

**SPECIAL ISSUE****Science communication in unexpected places****ARTICLE**

Improvised theatre for public engagement with the climate crisis in rural Irish communities

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Abstract

Engaging the public with the climate crisis has proven challenging due to both the technical complexity of the issue and the strong emotions evoked. “Doom and gloom” approaches run the risk of provoking backlash, despair or overwhelm, none of which support constructive action. Here we used unscripted theatre to make room for both scientific content and affective responses, towards enhancing agency in rural communities at the greatest risk of negative impacts from climate change, who are often excluded from scientific, engagement, and policy discussions. We developed a travelling improvised theatre show called ‘We Built This City on Rock and Coal’ that toured diverse Irish coastal and island communities. Mixed methods evaluation showed that self-efficacy of improvisers, scientists, and audience members on the topic of climate change increased after taking part, demonstrating the viability of improvised theatre as a science communication strategy and methodology for co-created engagement with societal challenges.

Keywords

Environmental communication; Science and technology; art and literature; Public engagement with science and technology

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1 - Introduction

Climate change is the existential threat of our time, interweaving complex science and policymaking with political conflict resulting in slow and insufficient global action [Calvin et al., 2023]. Initial approaches to communicating the science of the climate crisis focused on the planet warming, sea level rise, and potential collapse of agriculture, economy, and other necessities [Harris, 2007]. However, this 'doom and gloom' approach has been shown not to inspire behavioural change [Hinkel et al., 2020; Nisa et al., 2019], and can in fact fuel inaction, as people conclude that nothing they can do will be sufficient [Moser, 2016]. This reflects what has been found in other fields: that communicating the nuanced, self-correcting nature of scientific research is challenging [Osman et al., 2017], that emotional responses are important but complex [Chapman et al., 2017], and that public engagement around the science affecting people's choices on a day-to-day basis can get mired in pre-existing conflicts of worldview such as personal freedom versus the collective good [Placani, 2024]. Public engagement with climate science defies a "one size fits all" approach, as the cognitive strategies that influence understanding are dependent on personal beliefs, psychological distance of climate change impacts and other norms [Bain et al., 2012; N. Bostrom, 2013]. People's willingness to partake in pro-environmental or climate action is hence dependent on personal experiences, identity, agency and local risk [Bain et al., 2012; Fielding & Hornsey, 2016] as well as connection to nature [Mackay & Schmitt, 2019; Wang et al., 2021]. Established enablers of engagement include programmes focussed on place-attachment, inferring general global trends from particular (personal) experiences, and trust-building between public audiences, policy and decision makers and researchers [Broomell et al., 2015; van der Linden et al., 2015].

Art/science methodologies can incorporate all of these enablers, encouraging different perspectives and communicating scientific ideas creatively, less dogmatically and more engagingly than traditional lectures and other forms of didactic knowledge transfer [Segarra et al., 2018]. Indeed, the deficit model of science communication, where knowledge is transferred from an 'expert' to a 'layperson', is less effective than dialogic and participatory approaches where both sides listen as well as speak [Metcalf, 2019]. The deficit approach entrenches existing hierarchies, rather than challenging power asymmetries as art-based methodologies that share agency between audiences and practitioners can [Hoppe & Tolstrup Holmegaard, 2022]. In this changing landscape, science/art partnerships have emerged as powerful vehicles to engage the public with new ideas, often reaching them in unexpected places, communicating both science and art more effectively and strengthening interdisciplinary identities among researchers of all stripes [Williams, 2018; Mullen et al., 2020].

The performing arts have a particular role to play in the climate crisis, as theatre and performance centred on scientific topics have been shown to engage audiences and researchers in bidirectional understanding and critical thought [Dowell & Weitkamp, 2011]. Combining science communication with performing arts brings education into informal and nonformal spaces, which can create a bridge between formal learning environments and the wider world [Eshach, 2007]. Science/dance initiatives promote embodied knowledge among both audiences and performers [Myers, 2012], and theatre about science makes space in and out of traditional arts venues [Weitkamp & Almeida, 2022] for both technical and emotional complexity [Brunello et al., 2019; Bentz et al., 2022]. These approaches have been shown to increase engagement and confidence among underrepresented student groups [Boone et al.,

2020] and underserved communities [Pritchard et al., 2024], reaching audiences in new places and new ways [Weitkamp & Almeida, 2022]. Participatory theatre is especially effective at giving audiences agency in exploring scientific challenges [Keith & Griffiths, 2020], and participatory research methods are known to enhance place-based engagement [Roche, 2024]. No research has yet been done on the impact of fully improvised theatrical shows about scientific subjects, but the innate multiplicity of meanings that underlies comedy can help in understanding multifaceted issues like climate change, and improvisation training has been shown to help practitioners overcome conditioned responses and imagine new and possible realities [Boykoff & Osnes, 2019; Mehta et al., 2021].

In this study, we examine the efficacy of improvisation as a tool for public engagement and informal science communication with the climate crisis by analysing audience and performer responses to 'We Built This City on Rock and Coal', a project which brought fully unscripted shows to rural, coastal, and island communities on the island of Ireland. These communities were chosen as they are on the front lines of climate change, and place-based engagement has been shown to be effective in remote regions for climate action [Gislason et al., 2021]. The shows were themed around nature, climate change, and local action, with prompts provided to the audience to elicit written suggestions which were then used by the improvisers and scientists (who are both considered performers) to create unique hour-long shows in each location. In addition to inspiring a sense of agency in the audience pertaining to the climate crisis, the format of the show was designed to give agency to the performers as well. Through surveys and analysis of the written suggestions provided by the audience, we aim to answer the questions:

1. Is improvised theatre an effective means of exploring reactions to the climate crisis?
2. Does an improvised theatre show about climate change affect audience or performer self-efficacy on these issues?

2 - Theoretical background

Reaching communities where they are is an important consideration in science communication strategies [Humm & Schrögel, 2020; Orthia et al., 2021], with the specific location of these activities crucial in involving communities [Gormally et al., 2024] and connecting science to meaning and culture [Schweizer et al., 2013]. Learners thrive in environments that acknowledge their needs and experiences, and informal settings, such as within local communities, are one way to support learners bringing their prior knowledge as they engage with new ideas [National Research Council, 2009]. However, this can be forgotten when scientists engaging in science communication prioritise sharing knowledge over building trust with the public or tailoring messages to audience needs [Dudo & Besley, 2016]. Inclusive science communication should therefore centre the audience [Canfield & Menezes, 2020], but this need not be limited to generalisations when preparing content for public engagement: the audience can co-create the content and co-produce the result [Galende-Sánchez & Sorman, 2021]. The process of co-creation, for example in participatory theatre about climate change, has been shown to challenge traditional knowledge hierarchies, providing participants with a path toward 'emancipatory action' [Enria, 2016].

There is a long history of participatory theatre to tackle societal challenges. Based on educator Paulo Freire's *Pedagogy of the Oppressed* [Freire, 1994], which sought to reclaim

education from colonialism as a tool for transformation, Augusto Boal's Theatre of the Oppressed transformed spectators to participatory 'spect-actors' who explored local social issues in urban Brazil [Boal, 2000]. This approach enhances audience agency using theatrical methods as well as embodied knowledge, as a grassroots method of consciousness-raising and empowerment [Boal, 2006]. The embodied, participatory approach of Theatre of the Oppressed catalyses explorations of power, positionality, and agency in societal challenges like the climate crisis [Bennett et al., 2024]. While tools from Theatre of the Oppressed, especially forum theatre, have spread globally [Malloy, 2015], there is another form of participatory theatre that many audiences are more familiar with: fully improvised theatre (or 'improv').

The use of improv techniques to improve science communication and audience connection is well known, pioneered by the Alan Alda Center's science communication training based on improv exercises [Fessell et al., 2019]. Improv exercises have been used to enhance communication skills in pharmacy students [Boesen et al., 2009] and medical students [Rossing & Hoffmann-Longtin, 2016; Watson, 2011]. Improvisation exercises have also been used to teach science communication in a university context [Ponzio et al., 2018; Rossing & Hoffmann-Longtin, 2016], and are shown to improve self-efficacy in women and empathy in men [O'Connell et al., 2020], both of which are important factors in science communication [Bilandzic et al., 2020; Murphy & Kelp, 2023]. Healthcare professionals who took part in improv training experienced substantial increases in communication skills such as listening, non-verbal communication, and introspective communication, with the largest changes found for the participants who engaged most thoroughly with improv training [Preis et al., 2021].

In live performances, improv offers the audience a chance to witness and even participate in the creative process. Fundamentally, improv is based in the theatre games developed by Viola Spolin for use by actors as well as inner city and immigrant children [Spolin, 1999], which were adapted into longer formats by Del Close after observing the Compass Players [DePasquale & Lewis, 2012]. Improv can be comedic, and humour is an important coping mechanism for difficult subjects [Chiodo et al., 2020]. Improv has also been shown to improve participants' creativity and psychological well-being [Schwenke et al., 2020]. Use of an unscripted theatre format like improv also helps science communicators avoid preconceptions, an important consideration in rural, coastal and island communities [Alexander et al., 2024].

Coping with climate anxiety requires not just factual information, but space for affective and emotional response [Bentz et al., 2022], which is a feature of many science theatre pieces [Bevan et al., 2021]. Improvisation is a means of 'rehearsing the future' when different scenarios of the climate crisis are explored [Tysczuk, 2021]. Developing good-natured comedy centred on climate change can help students process emotions and sustain hope [Osnes et al., 2019], and the use of entertainment to facilitate communication between scientists and citizens creates an informal learning space [Stocklmayer & Rennie, 2017]. Hence, the improv format for 'We Built This City on Rock and Coal' was designed to prompt audiences to reflect on their connection to nature, as well as their affective response to the climate crisis, with the aim of eliciting mixed emotions that could be explored to result in a cathartic recommitment to action. The live nature of the events leveraged social influences in local communities, which are a key part of climate change attitudes and behaviours [Bourke et al., 2024]. The show was also inspired by hopepunk, defined by Alexandra Rowland as a narrative genre that finds meaning in the fight against injustice, and the community that is

formed by that fight, rather than the completion of that fight which is an impossible ideal [Rowland, 2019].

Whether climate anxiety leads to action or paralysis can depend on many factors, which are primarily mediated by self-efficacy [Innocenti et al., 2023]. Self-efficacy is a well-established measure of belief in individual agency, where a person's sense of control over themselves and their environment can be enhanced or suppressed by external interventions [Bandura, 1977]. While experiencing failure can reduce self-efficacy [Smith et al., 2006], it also depends on observations of the behaviour of others [Maddux, 1995], implying a relational aspect. With regards to the climate crisis, stronger beliefs in personal self-efficacy and government and collective response efficacy have been shown to correlate with stronger support for climate action, regardless of pre-existing ideology [A. Bostrom et al., 2019]. Hence, self-efficacy can be a critical ally in coping with the failure of previous climate regimes, and adapting to find new forms of collective action [Harris, 2007].

3 - Methodology

3.1 - *Show format*

'We Built This City on Rock and Coal' was developed by co-authors Fairfield and Schutte, who had both performed science-inspired improv theatre before and both participated in the Arctic Circle science/art residency, which is focused on engagement with the climate crisis. A cast of improvisers and scientists was assembled for performance and evaluation of an initial pilot show at the Dingle Arts Festival. Before a national tour of the show in 2024, there was a week of rehearsal and a press preview that included a post-show discussion with the audience and the cast.

The cast for each event comprised 5–8 stage improvisers with 6–20 years' experience, a technical improviser on a soundboard, and 1–2 scientists with expertise in environmental science, geoscience, sustainability and/or the bioeconomy. The scientists received basic improv training and could respond to audience suggestions, provide scientific context and even interject in scenes, which freed the improvisers from the fear of saying something incorrect so that they could focus on following the core improv tenet of 'Yes, And'. This tenet indicates the acceptance of whatever has already occurred in a scene as truth, so that the improvisers can collaboratively build upon the idea or statement. The improvisers spent a week in rehearsal with tailored engagement with the scientists, developing a format designed to communicate the climate emergency through improvised theatre woven together with scientific content. The improvisers also established physical and topical boundaries for safety, an important task given that not all of them had performed together before. Since ethos of the shows was hopepunk, even if scenes explored the difficulties of climate adaptation or even apocalyptic themes, resistance to despair via hopeful action was the aim, if possible, for scenes near the end of each show. 19 shows were performed in 17 locations (Figure 1), in areas with 140 to 6000 inhabitants. These locations included traditional theatre venues such as arts centres, as well as heritage centres, community halls/centres, national parks and picnic spaces.

At each show, audience suggestions were solicited through prompt questions on slips of paper, which audience members were invited to write on before the show and place into a

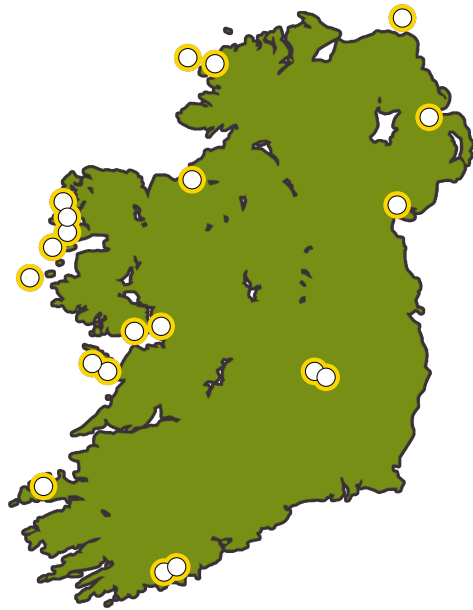


Figure 1. A map of Ireland with the locations of the shows (left) and a scene from ‘We Built This City on Rock and Coal’ (right, photo credit Anita Murphy).

box (see Table 1). This material was used by the improvisers to create short scenes, songs, and longer theatrical pieces exploring connection to nature, concern about climate change, and barriers to talking about climate change. The scientists also used the suggestions as invitations to reflect on specific topics, sharing their research and experience. While similar suggestions might arise at different shows, the improvisers never used a suggestion the same way twice, and the entire show was unscripted, developed and performed on the spot with the audience watching the creation of scenes as well as their performance. During the hour-long show, the improvisers used more audience suggestions at the start, to demonstrate that everything was in fact improvised. After the scientist had spoken and at least midway through the show, the improvisers began to link multiple scenes together without adding new suggestions. By the end of the show, characters might have recurred several times, and the improvisers aimed to incorporate as many details as possible from early scenes to raise the intensity and comedy of the performance, as well as to connect back to audience suggestions.

3.2 ■ *Recruitment*

Ethical clearance for the prompts and evaluation questions was provided by the University of Galway Research Ethics Committee (reference number 2024.05.007). Audience members attending and improvisers performing in the ‘We Built this City on Rock and Coal’ shows were invited to participate in evaluation on a voluntary basis. Convenience sampling was used, and any cast or audience members who did not agree to participate in the study are not included in the study results. Individuals under the age of 18 were excluded from the study. There were no other exclusion criteria. All answers were recorded anonymously and compliance with GDPR was ensured.

3.3 ■ Data collection and analysis

Responses to the audience prompts (Table 1) were collected at each show and used to shape the show as well as for additional analysis presented in this paper. The performers and audience were invited to anonymously fill out the survey questions in Table 2 at discrete time points. The audience were asked before and after the show to fill out paper surveys. The performers were invited to respond online before starting the rehearsal process at the start of the project, after their first show and one month after finishing the project, using unique codes to enable tracking of individual changes. These questions were selected by building on the work of Carlin et al. [2020], O'Mahony et al. [2024] and Murray et al. [2022] and the Imperial College Self-Efficacy Scale adapted from Chen et al. [2001].

Table 1. Questions shared with the audience pre-show to create prompts for the improvisers.

Pre-Show Audience Prompt Questions
1. What have you appreciated about the outdoors recently?
2. What makes climate change hard for you to talk about?
3. What has you worried about climate change?

Table 2. Performer and Audience Evaluation Questions.

Evaluation Questions	Answer Format
What one word describes how you feel about the climate today?	<i>Free choice</i>
How worried are you about climate change?	<i>Select one of:</i> <ul style="list-style-type: none">• Very worried• Somewhat worried• Not very worried• Not at all worried
How confident are you in talking to friends and family about climate change?	<i>Select one of:</i> 1 (not at all confident) — 5 (extremely confident), 0 = don't know
How confident are you that you can take action to mitigate climate change in some way?	<i>Select one of:</i> 1 (not at all confident) — 5 (extremely confident), 0 = don't know

The quantitative evaluation reported here consists of two parts:

1. Written responses to audience prompts (Table 1)
2. Survey responses from performers, as well as audience members (Table 2)

Artist R.G. interpreted the responses to Table 1, question 1 quantitatively through illustration, scaling individual images relative to their popularity. Audience responses to the prompt 'What has you worried about climate change?' were coded deductively using the six climate change areas proposed by Stewart et al. [2024], following similar principles to thematic analysis [Kiger & Varpio, 2020]. To reduce the possibility of researchers biasing each other, an initial coding of ten of the responses was independently carried out by all three coders. The resulting responses were then collectively discussed and cross-calibrated to ensure all coders shared the same understanding of the framework. The final coding was carried out on

the whole dataset by one researcher, with the other two researchers coding different halves of the dataset. The final coding was then confirmed by discussing any discrepancies between the two coders in a group discussion, where the other coder (who had not coded the data) acted as a decision maker after this discussion.

Quantitative data collected from the performers excludes the paper authors, who are represented by the qualitative observational reflections below, including the project evaluator (C.M.), to explore the impact of creating and delivering a series of improv shows about the climate crisis through partial collaborative autoethnography [Chang et al., 2016].

4 - Results

In total, 430 audience members attended the shows, of which 59% self-identified as being from a rural community in response to an informal question from the event host. The shows were intentionally timed to target and suit local communities and not tourists, for example beginning after evening ferries had left offshore islands. Ten performers (both improvisers and scientists) participated in the evaluation described below.

4.1 - Audience prompts

Audience responses to the prompt ‘What has you worried about climate change?’ were classified according to the six climate change areas proposed by Stewart et al. [2024]. The proportions of the circles for each category and the overlap between the categories in Figure 2 reveal that the physical environment and societal response were the most popular classification categories. Livelihood was the smallest category overall, with all Livelihood answers also relating to the Physical Environment. Worries relating to Future Generations overlapped with Apocalyptic Events and Societal Response, and worries relating to Living Environment overlapped with Physical Environment and Societal Response.

Audience responses to the prompt ‘What have you appreciated about the outdoors recently?’ were quantitatively interpreted by the artist R.M. (Figure 3), whereby the proportions of the items in the image correlate with the relative popularity of the keyword from the thematic coding (e.g. the large size of the bird is proportional to its frequency in the audience responses). During this coding, recurring categories were identified, e.g. jays and swallows could both be classified as birds, but birds also repeatedly appeared. These categories are presented in Table 3, where it is particularly notable that 32% of the prompts described a sensorial experience of nature and 30% of the prompts included a reference to an active enjoyment of nature such as swimming or walking. Birds at 21% were also very popular.

Table 3. Recurring categories in responses to the prompt ‘What have you appreciated about the outdoors recently?’.

	Senses	Active Enjoyment	Birds	Weather	Water	Insects
% of all responses	32	30	21	18	11	7

4.2 - Audience and performer survey responses

In Figure 4, the audience does not show a large change in their worry about climate change before and after the show, but there is a small shift in the number of performers reporting

Six worries present in audience surveys

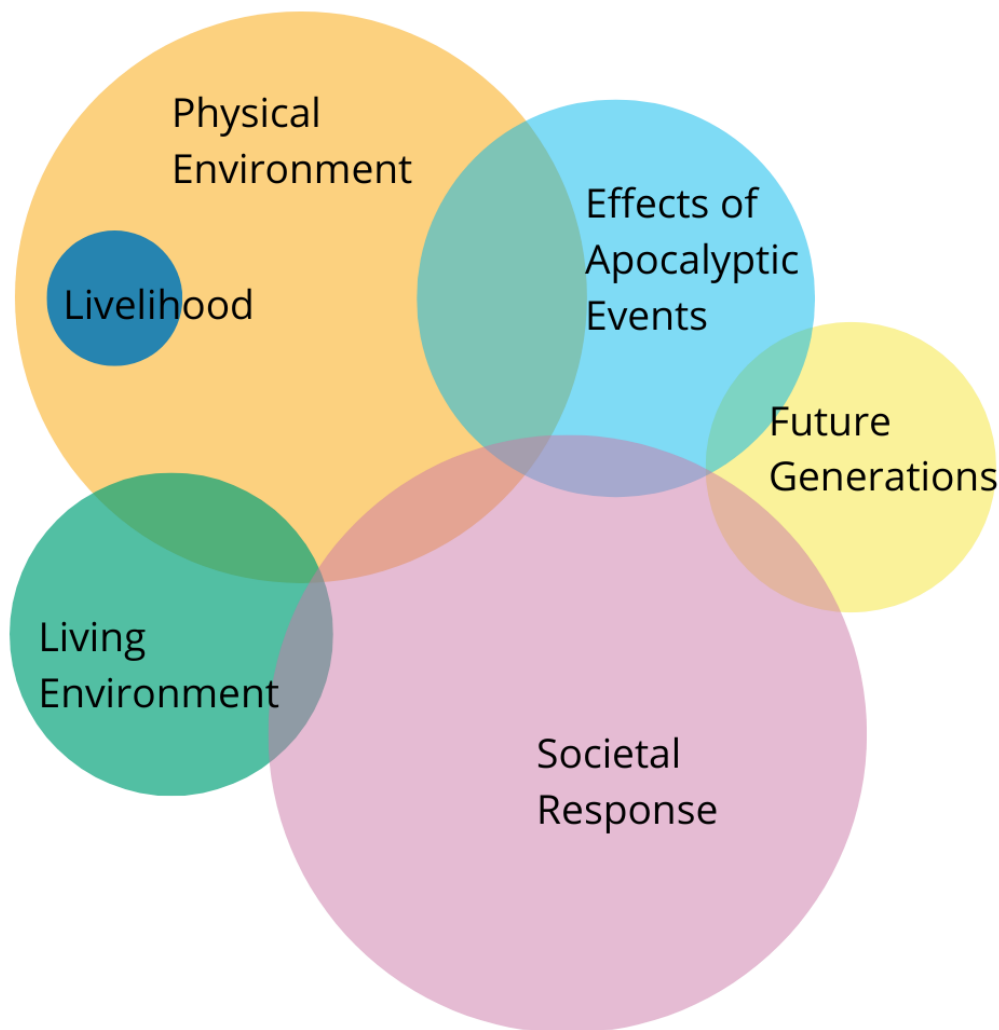


Figure 2. Classification of 76 audience responses to the prompt question ‘What has you worried about climate change?’ according to the six climate change impact areas proposed by Stewart et al. [2024].

that they are ‘very worried’ to ‘somewhat worried’ after performing in the show. The middle survey point suggests this shift occurred early in the tour for the performers. For both audience and performers, there is an increase from 46% to 61% in the number of people who feel more confident talking to friends or family about climate change after the show, shown in Figure 5, with this increase being particularly marked for the performers. The increase in the performers reporting more confidence in talking to family and friends about climate change comes after the end of the tour.

The responses to the question ‘How confident are you that you can take action to mitigate climate change in some way?’ shown in Figure 6 for the audience pre- and post-show are broadly similar. However, for the performers there is a clear shift upwards that appears to start for the performers after their first show (the ‘middle’) and subsequently climbs after the tour, with an increase in performers feeling confident in taking action from 40% to 89%.



Figure 3. A visual representation of the thematic analysis of audience response to the question ‘What have you appreciated about the outdoors recently?’.

The words shared by the performers at various stages of the show cycle in response to the evaluation question “What one word describes how you feel about the climate today?” (Table 2) were depicted using a word cloud (Figure 7). The audience were also invited to respond to this question but very few did, so their data is not included here. The figure was created with TextStudio and Canva. The size of the shadow under each word is proportional to the amount of times the word appeared as a response to the question. The colour of the shadow corresponds to the time point the performer, or performers, answered the question with that word (red for before the tour, blue for during the tour, and green for after the tour); a shadow with two colours means that the word appeared as an answer at two different timepoints. After shadows had been calculated and added to each word, the words themselves were scaled to different sizes according to the total amount of times they appeared in the surveys.

5 ▪ Discussion

5.1 ▪ Quantitative reflections

The prompts for audience suggestions remained the same throughout the tour, and some suggestions from the audience recurred frequently over many shows. For example, ‘sea swimming’ was often mentioned as a way to connect to nature (Figure 3), which across

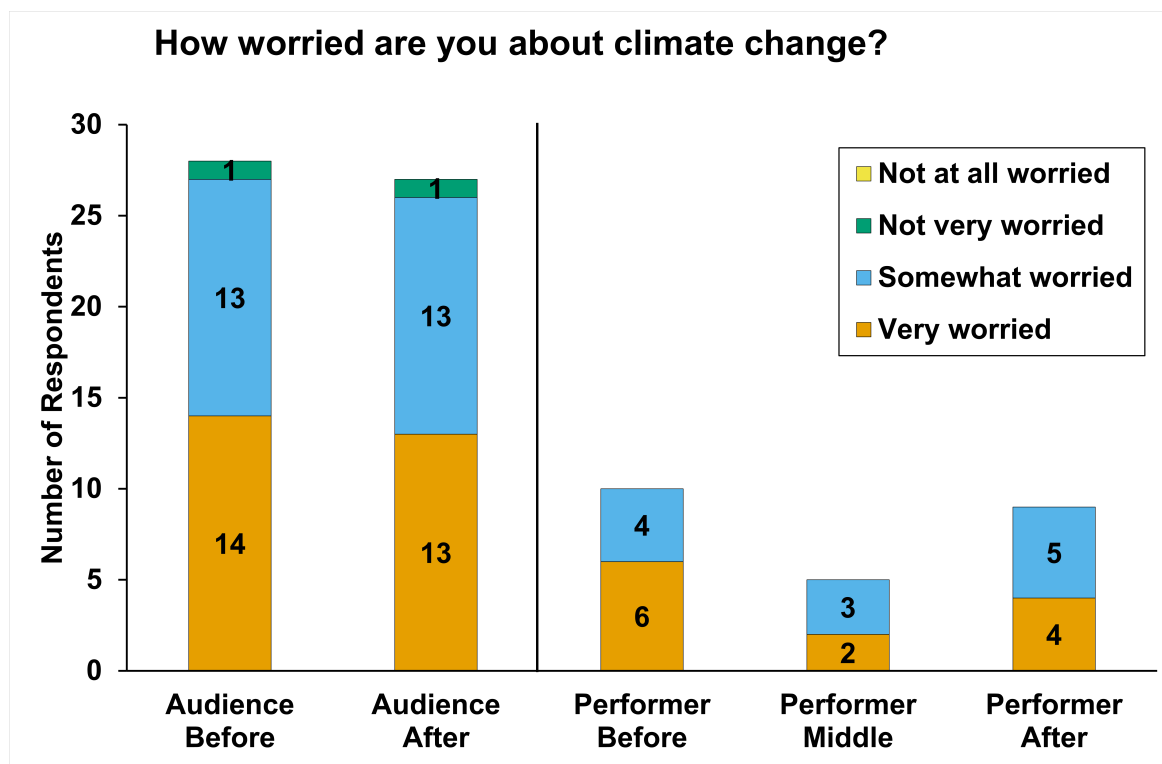


Figure 4. Audience and performer survey responses to the question ‘How worried are you about climate change?’.

different shows could result in scenes about swimming in the sea, fighting sea level rise, being fish who noticed climate change, or even being waves. Simplistic oppressor/oppressed binaries in characters and plot were resisted to explore the full complexities of given audience prompts [Diamond, 2007]. However, given that the shows were all improvised, suggestions and their theatrical interpretations were impossible to predict in advance and varied from show to show. Responsivity to the audience mattered given the importance of place-based narratives in the coastal locations visited for shows, [Silbernagel et al., 2015] pictured in the map in Figure 1.

The distribution of worries amongst the six categories of climate worry (Figure 2) provides some interesting reflection points. The relative dominance of ‘Societal Response’ emphasizes the relationality of the climate crisis, and our dependence on each other for collective action [Rowland, 2019]. Whilst 95% of Irish people surveyed by O’Mahony et al. [2024] think climate change is happening, only 54% think “Irish people are being harmed right now by climate change”. The fact that Future Generations, Livelihoods and Living Environments are the smallest categories could be connected to this lack of awareness of the local impact of climate change. However, the diversity of the awareness of nature depicted in Figure 3 suggests these audiences had a deep connection with many different kinds of nature. The many experiential and sensorial descriptions of nature seen here evoke the strong recognition of the value of nature for both physical and mental health demonstrated in the NEAR Health study [Carlin et al., 2020], and including creativity in nature-based reflections has been shown to enhance community connectedness and mobilisation [Sirisena & Cheetham, 2024].

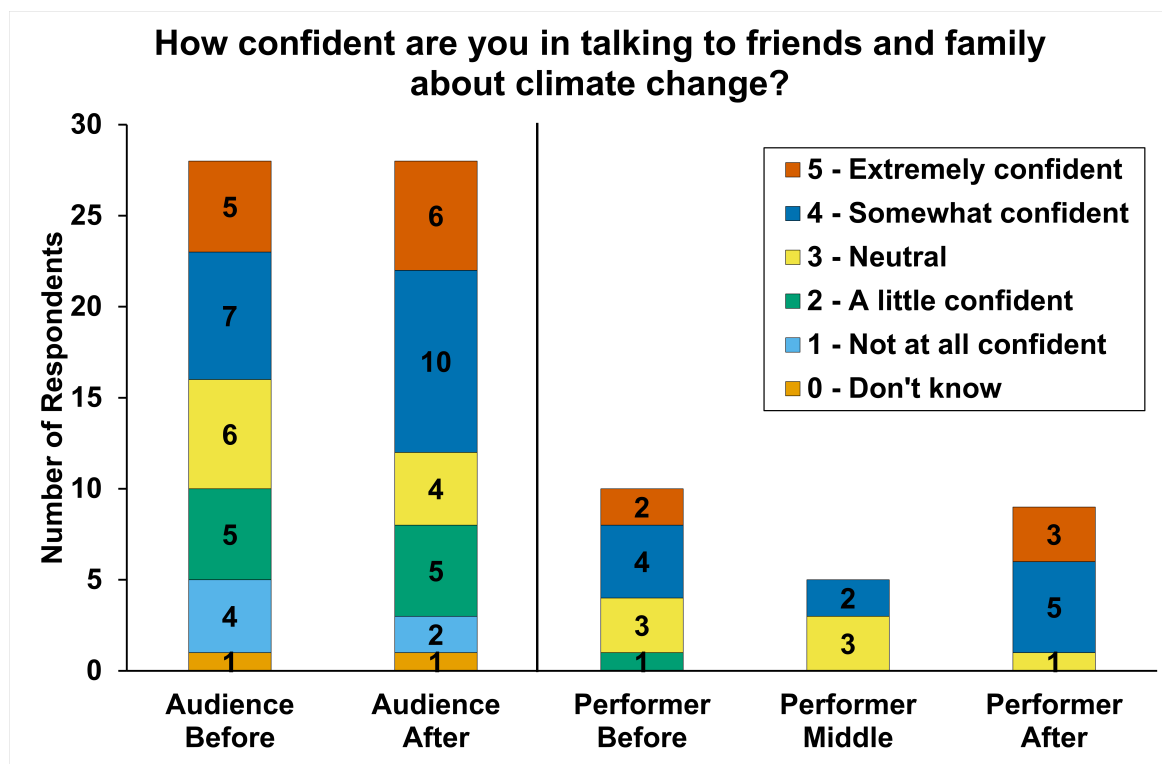


Figure 5. Audience and performer survey responses to the question ‘How confident are you in talking to friends and family about climate change?’.

The difference between performer and the audience responses to the survey question ‘How worried are you about climate change?’ in Figure 4 indicates that the performers (a group including both improvisers and scientists involved in the shows) were more worried at the start of the tour compared to the audience before the show. This could be influenced by reasons performers may have had for participating in a climate-themed show. A decrease in worry could be connected to an increase in self-efficacy, given that both audience and performer responses in Figure 5 shift towards increased confidence in talking to family and friends about climate change. Themes explored by the performers in shows often built on situations relating to interactions around climate change between family and friends, which may increase audience and performer awareness of these interactions in their own lives, while holding space for multiple kinds of emotions as well as dissensus [Hurley & Roche, 2023].

The increase in performers reporting more confidence in talking to family and friends about climate change comes after the end of the tour. During this tour, in addition to improvising in the shows, improvisers had multiple conversations together and with scientists and communities, about topics relating to climate change. These moments create an opportunity for reflection on personal self-efficacy and confidence in talking about climate change, but also in taking action. Confidence in the latter also increases for performers (Figure 6), which may have been amplified by these conversations. Figure 7 also shows a shift in the words the performers use to describe climate, with more extremely negative words like ‘bleak’ and ‘devastated’ before the tour began, and more positive words like ‘optimistic’ afterward, although ‘worried’ and ‘concerned’ dominated during the tour itself.

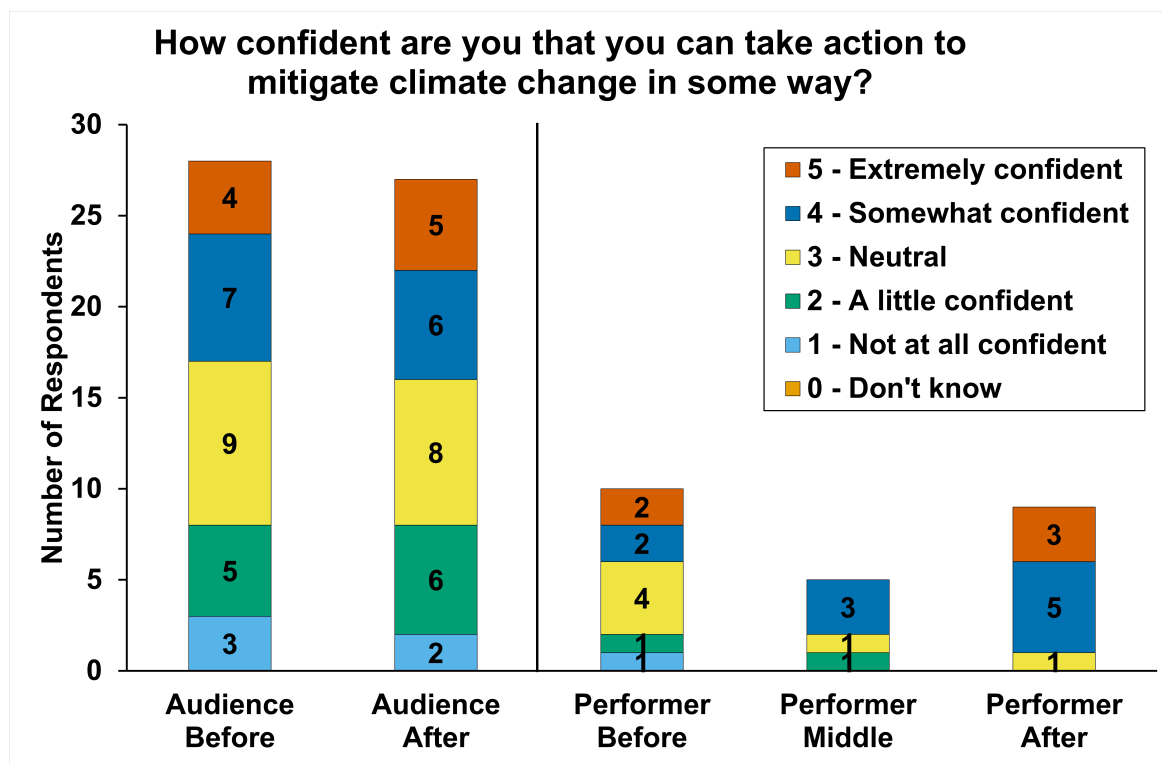


Figure 6. Audience and performer survey responses to the question ‘How confident are you that you can take action to mitigate climate change in some way?’.



Figure 7. Performers were asked the question ‘What one word describes how you feel about the climate today?’ They provided these words before, during, and after the tour, with the height of the coloured shadows representing the number of times that word occurred at the different time points.

The difference in degree of change between the performers and audience makes sense when each show is considered an intervention, which each audience received once and the performers received multiple times. Additionally, the performers were more active during the shows, and employed creative self-expression which has been shown to improve self-determination in science communication [Gallagher et al., 2025].

5.2 ■ *Qualitative reflections*

Rehearsal perspectives. The nature of improv means improvisers need to be familiar with a broad range of topics and able to rapidly move between them, in order to quickly swap between audience prompts. Most of the improvisers had previously worked with scientists, were open to learning about climate and already worried about climate change. However, improvisers still had questions about how to convey science onstage. Initial concerns about the accuracy of statements the improvisers might make on stage were assuaged by providing the scientists with a bell they could ring to interrupt a scene, to either add context or provide corrections. Knowing that someone else was responsible for the factual accuracy of the scene helped the improvisers avoid second-guessing themselves, an important aspect of live performance. The improvisers also spent sessions establishing which improv tools to make use of (such as tagging) and a rough structure for the show, in terms of how frequently to read new suggestions and when to focus on two-person scenes versus group scenes. As hopepunk was the agreed upon ethos of the show, there was substantial discussion around apocalyptic themes and villainous characters, and the artists wondered how much freedom they had with this when portraying scientists, politicians, and other actors in the climate crisis. Rehearsal scenes and exercises worked toward improvised theatre that acknowledged difficult emotional realities as well as discovering micro-actions toward transformation [Pascoe, 2025], paralleling play-based processes which have recently been used in live-action role-playing as a means of place-based climate education [Innocent, 2025].

In an interesting duality, the scientists were observed to have many questions and uncertainty about performing in the show [Gallagher et al., 2025]. They had previously worked extensively on communicating key themes of the climate crisis, but were clearly hesitant about the mechanics of participating in an improv show. The fast-paced interactions between the improvisers comes from years of practice, so this was a steep learning curve. This was particularly evident with the improvisers' use of tagging, which enables improvisers to communicate to the others to join, pause or leave a scene through pre-agreed signals (usually hand signals). Inherent in the act of tagging is an understanding that the improviser wants to take space on the stage and to explore a new or related idea. This was a new concept for the scientists and requires a different approach to communication compared to giving scripted outreach talks to a group. It can be intimidating to quickly insert yourself into a scene, especially when the scientist has no idea what they might have to talk about or where they might end up and the decision must be made in the moment. It was also challenging at first for the scientists to override their enjoyment of the show and think as an editor about how and when to incorporate themselves into the narrative onstage.

Tour. The varied audience suggestions in each location, the changing cast and the increased confidence and comfort amongst the team meant the show naturally evolved over the period of the tour. The recurrence of some suggestions was also an opportunity for improvisers to return to topics or themes to re-explore them in new ways. The scientists were

also observed to gain confidence over the tour of the show, where initially they did not feel comfortable taking space on the stage and were mostly invited to take space by the improvisers. However, increasingly the scientists were observed to be more confident jumping in unprompted to address points shared by the improvisers. Many improvisers noted the diversity of the audience compared to regular improv attendees from cities, namely that audience members covered a very wide age range and most seemed to not have seen improv before. Reflecting on who was in the room, it should be noted that some people who expressed scepticism of climate change did attend the shows and shared their perspectives in both responses to the prompts and in verbal/written communication after the show.

An important contributing factor to the shift in performer responses in Figure 4, 5 and 6 was the interactions observed by the evaluator between the scientists and the improvisers outside of the show. The surrounding nature in uniquely beautiful areas of rural Ireland and the theme of the show led to multiple exchanges and discussions about the climate during bat walks, garden tours and in the pub. The improvisers even took on science communication roles by sharing facts they had learned with the audience as part of the show. There were also multiple exchanges between the performers and the audience after the show, where audience members would independently approach the improvisers (as well as the scientists) to share reflections or perspectives that resonated with them, as well as sharing stories of their own experiences. That these interactions between previously unconnected people about the climate crisis were initiated through the show creates an important point of reflection on the place of arts to humanise complex and existential topics.

5.3 ▪ *Limitations*

There are several limitations for this study that constrain the generality of results. The small numbers of performers and audience members invited to participate were a natural consequence of the rural nature of the shows. There are also different survey timepoints for both groups for the evaluation survey, where the audience were surveyed directly before and after the show, whilst the performers were surveyed before, during, and after the series of shows. Of the cast of 'We Built This City on Rock and Coal', one improviser (K.S.), two scientists (G.K. and F.M.) and one improviser-scientist (J.F.) are co-authors on this paper.

6 ▪ **Conclusions**

Improvised theatre is an effective and novel way of engaging communities with the climate crisis, incorporating scientific facts with space to explore personal responses. The responsive nature of the events allows the cast of improvisers and scientists to embed the show in local geography, creating place-based narratives that are developed on-site and not based on pre-conceptions. By analyzing written responses to audience prompts, we explored their connection to nature and found that their climate change worries centred on the physical environment and societal response. Self-efficacy in terms of both talking about climate change and taking action was measured using pre- and post-surveys, showing a substantial enhancement in performers, and a marginal enhancement in audience members. The degree of this change tracks with the length of time each group encountered the project.

While the improvisational nature of 'We Built This City on Rock and Coal' enabled theatre which addressed the specific climate change concerns of the audience present, it should be

noted that the success of such a show hinges on two things: capable improvisers who can address complex technical and emotional topics in their creative practice, and scientists who have a broad range of knowledge and who are motivated and able to provide accurate and relatable scientific contributions to an event without script in hand. The rehearsal and training period, for both improvisers and scientists, was essential for this process, and while improv has been used for a long time as a science communication training tool, training scientists to contribute to an improv show requires additional effort (and willingness by the scientists to step outside their comfort zone). Based on this project and the global success of forum theatre, improvised theatre and collaborative storytelling could be useful for bringing together rural communities with policy makers and decision makers from other sectors, to sidestep entrenched interests and discover novel, place-based, and community-led solutions to the climate crisis.

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