

contributed articles

DOI:10.1145/2500889

How to create and resolve discomfort for a thrilling and memorable experience.

BY STEVE BENFORD, CHRIS GREENHALGH,
GABRIELLA GIANNACHI, BRENDAN WALKER,
JOE MARSHALL, AND TOM RODDEN

Uncomfortable User Experience

THE INCREASING USE of computers in games, rides, performances, installations, and other cultural experiences is shifting the focus of user-experience design from the traditional usability goals of learnability, performance, and minimizing errors to new ones, like fostering emotional and aesthetic engagement.¹⁷ This switch inspires unconventional approaches that turn traditional interaction design on its head, as in, say, celebrating the role of ambiguity rather than clarity¹¹ and transforming system limitations into opportunities.⁴ Here, we integrate perspectives from human-computer interaction (HCI) and performance studies to explore the deliberate engineering of discomfort as a way to create intense, memorable interactions and engage challenging themes.

Uncomfortable interaction—managed carefully and ethically—may become an important tool for designers, promoting entertainment, enlightenment,

and sociality. We draw on our experience creating and studying interactive performances and amusement park rides to explore how discomfort can address the following questions:

- What are the potential benefits of uncomfortable interaction?;
- What forms can such interaction take?;
- How can discomfort be created?;
- How can it be embedded in an experience?; and
- What ethical challenges must be addressed?

Benefits

Uncomfortable interaction causes a degree of suffering to the user, mentally through suspense, fear, and anxiety or even physically through movement, exertion, and pain. While suffering is not the goal of a cultural experience, discomfort is often employed in a transitory way to realize three key benefits:

Entertainment. Discomfort can arouse and excite and so entertain us. Amusement park rides employ extreme acceleration, sudden drops, and inversions to create the visceral sensation of thrill, while games and films (rides, too) employ an uncomfortable feeling of suspense through anticipation of dangers to come. Discomfort may increase the subjective intensity and memorability of such an experience, heightening a participant's sense of flow, or the psychological state of deep focus associated with immersive activities like computer games.⁵

» key insights

- The deliberate use of discomfort in interaction design can help produce a more entertaining, enlightening, socially bonding cultural experience.
- Designers can employ combinations of visceral and cultural discomfort by distorting control and social relationships.
- Embedding discomfort into an overall user experience must be done with care and reflect ethical considerations.



Enlightenment. Discomfort can frame our engagement with challenging themes, provoking us to reflect on our feelings and responses. Artistic works that confront challenging themes may employ discomfort to establish an appropriate tone, demand personal commitment, avoid trivialization, and promote empathy and respect. Religious and spiritual practices may involve abstinence, fasting, and asceticism.

Sociality. Confronting discomfort can prompt social bonding through shared rites of passage, as in, say, a child's "first" roller coaster ride⁸ or adolescent boys watching horror films together.¹² The same principle is in effect in team-development activities involving physically demanding tasks.

Examples

The arts, especially the performing arts, involve a longstanding tradition of discomfort. In the 1930s, German poet and playwright Bertold Brecht proclaimed theater should contain some level of *verfremdung* (alienation), causing unease or discomfort by encouraging the audience to look at something or someone from another's point of view.³ The latter part of the 20th century saw numerous performances that pushed the boundaries of discomfort, including Marina Abramović's "Rhythm O" (1974) where the audience was encouraged to apply a gun, bullet, pocket knife, axe, and matches to a performer's body and Vito Acconci's "Project for Pier 17" (1971) where the audience was invited to a late-night meeting on a derelict pier to hear Acconci confess a secret. Since the 1990s, the Cypriot-Australian performance artist Stelarc has created a series of works in which audience members are invited to observe his suspended body being moved and controlled by machinery and, in one memorable case, remotely controlled through electric stimuli.²¹

While artists may intend to push the boundaries, discomfort is also found in mainstream entertainment, from the visceral thrills and scares of an amusement park ride to the suspense of computer games, with the latter including even commodity electric-shock game controllers.⁹ HCI researchers and designers of tangible in-



Designers may prefer materials that are rough, tight, prickly, sweaty, or otherwise physically unpleasant.



terfaces have also experimented with discomfort; for example, users of "The Meatbook" (2007) interacted with the system by manipulating raw meat;¹⁴ exertion games involving intense or stressful physical interaction (such as punching, kicking, and hanging from ceiling bars);¹⁸ "I Seek the Nerves Under Your Skin" requiring participants to increase their running pace to hear a frantic punk poem;¹⁵ and "Mediated Body" transgressing conventional social norms by requiring participants to stroke a performer's body in public view to explore an interactive soundscape.¹³

Even this brief dip into the arts and entertainment reflects how routinely discomfort is employed in all manner of cultural experiences. In order to ground a more in-depth exploration of the phenomenon consider the following examples:

"Breathless." This prototype amusement park ride, created as part of the Horizon Centre for Digital Economy Research Day in the Park project, focuses on entertainment in the mainstream setting of an amusement park as part of a long-term exploration of future ride technologies. An early prototype in which a conventional bucking-bronco ride was controlled through a chest-strap breathing monitor highlighted the potential of using breathing to control rides, especially by requiring riders to simultaneously battle the ride and their own physical response, focusing them inward on their own feelings.¹⁶ "Breathless" extended this approach in 2011 by upping the discomfort level through respiration sensors embedded into a Wi-Fi-enabled gas mask to control a powered swing while requiring the rider to breathe in harmony with the swing's resonant frequency to make it go higher.

This control mechanism was embedded in an overall ride experience through a design inspired by Fragonard's painting "The Swing" (1767), an erotic scene involving three people: a woman on a swing, a voyeur in the bushes watching the woman's exposed legs, and a bishop controlling the swing through a pull rope (see Figure 1). This scene was mapped onto a ride structure in which a participant would move among three distinct

roles: voyeur, rider, and controller. Upon arrival, participants would join a queue, to be fitted with a gas mask when reaching the front. They were then taken to a specific location where they would be the voyeur watching a floodlit rider swinging before them. Next, they mounted the swing as the new rider and subsequently took the role of controller. Each ride began with the controller's breathing driving the swing but transferring swing control over to the rider halfway through.

"Ulrike and Eamon Compliant." In contrast, in an example from the arts, the British artists Blast Theory are renowned for their mobile and interactive performances, several of which have been studied within the HCI context.² "Ulrike and Eamon Compliant," created for the 2009 Venice Biennale, addresses the theme of terrorism, inviting participants to enter the minds of one of two notorious international terrorists, Ulrike Meinhof and Eamon Collins. The work takes the form of a solo city walk where participants receive a series of automated phone calls guiding their direction while narrating episodes from the lives of either Ulrike or Eamon, detailing the events leading to their terrorist acts, their subsequent arrests, and ultimately their deaths. The instructions are designed to establish a sense of constant surveillance and increasing compliance through such tactics as requiring participants to perform physical gestures (such as stopping in the middle of a bridge and touching their heads) (see Figure 2) or taking off their sunglasses and sitting on a bench. They are twice asked to confirm they wish to proceed.

Participants are eventually guided to a deserted alleyway leading to a canal (or similar landmark in other cities) where they are asked to make one final commitment to continuing the journey. If yes (nearly all do), they are guided to a waiting performer who leads them to an interview room with two chairs and a mirror to be interviewed by a second performer who asks their personal views on terrorism, leading to the question, "Could you imagine a situation in which your community is being attacked, with people killing your neighbors and friends at random, and where you

Figure 1. Rider on the Swing, with human controller in background, in "Breathless."



Figure 2. Complying with an instruction in "Ulrike and Eamon Compliant."



Figure 3. Final interview in “Ulrike and Eamon Compliant.”

might have to fight?” As they are led from the interview room, they are invited to pause behind a (one-way) mirror to briefly watch the next participant being interviewed (see Figure 3).

Uncomfortable Interaction

These scenarios reflect how uncomfortable interaction can be in practice, identifying four primary forms of discomfort, each leading to a set of design tactics:

Visceral. In light of the growing interest in physically embodied interaction,⁷ we first consider visceral discomfort, referring to the aspects of our personal experience relating most directly to physical sensation, from the unpleasant sensation of materials to demanding stressful or strenuous movement to causing pain. They reflect three tactics for creating visceral discomfort:

Design unpleasant wearables and tangibles. Devices can be uncomfortable to touch, hold, and wear. The gas mask from “Breathless” has a striking physicality—hot, sweaty, and claustrophobic, with an overpowering rubbery smell—while the tactile sensations of “The Meatbook” evoke disgust. Designers may prefer materials that are rough, tight, prickly, sweaty, or otherwise physically unpleasant;

Encourage strenuous physicality. The second tactic is to drive interaction through unusually strenuous physical activity. Roller coasters and other thrill rides place physical stress on the body through high g-forces, inversions, rolls, and drops, while “I Seek the Nerves” and other exertion experiences generate intense feelings through exertion or stressful positions (such as hanging from ceiling bars);¹⁸ and

Cause pain. The most extreme tactic is to cause pain, as through, say, electric-shock game controllers. An effective tactic here is to deliver “acute” pain (in the sense of transitory rather than especially strong) as opposed to “chronic” pain while not causing physical damage.

Cultural. A contrasting form of discomfort invokes dark cultural associations:

Confront challenging themes and difficult decisions. The cultural acceptability of material considered adult, difficult, or vulgar provides a significant (and shifting) boundary for discomfort. Interactive works increase discomfort by requiring users to take difficult moral decisions directly, rather than being left to observe; for example, “Ulrike and Eamon Compliant” invited participants to defend or

reject the actions of terrorists; and

Design culturally resonant devices. Cultural associations extend to the form of the interface itself. In addition to visceral discomfort, gas masks may invoke chilling associations with, or even memories of, warfare and civil unrest. Such resonance may be culturally and contextually specific, as in, say, the contrasting associations of a gas mask in a war museum compared to a fetish-themed nightclub.

Control. HCI guidelines have long maintained that the locus of control should remain with the user;²⁰ that is, it is generally good when people control the interface rather than the interface controls them. Experience designers can therefore generate discomfort by distorting this relationship:

Surrender control to the machine. Part of the thrill of a ride involves giving up control to a machine, being strapped in and unable to dismount. Interactive experience opens up the possibility of partial or unreliable control; for example, the “Bronco-matic” invoking the powerful feeling of simultaneously battling to control a ride and one’s own body while ultimately losing control of both;

Surrender control to others. Theatrical performances typically involve surrendering control to performers, possibly engendering uncomfortable feelings of disempowerment. This surrender is a familiar tactic in many everyday conventional performances, as in, say, a comedian singling out an audience member; for example, “Ulrike and Eamon Compliant” demands deep compliance with detailed instructions, while “Breathless” involves surrendering control to another participant; and

Require participants take greater control. Discomfort can be found in assuming greater control of others, as it may invoke feelings of power, responsibility, capriciousness, and mischief. Thus, “Breathless” requires participants to control others, as well as being controlled by others, while Blast Theory’s performance “Uncle Roy All Around You” invites online participants to control pedestrians on the streets of a remote city.¹

Intimacy. Computers are increasingly employed to maintain social

relationships, giving rise to various social tactics for creating discomfort:

Isolate people. Isolating a participant from friends and family is a common tactic, leaving them alone in an unfamiliar environment. Isolation is not only disturbing but naturally focuses people inward on their own feelings. Both “Ulrike and Eamon Compliant” and “Breathless” exploited this tactic, with the former requiring solo exploration of Venice and the latter using gas masks to anonymize participants, reduce their ability to communicate, and focus them on their own breathing;

Establish intimacy with strangers. In contrast, intimate encounters with strangers can be especially uncomfortable. The one-to-one interview in “Ulrike and Eamon Compliant” is a challenge, while the “Mediated Body” required participants to physically touch a stranger’s body; and

Employ surveillance and voyeurism. This final tactic emphasizes the sense of vulnerability inherent in surveillance by unseen observers, as implied by the instructions in “Ulrike and Eamon Complaint.” There is also discomfort in watching others, as in, say, the helplessness a viewer would feel watching loved ones on a dramatic roller coaster ride. The reverse is the illicit thrill of voyeurism exploited by “Ulrike and Eamon Compliant” when participants are invited to look through a one-way mirror.

Embedding Discomfort in the Experience

Having identified tactics for creating uncomfortable interactions, recall that our intention is to employ them in the longer-term pursuit of entertainment, enlightenment, and sociality. Discomfort is not our overall goal but rather a transitory point on a journey. Again, an experience designer can turn to the field of performance studies for assistance. The European Renaissance of the 14th–17th centuries saw development of the classic five-act performance structure consisting of exposition, rising action, climax, falling action, and dénouement, as visualized in Gustav Freytag’s pyramid (see Figure 4) based on Aristotle’s earlier three-act structure.¹⁰ The pyramid gives an experience designer an



A variety of risks must be considered, from physical danger and injury to emotional trauma to social embarrassment.



elegant way to embed uncomfortable interaction into an experience:

Exposition. The first act addresses the initial framing of the experience to set an appropriate expectation. In “Ulrike and Eamon Compliant” the exposition takes the form of an initial briefing that explains the work, while the branding and ratings of rides support judgment of what is appropriate;

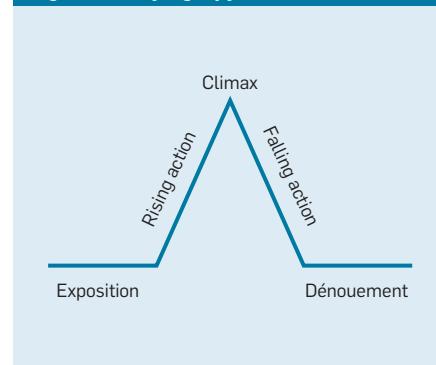
Rising action. Anticipation of discomfort increases as the experience proper begins and suspense builds; for example, a roller coaster gradually rises up a ramp toward the first drop;

Climax. Anticipation is now transformed into experience. Two important principles guide the design of this moment: First, it must be transitory, or relatively brief compared to the exposition and rising action, with effects that pass quickly. Thus, electric-shock game controllers deliver brief shocks after long periods of suspense, while the initial drop on a roller coaster takes seconds compared to perhaps an hour of queuing and waiting. Lingering feelings of nausea are a different matter, and it is unlikely that anyone would deliberately design a ride to deliver such discomfort;

Falling action. Discomfort is followed by a moment of release or catharsis that may be associated with feelings of intense pleasure, even euphoria. The designer might seek to extend such feelings for a while by, say, adding gentle curves to the end of a ride; and

Dénouement. The final act addresses the importance of reflection, letting participants assimilate the discomfort, share it with others through storytelling, deliver new insight, or simply enjoy the bragging rights of having survived, supported by a photo and,

Figure 4. Freytag’s pyramid.



perhaps, other souvenir objects.

This structure can be extended in various ways; for example, multiple climatic moments can be embedded into a complex experience, as in, say, designing climbs, drops, and loops into a roller coaster or twists and false endings into a narrative. An experience may deliver different feelings when repeated (such as when suspense gives way to the pleasure of physical movement) or adapted to participants so as to provide them with a fresh experience each time round; some roller coasters even involve control of individual seats. A final option is to reveal how discomfort was engineered during the dénouement (such as participants looking back through the one-way mirror in "Ulrike and Eamon Compliant"), reflecting the way stage magicians sometimes reveal their trickery as part of the set up for a further trick.

Ethics of Uncomfortable Interaction

Finally, deliberately introducing discomfort into an experience requires ethical consideration; the following comments therefore address key ethical challenges:

The first overarching question is to consider on what basis an experience designer might justify the deliberate use of discomfort at all. While deontological ethical systems are based on an axiomatic definition of the rightness or wrongness of actions, other schools of ethical thought since the 19th century British philosopher Jeremy Bentham have argued a consequentialist position that assesses the goodness of an action solely in terms of that goodness or otherwise of its consequences.⁶ Adopting this point of view, might an experience designer justify a degree of short-term discomfort through the longer-term benefits to participants of entertainment, enlightenment, and sociality? An experience designer might ask: Would the participants be happy in hindsight with what has occurred? And given what they know afterward would they still have chosen to take part?

A second potential route to justifying an uncomfortable interaction focuses on an individual's right to choose. Contemporary Western eth-

An experience designer might ask: Would the participants be happy in hindsight with what has occurred?

ics and human rights follow the 18th century German philosopher Immanuel Kant and others in assigning a primary value to the individual, and in particular to free choice and self-determination, possibly including the right to deliberately choose discomfort, subject to limitations of its effect on others and assuming the individual is competent to make such a decision. This idea is commonly invoked in relation to an artistic or entertainment experience where both artist and audience could claim a right to freely express themselves through acts of creation or participation. However, the same principles of individual value and autonomy also disallow the arbitrary imposition of discomfort on another, at least against that person's will.

Such arguments do not, of course, provide blanket justification for uncomfortable interaction. Rather, designers must carefully weigh each experience, focusing on specific ethical concerns, and balance any temporary discomfort against the longer-term value of entertainment, enlightenment, and social bonding:

Informed consent. The idea of informed consent is challenging for cultural experiences, especially those involving surprise, where, by definition, participants do not necessarily know in advance what they signed up for. This surprise is further complicated when playing up the anticipation of discomfort beyond the actual experience, though this would seem preferable to experiences where actual discomfort exceeds anticipated discomfort.

Requiring written formal consent to take part in such an experience is rare; rather, consent is often achieved through the careful framing of the experience in advertising, ticketing, branding, and trust in the hosting venue, all representing an unwritten contract with participants. Peer pressure is another factor designers must consider. In recognizing the importance of social bonding, they must be aware of the possibility of personal social pressure on participants to participate. Some members of groups may be more hesitant than others, and designers may wish to be wary of an experience in which the leader de-

termines the level of discomfort for an entire group;

The right to withdraw. It may be impossible for participants to withdraw from an experience once a key point is passed, as in, say, dismounting a moving roller coaster, though such a ride is typically short and carefully regulated to minimize risk to participants. Consequently, it may be justifiable for a designer to limit opportunities for withdrawal than would be the case in other contexts. While one might argue an experience should be clear about any point of no return, explicit warnings about the right to withdraw are employed to further increase suspense in some rides, even in “Ulrike and Eamon Compliant”;

Privacy and anonymity. An individual's right to privacy is another ethical principle. However, tactics that generate discomfort by distorting intimacy, especially through voyeurism, clearly impinge personal privacy. A designer must therefore consider whether private actions would become visible to those outside the “performance frame.” Breeches of privacy and anonymity should be restricted largely to those within the frame, especially in situations involving a degree of symmetry (such as where observers are themselves observed); and

Managing risk. Finally, experience designers have a clear responsibility to consider and manage risk. Given the breadth of the tactics we have covered here, a variety of risks must be considered, from physical danger and injury to emotional trauma to social embarrassment. Dealing with them is a practical matter requiring assessment and management within a variety of professional codes and regulations, standard practice for design professionals working in the cultural sector in galleries, theaters, and theme parks. Second are the contingencies incorporated into the experience or its related alternative “paths.” Finally, there is “orchestration,” or the set of procedures and supporting technologies that enable human controllers to monitor and intervene in an experience from behind the scenes.²

Conclusion

We have argued here for the deliberate design of uncomfortable interaction

so as to deliver an entertaining, enlightening, socially bonding cultural experience. While this idea is familiar in the worlds of art and entertainment, it is unconventional in HCI. We therefore aimed to unpack the various ways deliberate discomfort could potentially be achieved, identifying four primary forms of discomfort and associated set of design tactics for each. Most important, we have urged the embedding of such tactics within an experience, along with careful consideration of ethical challenges.

Our intent is to stimulate discussion around the challenges of cultural applications of computers across games, rides, performances, and installations. An open question is whether it has implications for other types of computing.

Acknowledgments

This work is funded by the Research Councils UK (<http://www.rcuk.ac.uk/>) through Horizon Digital Economy Research grant (EP/G065802/1) and by the Engineering and Physical Sciences Research Council (<http://www.epsrc.ac.uk/>) through Dream Fellowship award EP/J005215/1. We also thank the artists of Blast Theory (<http://www.blasttheory.co.uk/>) for their collaboration. □

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Steve Benford (sdb@cs.nott.ac.uk) is an EPSRC-funded Dream Fellow and a professor of collaborative computing in the Mixed Reality Laboratory and Horizon at the University of Nottingham, Nottingham, U.K.

Chris Greenhalgh (chris.greenhalgh@nottingham.ac.uk) is a professor of computer science in the Mixed Reality Laboratory and Horizon at the University of Nottingham, Nottingham, U.K.

Gabriella Giannachi (g.giannachi@exeter.ac.uk) is a professor of performance and new media and Director of the Centre for Intermedia in the Department of English at the University of Exeter, Exeter, U.K.

Brendan Walker (studio@aerial.fm) is a senior research fellow in Horizon at the University of Nottingham, professor of creative industries at Middlesex University, and director of design practice at Aerial, U.K.

Joe Marshall (jqm@cs.nott.ac.uk) is a Leverhulme-funded research fellow in the Mixed Reality Laboratory at the University of Nottingham, Nottingham, U.K.

Tom Rodden (tar@cs.nott.ac.uk) is a professor of interactive systems in the Mixed Reality Laboratory and Horizon at the University of Nottingham, Nottingham, U.K.