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**Abstract**

Acknowledged as urgent and complex, the communication of environmental science is at once an outcome and a subject of academic research. In this article, we detail the results of workshops with young residents of five “Antarctic gateway cities” (Hobart, Christchurch, Punta Arenas, Ushuaia, and Cape Town) who helped design and evaluate an online game that sought to communicate complex intersections of climate policy and science. We focus here on secondary effects of the workshops and game. On the one hand, outputs such as digital games respond to renewed desires for and from researchers to reach beyond scholarly sanctuaries and engage with real-world issues and communities in ways that question barriers of expertise and institutional entitlement. On the other, such dissolutions expose gaps in competency that can unnerve both researchers and participants, interrogating the expediency of collaborative game design and evaluation, and posing questions about the broader role and scope of “non-traditional” research outputs. Elaborating on Pérez Latorre’s notion of “counter-fun”, we chart our efforts to engage youth audiences in Antarctic cities through workshops, social media and anonymous statistics derived from gameplay. We conclude that game design and evaluation, as methods that bind and orient researchers and participants toward common objects of interest, can yield surprising channels of speculation and dialogue that align neither with conventional research nor the planned engagement of non-traditional outputs.

## Introduction

In November 2019 in Cape Town, our research team held the sixth of a series of co-design workshops to gather feedback and ideas on a digital game we had developed called *Antarctic Futures (AF)*. Like most serious games, *AF* was designed to educate and challenge players; in this case, its purpose was to provoke thinking and discussion about Antarctica's importance in regulating global climate flows, and its political and cultural significance as a space of scientific cooperation, peace and nature conservation. At the time of the workshop, the game was in the "beta" phase, meaning it was playable and could be tested, but likely had bugs and unfinished features. By this stage, we were interested in improving technical elements of the game, but also in studying its social effects — the ways it could work as a stimulus to political debate in group settings.

Cape Town was last of the five Antarctic gateway cities on our co-design journey, which had begun in Christchurch almost two years earlier, and had also engaged participants in workshops in Hobart, Punta Arenas and Ushuaia. The Cape Town workshop was held in the meeting room of a local not-for-profit organization, and featured students and professionals interested in debating social and environmental urban policies, recruited through a grassroots organization called "Young Urbanists". One of the participants introduced himself during an initial ice-breaking activity, expressing his doubt about whether we, as academics, should be developing a game at all. In his view, games should be left to people who develop them professionally. He was expressing a concern that we had encountered before, and would re-encounter over the following months through processes of testing, promoting and disseminating our game. It was, as we explore in this paper, a challenge to the professional legitimacy assumed by academics engaged in non-traditional outputs, not limited to the field of game design. By the end of the workshop, after what was at times a heated debate about the limits of *AF* and its future potential, the same participant explained that he now understood why the process of co-design would be useful to us as researchers, as he had himself enjoyed debating the politics of the game. While he still questioned the logic of developing a game — he acknowledged the value of the discussions that the software, with all of its bugs and imperfections, had generated. For this participant, ironically, the game's serious intent — to function as a pedagogical and communicative tool — ended up making those discussions fun.

The game had been developed as part of an Australian Research Council Linkage project entitled *Antarctic cities and the global commons: Rethinking the gateways*. Carried out between 2016 and 2020, the project aimed to cultivate a sense of guardianship for Antarctica in and across the five cities, shifting urban practices and imaginaries from the limited and functional role of "gateway". The game belonged to a wider set of activities focusing on the development of youth networks across the cities that also included an Antarctic youth expedition and the formation of an international Antarctic youth coalition (AYC). *AF* would serve

both as an educational tool and a platform for discourse among young people connected geographically, economically and culturally to the remote “ground” of the Antarctic continent. This conceptual centrality is reinforced graphically within the game interface, with the world map re-projected around the Antarctic continent, and the five Southern Ocean rim cities highlighted.

One affordance of games as devices for learning and communication is that they can be linked to practical actions. Our design approach sought to position *AF* as a means for studying and theorising Antarctica as a cultural, political and environmental symbol of the Anthropocene. However, the act of gamification itself — the introduction of limited agency, through taps, swipes and other gestures — acknowledges the wider role of participant-players as citizens that enact or exercise change and meaning at urban, continental and global scales. While “gamification” conjures faddish associations with, for example, the quantification of learning, as a practice it belongs to a long tradition that has addressed social issues through modes and genres of play, comedy, farce and burlesque. Like these other modes, gaming has struggled for scholarly acknowledgment. Writing in 2006 in the inaugural issue of the journal *Games and culture*, Boellstorff lamented the lack of recognition of game studies as a discipline and hinted that the study of gaming was moving from the periphery of scholarly inquiry to take a central position in how we study and theorize social life. Our paper contributes to thinking through how cultural and social research can embrace the interactive and multi-modal architecture of digital games in providing novel opportunities for reformulating forms of participatory citizenship.

During the participatory design process, we drew from what Halberstam has described as the *refusal of mastery*: counterintuitive modes of knowing and researching, such as play, irony and failure, that may produce alternatives to professionalized, all-encompassing critical social theories. For Moten and Harney (2004), such academic “undercommons” are “fugitive spaces” of research, teaching and dissemination that strategically address the impossibility of transformative political engagement within the academic system. More modest in scope, our proposal in this paper follows similar lines of thinking in introducing what we termed “playful futures” (Pollio, *et al.*, 2020) as a research practice. By charting the last stages of *AF*’s development, as well as the launch of its social media strategy, we explore how imperfect, unprofessional academic research products can test the limits of academic research and its domains of legitimacy. The process of game design and evaluation, as we elaborate further below, involves an experience of “counter-fun” [1]: a difficult and sometimes confused set of encounters that nonetheless constitute a practice of being, as Latour (2018) has put it, politically and scientifically “down to earth” [2].

Reflecting upon the late stages of game development and promotion we show how tensions, difficulties and limits of legitimacy are part of experimenting with serious games as academic outputs. The article is structured as follows: first, we briefly

place our contribution within current literature exploring the notion of counter-fun as an aspect of the digital turn in academia that plays a role in giving “ground” to climate change. We then discuss our methodology: the experimental approach that we followed through the game evaluation phase, and the autoethnographic methods we employ to recount our experience as academics experimenting with games and social media. The empirical sections that follow discuss three *AF* evaluation workshops, results from social media campaigns, and analytics derived from gameplay. We conclude the paper with observations about the discursive and collaborative possibilities of non-traditional research outputs.

### **Science communication and the predicaments of engagement**

In *Down to Earth*, Bruno Latour argues that political differences over responses to climate change mask an underlying “new universality”, a negative sensation which “consists in feeling that the *ground* is in the process of giving way” [our emphasis] [3]. This universality exists as a shared anxiety that manifests differentially across locations and cultures but is nonetheless concerned with common planetary materiality: the earth beneath our feet, and consequently, the traversal of feet across the earth. Latour establishes this universality through a conceptual elaboration of the figure of the migrant, which includes not only those in physical transition across borders but also the stationary citizens who must today move on from the solid ground of past certainties. Within this framing, disparate global concerns — migration, inequality, climate change, race, safety, modernisation, tradition, national sovereignty, even globalisation itself — can be reorganised under a singular diagnosis that subsumes differing social pressures and opposing viewpoints.

Calls for a new universality in response to crisis, even when framed through sympathy with human subjects excluded from universalisms of the past, risk obscuring the experiences of, for example, Indigenous cultures for whom colonial and Anthropogenic disaster has been an integrated and continuous state over the past five hundred years (Davis and Todd, 2017). What we focus on here rather, are the connections between Latour’s interest in non-rational discourse and new media, including games. Without addressing new media directly, his analysis includes an implied and familiar critique of utopian hopes that the ubiquity of communication platforms might realise new negotiations of difference and opportunities for consensus building. In the context of environmental action, and as one example among many, the bushfires in Australia in 2019/2020 provide a critical case that exemplifies the polarisation of online discourse, buttressed by the barely concealed ideological positions of new and traditional media platforms, editors and owners. In particular, News Corporation outlets such as *The Australian* and *Sky News* were singled out by an uncharacteristically diverse group that included former employees [4] and current executives [5] for their biased coverage that attributed causation for the number and intensity of fires variously to arsonists, green policies limiting pre-emptive burning and excessive forest coverage. Conversely,

attribution to climate change was frequently ridiculed within these same outlets, permitting mining company owners to appear conciliatory in suggesting a mix of causes that acknowledge but downplay the warming of the Earth [6]. Social media occupied a more ambiguous role: instrumental in fund-raising and circulating vital and timely information about the movement of fires themselves, but also contributing to the spread of misinformation [7]. As emerging scholarship has begun to demonstrate (*e.g.*, Sano-Franchini, 2018; Rice, 2020), new media capitalism, as much as old, relies upon the production, circulation and amplification of controversy and outrage, and reinforces other capitalist interests in doing so.

Under such conditions, Latour argues that it is unsustainable to talk about research through the correctness of its arguments alone, as though such appeals could be made without reference to the processes of the production of those arguments. In a recent recapitulation of Latour's case, Kofman writes "if scientists were transparent about how science functions — as a process in which people, politics, institutions, peer review and so forth all play their parts — they would be in a stronger position to convince people of their claims" [8]. One way of interpreting this notion of "engaged" or "tactical" research draws upon user-centered strategies that urge academics to build and promote civic engagement and discourse within a "community of practice" [9] (Third, 2016). Such practice encourages academics to increase participation in non-conventional academic spaces and engage with communities through new forms of digital and off-line activities. It also presents committed academics with a dilemma. On the one hand, opening up science — including social science — practice to public influence risks a de-legitimising of expertise and can, as the current rush to impact metrics suggests, accelerate the corporatisation of scholarship. On the other, it produces occasions through which to cultivate an undercommons with students, research participants and activists that are outside the academic sphere. Moreover, broad collectives such as "the people" and "community" themselves contain of course social differences and conflicts, with efforts to "convince" one group alienating others. Motta (2018) for instance highlights how the recent "March for Science" rallies and academics' participation in politics, activism and discourse on social media has exacerbated the divide in attitudes towards researchers. Others such as Holzniekemper (2017) have pointed to the issues of science communication within academia itself: scientists disseminate information as carefully gathered facts but have a "blind spot for the afactual: the realm of narratives, norms and values" that often shape scientific interpretations [10].

The desire to open processes of research to scrutiny, to better convince the public of the merits of its claims, can be, as many have noted, ably afforded by digital media. There is a growing expectation that scholars and researchers use social media platforms and new digital tools to connect with and educate public audiences (Abraham and Jayemanne, 2017; Van Eperen and Marincola, 2011). However, these requirements are not typically accompanied by the necessary

support or training, or allocations of time for learning new skills, making these objectives difficult to achieve. Demands for institutional innovation are producing “hybrid” academics who are not only researchers but also practitioners, activists and strategists (Keeler, *et al.*, 2017). Furthermore, tracking and measuring engagement through these hybrid roles adds to the ongoing impacts of the neoliberal university’s “increasingly managerial approach to higher education” [11]. In the next section, we reflect on our affective experiences of this neoliberal agenda, but the concept of “counter-fun” offers another frame through which to interpret the actions of ourselves and our participants. We argue that such an orientation allows an alternate positionality: a shift away from the overwhelming gravity of environmental action to a smaller, more collaborative and experimental space for discourse.

### **Academic engagement as counter-fun**

In his discussion of the indie genre, Pérez Latorre locates the notion of counter-fun in games that offer a markedly anti-capitalist entertainment proposal:

“... a sort of gameplay design that we could call ‘counter-fun’ or ‘anti-capitalist fun’, an entertainment proposal characterized by depriving the videogame of common videogame design elements potentially linked to capitalist values, consumerism, or to the maximization of efficiency and benefits, as well as by counteracting the fantasies of power common in mainstream videogames.” [12]

We apply this term to characterise the development of *AF* as a game that counteracts fantasies of perfection within and outside the boundaries of academic and commercial legitimacy. Here, games are imagined as not merely about fun, but as holding serious purpose. Equally, counter-fun might be juxtaposed with *both* the seriousness of much science and efforts to simplify its communication to reductive key messages or entertainment. Following but expanding on Pérez Latorre’s definition, counter-fun counters both seriousness and fun. For our game, designed neither to amuse nor, in a straightforward way, to teach, counter-fun primed the production and promotion of *AF* as political acts embedded in experimental reasoning that rejected such borders. Our engagement with web development, game design and social media can be viewed as adhering to an “academic self” who is prepared and equipped to handle current impact agendas that are not only concerned with bibliometrics but are also involved with different publics using various types of platform media [13]. But our attempts also resemble a more political academic self, who, in utilising these platforms, applies an experimental approach to creating dialogue and talking back to power structures. Counter-fun infused our research activities with a light-hearted playfulness that is often left



outside traditional academic outputs while keeping them within a political sphere and without reducing them to escapist fantasies (Halberstam, 2011).

Our essay contributes to a growing literature on the radical possibilities of game design as a strategy for multiplying the sites in which academics experiment with new avenues of engagement, critical play (Flanagan, 2009) and gamified research, applying them to the complex issues facing life on the planet (Zimmerman, 2008; McGonigal, 2011). Part of our focus in what follows concerns an aspect of game design, development and dissemination that is often neglected: the difficulties, failures and bugs involved in making games as academic objects. In a sense, we explore the possibility that games, as well as opening debates about aspirational ideas such as justice, equity, honesty, and cooperation (Flanagan and Nissebaum, 2014), can foster an engagement with negation about the impossibility of action, the failures and limits of scientific legitimacy, and the affective capacities of academics themselves involved in such work. We propose that these negative aspects are part of the essential work for building a critical community that provides counter-narratives and alternative views. Our strategies included considerations around shifting away from mainstream gameplay orientations based on “win/lose” binaries, encouraging active experimentation and negotiation, and emphasizing the importance of games within a broader discourse on climate change rather than as stand-alone activities (Pérez Latorre, 2016; Whalen, *et al.*, 2018). And while the game does propose a “god’s eye view” that determines the outcome through policy determination, the structural and stochastic conditions of the game’s simulation mean the attempt at mastery is only ever partial. Our emphasis on these aspects also allowed us to reflect upon our own positionalities as humanities and social science researchers navigating the disciplinary boundaries of environmental research and game design.

*Antarctic Futures*’ promotion, through social media and other online channels, was therefore focused on its pedagogical and discursive value in a variety of settings. To support this, we developed a set of supplementary assets including a resource pack, a game trailer and a documentary, which we discuss in more detail below. Yet while these resources themselves were well received, they failed to produce widespread enthusiastic engagement with the game. Similar to what we encountered in the development of the software itself, in its dissemination we were faced with tensions between users’ perceptions of digital games and alternative modes of play (Pérez Latorre, 2016). The analysis of our own experiences of game development and promotion suggest this complex relationship is mirrored by other complicated articulations of scholarly practice and environmental activism. As such, it contributes to a growing literature on the possibilities of digital games and social media as instruments for speculative academic work.



## Participatory game design

The development of *Antarctic Futures* began in 2017. As the initial phases of the game codesign went by, the serious game became more complex. As a research tool, it became a way to test the possibility of translating complex, scientific and forward-looking scenarios — hence the name of the game — into a playable experience. We have detailed the early development of the game in another paper (see Pollio, *et al.*, 2020), hinting that the first codesign stages were insightful though marked by what we called “productive dead ends” — alternative development paths that we did not, or could not undertake, but were nonetheless useful to grasp both the limits of the game and our approach. What we realized early on, for example, was that many expectations of workshop participants could not be met in practice, as neither the budget nor the team was sufficient to design and develop a 3D, immersive simulation game. Our options were either to outsource the game to a professional firm — an option which would have defeated the purpose of game design as a research practice — or to accept that these expectations placed upon us needed to be scaled down.

For these reasons, we opted for a two-dimensional game, merging some of the insights of the participants from the first few workshops with a game model underlying *Plague Inc.*, a video game first developed by independent games studio Ndemic Creations in 2012. In *Plague Inc.*, players are tasked with evolving a pathogen so that a global pandemic annihilates the entire human population. We selected this game as a genre exemplar for *AF* for several reasons. First, *Plague Inc.*’s interface is simple and “graphically spartan” [14], a two-dimensional map of the world overlaid with interactive elements for evolving the virus, pausing and playing the game, configuring settings, and so on. With relatively little in the way of animations or 3D features, we felt developing a clone or copy would be feasible given our time and cost constraints. Developing a global map interface projected on Antarctica would also help to visualise the relationship of the Antarctic cities to the continent and the rest of the world. Inverting the dystopian or posthuman logic of *Plague Inc.*, what Mitchell and Hamilton (2018) term “play[ing] at apocalypse” [15], our variation sought instead to promote “custodial” attitudes, but with complications. Instead of wiping out humanity, our game involves the creation of a strategic policy that saves the world from environmental catastrophe. The basic model of the game, given the Antarctic cities context, is based on a 2018 paper by Rintoul, *et al.*, which appeared in *Nature* just a few weeks before we held the last of the first round of design workshops in August 2018. In the paper, eloquently titled “Choosing the future of Antarctica” [16], the authors imagine Antarctica from the perspective of 2070 and describe two alternative future scenarios: one in which climate action is at least consistent and consensual across international actors, and one in which environmental policies are individually and sporadically applied. The two scenarios yield two Antarctic futures: one in which the continent is preserved mostly as it is today, and one in which the continent is environmentally compromised beyond repair. The two scenarios are a function of

global temperature rises but also of specific decisions made at the governance level of, for example, the Antarctic Treaty System.

Combining these two possible futures with the gaming model of *Plague Inc.*, and the visions and suggestions of the co-design workshop participants, our first aim was to build a clickable demo. We presented this prototype at a design workshop held, appropriately, at a prominent game shop in Hobart in August 2018. Even at this early stage our participants provided very useful feedback on the game, including ideas for multiplayer enhancements, a global leader board and social media integration. Several of these features were voiced and developed by participants to amplify the game's political reach, acknowledging directly its multiple uses. In sum, after the first round of workshops, we had a long list of possibilities for developing the game into a prototype. Over several months, what was to be the final form of the game's logic took shape.

The resulting gameplay unfolds over a 50-year period (2020–2070), during which the player must collect resources, respond to quiz-style prompts and select or upgrade policies to avert a worst-case scenario. Every country has two key statistics — environmental *loss* and *preparedness* to address climate change — and without intervention, the *loss* statistic grows, until it reaches a point of no return and the game is over. Policies are grouped by areas of economy, politics, culture and ecology (see [Figure 3](#)), and the game is modeled in such a way that both the coherence and balance of policies are important in building *preparedness*. For example, a combination of complementary policies such as *Reduce Inequality* (Economy) and *Promote Democracy* (Politics) can boost preparedness, while a combination of contradictory policies also selected from the same group will be less effective. We purposely included strategies like *Boost Military* that could be read either as counter-environmental or as necessary for enforcing other policy choices. Importantly for the use of the game as a provocation for discussion, it is possible to avoid losing the game entirely with a policy mix that is coherent and balanced but not necessarily pro-environment.

## Methods

Our approach to evaluating the game was primarily qualitative, drawing upon workshops and other data-gathering activities, as well as incidental events that we experienced during game development, evaluation and promotion, which we report here through autoethnographic reflection. In addition, the game itself captured anonymous data of choices made by players through their gameplay, which we report through descriptive statistics. In this section, we outline these methods and discuss how, despite their eclecticism — or perhaps because of it (Law, 2004) — they elicit key themes for analysis and discussion below. We experimented with various forms of engagement and feedback on the game through three key instruments: a series of workshops, each conducted in an Antarctic city, a social media campaign, and analysis of gameplay.

The workshops were all conducted in the latter half of 2019, in Hobart, Australia (July;  $n = 20$ ), Ushuaia, Argentina (September;  $n = 3$ ), and Cape Town, South Africa (November 2019;  $n = 7$ ). In each city, participants were young adults, either students or workers, recruited through university networks or professional associations. They followed three earlier workshops, conducted in 2017–2018, which employed participatory design to inform the game’s genre, look, mechanics and user experience (Pollio, *et al.*, 2020). The later events, in contrast, demonstrated the game, asked participants to play it, and obtained qualitative feedback that would inform further development. Together the workshops produced a long list of features, bugs and suggestions that populated a backlog ([Figure 1](#)), or technical “to-do” list, which in turn we used to complete version 1.0 of the game in July 2020. The workshops each ran for approximately two–three hours, and included the following activities:

- An overview of the project and the game;
- A 30–45–minute gaming session; and,
- Facilitated “break-out” discussions in groups of four–five participants, to consider both:
  - (a) the issues raised by the game about Antarctic custodianship and environmental sustainability, and
  - (b) questions and feedback on the game itself.

Item	Status	Priority	Apr 2019	Oct 2019	Jan 2020
1 Basic model of policy impacts	COMPLETED	High	YES		
2 Crisis effects	COMPLETED	High	YES		
3 Improve "infection" / "convinced" terms	COMPLETED	High	YES		
4 Allow mouse over during pause	COMPLETED	High	YES		
5 Remove pause when returning from policy window	COMPLETED	High	YES		
6 Fix crash on server	COMPLETED	High	YES		
7 Don't select a country to begin the simulation	COMPLETED	High	YES		
8 Opening page / start review	COMPLETED	High	YES		
9 Connect crisis to countries less affected by policies	COMPLETED	High	YES		
10 Define narratives for Antarctic events	COMPLETED	High	YES		
11 Define visualisation for Antarctic events	COMPLETED	High	YES		
12 Define narratives for game over	COMPLETED	High	YES		
13 Change awareness to Environmental Loss	COMPLETED	High	YES		
14 Fix the Pause button	COMPLETED	High	YES		
15 Fix density and size of red-green dots	COMPLETED	High	YES		
146 Clickable newsfeed. CONNECT TO QUIZ OPTION.	OUT OF SCOPE	Medium			YES
147 why 2070? Tells us a bit more why the game has been designed in this way.	RESOURCE PACK?	High			YES
148 Some people thought it is not Antarctic centric enough (more about saving the world in general rather than An	RESOURCE PACK?	High			YES
149 In general participants would like more info on the game dynamic and the specific impact of policies: Is there	RESOURCE PACK?	Medium			YES
150 Loss / percentage. Confusing when clicking on resources – what are underlying country changes?	LOGGED	Medium			YES
151 Crisis alerts and pop-ups: In general, participants considered that it would be interesting to do something else	COMPLETED	Medium			YES
152 Narrative support - effects: some participants suggested it would be important to add effects to make it more c	COMPLETED	Medium			YES
153 Some people didn't pay attention to the banners and they still won. Perhaps some function that forces the pla	COMPLETED	Medium			YES
154 Motivate people for long-term planning (keeping resources).	LOGGED	Medium			YES
155 Some participants thought there is a need for more competing discourses. For example: if you go down a cert	LOGGED	Low			YES
156 Additional options: If some policies fail, delete the policy. Pay for a policy for a period of time. Policies can hav	LOGGED	Low			YES
157 some participants didn't understand the consequence of 'boosting military'; others would like more info on 'ter	LOGGED	High			YES
158 More information on what, when, how policy decisions have an impact on the game: more detailed stats at the	COMPLETED	Low			YES
159 Leaderboard, achievements. Connected to PlayStore / AppStore support?	LOGGED	High			YES
160 Some information is too technical, particularly for some complex terms (for example 'ocean acidification'). Per	COMPLETED	Medium			YES
161 Some people would like more clarity when looking at each specific country	LOGGED	Low			YES
162 Other play modes: challenges randomly selected. Level system (easy, moderate hard).	COMPLETED	High			YES
163 Potential as a research tool. Besides IP address, it may be useful to collect more info about players (gender, z	LOGGED	Low			YES
164 Target audience: It might be difficult to engage younger players (given more limited attention span and some	LOGGED	Low			YES
165 Reduce resource frequency. LINKED TO DEINVESTMENT.	LOGGED	High			YES
166 Changeable map colours	COMPLETED	High			YES
167 Privacy policy	IN PROGRESS	High			YES
168 Settings button	COMPLETED	High			
169 Tutorial	COMPLETED				
170 Button / font size	COMPLETED				
171 Speed	COMPLETED				
172 Quiz	COMPLETED				
173 Hyper-capitalist - check personas	IN PROGRESS				
174 Rebase code onto new repository	COMPLETED				
175 Update framework	COMPLETED				
176 Setup for A/B testing	COMPLETED				

Figure 1: Antarctic Futures development backlog.

Following the workshops, we produced further outputs and activities that helped generate other kinds of feedback. The format itself, refined across the three workshops, inspired the production of a resource pack that could be deployed alongside the game in secondary and tertiary pedagogical settings. In 2020, coinciding with a push to release the game, we conducted a social media campaign, targeting young people in Antarctic cities. We experimented with a number of platforms including WordPress forums, Discord, Twitter and Instagram. However, for reasons discussed below Instagram proved most successful, and produced useful measures of the game and project's reach.

Following workshop feedback, we added a quiz that appears sporadically throughout the game, which was also deployed as a standalone interactive application on the Kahoot platform, enabling a discrete set of feedback to be captured. The quiz, along with other textual game elements, was translated into Spanish by first language speakers on the project team. Together, with other comments received via e-mail, these activities provided the opportunity for

more *ad hoc* feedback that was nonetheless instrumental in the game development process and informed our findings discussed here.

In-game data offered us both a means of capturing the policy preferences of players, and more critically, a way of understanding what such metrics might signify about games as research instruments. To capture this data, we needed to rely upon our own scripted analytics procedure, as standard engines such as Google Analytics would not provide us with the detailed information about choices we would need for analysis. Technically, the sequence of player actions is sent from the Web browser to the host server whenever a game is concluded, stored in text format that can be retrieved and analysed at a later point. Such data helps refine the game — adjust difficulty, for instance, if it appears too many players are losing — but can equally function as a type of implied survey that, with both caveats and affordances, reveals preferences and dispositions.

Over approximately 12 months we received 473 completed game results. Players were anonymous, and we did not ask any questions before or after play. However, we did record IP addresses, which can be queried for the likely country of the player. As several games were completed during workshops, we decided not to consolidate results based on unique IP addresses. This means that completed games include an unknown number of test games played in Australia and Italy (the locations of the developer teams at various times).

Finally, as scholars masquerading as game developers, designers and marketers, we are intimately embedded in many of the questions posed by workshop participants, especially about the function of games as research objects and instruments. We discuss our own experiences in developing the game and several associated assets — the resource pack, a game trailer and a documentary — as ways to reflect upon the often troubled but also enriching process of game development as a form of scholarly praxis. We consider in particular two aspects: the maintenance of the development backlog, and the construction of personas used to test different strategies of, within the game apparatus, sustaining Antarctica and the planet. These reflections serve not only to contextualise our other data but also to reflect upon the often unacknowledged and messy world of scholarly engagement through the device of the “non-traditional academic output”.

### **Participatory game evaluation**

It wasn't until February 2019 that we were able to fully code the prototype. In the months before, however, we held a series of discussions around what the first version of the game should look like. We started a shared spreadsheet to manage a product backlog ([Figure 1](#)), a common tool of agile development for games and other software (Radigan, 2019), in which we listed all the features we wanted to include, all the bugs we thought needed to be fixed, all the options that needed to be tried, and all the ancillary pieces of work required by design and coding (for

example, the development of a privacy policy). At this stage, we considered outsourcing the media strategy of the game to a professional firm, so the backlog did not include “promotional” features relating to social media or growth hacking tactics. But it remained a very long to-do list, featuring nearly two hundred items to be completed or ruled out-of-scope.

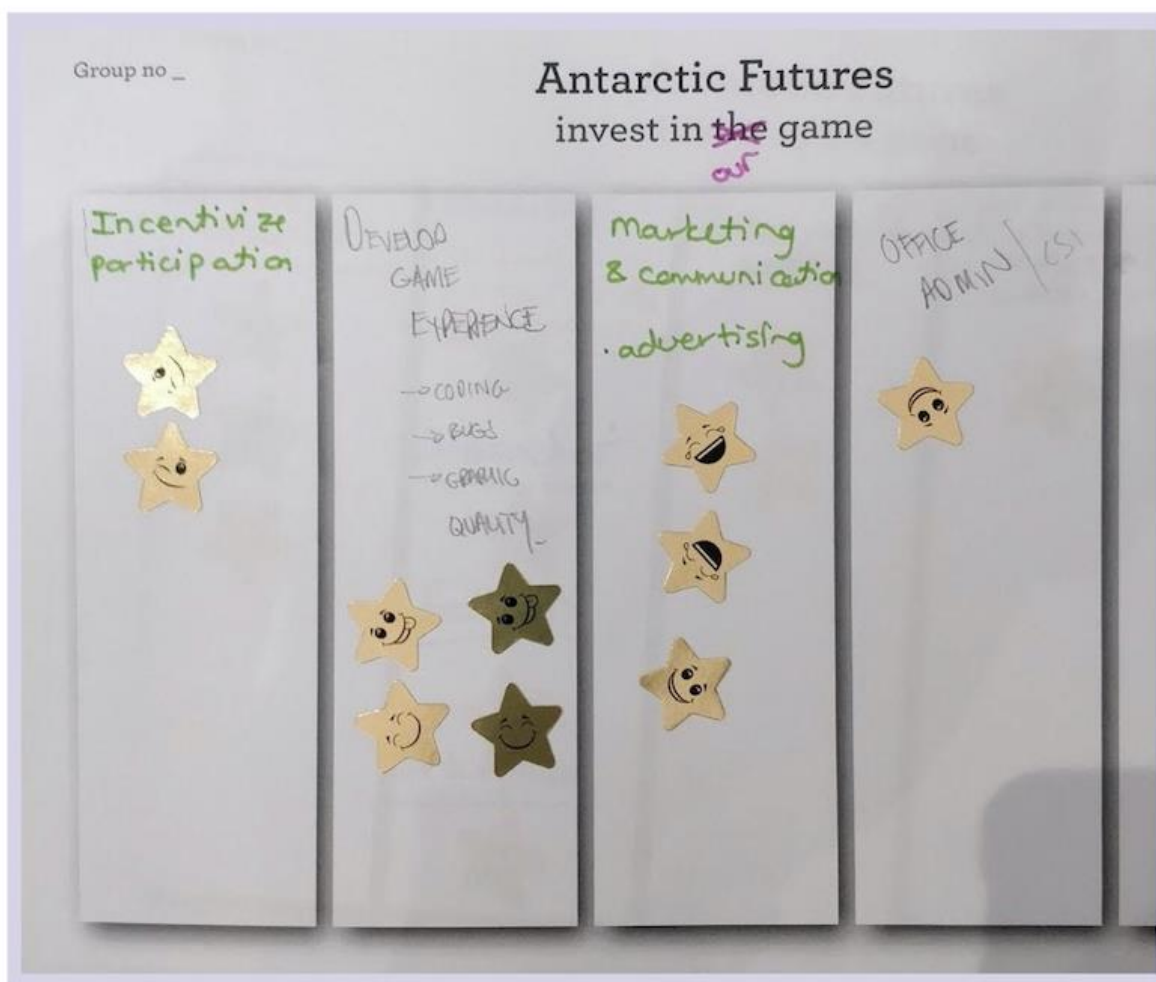
Another key instrument we borrowed from agile methods was the use of personas. In our case, personas were not intended to represent specific kinds of users in developing use cases — there was only one such kind, the player. Rather, personas represented extreme types that a player might choose to adopt in selecting play policies. To provoke, rather than merely instruct, we wanted players to experiment with different winning strategies. A condition of any winning strategy was only that it be coherent to the policy mix. Accordingly, we devised five strategies: the “democratic socialist”, who would want to reduce inequality while promoting green cities and democracy; the “green capitalist”, who would similarly desire pro-environmental policies, but also higher automation and reduced regulations to increase profitability; the “celebrity environmentalist”, who would pursue celebrity endorsements, diplomacy and social media campaigns at the expense of, perhaps, more fundamental political and market reforms; the “eco-totalitarian”, who would boost military spending while simultaneously reducing emissions; and the “climate sceptic”, who would prefer economic, political and cultural policies to environmental ones. These personas proved significant in determining positive and negative multiplier effects in our policy model, and in testing any unintended effects of less coherent policy pairs and combinations. They quickly became a kind of ironic shorthand when the mathematical model was not working. At one point, the “green capitalist” could not win, for instance, while the “climate sceptic” won too easily.

We worked on the prototype during three intensive weeks of a hot Australian summer. By February 2019, the backlog had become both a working guide, detailing all that needed to be done, and a kind of self-flagellating “tantalus” machine, an endless list always getting longer despite how many items were ticked off. In practice, the backlog kept a list of to-dos, a list of what we achieved, but also a continuous reminder of the scale of work we had set ourselves, and our difficulties in realising it.

Or, perhaps, the backlog served as an incipient warning that, as the workshop participant would later tell us, “academics should not code games”. This remark was just one of many comments on our work obtained during workshops held over the second half of 2019 and on other occasions. As we sought external opinions, we also needed to absorb critique that was similarly chastening. For example, in early 2020, we were beginning to beta test *AF*, and were engaging with relevant event organisers for possible dissemination activities around the game. One local festival organiser declined to engage their audience with *AF* because the user interface was not polished enough in comparison to other serious games.



On the whole, however, most comments were encouraging. Several workshop participants admired what we had achieved, and those who had been involved since the beginning commended our capacity to shift from a barely playable demo to a fully functioning prototype. Many participants showed a keen desire to be co-authors of the game, irrespective of its imperfections. An anecdotal example of such commitment is shown in [Figure 2](#) below. One of the teams participating in the Cape Town workshop struck through the article “the” and replaced it with the possessive pronoun “our” — showing how they had a stake in the development of the game.



**Figure 2:** Image from the Cape Town workshop in 2019.

In addition to positive feedback, however, there were still dozens of comments that pointed to the limitations of our game. Many of these were useful: they highlighted



bugs or interface fixes that we needed to implement for the game to be enjoyed. Yet several comments set the bar to an impossibly high level given the internal capacities of our team. In an era when even so-called “indie” game budgets routinely run to hundreds of thousands of dollars, this expectation offers one caution for academics venturing into non-traditional research territory. There can be little forgiveness for outputs that are prototypes, demonstrations, or otherwise convey a sense of transparency in production. Early critical feedback obtained through participatory evaluation is invaluable yet contributes to a sense of risk and fatigue that puts into doubt the entire exercise. At many times we would have seconded the thought of the sceptical workshop participant, agreeing that perhaps academics should not make games. Such precipitous moments belong to generalised anxiety that necessarily attends to the performative expectations — thoroughly internalised, as well as laid down by others — of research work that moves beyond its historically legitimised channels. Counter-fun describes the discomfiting experience of playing certain indie games but can be applied as much to this affective dimension of game co-production, typified by the awkward and arresting pause during workshops, when researchers and participants alike sense, in a kind of collective *gestalt*, the absurdity of our undertaking and the derangement of usual roles and protocols. If counter-fun here responds less to critique of capitalist hegemony and mainstream game corporations, it serves to deflate “fantasies of power” no less resident within structures of knowledge production.

Regardless of practicality, we recorded all these comments, in our backlog spreadsheet, further increasing its self-flagellating properties. By the first half of 2020, we had segmented the backlog in many ways. We distinguished first those features that would be out-of-scope for an initial production version. Second, we separated “nice-to-have” features from bugs and other features that appeared to compromise playability. For example, several players found the game too hard to play during testing. In response, we needed to adjust the game’s equations to reduce the difficulty without compromising the sense of challenge and even frustration we wanted players to experience. Third, we separated systemic changes, associated with the Cocos framework the game had been built upon, from those that were specific to our game directly. Such systemic issues related to, for example, screen size and orientation not working as intended on mobile devices, and loading times taking too long.

These systemic changes eventually drove our decision to “port” or move the game from an outdated version of the Cocos framework to another, still produced by the same company, but with substantial differences that required an entire rewrite of the game. After testing technically complex features, such as graphics shaders and map interaction that could be supported on the new platform, we created a new repository on GitHub and spent approximately four weeks in May and June 2020 undertaking this migration. Fortunately, this decision dealt with a number of the systemic issues we had identified, resulting in a smoother and more performant

game experience. In addition, we refactored the code and added some level of code tests, to minimise risks of future changes “breaking” the game in unanticipated ways. The game’s equation-based model, adapted from the Rintoul, *et al.* (2018) paper, was also largely overhauled and tested using the personas we had created previously.

By July 2020, we were ready to re-launch the game, which we did through a “soft” launch: email and social media invitations, word-of-mouth contact, and an online workshop with other project stakeholders. While we again received quite varied feedback — much of it concerning the language of the game, which like *Plague Inc.* opted for a comparatively realistic level of scientific jargon — many participants noted that the game was easier and more enjoyable to play. For some, it offered a degree of confrontation that accorded well with our counter-fun intentions.

Our backlog remains, a testament both to work accomplished and unfinished. Contrasts with academic outputs are intriguing: the game will never be “accepted” after a process of peer review, yet in many respects, the informal evaluations obtained through workshops and other means were more grueling than any scholarly review, bound as it is to certain standards of politeness and restraint. Our completionist tendencies and relentless desire to tick off backlog items gave way to pragmatism and a sense of responsiveness to the many participants who had contributed to *AF*’s development. This meant living with anticipation of critique, during and after the soft launch of version 1.0 of the game — knowing, in other words, the kinds of feedback the game would solicit, but proceeding with the release anyway. In practice, therefore, letting go of the perfectionist mindset that is ingrained in academic work constituted in how we attempted to refuse the disciplinary mastery discussed by Halberstam (2011) — an attempt that also inclines towards a kind of performative mastery of its own.

### ***Social media***

A similar spirit of experimentation pervaded our efforts to build a fledgling community around the game. The aim of promoting the game through social media — as part of the broader dissemination strategy of the project as a whole — was to build a digital community around the game and to open up the participatory co-design process to a wider audience and potential users of the game.

The success of a social media strategy is often based on the engagement it generates from users, defined by discrete acts of liking, sharing, re-posting and following. However, these notions of participation and engagement are embedded in the logic of corporate social media strategies, which seek to contain or commodify participation (Kushner, 2016). For us, while outsourcing the media strategy was an initial consideration, learning and experimenting with it ourselves,

and thinking about our terms of engagement aligned with the aims and scope of *AF*'s “indie” or counter-fun direction.

To promote *AF*, we experimented with different social media platforms and software. A Twitter account, “@antarctic-cities”, established in 2017, reported on the different aspects of the project and shared general information about Antarctica and gateway cities by sharing external links and retweeting posts from other accounts. By July 2020, @antarctic-cities had close to 500 followers. However, for more specific engagement with *AF*, we started a WordPress forum on the project Web site in August 2019. At the same time, we created an Antarctic Cities server on Discord, a popular social media platform for gaming communities. Workshop participants from Hobart and Ushuaia were initially invited on both platforms to participate in discussions around the game. Some initial topics were also set up on the Web forum, including “strategies used” and “issues with the game”, to encourage participants to post their thoughts or concerns. However, while workshop participants joined these forums, there was no engagement in terms of active discussion or discourse around the game. An example of the tentative, experimental nature of the work of counter-fun that went into the online promotion of the game, its seeming failure nonetheless motivated us to continue experimenting with these platforms.

Proceeding with the social media strategy, an Instagram account, “@antarcticcities” was launched in January 2020 to promote the game alongside other outcomes of the project such as the Antarctic Cities Youth Expedition (ACYE), the formation of the AYC and the production of a feature-length documentary film on the project. Over the following months, our Instagram followers grew steadily, with one–two users joining every day, leading to over 500 followers by January 2021. Our posts consisted of *AF* screenshots, pictures and media images from ACYE, updates from AYC, and general project information including the documentary film, an *AF* trailer launch, and the resource pack. We noticed a significant growth in followers in the lead-up to and during the ACYE in January and February 2020, as promotional posts resulted in increased interest from the gateway cities. The ACYE ambassadors also started tagging, re-posting and re-tweeting updates through their accounts, which increased our reach across different geographies and communities. The official launch of the AYC also generated an increased following as expeditioners’ networks from their respective cities joined to support and celebrate the coalition. A growing follower base also supported us in promoting and testing the game in new and innovative ways. For example, we shared *AF* quiz questions through interactive Instagram stories and discussed the game in the “#AYClivesessions” campaign involving live interviews and Q&A sessions with the AYC. Other promotional campaigns included a simplified version of the quiz element on Kahoot, an online youth forum and a virtual Antarctica day festival. [Table 1](#) below describes our social media user base and engagement with specific campaigns.

Table 1: Antarctic Cities social network.					
Social media					
	Twitter	Instagram	Facebook	Kahoot	Discord
<b>Antarctic Cities</b>	553 followers	451 followers	Closed group	9 players	7 members
<b>Antarctic Youth Coalition</b>	NA	573 followers	693 followers	NA	NA

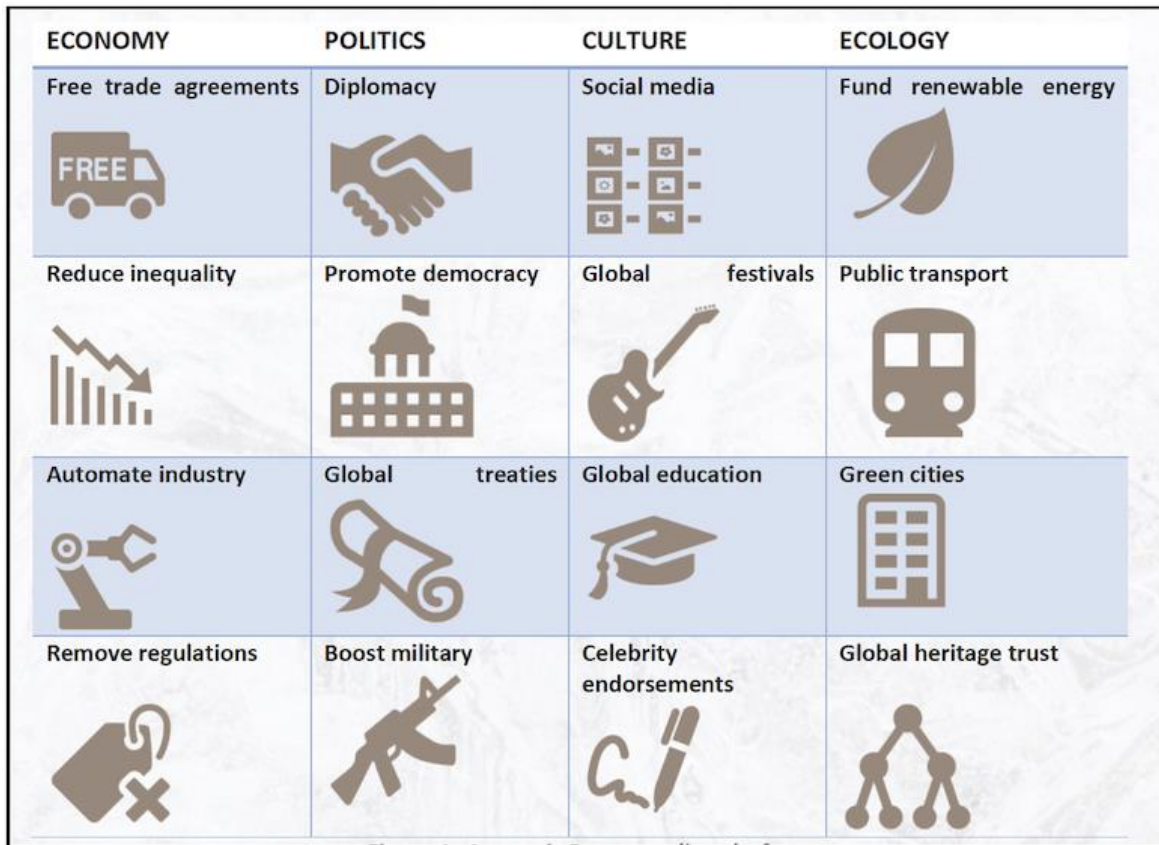
Unlike corporate social media and advertising strategies, the promotion of *AF* was more unstructured and somewhat instinctive. We e-mailed course coordinators, not for profit organisations and relevant events where we thought *AF* could make useful educational interventions. The resource pack we developed outlined multiple ways in which the game can support learning outcomes through scenarios such as classroom activities, icebreakers and roleplay sessions (Khan, *et al.*, 2020). While feedback from these promotions was mostly positive, the actual uptake of *AF* was relatively low. Some such as the local festival organiser discussed earlier, provided detailed commentary on their reluctance to showcase the game based on the absence of aesthetic qualities that they perceived would engage their audiences. Others, particularly course coordinators and academic staff expressed issues around time constraints, especially while transitioning to remote work during the early stages of the pandemic. For our social media audience, Instagram quizzes and simplified versions of the game on Kahoot were found to be more effective than the full-length Web version. However, in experimenting with different platforms and social media techniques, we observed that the challenges of engaging with the game were a result of our work being neither traditionally academic nor recognisably professional. As we discuss in the conclusion, in balancing these tasks with other aspects of contemporary academic life, we experienced complex negotiations between the imperatives of “engaged research” and the resulting possibilities for counter-cultural discourse.

### *Game analytics*

One important aspect of *AF* was its capture of the strategies players used. This provided us with feedback on the game itself, but also offered an intriguing angle on preferences towards certain policies over others. This angle is not one of straightforward “revealed” preference, as players will select policies according to varied strategies and motives: to win the game, to test (possibly perverse) alternatives, or simply to pass time. Nor however, are such strategies random. Rather, in aggregate, policy selection can be said to reveal how players negotiate

and enter into the narrative structure of the game. While the games industry has been making use of in-game data for some time for commercial purposes — with, as Stafford (2019) has argued, pernicious side effects relating to privacy and other concerns — its use in social science research contexts appears relatively limited. As we discuss below, such preferences need to be interpreted cautiously, but our analysis suggests that such in-game data poses a useful alternative to surveys in understanding attitudes on issues like climate change. Compared with completing a survey, for example, the strategy of soliciting data from young people through their choices in a game arguably — at least when accompanied by due disclosure and anonymisation — effects a shift in research agency, from participant to player, that accords with our overall emphasis on collaborative research. While our project results did correlate with verbal feedback reported through workshops, there is some obvious overlap between workshop participants and game players. In general, game analytics of this kind needs to be triangulated with qualitative data that could explore, for example, reasons for particular in-game choices and preferences.

The distribution of players by country and their in-game policy choices (see [Figure 3](#)) have been summarised in the two tables below. [Table 2](#) shows that the countries hosting Antarctic cities feature, unsurprisingly, the most completed games. The “Average Loss” statistic is an interesting indicator of engagement; lower average figures mean that players developed successful strategies to win the game, or at least reduce losses.



**Figure 3:** *Antarctic Futures* policy platform.

**Table 2: Players by country, top 10 (July 2019–August 2020).**

Country	Number of completed games	Average loss
Australia	291	53.7
Argentina	59	76.2
New Zealand	37	34.7
South Africa	16	40.8
Mexico	16	22.7
Chile	14	51.4
Italy	11	81.5
United Kingdom	9	55.5

United States	5	34.8
France	2	11.3

[Table 3](#) below shows the mix of policies available within the game, the number of times players chose each policy, whether they “levelled up” this policy (three levels are available for each), and the relative percentages of each statistic. An analysis of strategies used in the game shows that broadly pro-social (both economic and political) and pro-environment strategies dominate over those that reflect culture, neoliberal economic or militant political interests. Some minor positive reinforcement, or “nudging”, promotes the idea that players should select a balance of policies from these groups, rather than all economic or ecological policies for instance. The relative absence of cultural policies suggests this “nudging” was ineffective, with players opting exclusively for policies they think will directly benefit the planet and save the Antarctic.

<b>Table 3: Policy choice by popularity (July 2019–August 2020).</b>				
<b>Policy</b>	<b>Number of games chosen</b>	<b>Number of levels chosen</b>	<b>Percentage of total games</b>	<b>Percentage of total possible levels</b>
Fund Renewable Energy	280	570	59.2%	40.2%
Reduce Inequality	272	525	57.5%	37.0%
Green Cities	247	452	52.2%	31.9%
Global Treaties	245	443	51.8%	31.2%
Diplomacy	240	395	50.7%	27.8%
Global Education	240	447	50.7%	31.5%
Public Transport	232	420	49.0%	29.6%
Global Heritage Trust	225	389	47.6%	27.4%
Promote Democracy	198	300	41.9%	21.1%



Automate Industry	196	336	41.4%	23.7%
Free Trade Agreements	180	313	38.1%	22.1%
Social Media	173	261	36.6%	18.4%
Boost Military	115	167	24.3%	11.8%
Global Festivals	107	156	22.6%	11.0%
Celebrity Endorsements	103	167	21.8%	11.8%
Remove Regulations	89	138	18.8%	9.7%

The most popular policies for countries with at least five completed games show strong consistency (see [Table 4](#) below), with *Reduce Inequality* and *Fund Renewable Energy* appearing in eight and seven of these countries respectively. While *Green Cities* appears the third most popular overall, this is due to the dominance of the Australian data; it does not appear in any other countries' top three lists. The game quantifies assumptions about the relationships between policies to model coherence: a positive value between two policies means, for instance, that when both are selected overall *preparedness* receives a small additional gain. In one case, we were surprised to find what we had perceived as a negative relationship between the policies of *Free Trade Agreements* and *Reduce Inequality*, was contradicted by games played in Mexico, where these were the two most popular policies. Despite this, players from Mexico performed well at the game, experiencing an average of 23 percent on the game's loss statistic.

<b>Table 4: Most popular strategies, by country.</b>			
<b>Country</b>	<b>Most popular</b>	<b>Second most popular</b>	<b>Third most popular</b>
Argentina	Fund Renewable Energy	Reduce Inequality	Global Education
Australia	Reduce Inequality	Fund Renewable Energy	Green Cities

Chile	Reduce Inequality	Automate Industry	Public Transport
Italy	Automate Industry	Reduce Inequality	Fund Renewable Energy
Mexico	Free Trade Agreements	Reduce Inequality	Diplomacy
New Zealand	Global Education	Fund Renewable Energy	Public Transport
South Africa	Fund Renewable Energy	Reduce Inequality	Public Transport
United Kingdom	Reduce Inequality	Diplomacy	Global Treaties
United States	Reduce Inequality	Global Education	Fund Renewable Energy

While suggestive, these results come with considerable limitations. Aside from a likely biased cohort — players would only know about the game through Antarctic Cities social media and perhaps some word of mouth — they reveal policy preferences only weakly. Although the game’s simulation allows for various strategies, so long as they are in some sense ideologically coherent, it is possible players second-guessed policies they thought could win. In forthcoming work, we report on survey results taken from samples of Antarctic city residents that are, however, broadly consistent with concerns to reduce inequality and increase the use of renewable energy. While more work is needed to establish the epistemological value of games as instruments for revealing preferences — and while this was a peripheral rather than central motivation for *Antarctic Futures* — such results point at least to the potential for statistics to contribute to other methods of analysis. More significant are the ways policy selection tends to reinforce or — with interesting geographical emphases — query assumptions we as designers of the game had embedded to “nudge” gameplay and provoke discussion. Rather than functioning, in turn, as a stimulus to further revision that seeks to correct those assumptions, the spread of policy selection over time and place can be interpreted as a textured overlay to *AF*’s narrative.

### **Establishing polar grounds: Counter-fun, performative scholarship and discourses of discomfort**

Recounting one workshop participants’ opinion of our game, we reflect upon our broader experiences of developing and promoting *Antarctic Futures* as embedded

in notions of “counter-fun” where the game’s “seriousness” narrows its user base to specific pedagogical contexts, but its legitimacy as an academic product is also challenged. Our efforts also taught us about the merits of engaging climate change from a position of what Halberstam (2011) terms “low theory”, an approach to theoretical work that combines the playful with the “often impossibly dark” and serious realm of climate science. A growing group of scholars have acknowledged this contradiction and argued that there is an element of unknowability and incomprehensibility on the issue of climate change as a “high” theory — how humans engage with the planet, due to its scale (Morton, 2013), its unthinkability within “rational” realism (Harman, 2018), or, ironically, its lack of groundedness (Latour, 2018). Such “high theory” is marked by an ever-growing canon of environmental science that in its own planetarily, severity and urgency of policy prescriptions discursively mirrors this sense of impossibility: a world imperilled, and only perhaps salvageable by the expertise and power of a sufficiently motivated global elite. We suggest that through small interventions like our game, we identified openings that allowed us, in our research practice, to capture glimpses of alternate pathways that could be traversed collectively by researchers, participants, gamers and critics. And not only through gaming itself.

We further align our experiences with the characterisation of the digital academic, who “with the advent of digital technologies and their introduction to the academic workplace ... has increasingly become part of a globalised market” [17]. Others such as Frost (2017) have argued for a reconceptualization of an “emerging career trajectory that is less publish or perish, than platform and flourish” [18] as “connected” academics simultaneously produce and share their work through digital platforms. However, our experiences as academics performing the simultaneous roles of game developer, Web designer and social media manager raised issues of legitimacy that were multi-fold: the specialisation of our skills to perform these hybrid roles; our position as social science and humanities researchers experimenting with the politics of climate change; and our use of alternative pathways to intervene on debates on political action — echoed by the words of the workshop participant with which we opened the introduction of this essay. While these comments are not representative of our participants in general, they articulate in the extreme form an ambivalence that expresses itself more often as jaded indifference, sceptical bemusement, or “polite” participation. Such ambivalence points to the problematic discursive category of the serious game: neither necessarily fun to play nor avowedly pedagogical, it seems to request a form of labour without commensurate return. It is precisely this uncertain equation that makes the serious game “counter-fun”.

We, therefore, expand the notion of counter-fun to encompass all our research activities involved in the development and promotion of *AF*. From ideation to dissemination, our approach was deprived of elements linked to conventional strategies of game development, Web design and social media tactics. As academics working on a variety of projects and casual roles simultaneously, our

ability to holistically engage these tasks was also limited. At the same time, our work on *AF* was also flavoured by affective reflection, contemplation and fatigue but strongly linked to the intrinsic benefit derived from working with the research team and learning new skills. This tendency, an “intellectual *jouissance*” [19], creates an “affective economy” where participants develop a deep sense of attachment to creative scholarly work (Ahmed, 2004; Gill and Pratt, 2008; Freund, *et al.*, 2017). From a “counter-fun” perspective, particularly concerning the development of indie games such as *AF*, Pérez Latorre (2016) highlights the element of “cultural seduction” such work entails — a sort of invitation to feel part of a high intellectual and cultural community. The counter-fun positioning of *AF* and its associated outputs can be viewed as a “labour of love” where efforts to *complete* the backlog or *perfect* the game were rewarded by the joy of the task itself but are also the “hidden icebergs” of academic labour [20]. Activities like ticking items off the backlog, refining the game, increasing our social media presence, organising workshops, requesting feedback from users and hoping for some level of formal uptake of the game were aspects of our project strategy but also experiences that ultimately carried reflective potential for us as researchers.

From the outset, we did not expect *AF* to generate huge uptake, as measured by usual metrics of success. However, our experiences of developing and promoting *AF* illustrate how academic participation in non-traditional outputs such as serious games, web development and social media involves affective academic labour characterised by performative configurations of traditional and new forms of professionalised academic metrics (Harvey and Shepherd, 2017). Such performativity nonetheless requires the cultivation of new skills and practices for academics and participants alike. Through workshops, social media and industry partnerships, the participatory demands of academic projects like *AF* create additional avenues, as Kafai and Peppler (2011) suggest, for discourse around critical, creative and ethical aspects of policy and research. This also allows the recognition of the often invisible labour of those who are not part of the core research team, like the workshop participants, the AYC, and our social media followers who continue to contribute in valuable ways to the project. We therefore conclude that the productive possibilities of counter-fun located amidst these ambiguities between traditional/non-traditional outputs outweigh the debates on legitimacy as we outline throughout this article. At the same time, we register the problems associated with modes of non-academic engagement that purport, in the same breath, both to refute and comply with the demands of entrepreneurial scholarship. In other words, academics *should* code games and dabble with social media and other non-conventional techniques and methods.

Such pathways also imply risk, reputational and otherwise. As academic funding and tenure become increasingly tied to narrow bands of performativity, taking careerist detours into work less recognisably scholarly puts an economic cost to the “refusal of mastery” — even if, outside academia, such work is more recognisable. Such refusals belong to an environmental discursive strategy that echoes Latour’s

call to move beyond the purely rational. This involves breaking what might be considered the fourth wall of academic labour, which presumes both a scene containing the apparatus of conspicuous scholarship — scholars, literature, debate, critique and so on — and a recognisable means of transmission and translation of that scene to an — always presumably less informed public. Rejecting mastery in our case, as we have narrated here through the design and promotion of a software game, carved out a deliberately amateur undercommon: a space of collaboration, affect, experimentation and, ultimately, the ambivalences associated with counter-fun.

Our future plans for the game itself are in part determined by the same exigencies of funding and career options. We intend at the same time to find creative means for continuing to mobilise the game as a communicative and interactive simulation that translates, but also complicates, scientific evidence for non-scientific audiences. One of the motivations for the style as well as implied argument of the game is the lack of accessible media situated in the gap between games (serious or otherwise) and simulations that utilise agent-based modeling approaches in scientific and social science research. *Antarctic Futures* exemplifies a potentially novel direction between these two genres — neither entirely fanciful, nor an instrument of scientific research, but a bridge between the two. Simulations and models, which have acquired a certain problematic legitimacy of their own, can be de-mystified through “gamified” variants that open space for contestation about the assumptions they make.

On a more prosaic front, we acknowledge the need for the game to involve more committed strategies of engaging adolescent and young adult players in particular. This includes developing more coordinated marketing campaigns through social media and features that track progress and achievements within the game itself. We also intend to work with educators on other environmental and social scenarios, to extend the game’s application to teaching situations. Although the open source software landscape has itself become crowded and competitive, we plan to recruit a larger pool of developers to contribute to and extend the game, including for uses potentially unanticipated. Finally, we anticipate further evaluation of the game’s actual pedagogical effects: what is it that people learn through serious games like *Antarctic Futures*? How does this compare with other teaching materials, including other media (films, animations, quizzes and so on)? What can serious games adopt from many of the — often problematic — hooks offered by successful casual mobile games that employ leadership boards, achievements, in-app purchases, social interaction and well-funded social media marketing campaigns to boost player numbers and retention? And how can games be subject to the kinds of critical readings, peer review and intellectual excitement as traditional scholarly outputs? While the fad of gamification may be over, as Boellstorff (2006) has argued, the study of games as modes of theorising and acting upon social practice remains an emergent field.

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## Notes

1. Pérez Latorre, 2016, p. 28.
2. Or perhaps what Nicole Seymour (2018) has called “bad environmentalists”.
3. Latour, 2018, p. 14.
4. “‘Dangerous, misinformation’: News Corp employee’s fire ... .” 10 January 2020, at <https://www.smh.com.au/environment/climate-change/dangerous-misinformation-news-corp-employee-s-fire-coverage-email-20200110-p53qel.html>, accessed 22 January 2020.
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6. “Andrew Forrest claims bushfire crisis is caused by arsonists ... .” 8 January 2020, at <https://www.dailymail.co.uk/news/article-7867617/Andrew-Forrest-claims-bushfire-crisis-caused-arsonists-not-climate-change.html>, accessed 22 January 2020.
7. “As fires rage, we must use social media for long-term change ... .” 8 January 2020, at <http://theconversation.com/as-fires-rage-we-must-use-social-media-for-long-term-change-not-just-short-term-fundraising-129446>, accessed 22 January 2020.
8. Kofman, 2018.
9. Wenger, 2000, p. 225.
10. Holzniekemper, 2017, p. 623.
11. Lupton, 2015, p. 80.
12. Pérez Latorre, 2016, p. 28.
13. Mewburn and Thomson, 2017, p. 20.
14. Servitje, 2016, p. 98.
15. Mitchell and Hamilton, 2018, p. 587.
16. Rintoul, *et al.*, 2018, p. 233.



[17.](#) Lupton, *et al.*, 2017, p. 2.

[18.](#) Frost, 2017, p. 9.

[19.](#) Freund, *et al.*, 2017.

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Counter-fun, scholarly legitimacy, and environmental engagement — or why academics should code games

by Marina Khan, Liam Magee, Andrea Pollio, and Juan Francisco Salazar.

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