How to push which button: Understanding the potential of climate games through the lens of social action theories
Carien Moossdorff and Joost Vervoort

Abstract
Different presents and futures of Climate Change are too large or difficult to fully grasp. Games are a potential help with this: They can contribute to futuring capacities, including systems knowledge, throughout the population, and disseminate experiential knowledge of realities related to Climate Change. They can grant it a place in public arenas as well as in discourse at large. It seems, then, that we should welcome the recent rise in Climate Games. In this article, we set out to first map the games, commercial and ‘serious’, that relate to Climate Change. We present some ‘good practices’ in Climate Games. Then, we present a typology that covers the existing Climate Games. Finally, we lay out implicit notions of social actions that seem to underlie these games and their goals regarding Climate Games. We find six types of Climate Change applications in games: Casual, Systems Management, Knowledge, Experience, Subversive, and ‘Backdrop’. These types seem to want to do good by influencing mechanisms that guide social action. But they appeal to this based on implicit premises; each type can be linked to at least one of these different theories of social action in sociology: (anti)hegemonic thinking; discourse theory; habitus; structuration/risk assessment; Rational Action Theory; ‘culture as values’; ‘culture as institutions’, and Weber’s types of social action. Providing a model to assess goals in Climate Games can help overcome the ‘awareness problem’ and allow game designers and -funders to make an informed choice on the validity of the mechanisms they wish to tap into.

Introduction
We are currently facing an urgent need for action on transformative change. The threat of global warming’s consequences demands radical change in many facets of life, both in attempts to prevent further effects of climate change, as well as for adaptation to those effects that are already inevitable. This has been impeded by two important factors. First, the risks of climate change are so difficult to comprehend that people cannot assess them properly (Giddens 2009). Second, working towards truly transformative futures requires extending the imagination beyond impressions based on past experience (Schinkel 2005). This is not easy, and regarding climate change, it has not been going well (Ghosh 2018). Games offer a unique opportunity to address this societal need. Commercial video games alone exceed Hollywood’s revenue and audience. Games as a medium are well-equipped to practice foresight skills such as systems knowledge and foresight (Vervoort 2019). Additionally, gaming is an experiential medium, meaning that it may be invaluable when it comes to properly assessing risks that, in real life, only happen in a far-away future. In other words, games can add to our imaginaries (Oomen et al. 2021) in many different ways. On top of that, games are sites for political convention (Milkoreit 2019), public discourse, and community building (Molineux et al. 2015).

However, these societal impacts, especially games used outside of educational and other formal settings, are still under-researched, and importantly, under-theorized. While long-term effects are almost impossible to investigate empirically, a first step is to flesh out the potential mechanisms at work with theoretical work. This study contributes to that goal. This empirical and theoretical gap is becoming
increasingly important to fill, because of the rapid increase in numbers of ‘climate games’. Reckien and Eisenack observed a decade ago that this theme was on the rise, in ‘serious games’ alone. Currently, there is a boom in the genre in entertainment games, too.

The aim of this paper is twofold: First, we map the different types of climate games that are currently available. Then, we discuss the different notions of social action these types of games seem to tap into in trying to affect people’s behaviors.

Additionally, we lay out results of focus groups with game designers, discussing ‘good practices’ in climate games. We bring all this together to reflect on the future for climate games, to give a framework to game developers and -funders, and to rethink the divide between serious- and entertainment games. We aim to contribute to the literature on imaginaries, to add a piece to the puzzle of how games (and media) may influence behavior, and to bring theories of social action into this part of Anticipatory Governance/futures thinking.

We will first discuss theories that we build on: Existing work on climate related games, serious gaming, and their relation to commercial games. We will also mobilize some theories of social action that we return to later. We will discuss the document study, typology-building, and focus groups in the methods section. Under results, we map out climate games that are out there, provide some metrics, and lay out the suggested typology. We will discuss good practices that have emerged from our own analysis of the games, as well as from focus groups with game designers. We will also spend some time on the implications of our results for other fields.

**Background: research on climate games**

Gaming as an approach to engaging with complex societal issues has been around for as long as other approaches such as scenario narratives and modelling (Mayer 2009). ‘Serious’ games - games designed specifically as change interventions are becoming more and more widespread, including specifically in the sustainability space (Vervoort 2019). But climate games have their own trajectory in this context which is more recent. Reckien and Eisenack demonstrate, in an extensive review from 2013, that climate games have been on the rise for quite some time. They limit their analysis to more purely ‘serious’ games - games designed specifically as change interventions. They map out different themes, from basic knowledge to more advanced topics. In these ‘mitigation’ is the most common theme. There is less of a focus in their analysis on quality and effectiveness. So what is known about what makes serious games effective? Shen et al. write in their chapter on fun in serious games (200): “Our data suggest that in order for a serious game to be acceptable or playable, it has to meet certain thresholds in terms of technological capacity, aesthetic presentation, and game design elements” (p.58). Some serious games are very fun but some are not. “When making strategic decisions about allocating often limited financial resources, organizations and institutions interested in designing and developing serious games should consider investing in the narrative and social aspects of a game instead of solely focusing on improving the look and feel” (p.44). Topp et al. (2019) find that perceived entertainment can increase cognitive engagement with climate change content. Galeote & Hamari (2021) compare Climate serious games and entertainment games: “the
analysis reveals that most games comply with most recommended attributes*, but credibility, achievability, meaningfulness, and social features are uncommon or rare” (abstract). “Results suggest that serious games tend to directly connect players to climate change through positive and plausible actions, while entertainment games often present stories where climate change has a powerful impact on the world that the player inhabits” (p.13) and “The only attribute that is associated with games for entertainment is narrative-driven. This means that most games for entertainment present a progression of meaningful events related to climate change” (p.14).

Vervoort (2019) has brought up the potential of commercial games as tools for foresight, for actor perspective and interactivity with the world and system - questioning the sharp divide between entertainment- and serious games. There is much to be learned from commercial games in terms of their very effective engagement with affect and emotions. Ahlqvist and Risiart (2015): “As Anderson (2007: 159) asserts: ‘Affect is a necessary component of anticipatory governance because it resolves the paradox of how the event can remain virtual, that is ‘be’ a threat or an opportunity, but at the same time is real in effect, i.e. it causes some form of event in the present” (2015: 98).

For Disaster Preparedness this argument has already been made with help of empirical data by Viennaminovich Gampell & Gaillard: “While games designed with the primary intention of entertainment may not necessarily provide players with specific content to be learnt, the discourses present in the game may provide an opportunity for some form of learning to occur in some players but may not in others (Ulicsak and Wright 2010)” (p.289). “The identified entertainment video games reinforced their potential to be a form of edutainment by demonstrating the ability to satisfy many of the different criteria within the DRR framework each taking a very different approach to portraying DRR” (p.301), “results of the content analysis show that both educational and entertainment games have the potential to provide players with an understanding of DRR strategies and actions” (p.302).

*Mobilizing theories of social action
We build on several theories of social action or relating to the world with meaning. Three main strands are presented as they are seen in games: Rationalities, ideology, and experience.

The rationalities cluster is directly taken from Weber’s ideal types of social action, and comprise both instrumentally rational- and value rational action, (Weber in Calhoun 2012: 226). Weber defines instrumental rationality as “determined by expectations as to the behavior of objects in the environment and of other human beings; these expectations are used as "conditions" or "means" for the attainment of the actor’s own rationally pursued and calculated ends” (ibid.), and value rationality as “determined by a conscious belief in the value for its own sake of some ethical, aesthetic, religious, or other form of behavior, independently of its prospects of success” (ibid.). Both rationalities are clustered together here because of their deliberate and purposeful motivation for action, based on a reflexive effort to make a good, useful, or meaningful choice. It should be noted that Weber only considers acting ‘social’ when an action has meaning, not just for the actor herself, but when she knows other people will interpret the act similarly.
The ideologies cluster is moral in nature and it concerns deep and pervasive beliefs and sentiments about what is right, wrong, adequate, or even possible in a given situation. The term was introduced by Marx (in Calhoun 2012: 84-5) and in the Marxist tradition, ideology has meant the system of beliefs stemming from the material relations, justifying and upholding it. In this study, we broaden the word’s scope to encompass any pervasive belief system that justifies and guides social action. Ideologies do not necessarily stem from an elite, although they will often be supporting some sort of status quo. They may be overt and explicitly stated, or implicit and never pointed out; audiences and developers alike may or may not be conscious of their presence.

The final cluster builds on theories of immediate experience. It works with phenomenological ideas of embodiment (Kelly 2002) and sense-making of a situation (Goffman 1974) as it concerns the individual. We can, outside of games, only ever interpret and interact with the world from our own, physical experience. To truly step in someone else’s shoes and figure out what the world means and does to them, opens up a new register of possibilities for action and understanding. Group experiences are seen as moments that can build cohesion (Durkheim 1995, Collins 2004) as well as morals, symbols, and motivation to stay in action (Collins 2004).

Methods
The empirical work for this study has consisted of three steps: Gathering and mapping of Climate Games data, analyzing those into a typology, and focus groups with game designers.

Different platforms have been used to find Climate Games. Ecosia and Google (terms ‘climate game’, ‘climate games’ ‘game climate change’) were used to find listings of games of any type. Notable finds are the serious games (for example, on the platform games4sustainability.org) and several board games. This route also pointed to some browser games, but since most of these run on the since abandoned Flash, these were not accessible at the time of research. The Steam store platform yielded a few dozen games (‘climate change’; ‘global warming’; ‘climate’); the Origin platform zero. The App Store, accessed on iPad, and the Play Store on an Android phone, got another few dozen each.

Before turning to console platforms and other data sources, data collection on this project joined forces with that of the International Game Developers Associations Special Interest Group on climate change. This group has been compiling a database on Climate Games of their own. Data on video games have been taken from there; we have been able to add the Android and ‘serious’ games to their set.

All games that are freely accessible have been played, in addition to some paid titles. The latter group were selected based on renown or apparent fit. Personal memos were taken throughout gameplay, with the main focus of ‘good practices’. Reasons for making a memo would include: Getting frustrated, wanting to quit playing, getting very confused, etcetera. But also experiencing delight, pleasant surprise, forgetting the time, etcetera. Additionally, general notes on game characteristics and climate were added to the database.
Two focus groups with game designers were conducted. These focused on the state of climate games and good practices in them. The tentative good practices, based on the first analysis, were also presented and discussed here. The conversations have been transcribed and analyzed to revise and enrich the good practices.

Two axes were distilled: The location of climate change in the game (in setting; game mechanics; plot, etcetera), and the main goal with climate change for the audience (inform; get attention; normalize behaviors, etcetera). These were continuously compared to one another, and to the memos, leading to the initial typology. The typology was further refined by placing games from the database in one of the types.

Finally, theories of social action were applied to the apparent assumptions of game designers for each type.

Results

Focus groups: Looking for good practices in climate games

The focus groups yielded an array of different results - but no dissent within any of the groups. This indicates first and foremost, that we are just scratching the surface of knowledge and visions of good practices for climate games. Some of the good practices mentioned are contradictory, which is in line with the developers’ reluctance to come up with universal good practices that go for all climate games.

One of the groups did emphasize the importance for all transformative games to have just one goal, and possibly a secondary one, and do that really well. They warned against trying to do everything with one game. Within that parameter, the game developers stressed, every game is unique and so there are no best practices that can be applied to all the games.

“I think [my favorite climate-related game Lichenia] is fantastic, and I think the creator knew exactly who they were creating the game for and the impact they wanted it to have. But then every decision made after that, in a different project, would have been not good, but in this project, was good. That makes our job harder when we’re trying to encourage people, not having a checklist” Developer, focus group 2.

Some different strategies and insights did come up. The developers agreed that, in spite of some audiences lamenting the ‘rise’ of politics in games, a game will always convey values, even if the maker did not express them intentionally. It is good, then, to be self-aware and self-critical regarding the values that are embedded in a game.

The groups stressed the importance of action in the real world; just telling a story about climate change and having the audience forget about it after playing is not enough. This led one developer to point to
the timing of activating players: “Once the player is done playing the game, that is typically when we need them to go do stuff in the real world” (developer & funder, focus group 2), indicating that the most effective climate games facilitate action at this point.

At the same time, the group recognized that any single game will not reach all the players effectively. An example was brought up of a teenager who became inspired by Firewatch:

“he decided to make it a goal of his to visit all of the Firewatch stations along the East Coast, and now I think he’s in an undergraduate program that focuses on specifically that. And Firewatch [...] also enabled him to identify his own personal connection to the Black Lives Matter movement, because of the racial disparities and inequalities in that field. And so, you know, there’s something to be said about how like, there’s messages that many of us may not get, but are relevant enough for one person that creates that change” (developer, focus group 2).

A seemingly opposite goal (expressed here by the same person) that the entire group agreed with, was to reach as many people as possible with little impact:

“what if climate-conscious behaviors were in the majority of games that were out there. What if the majority of the characters that were in protagonist roles are environmentally conscious and socially conscious and culturally conscious? Where it’s not something we may be able to explicitly measure but it becomes so normalized that future generations that see this and experience this and have these games be part of their identity, just goes: yeah, that’s, that should be a given, right”.

Additionally, the benefits of community-building for (some!) climate games were mentioned. Communities are considered important for audiences to achieve meaningful action and to cope with climate grief; however, community-building is important for developers, too. For example, the International Game Associations’ Special Interest Group (IGDA SIG) on climate games that we collaborated with, have their own Discord server where developers and funders can gather resources and strategies to improve their specific climate games.

Community also links to a good practice that was expressed in the realm of role playing games (tabletop or live-action): to provide ample space to debrief, or in general to care for one’s players, who may be dealing with disturbing experiences regarding their own futures.

Finally, it is considered desirable for the player to want the climate content, instead of forcing it on them. This can be achieved in so many ways that it escapes a single ‘good practice’, but examples include: creating an elusive mystery that the player wants resolved; making the content very important for characters that the player cares about; making the climate content the solution to a problem that a player wants to solve for different reasons.
Some concerns were raised, too. Many of the developers are keenly aware of the difficulties in measuring impacts of climate games (or any medium). They especially wonder whether these games do not speak only or mostly to people who already care about climate games. Additionally, many good, engaging climate games do not reach any sizable audience at all. This is in part due to a saturated market generally, but isn’t helped by an inundation of barely finished games, as well as games that are simply incoherent or unengaging (especially on Google Play). Our strong recommendation, then, is for everybody who cares about climate games, to make an effort to promote and share any climate game they truly think is good.

*Climate games: An overview*

Our own dataset of climate games comprises about 200 titles of games for PC, Android, iOS, browser, board games, and offline roleplaying games. Before we could add the itch.io games and console games, our database was merged with that of the International Game Developers Association Climate Special Interest Group. This database currently has about 400 items but is still under construction; it will be freely available (hopefully) as soon as in 2022.

*Typology*

<table>
<thead>
<tr>
<th></th>
<th>Location of CC</th>
<th>CC goal or effect with audience</th>
<th>Characteristic of mechanics</th>
<th>Perspective of player</th>
<th>Commercia l/serious</th>
<th>Availability</th>
<th>Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casual</td>
<td>Environment, setting, or mechanics.</td>
<td>Appeal to audiences. Sometimes also to inform.</td>
<td>Simple, repetitive, continuous mechanics. Clicking, tapping, or small movements.</td>
<td>Control one aspect of an abstracted play-world from the outside.</td>
<td>Mostly commercial/entertainment.</td>
<td>Very easy to access, very cheap/free. Often in English.</td>
<td>Mobile, especially Android. PC may have some, too.</td>
</tr>
<tr>
<td>Systems management</td>
<td>Plot, environment, mechanics.</td>
<td>Consider solutions/adaptations; frame as fixable problem; learn systems thinking.</td>
<td>Input/output systems management. (invisible) spreadsheet work. Sometimes complicated, often round- or turn-based.</td>
<td>Godlike. Isometric or other top-down perspective, OR spreadsheet/control room.</td>
<td>Both.</td>
<td>Usually in English, sometimes (serious) free or cheap, sometimes (entertainment) expensive.</td>
<td>All platforms.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Mechanics. Sometimes plot/dialogue.</td>
<td>Inform.</td>
<td>Player scores points by solving knowledge-based puzzles or quizzes.</td>
<td>First-person as yourself; interact with interface.</td>
<td>More often serious.</td>
<td>Easy to access and cheap/free.</td>
<td>All platforms but especially on mobile.</td>
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These five types have been derived from the data. The types emerged initially through a comparison of location of climate change, and goal with climate change. These two items together proved distinctive between categories of climate games. Other axes that had been considered were let go or only added to the table because they give more information. To avoid confusion, it is important to keep in mind that these types describe climate games, as they relate to climate specifically. Other types of, for example, casual games exist, but that is not what we are describing here.

The types cover the available data well; almost all games fit more or less into one type as their primary category. Many games, however, do share characteristics with a secondary category. We will briefly characterize each category, and move on to the analysis of their apparent assumptions about social action.

**Casual**

Casual climate games are simple. They are easily picked up and easily put down. Their game mechanics are simple, sometimes very simple, like clickers. They either have infinite progression or repetition.
In this game, called ‘Climate’, players guide a penguin over the ever-decreasing surface of ice. At the start of the game, it explains this is happening because of greenhouse gases. The balancing is necessary because the penguin drowns in water.

Casual games that we studied use climate change to frame the action required by the player in either setting, mechanics, or plot. All of these tend to be so simple that the game can be played while ignoring the climate aspect completely. Some of them cross over into the Knowledge category by providing information in between gameplay.
In ‘Climate Run’, players guide running penguins and other animals around obstacles that are caused by global warming and other man-made environmental effects. The gameplay is extremely casual, but the game gives some extra information in text boxes; for example about how players at home can take actions, and how climate change affects different ecosystems.

**Systems management**

Systems management games are about managing input and output. Resources usually need to come in, while producing desirable outcomes and preventing or minimizing undesirable ones. In climate games, greenhouse gas emissions are typically an undesirable output. These may be lowered (indirectly) through changing inputs, for example lowering investments in industries, or spending resources on population awareness campaigns.
In ‘ECO World Inc. Save the Earth’ players manage environmental parameters around the globe by implementing policies and responding to crises. The goal is to stabilize the ecology.

In many climate games of this type, especially the ones that are freely available, reducing environmental impacts through system management is the win condition. In other games, managing the environment is another mechanic that may facilitate or hamper the road to the win condition. Gameplay of this time tends to take more time (20 minutes - 20 hours for a playthrough) and attention.

In ‘Civilization 6: Gathering Storm’, players can prove their civilization is ‘the best’ through different mechanics. Their own actions can get in the way, for example through fossil-fuel-induced climate effects that generate droughts and hurricanes. Image by Gamespot.

Knowledge climate games exist to inform. Some of them use the quiz or puzzle mechanic, where rehashing, deducing, or discovering correct knowledge leads to a win condition. Others use simple mechanics that are secondary to the goal of knowledge sharing (crossing over somewhat into the Casual category). Knowledge games tend to be easy to start and stop playing.
‘World Rescue’ alternates information and storytelling with mini games with simple mechanics.

Backdrop
Climate games in this category relate to climate through the history or geography of the setting, but in such a way that the player does not need to engage with it. For that reason, a variety of game mechanics and genres are possible in this type. Many post-apocalyptic first-person RPGs fall in this category; so do certain city-builders.

Timberborn is set in a world where humans have died out as a result of the climate change they created. Beavers have since evolved to a point where a city builder game around them makes sense.

The use of climate here is somewhat arbitrary; often this could have been replaced by a nuclear threat, AI run amok, or some other man-made disaster. The popularity of climate in these games, then, speaks to its place in current discourse and imagination.
Experience
Where climate has a more central place in narrative and in the direct, current environment a player interacts with, the game is of the Experience type. Climate may be pervasive as a theme, and occupy mechanics, plot, setting, characters, dialogue, and environment, but it will always be in the plot. What these games offer is a deep experience of some part of climate change, usually through some degree of simulationism. More serious gaming exercises fall in this category, where people learn to empathize with certain stakeholder positions or emotional responses; so do tabletop- and live action role playing games, as well as some first-person RPGs.
Experience games tend to demand some investment of time, attention, and sometimes preparation.

Lost Roads is a fantasy Tabletop Roleplaying Game (TTRPG) where a group of players experiences a journey as climate migrants.
Shocks and Shields is a variation on tag, where environmental shocks can haunt people away from their homes.

Subversive and strong mixes
Initially, a sixth category was devised, called ‘subversive’. Ultimately, this has been abandoned because each game in it could be covered by one of the other categories. It is worth mentioning though, as perhaps a style of addressing climate topics, rather than a type. Within this typology of five, some games are subversive. For those games, climate (and/or any other sustainability issue) is usually a pervasive theme, located throughout the entire game. Outcomes tend to be more radical, rather than adaptive. Sometimes they seem ‘normal’, but include strong elements of dark play. Notably, the goal they seem to aim for regarding Climate Change transformation in the player, seems to be some sort of radical moral, emotional, or cognitive overhaul, rather than the more modest sharing of information or fostering of insight that other games give.
‘McDonalds’ is ostensibly a systems management game for a fast food business. However, the game has some dark play elements that force the player to conclude that having the business thrive cannot be done without destroying the world.

Additionally, we should emphasize that most games do not fit one type only. Many have a primary type, and on top of that have some characteristics of one or two other types. Some interesting cases are right in between the types. Titles like The Sims 4: Eco Lifestyle are examples of games that could be classified as Experience, Backdrop, or Systems Management, all depending on how the player chooses to relate to the game.

In ‘The Sims 4: Eco Lifestyle’, a simulator of everyday life, a player can choose to engage with the environmental, natural, and political mechanics by managing input and output, by empathizing with their Sim’s realm of experience - or he can choose to ignore them and play the game as normal.

Theories of social action in climate games
Most climate games aim to ‘do good’. Many do so explicitly: Some link to or are affiliated with charities; some try to teach good behaviors or spread ‘awareness’. Many games claim these good deeds in their store descriptions. All of these claims rest on the assumption that games can change or inspire behavior, then. However, the mechanisms different game types use to try to achieve that change, are very divergent. In their strategies for motivating people towards climate actions, games build upon assumptions that overlap with those of sociological theories. Three main types can be distinguished; these will be introduced here. Since they all describe ways of relating to the world, these different ways of influencing climate behavior tend to coincide with gameplay features. Some of the types presented above overlap to some extent with some models of human behavior - but they do not correspond perfectly.

Types of rationality: Cognitive
Many climate games, especially the games with a ‘cerebral’ feel, seem to aim at achieving change by tapping into instrumental rational action and value rational action. Instrumental rational action would translate to the real world by giving the player enough information to calculate or estimate that climate change would, eventually, be very bad for him, and so that many costs are warranted to prevent or mitigate it. Additionally, the games in this cluster could give information on how to go about that, setting the player up for real-world action.

Similarly, value rationality would tap into a motivation based on values. For example, helping victims of droughts in Somalia (as in ‘World Rescue’, shown above) could be considered good, helpful, kind, and fair. So being aware of droughts and the harm they cause people, may inspire players to take value rational action.

A point of attention with rational action is perhaps that games, inherently, cannot (and need not) express the real world with perfect accuracy. For this reason, the instrumentally rational actor may want to combat the degradation of a forest like he did in ‘Environment Inc.’; but the political reality may be different. Another, more profane problem with this approach is that it is relatively easy to consider action, but not actually take it. Both these points connect to one of the points that emerged from the focus groups: That games, directly after playthrough, should connect with the player to activate them. In the case of rationality-based games, this can be pointing them to useful charities (and some games do!), volunteer organizations or ways to engage with the political systems of the real world directly.
In ‘Terra Nil’, players purposely build and demolish buildings in order to meet certain environmental goals on the map.

In ‘Eco Warriors: Rodrigues’, the young audience can clean up trash: a clean environment is presented as desirable. Separating recyclables is part of the game.

Ideology: Moral
As mentioned in the section on the focus group results, games always present some ideology. Sometimes this is a very conscious decision, such as in the ‘Democratic Socialism Simulator’ (see below),
where existing beliefs are actively challenged. Many times, that is not the case, and ideologies are present in more subtle ways. ‘The Sims 4: Eco Lifestyle’ (introduced above) is an interesting example of this: While it invites players to engage with ‘off the grid’ living, producing their own food and products, and pushing for a clean environment, a lot of the gameplay is still very much capitalist and consumerist.

‘Democratic Socialism Simulator’ challenges assumptions about the cost of social and environmental policies as well as the functioning of political institutions.

For all games, then, it is worthwhile to consider what ideologies are being presented or perpetuated. This is especially important if the game is trying to achieve ideological transformation: Is the game not supporting a conflicting ideology in a different place? (This is not necessarily bad for the game, but it may be bad for the transformational power.) It is important to realize how powerful seemingly ‘background’ information may be in justifying what ‘ordinary reality’ looks like. This resonates with the focus group’s desire to normalize the presence of climate features and climate behaviors in games that are not about climate.

Experiences: Sensory
Climate games that play into experience are very often, but not always, relatively unmediated. For all of them, affect is very important. In individual games, that can happen by transporting oneself into the physical experience of another person (for example, in Virtual Reality, or with some more mental efforts in visual novels). This strategy seems to aim at giving either empathy, or a deep understanding of situations that were otherwise far removed from the player’s emotional repertoire.
The virtual reality installation ‘Tree’ allows a person the experience of a growing tree in a forest under pressure from humans.

‘The Climate Trail’ is an interactive visual novel where the player tries to make it to Canada, a haven for climate refugees, by bike.

Tabletop- and Live Action Role Playing Games fall in this category, too. They have many similarities with the individual version, but also include a group experience. The group experience has the additional possibility for inspiring community-forming, a shared creation of morality and symbols, and a feeling of motivation.

Because affect is so important in this approach to players, and because the subject matter may be dark, games that play on experience especially benefit from the focus group’s suggestion to debrief after gameplay. Additionally, an invitation to connect to a community could be a good fit with this strategy.
Since it is very important to carry the affect over from game to real-world, the suggestion to connect with the player after they finish the game fits this strategy as well.

**Discussion & conclusions**

Hundreds of climate games are available, and they can be adequately captured in five types based on how they mediate between the player and climate change: casual, knowledge, systems management, backdrop, and serious. Furthermore, climate games can be clustered by their strategies for appealing to behavior changes: rationalities, ideologies, and experiences. Each of these strategies resonates with one of the outcomes from the focus groups with game designers.

Interestingly, climate games also reflect the theoretical debate on structure and agency; either allowing the player to control all of the structure as an omnipotent god or government, or focusing on the individual’s choices and actions while never having to relate to structure at all. The interaction between individual action and institutions or structure is under-explored in climate games, but very important for climate action.

As suggested by the focus groups, it is important to focus on one transformational goal instead of trying to do it all. However, these three different roads can all be mobilized for the same goal. If developers choose to focus on only one or two, this framework can give them tools to discuss why that is the best choice for their product, or to find out what may be overlooked. This model also suggests that partnerships between different but related games could be powerful alliances for change.

Games can do more to facilitate the step from engagement to real-world action, even if it is as simple as linking to a Discord server for climate-conscious gamers, suggesting a charity to donate to, or inviting people into a letter-writing campaign: guiding people to the next step, based on the strategies that were employed, makes it easier for them to translate game-action to real-world action.

Finally, the focus groups’ participants see little merit in the continued separation of serious and entertainment games. We agree: Entertainment games can have transformative power, and serious games can be entertaining.

**Limitations**

The data collection has had some limitations, especially because a lot of the information is not available. Notably, the publication year is very difficult to find for many games. We would have liked to present more statistics on this, as well as on user ratings (also not available for many platforms). Hopefully, this will be available in a few years, with the collective efforts of the IGDA Climate SIG.

**References**


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