Simulating the Illegible and Diffuse: A Weird XR for Materialising Empathy Without Essentializing Embodied Experiences of Discrimination

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Abstract

We present an XR scenario that explores XR's distinct potentials to materialize empathy for persons facing discrimination as complex embodied experiences by making use of non-realistic, surreal effects. We present insights from an ongoing research project that focuses on designing XR-based training for medical first responders (MFRs), such as paramedics, as a professional group that faces discrimination in situational, relational, and high-stress interaction settings. We operationalized empathy as the socially shaped ability to perceive, relate to, and feel another person's situated perspective. With our approach, we go beyond individual perspectives, which conceptualize empathy as affect or competency, but draw on feminist understandings that acknowledge its situatedness and embeddedness in social processes. Hence, the scenario aims at fostering users' knowledge on the situated dynamics of situations of discrimination, including their interpretative complexity, but also to establish affective engagement, relatedness, and connectedness with the marginalized person. We do so by going beyond the current trend of approximating or replicating reality in XR development, e.g., to transform social interaction and friction reality. We hope to stimulate reflection and dialogue on non-essentializing ways of materializing empathy through weird XR, while enabling us to learn from others' perspectives, experiences, and critiques.

Keywords

empathy, weird XR, embodiment, gender-based discrimination, de-essentializing experiences

1. Background

Fostering empathy for discrimination experiences faces the challenge of representing complex and situated experiences without reducing them to simplified narratives and without implying that observers can come to 'know' the felt reality of inhabiting a marginalized identity. Training programs on how to deal with discriminatory behavior in professional settings often use role-based approaches, assuming that experiencing realistic scenarios leads to more empathic responses and greater cohesion and solidarity. In line, XR-based approaches mainly operationalize empathy as perspectival simulation and offer observation and enactment of different situations (e.g., [1, 2]. However, experiences of discrimination are often not fully legible even to those who experience them and might lead to self-doubt, hesitation, interpretative uncertainty, and shame. Experiences of discrimination can be hard to describe, verbalize, and, thus, communicate, while, for instance, everyday microaggressions and structural discriminations may not be immediately recognized by privileged persons. Moreover, discriminatory experiences have to be understood as situated and relational and unfold in a complex way with pervasive bodily effects (e.g., [3, 4, 5, 6, 7, 8]). Hence, the representation and materialization of discriminatory situations is not only about illegible situations but also about the situated embodied experiences – a phenomenon that exceeds what can be captured through rationalized observation, linear simulation, or narrative realism.

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We present an XR scenario that explores XR's distinct potentials to materialize empathy for persons facing discrimination as complex embodied experiences by making use of non-realistic, surreal effects. We draw on insights from an ongoing research project that focuses on designing XR-based training for medical first responders (MFRs), such as paramedics, as a professional group that faces discrimination in situational, relational, and high-stress interaction settings. We operationalized empathy as the socially shaped ability to perceive, relate to, and feel another person's situated perspective. With our approach, we go beyond individual perspectives, which conceptualize empathy as affect or competency, but draw on feminist understandings that acknowledge its situatedness, embeddedness in social processes, and embodiment [9, 10]. Hence, the scenario aims at fostering users' knowledge on the situated dynamics of situations of discrimination, including their interpretative complexity, but also to establish affective engagement, relatedness, and connectedness with the marginalized person. We do so by going beyond the current trend of approximating or replicating reality in XR development [11, 12] and making use of the "the strange social opportunities and alien physics and materiality of XR" [12], e.g., to transform social interaction and friction reality.

We contribute empirical and practical Research-through-Design insights into how XR researcher-designers can address the situated, relational, and embodied dimensions of empathy. During the workshop, we will present one implemented XR scenario, allowing attendees to experience and reflect on our empathy-centered design approach that aims at materializing the situated and embodied dynamics of discrimination.

2. Co-designing an XR discrimination scenario with medical first responders

In our project GAIN, we targeted MFRs. MFRs carry out vital work which is conducted in high-stress situations; often facing conflicts in active service, such as non-acceptance of help, verbal abuse, and physical and sexual harassment by patients, relatives, and bystanders [13]. These actions are often gendered, racialized, classed, etc. For example, women and younger people are often perceived as lacking medical expertise or bodily strength, which can be a barrier to accepting help. Empathy is a key factor in addressing these issues.

We conducted a co-design workshop with four MFRs (three women, one man, with different levels of experience) to collaboratively design 'weird' XR scenarios. Using creative materials, each participant created a scenario based on a personal experience. First, they set the scene, materialising the situation and involved actors. Second, they added effects of the discrimination experience, such as 'feeling small', 'beaming onself out of the situation', or 'feeling tied up'.

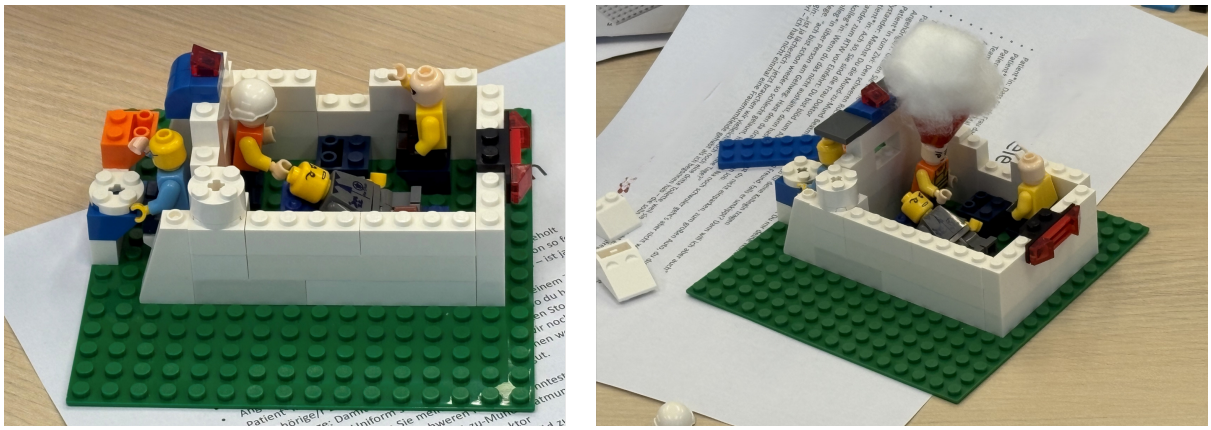

Figure 1: Scene of a discrimination experience

Figure 1 shows a discrimination experience described by a young woman. We selected this specific scenario because it describes a situation that was mentioned throughout our research: a (young)

woman's ability to carry a patient being questioned. In this specific case, our participant and her colleague (also a young woman) transported a patient – an older woman – and her daughter from the hospital to their home. During transport, both started to question the participant's ability to carry them. The participant described the situation as follows:

> I had a situation where [...] I was sitting in the back [...], and the patient and her daughter were in the car and the driver was sitting in the front, there were two of them and it was a patient transport home and [unintelligible] and suddenly the daughter asked me, yes, where is the third colleague? And I was like, which third colleague? We just picked you up from the hospital, the two of us? [imitating the patient] Well, we did say that she had to go down one flight of stairs at home because the lift only goes halfway, so one, the other staircase goes, whatever. [as herself] Yes, eh, that's fine, isn't it? I knew exactly what she was getting at, but I said, yes, that's fine. [as the patient] But, um, well, you didn't understand, she has to be carried down. [as herself] Yes, I understood that, yes, and so on. [as the patient] Yes, but you're a woman. And I looked at her and said, 'Yes, and that's why I can't carry her down?' [as the patient] Yes, that's bad for your uterus. [loud laughter]

While she emphasised that she was not stressed by this exchange, having experienced such situations before, she described feeling perplexed and speechless by the statements. She also mentioned how new colleagues might feel frustrated or angry in such situations, which underlines the importance of training to reduce stress in operational situations. In Figure 1, we can see both the scenario (left) and the effects she added (right) to make this experience tangible: she wanted to visualise her speechlessness, not finding the right words to react, by adding cotton wool on top of the little figurine's head to express the barrier of speaking up.

The participants also discussed the discolouration, thus showing the effect of being unable to act or remove oneself from this situation and simulating the feeling of being stuck, being tied up, and being shackled by the situation. Discussing a similar theme, though in a different scenario, another participant tied up his figurine with a thread.

3. Developing an XR-based scenario

Building on the co-design outcomes, we developed an XR scenario that translates the lived experience of gender-based discrimination in an MFR context into a first-person experience. Drawing on the concept of weird XR [11], we deliberately move beyond realistic scenario replication and instead leverage XR's capacity to *materialise* the experience of discrimination through environmental and perceptual manipulation.

3.1. Scenario and Phase Structure

The scenario places the user in the role of a woman paramedic seated in the back of an ambulance alongside an older patient and her daughter. The daughter progressively questions the user's competence based on her gender, escalating from indirect concern to overt insult. Rather than relying on dialogue alone, we designed a three-phase perceptual arc that mirrors the psychological escalation reported by participants in our co-design workshop:

In **Phase 1** (latent tension), the environment appears normal – neutral colours, normal view, ambient vehicle sounds. The daughter's remarks are indirect, and inner thoughts reflect self-doubt and rationalisation (*"Was that even discriminatory, or am I imagining things?"*). In **Phase 2** (growing unease), the visual field begins to narrow through vignetting, colour temperature shifts toward colder tones, and the user hears their own breathing amplified alongside a rising heartbeat. First intrusive 'inner voice' thoughts appear as spatial audio. In **Phase 3** (direct confrontation), the field of view constricts into a pronounced tunnel vision effect, colours desaturate, and the surrounding environment appears to grow – walls close in, the daughter's avatar looms larger – while the user's own virtual hands shrink.

A haptic vest applies chest pressure to simulate the somatic sensation of constriction. The inner voice becomes insistent. In **Phase 4** (recovery), all effects gradually normalise, guided breathing prompts appear, and reflective questions are displayed to prepare participants for debriefing.

3.2. Visual Style

We adopt a low-poly, stylised rendering for both the environment and characters (see Figure 2). Avatars are deliberately faceless – recognisably female in silhouette and body proportions, but without individualised facial features. This design is motivated by two converging considerations.

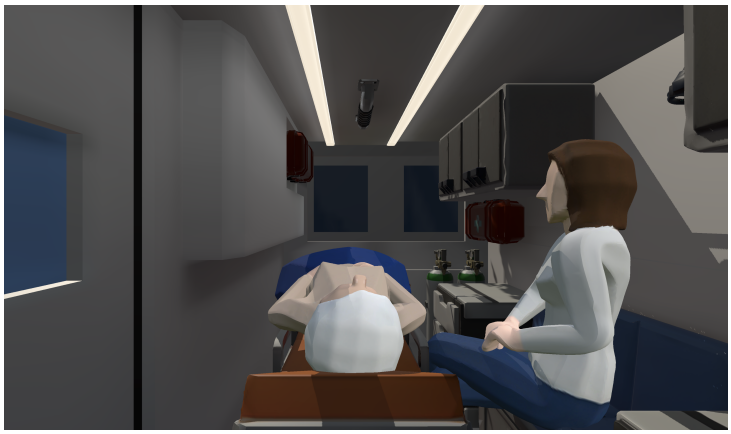

Figure 2: First-person still image captured during the XR simulation, showing the user's initial phase 1 viewpoint without visual effects inside the low-poly ambulance environment.

Figure 3: Avatar of a woman MFR used for embodiment within XR ambulance scenario.

First, research on simulation fidelity consistently shows that physical resemblance to reality is not the primary driver of training effectiveness or transfer of learning. Norman et al. [14] demonstrated a minimal relationship between simulation fidelity and learning transfer, arguing that *functional* and *psychological* fidelity matter more than visual realism. Hamstra et al. [15] reinforced this by recommending a shift from physical resemblance toward functional task alignment in simulation-based training. For novice learners in particular, simplified environments can even outperform high-fidelity ones by reducing extraneous cognitive load [16]. Since our training targets empathy and awareness rather than procedural motor skills, psychological fidelity, which is achieved through our perceptual manipulation mechanics, is the critical design variable, not photorealism.

Second, the abstract, faceless design generalises the experience. Rather than depicting a specific individual's story, the scenario represents a *structural* pattern of discrimination – reflecting our co-design participants' emphasis that such situations are recurring and shared across the profession. By stripping away identifying features, we invite users to project themselves into the role rather than observe a particular person's misfortune, a distinction critical for perspective-taking over passive spectatorship [17]. The low-poly aesthetic further supports the perceptual manipulation mechanics:

when colour desaturation, spatial distortion, and scale changes are applied, they read as intentional psychological signals rather than rendering artefacts, precisely because the visual baseline is already abstracted from photorealism.

3.3. Grounding and rationality of the design

This perceptual design draws on several converging lines of evidence. First, we leverage the *Proteus Effect* [18]: by embodying a female avatar, users adopt behavioural and attitudinal shifts consistent with the embodied identity, a mechanism that has been shown to transfer to post-XR behaviour [19]. Recent work on virtual reality perspective-taking (VRPT) confirms that such embodied experiences can increase empathy toward outgroups and reduce intergroup bias through both affective and cognitive pathways [20, 17].

Our environmental manipulations exploit what research on *body ownership illusions* has established: that altering the visual properties and scale of a virtual body can modify self-identification, perception, and implicit attitudes associated with the embodied form [21, 22]. Embodying a child-sized body, for instance, causes adults to overestimate object sizes and identify with child-like attributes [23]. We apply this principle in reverse, scaling the environment up and the user down, to induce a visceral sensation of *feeling small*, directly reflecting the participants' descriptions of their experience.

Third, the visual effects (vignetting, desaturation, spatial distortion) serve as deliberate perceptual stressors. XR environments have been shown to elicit heightened emotional engagement and measurable physiological responses, including changes in neural activity and autonomic indicators such as skin conductance and heart rate, compared to traditional 2D presentations [24]. Manipulating environmental parameters such as lighting, colour, and spatial openness can modulate users' affective states and perceived agency without explicit narrative content [25]. Our design uses these manipulations not as glitches but as intentional *phenomenological signals* that externalize internal psychological states.

Finally, the multisensory integration – combining visual distortion with haptic chest pressure and spatialized inner-voice audio – is grounded in evidence that cross-modal congruence deepens the sense of embodiment and emotional engagement [22]. Rather than passively observing discrimination, the user's body becomes the site of its effects, aligning XR's capacity for somatic illusion with the training goal of fostering embodied empathy.

4. Concluding statements: An invitation to reflect and discuss

We present an XR scenario as a proof-of-concept prototype that concretizes and operationalizes our approach to materializing empathy through weird XR: By using strategies from weird XR, we aim to foster the users' knowledge on the situated dynamics of situations of discrimination, especially the interpretative complexity and embodied dimensions, but also to support relatedness and connectedness with marginalized persons without essentializing identities. Our system demonstration is an invitation to critically reflect and discuss the potential of weird XR for empathy in the context of discrimination. Providing personal experiences as a starting point, participants can reflect on how they felt during testing the scenario and which aspects of illegibility, embodiment, and relationality become experienceable. In reflecting on their own situatedness, participants are invited to consider how these experiences resonate with their everyday lives as well as with their roles as researchers, designers, and developers of technologies that seek to materialize empathy. We would like to critically discuss which potentials, limits, and risks of weird XR emerge, particularly regarding engaging marginalized experiences without reifying and essentializing identity categories, and how to research, design, and evaluate such systems.

We hope to stimulate reflection and dialogue on non-essentializing ways of materializing empathy through weird XR, while enabling us to learn from others' perspectives, experiences, and critiques.

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Declaration on Generative AI

During the preparation of this work, the authors used gemma in order to: Grammar and spelling check. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

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