

Eight semi-structured interviews (Brinkmann et al., 2014) were conducted between the 3rd and 6th of May 2021, through Zoom, see Table 1. An average interview lasted 20–30 min. The interviewees are individuals who participated in an online Game Day and expressed their willingness to comment on their experience. The interviewees were targeted due to their background or high engagement with the topic of climate change and are considered as having relatively high levels of knowledge on the subject. The high level of knowledge of the participants likely influences the results as they are more favorable to game and the message to begin with.

The interview questions about the gameplay were framed in the context of climate change communication. The interviewees were asked

Table 1
List of interviewees.

ID	Date (y-m-d)	Organization type
Interviewee 1	2021–05-03	Social movement
Interviewee 2	2021–05-04	Not disclosed
Interviewee 3	2021–05-05	Non-Governmental Organization
Interviewee 4	2021–05-05	Not disclosed
Interviewee 5	2021–05-06	Non-Governmental Organization
Interviewee 6	2021–05-06	Non-Governmental Organization
Interviewee 7	2021–05-06	Non-Governmental Organization
Interviewee 8	2021–05-06	Social movement

Fig. 2. Steps of the iterative research process.

to give examples of when communication of climate change has been ineffective, their feelings related to the game and the type of climate information represented in the game. In the final question, the interviewer listed additional climate change communication challenges found from literature, namely: climate communication as unrelatable (1), overly complex (2), inducing negative associations (3), one-directional (4), and as having mainly mitigation and little adaptation focus (5). The full list of interview questions can be found in Appendix 1.

4.1.2. Survey

Day of Adaptation collects survey data for monitoring and evaluation purposes after each of its activities. The dataset created for this study consisted of post-Game Day surveys between 2019 and 2021, from eleven Game Day events. The survey was either sent out to participants via email link in the following days after an activity or filled in at the end of an activity, see Table 2 for the game days included in this study. All participants were given details of what the survey would be used for, and they gave their prior informed consent.

In the questionnaire, the participants were not asked to address climate communication directly, but they were asked to rate and comment on the organization, facilitation, and content of the events, as well as to share their main learning outcomes. The survey consists of 13 questions in total. In five of the questions, only numerical answers could be given, while eight questions were open-ended where participants could write their answers (1; 2; 2A; 3; 4; 5A; 6A; 8). The focus was on the open questions and especially questions 3, 4, and 8 as they triggered the most elaborate answers. The survey respond rated varied during each day but responses were received from all game days, thus representing each of the data collection events. The questionnaire is in Appendix 2.

4.2. Data analysis

The analysis of the interview data and the open-ended survey answers follows thematic analysis (Braun and Clarke 2006). Thematic analysis provides a great deal of theoretical freedom in identifying prevalent themes in the data. Our analysis made use of a mix of deductive and inductive approaches during the research process (Fig. 2). Before commencing the data collection, five themes were identified through a purposeful literature search and sampling (Suri, 2011) of climate change communication challenges, and two further were identified by the researchers. These themes were further translated into keywords, for example, negative associations: fear, blame, sadness, inability to act, and so on.

The themes identified in the data are semantic (Braun and Clarke 2006), and we assume the responses reflect reality. For example, if an interviewee argues that they normally find climate communication overly technical and complex, and then later argue that Minions of Disruptions was communicating in a simple way, we will draw the conclusion that the game is considered a better alternative by the participant. However, we recognize that any interview guide is likely to exclude a list of questions - such as what type of communication the respondents have been exposed to previously.

We further used the keywords to search the survey data previously collected by Day of Adaptation. Analysis of the surveys took an exploratory approach. The purpose was not to quantify the results, but rather to complement findings in the interviews with survey responses and to identify additional emerging themes. We used the themes identified from the interviews in a keyword search through the dataset. The language prevalent in the surveys was used to expand the keyword list with the language prevalent in the interviews.

5. Results

This section presents the results, structured according to the themes. References to the survey data include two numbers, first of which is the game played and the second the player in question. We also show quantitatively responses to illustrate the representativeness of statements in the data.

5.1. Relatability of climate action information

When interview participants were asked to think of examples of times where they may have noticed that the communication of climate information has been ineffective, the issue of abstraction was often mentioned of their own accord by most players. One participant reflected that most of the climate communication has focused on scientific

Table 2
The survey sample.

ID	Date (y-m-d)	Organization(s)	Organization type	Country	Game Version	Participants	Surveyed Participants	Survey Participation (% of Participants)	Sample Distribution (% of total surveyed)
1-	2019–12-02	University of Groningen	University	Netherlands	In-person	25	19	76	22.1
2-	2020–04-16	Gebied-b	Activist Group	Netherlands	Online	3	2	66.7	2.3
3-	2020–06-28	Amsterdam Game Lab	Association	Netherlands	In-person	5	4	80	4.7
4-	2020–08-19	ABN AMRO	Bank	Netherlands	In-person	12	2	16.7	2.3
5-	2021–01-24	Climate Adaptation Week in the city of Groningen	Community of Climate Professionals	Netherlands	Online	60	14	23.3	16.3
6-	2021–04-05		Activist Group	Chile	Online	4	3	75	3.5
7-	2021–04-23	Red Global MX	Non-profit Organisation	Germany	Online	9	6	66.7	7
8-	2021–04-26	University of Philippines	University	Phillippines	Online	20	20	100	23.3
9-	2021–04-28	Deep Adaptation	Social Movement	UK	Online	8	5	62.5	5.8
10-	2021–05-06	Simavi & Deltares	Non-governmental Organisation	Netherlands	Online	7	1	14.3	1.2
11-	2021–05-12	Instituto Puebla	University	Mexico	Online	13	10	76.9	11.6
						166	**86**		**≅100**

reports but that this leaves the consequences of climate change too abstract [Interviewee 8]. This has had the effect of "divorc[ing] the whole predicament and global catastrophe of climate change from peoples' personal lives. And therefore, I think it accounts for a lot of the inaction that has marked the field over the past 40 years." [Interviewee 8].

Another interviewee argued that climate change, "[i]t's over there, or it's someone else, or it's something that we don't engage with directly. I live miles from the sea why do I care if the sea level rises, right, there's this […] distance" [Interviewee 1]. For many participants, the game had the effect of reintroducing the threat of climate change to them by reminding them of the potential consequences.

After playing the game participants experienced a range of relatability to climate action, from low, medium to high. Five participants expressed a low sense of relatability, many of which explicitly stated that they were missing a link between the game and their personal lives or the local context. More specifically, the link between the different disruption paths and the world of the team (the business/school) is limited and should be explained better [4–2].

Some participants directly addressed a key design element of the game, namely the action cards. The intention of these cards is to make participants reflect on action- messaging in their day-to-day life, which resulted in statements such as, for example, "Every move we make in our lives can affect our climate…"[8–18]. Discussion and in-game decision-making occasionally clashed, and time pressure was brought up as a common barrier to forming links. Participants commented that the time pressure in the game made them not read all the available material [1–8] [5–8].

Two participants expressed a medium sense of relatability to climate change. Medium sense is here understood as accounts, which stressed the importance of action, but used language which relates little to the personal or local level. They described climate change as a serious threat, yet they do not express that its effects would hit close to home, or that immediate local action would need to be taken. For example,

> "[C]limate action should not be taken lightly. It is a huge issue that will affect the world" [8–11].

Eight participants expressed a high sense of relatability, as indicated through words of proximity such as "on my part", "for me", "our lives". For example, "we need to take actions" [8–4], and "Every move we make in our lives can affect our climate…"[8–18]. Through the game play, questions were raised regarding the real life equivalent of the game, e.g., the number of cars in the team, which led to "talking about your own life within the game" [Interviewee 7].

Interviewees were asked specifically whether the game communicated climate change information in a way that was concrete. In response, participants noted accessibility [Interviewee 3] and the impacts being real and tangible [Interviewee 4]. "It does make it accessible to people. … People are thinking about wind power or whatever so by inserting those topics into the game it seems pretty real to life, like, these are the things that are on people's minds." [Interviewee 3]. Another stated that: "it does sort of force people to think about okay, I'm in this situation because basically you're on the game board. So, it makes it real and tangible" [Interviewee 4].

5.2. Complex climate information is overwhelming

There is a tendency to simplify communications because making complex connections within a topic can easily become overwhelming (Howarth et al., 2020), and complexity of climate information featured in most interviews. According to one interviewee, climate information tends to focus on a single thread, e.g., emissions or sea level rise, with often overlooking the causal linkage between the causes of those emissions and everyday action [Interviewee 1]. Complexity also arises from the link between increased emissions and impacts of climate change. Arguably, game design can also focus on simplifying some of this complexity to communicate the issue more effectively but still introducing the causal relationships. There is evidence for both that the game is successful, but also that it simplifies reality too much. Five participants expressed that Minions of Disruptions can convey that action is complex, for example, by illustrating the link between increased carbon in the atmosphere leading to lower earnings [Interviewee 1].

Participants directly referred to the game as a useful tool to break down information, allowing them to think and see how things are evolving [Interviewee 5]. Addressing climate information in real life and even in the game can be challenging. One participant noted that:

> "initially it felt very overwhelming but learning through playing was excellent." [9–4]

Furthermore, one participant argued that there were some aspects, which were overwhelming whereas others were not. Scientific information in the game is rather common, and it might make it easier to grasp, which leaves mental capacity to apply the information and insert in a local context [Interviewee 6].

Views on the degree of complexity differed. It was not always perceived as a positive thing; however, some appreciated it. On the one hand, one participant criticized a specific game element, where the amount of carbon keeps increasing and the participants can only adapt to the changing status quo, and not mitigate the effect [1–7]. On the other hand, another interview participant found this design element in the game insightful in that:

> "it shows complex cause and effect but also, you know, when you accumulate problems, you create thresholds that – so I like that level of complexity in it." [Interviewee 2]

Two participants considered that the game simplifies action, and thus there would have been space to overwhelm the players even more. For example, adaptation and mitigation have a complex cause and effect connection, which the game makes look simpler than it is [9–3]. One interview participant clearly indicated that they considered simplification of collaboration a drawback of the game. While the benefits of collaboration are immediately seen in the game, in real life, some of the benefits might not materialize for several decades and are dependent on whether people are able to solve the self-interest versus common interest dilemma [Interviewee 2].

5.3. Fear and blame

Feelings of blame and fear, and their reduction in games has been identified in the literature as one way to reduce psychological distance (Fox et al., 2020) and in this game, these negative emotions featured strongly. One participant argued that communication about climate action sometimes induces emotions of blame and threats within the receiving audience causing inaction, particularly in cases where climate action may threaten peoples' livelihood in the fossil fuel sector, for example [Interviewee 4]. In turn, the Minions of Disruptions game can create a lighter and more fun atmosphere. All the survey participants were asked to share three first words that come to mind after a game experience, see results of this in Fig. 3.

Out of 86 surveyed participants only a handful of words with negative association were found including "stressful" "pressured" and "chaotic". Several participants pointed at a feeling of needing to act as a reason for empowerment, since the game helps to visualize actions to take [Interviewee 5] and this may have an impact on people and their community [Interviewee 8]. There were also comments regarding the reward system in the game in terms triggering it in people [Interviewee 1] and doubts whether a negative focus could achieve the same [Interviewee 7].

One interview participant also refers to a specific case, where without being externally guided, the realization emerged among the players that their inaction has effects. This relates to the fact that the game is designed to be largely autonomous in the gameplay so that minimal facilitation intervention is needed.

Fig. 3. The survey participants were asked to write three words that express their experience. The size and hue of the word express their frequency in the sample.

> "I was like, well, you can have more like, for instance, vegetables and you need to have more of that and not killing them for doing more buildings and something like that. And they were like – my partners in the game were like, oh, yes that's true we are doing the opposite to help us in real life. I was thinking how I can do it in my own life (..) I haven't thought about a solution but now that we are playing, I think I have to think it." [Interviewee 6]

Although no specific questions were asked in relation to players' sense of agency, nine participants reflected an increased sense of agency in taking climate action after playing the game, thus implying that fear and negativity can be alleviated by this type of engagement. This could mean, for example, playing the game at their workplace with other people [Interviewee 4], or to make more decisions, changes and involve their community [11–4]. Of these, two participants explicitly referred to the agency and autonomy that the gameplay incorporates, especially in comparison to more traditional climate information, which offers very limited space for agency for people to act [Interviewee 8]. In an uncommon manner, the game extends agency across sectors [Interviewee 2]. Only one participant, on one occasion, highlighted a weak sense of agency following their experience due to the feelings of being overwhelmed related to the inability to mitigate, stating:

> "We couldn't really see how our actions are worsening or improving the condition for carbon emissions. It's just like a left out section beside the game that we can't do anything about it. But the whole message is if we do well/bad and cooperate/not we should be able to see the change in carbon emission level." [1–7]

5.4. Trustworthiness of climate information

Trustworthiness of climate information relates to the scientific facts behind the game itself, as well as the context in which the game is set, stressing the accurate representation of climate change as phenomenon. Previous research has shown that sometimes the game itself does not accurately portray the context within which it is set (Asplund et al., 2019). In our data, two interviewees noted that climate information is highly prevalent, but also that there is uncertainty surrounding the degree of its trustworthiness of climate information in general. This relates to there being too much information, from various sources which may not be entirely correctly represented [Interviewees 7 & 8]. Namely,

> "There is too much information in general making that most of the information
> that is out there, I don't want to say that it's fake news, but it has not been.
> proved, or it has not been validated [Interviewee 7].".

The question here is whether a climate game can make the participants experience that the information they are receiving is valid and trustworthy, and whether the game was based on valid and trusted information. No participant found the information untrustworthy, although some did imply that adding additional complexity would be necessary. One participant suggested that while the cards in the game give nice suggestions for climate-positive activities, there is a need to ensure that they are effective [5–8]. For example,

> "The cards gave nice suggestions for climate-positive activities […] you must be sure that this indeed is climate-positive (e.g. amongst conservationists the effect of planting of trees is disputed)." [5–8].

In addition, two participants on two occasions explicitly said that they would recommend the game to people who are already interested in climate change or for "like-minded individuals" [5–10, 7–2] while no one recommended playing the game with groups that are dismissive. One participant did consider that trust among team members is crucial [Interviewee 5].

5.5. Climate action is portrayed as individualistic

Another challenge that emerged was that there is a tendency to conceive climate action as an individual instead of a collaborative effort. Consequently, the collaboration element was seen as challenging because it is not necessarily something that people are accustomed to [Interviewee 1]. Fifteen participants mentioned teamwork or collaboration as key insights with one interviewee stating that:

> "I would tend to describe it as an engaging and playful way of exploring with other people how climate action can only be something collaborative and a win–win or lose-lose kind of thing. It's either everyone sort of helps one another out in carrying out the best possible actions in all the means of activity and therefore everyone wins. Or you don't collaborate much and then things are kind of disjointed and ineffective and in the end it's the minions and the carbions that win, right (..) I think maybe the game is useful in

making people think more deeply about how they can be truly involved in a collectively co-operative set up" [Interviewee 8].

One game participant expressed how they experienced a connection between collaboration in a game-setting and real-life world, and how collaboration can also help with understanding the game mechanics themselves [7–2].

Moreover, one participant valued the sharing of experiences and observations as higher than receiving correct information [Interviewee 1]. In fact, three participants pinpointed the discussion among team members as the most important aspect of the whole game, and if the discussions were cut short this was seen as a drawback, since it was one of the most valuable aspects of the game [4–2, 5–8].

There was some divergence on whether the collaboration and interaction resulted in better outcomes. One participant argued that collaboration does not have intrinsic worth: it does not automatically lead you to consider how your perfect solution will affect other people, other groups of people, other stakeholders [Interviewee 5]. This finding is somewhat contrary by accounts of others, where it was thought that particularly negotiation and collaborations between teams were eye-opening [Interviewee 7]. In particular, the game showed that you cannot solve issues alone but that you must negotiate [Interviewee 2] and account for multiple sectors to make a real change [Interviewee 6]. Finally, it was noted that while teamwork is necessary to solve problems, the work is continuous, since the problems continuously change too [1–8].

6. Discussion

6.1. Serious games and psychological distancing

Game participants expressed short distance to climate change in different aspects of all four dimensions. Firstly, in terms of hypothetical distance, previous research suggests that when faced with uncertain climate scenarios, individuals often behave in a risk-prone way (McDonald,Chai and Newell, 2015). Several participants emphasized the importance of (immediate) action. Yet, there is no evidence that hypothetical distance was affected in terms of reducing skepticism toward climate change; this is evident by the fact that no participant related the game to trustworthiness. This is likely to be linked with the composition of the sample of players had relatively high background knowledge and trust in climate change to begin with. This is consistent with the finding of Keller et al. (2022) that this type of hypothetical distance is generally low.

Secondly, temporal distance - which discounts events that seem to be in the distant future - appeared short post-gameplay. A participant stated that the game reminded them of the urgency of action, alluding to how information might have been received before, yet needed to be re-introduced for the temporal distance to shorten. Thirdly, spatial distance, that is, the idea that climate impacts will be more severe elsewhere, especially common among those from countries of Global North (Steynor and Pasquini, 2019), was reduced somewhat. Participants made connections between their own lives, disruptions and climate action. Finally, social distance appeared shorten, which could be seen by the numerous referrals to the experience of augmented agency, attributable to players playing the game as themselves with their organization or community and being granted the opportunity of making vital decisions.

In terms of the studied communication challenges, relatability, collaboration, and autonomous play are seen as the most relevant findings in terms of bearing potential for shortening the psychological distance. A positive environment emerged as an important theme as it facilitates an increased sense of urgency to act without stimulating counteracting emotions and motivational barriers. To reduce the feeling of being overwhelmed through de-complexifying climate change information also showed potential in reducing the psychological distance, but the evidence is inconclusive, as views on the impact of simplified messaging on action were mixed.

For most participants, although not for all, the game, and some of its specific elements, such as action cards, increased the relatability of climate information. According to Steynor and Pasquini (2019), people from the Global North believe climate change will not affect them but others in geographically distant areas and groups of people. Using a game to connect the climate crisis with participants' daily lives - making it socially, temporally, and spatially *close* - appeared to reduce the experienced distance at least temporarily. Indeed, Anderson and Maffey (2021) reflect on the effectiveness of engaging citizens in climate change issues through creating linkages with their immediate and personal lives. They posit that this allows individuals to connect emotionally - particularly for those experiencing psychological distance.

Collaboration and the ability to discuss were strong elements and have the potential to reduce psychological distance. Players experience the consequences of climate change on themselves and the players around them, thus making connections more concrete. This can enable a player to consider potential action beyond the game play into real life situations as social norms, which are an important mediator of proximal distances (Keller et al., 2022). In our case, the collaborative nature of the game also showed the players that they are not alone solving the challenge, which can further motivate them. Psychological distance may be greater in areas where self-efficacy is low (i.e., individuals lack capacity to influence) (McDonald, Chair and Newell, 2015). Participants stressed the benefits of collaboration, and even considered it more helpful than the knowledge provision on climate change gained through the game, illustrative of the knowledge-action gap (Berrang-Ford et al., 2021; Eisenack et al., 2014). These results are in line with literature that proposes opportunities for increasing engagement and climate action through making climate action communally supportive (Rayner and Minns, 2015).

Autonomous play emerged as important. By game design, players hold their own decision-making power - at both individual and collective levels - and in turn, observe that their decisions influence the collective outcome. Thereby, games allow a relatively high level of perceived agency, which is rare in the context of collective and complex problem-solving (McDonald, Chai and Newell, 2015). In line with Fox et al. (2020), interactivity and agency allow game participants to observe a two-way relationship between themselves and their environment. Agency is thus be curated through several mechanisms that contribute to a reduction in the psychological distance. Temporal, spatial, social, and hypothetical proximity may motivate players to act now and not later, acknowledging that local action is relevant, and that action can be taken by the group/individual.

Creating a positive environment seems to have contributed to the successful experience, where the psychological distance was reduced, though few dismissive reactions emerged toward climate change. This is important as messages - particularly those presented through immersive and interactive game experiences - should be conveyed in a way that evokes a balanced level of threat to induce desirable reactions (Fox et al., 2020). Messaging around climate change to date has been overwhelming, meaning that many individuals adopt coping strategies, which lead them to dismiss or deny the existence or seriousness of the threat (Rayner and Minns, 2015). Our findings indicate the need to balance negative and positive emotions in game design, as found by others (Ouariachi et al., 2020), who found that the best gaming platforms induced both positive and negative emotions and tapped into both extrinsic and intrinsic drivers. Blame and fear-evoking games can feel too threatening to participants, especially if they feel psychologically close, and in reaction may try to minimize the fear or unpleasant feelings by dismissing the threat (Fox et al., 2020).

Participants nevertheless reported the game as useful in breaking down and de-complexifying information. As argued by Wolf (2020), a reduction of complexity is in part characterized by higher perceived understandability, and understandable information is construed at

lower levels (i.e., more psychologically proximal). Further, spatial distance might be explained as a reaction to avoid overwhelming information (that climate change might have a severe impact on a person) (McDonald, Chai and Newell, 2015). The fact that the information was not perceived as overwhelming by most of the participants in this study resonate the finding that if individuals are given the possibility to generate their own 'unwelcome messages' through collaboration and in dialogue with others, as opposed to receiving one-directional messages from an expert, they are more likely to accept them, similar to previous findings (Berzonsky and Moser, 2017). Some participants, however, felt the game simplified climate information perhaps too much. The varying responses in this regard reflect the fact that an individual's psychological distance is dependent on their cognitive style and worldview, and consequently some participants would prefer to receive more complex information than others (Keller et al., 2022).

6.2. Distancing theory and climate services

Concerns about the extent of legitimacy, relevance, and validity of climate services have led to calls for new methods with which to co-produce knowledge so that information uptake would increase, and user perspectives would be more appropriately considered (Neset et al., 2021). Examining climate communication through psychological distance, this study supports the existing evidence in favor of serious games, and the ability of games to convey information by shortening psychological distance without inducing dismissive emotions. Moreover, games offer participants the possibility to co-create solutions, experience self-efficacy, and discuss relevant matters in their community or organization. This relates to concrete, action-oriented thinking that motivates considerations of feasibility, attainability, and safety (Sagristano, Trope and Liberman, 2002; Trautmann and van de Kuilen, 2012). According to McDonald, Chai and Newell (2015), targeting low proximity by increasing concern toward local impacts is especially effective in achieving adaptive (as opposed to mitigative) action.

The psychological link to climate change is complex (Brügger et al., 2015), but it ought to be explored if there is to be widespread data-driven planning. While much climate information is being produced, there remains a disconnect with the public (Krauss and von Storch, 2012). Participants in this study, as in the literature, that climate change messages tend to be presented in abstract terms, which inhibits engagement with the information. That this reflection was unprompted was particularly indicative of the widespread communication challenge.

Looking at these responses in contrast to reports of the accessibility of the information communicated through the game, it appears that engaging with climate change through gameplay, Minions of Disruptions™ may facilitate a greater psychological proximity to the issue. This aligns with approaching communication through benign and familiar topics (McDonald, Chai and Newell, 2015) with relevance to the audience's socio-cultural context (Steynor and Pasquini, 2019). Moreover, reducing psychological distance can help cope with cognitive uncertainty. Thereby, reduced cognitive uncertainty through gameplay may deter participants from opting for status quo (Meyer, 2006) and encourage exploration of the decision space available to them. Moreover, players are face-to-face with the immediate consequences of their actions without feeling overwhelmed about it, and motivation increases thanks to collaboration. Such results may be difficult to achieve with one-directional communication.

The literature has discussed the need to move away from predominantly negatively framed messaging on climate change (Ereaut and Segnit, 2007; Ockwell, Whitmarsh and O'Neill, 2009; Wolf and Moser, 2011), and our results continue to support this. The results also highlight the importance of the environment in which climate change is communicated: a safe and fun space may provide a buffer to the negative associations of climate change, thereby allowing participants to emotionally engage with the challenges, empowering them and increasing perceived agency, rather than overwhelming and paralyzing, as also found in other studies (Davies and Hügel, 2021). This supports previous literature on climate change communication in general and communication through serious games (Ouariachi et al., 2020; Rayner and Minns, 2015; Wolf and Moser, 2011).

Serious games do not always produce even results among participants as some do not find them engaging (Neset et al., 2021). This unevenness was also found here as participants seemed to be focusing on different dimensions of distancing, to varying degrees, indicating that the audience had divergent worldviews, cognitive style, and identity (Keller et al., 2022). Thus, the degree to which they related to the information differed. For communicators, it would seem optimal to put resources into messages which both decrease and increase psychological distance, as it has been observed that those with more conservative values tend to respond to the first better, and those with more liberal values to the second.

Further issue that is often unaddressed is the temporal dimension of game play, i.e., how long does the effect of the game play last and the lack of methods and longitudinal studies more broadly. This is naturally a pertinent question for any climate communication tool and service, and something that this research was unable to address. Existing studies of the effectiveness of climate services show that user engagement and design are crucial (Christel et al., 2018), and that evaluation should be incorporated to the service from the beginning (Tall et al., 2018) to examine its impact. Games, which are or have components that are co-designed with stakeholders have been shown to increase player engagement (Rodela et al., 2019, Marome et al., 2021) but there are few studies that explore the impact of game play over longer periods of time (Koens et al. 2020). This would also require rethinking of the types of research methods and stakeholder engagement (Bakhanova et al., 2020) to capture changes in people's thinking and behavior over longer periods of time with a focus on solid combination of qualitative and quantitative analysis.

In line with the idea that communication should be matched with the assessed construal of the audience (Brügger et al., 2016). Serious games such as Minions of Disruptions may be easily received by audiences, which are already used to construing climate change in solution-oriented terms but not with those that do not. This is in line with Frías-Jamilena and colleagues (2022) proposing that the greatest gains may lie in introducing serious games to audiences with high psychological distance, not with those that already accept the need to act. Studies on "localizing" climate change have not shown indisputable proof that such an approach would directly lead to increase in climate engagement (Schuldt et al., 2018). Consequently, this has led to communication strategies, which aim to express the urgency of the risk and to prove that climate change is happening or could happen (e.g., Wolf, 2020). Our study illustrates the potential of using serious games in reducing psychological distancing, which can support the move towards action.

7. Conclusion

This paper discusses the role of serious games in communicating climate change and asks how serious games may help reduce psychological distancing from climate change. We introduce a case study of Minions of Disruptions, which gamifies climate action by letting the players choose their own adaptation strategy. Our results show that agency of those playing is supported by the game and the pursuit of collaborative action and shared understanding is particularly useful. The game is found to help participants better grasp the complexities of climate change and the game made climate information more relatable. While these findings are line with the overall claim that games may support the reduction of psychological distancing and promote action, there are further research questions that need to be asked beyond a single case study. More comprehensive and robust follow up methodologies may serve to answer how permanent this interest in action may be and to what extent in translates into action in everyday life. Also,

comparative studies across games with similar intent but different game mechanics may reveal interesting insights.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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