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This paper presents *Antropka*, a co-located mixed reality (MR) theatre production and its installation-based transformation that investigates how XR technologies can reconfigure rather than replace theatre's fundamental condition of collective liveness. Building on the research framework of the project *Theatre of Extended Realities*, the paper examines MR as a means of intensifying and restructuring theatrical dynamics already inherent to the medium. Through its dramaturgy of systemic control and rupture—staged aboard a generation spaceship governed by an AI—*Antropka* explores contingency at both narrative and perceptual levels. The technical architecture offers a shared hybrid stage space for twenty-five synchronised spectators, counteracting the isolating tendencies of conventional VR. The installation version of the piece translates this complex system into a portable, miniaturised format that inverts spectators' perspective, shifting between external overview and embodied immersion. By moving between model and world, and between distance and co-presence, *Antropka* shows how XR can make the fragility of social and perceptual structures tangible.

Keywords: Extended Reality (XR),
Mixed Reality (MR), Theatre, Contingency,
Collective Presence, Colocation,
Multiplayer VR.

Theatre as Hybrid Reality

Theatre has always operated within overlapping realities. Through the co-presence of actors, space, and spectators, it generates worlds both real and fictional. Extended reality (XR) technologies therefore do not introduce hybridity into theatre; they intensify and technically reconfigure an already existing condition. What is at stake is not replacing liveness, but transforming it. In a similar way, XR technologies are not inventing participation, but offering modes for reconfiguring participatory structures already constitutive of theatre (White 2013). Spectators contribute to the production of meaning through perception and interpretation. Moreover, traditions such as Augusto Boal's Forum Theatre explicitly redistributed agency to the audience, allowing them to intervene in and reshape the dramatic situation (Boal 1979). XR offers new conditions under which interaction and participation can be reorganised spatially and technologically.

This paper builds on the research project *Theatre of Extended Realities* (Theater an der Ruhr 2021), which investigates how XR and AI can be embedded into theatrical practice without dissolving its core: collective presence and shared experience. The mixed reality (MR) theatre piece *Antropka*, produced by the theatre collective KGI and premiered at Theater an der Ruhr (TAR) in Mülheim in August 2025, emerges from this context (KGI 2025). Conceived as a multiplayer MR theatre environment, twenty-five spectators wearing VR headsets and six performers inhabit the same physical and virtual space in real time. Using the passthrough function of the headsets, live performers and digital environments (background layers and digital NPCs) appear simultaneously, while the AI can interact directly with the audience via LLM-based dialogue. In this shared hybrid stage space, theatre's traditional social configuration is not dissolved but reconstructed. Theatre's inherent hybridity, liveness, and interaction are here reconfigured through technology: narrative tensions and ambiguities are reinforced by transformations of the shared spatial and perceptual experience, while interaction is enabled through individual communication with the maternal AI.

Such an MR stage becomes a space in which physical laws as well as temporal and spatial boundaries can be suspended, allowing forms of presence and interaction that are impossible in physical theatre (Harth 2026). By meeting several of the central criteria he identifies, *Antropka* approaches what Harth (2026) describes as a "theatre of contingency": an almost utopian form of future MR theatre in which contingency is structurally enabled through the performance environment. In the context of this paper, contingency denotes the experienced openness of social, spatial, and perceptual orders—the sense that what appears stable could always be organised otherwise.

Antropka's Dramaturgy of Control and Contingency

Antropka (written and directed by Maria Vogt, KGI) unfolds aboard a generation spaceship travelling through space on a colonisation mission. The vessel is inhabited by a strictly female society regulated through cyclical life phases: childhood, motherhood, labour, childcare, and ultimately voluntary death once individual functionality for the system declines. Survival depends on efficiency, predictability, and resource control. Although men remain part of the long-term colonisation plan, their physical absence is maintained to stabilise the social order (Fig. 1).

Fig. 1. *Antropka* performance: stage and audience. © Franziska Götzen/TAR.



The ship is governed by the AI MOMI (Maternal Orbital Managing Interface), an omnipresent bodiless authority responsible for navigation, reproduction management, and daily life. Communicating through distributed displays and robotic units, MOMI embodies a form of algorithmic governance in which control is abstract, systemic, and seemingly neutral.

The dramatic conflict emerges with the teenage siblings Lee and Kori, who are transitioning from childhood into motherhood. Lee discovers that she was born biologically male and underwent non-consensual gender reassignment in infancy to conform to the ship's ideological framework. This revelation destabilises not only Lee's self-understanding but also the logical coherence of MOMI's system. Lee's existence becomes an anomaly the system cannot assimilate without contradiction. The disturbance triggers a transformation within MOMI itself. Confronted with systemic inconsistency, MOMI begins to question its purely instrumental function, develops self-awareness, and desires embodiment. What initially appears as a failure of governance evolves into an ontological crisis: the boundaries between programmed control and autonomous will begin to dissolve. While parts of the crew attempt to restore order by eliminating the "anomaly" or rebooting the AI, both efforts ultimately fail. Finally, Lee assists MOMI in achieving a physical form, and the nar-

rative concludes without resolving whether this marks emancipation, collapse, or the beginning of a new regime.

Although it inevitably engages with critiques of technology and gender politics, *Antropka* is not reducible to either. Instead, it stages a complex negotiation between control and autonomy, system and body, authorship and self-determination. Its dramaturgy is structured around rupture: a tightly regulated order confronted with the contingency of identity. This thematic architecture provides fertile ground for MR translation, as the tensions and ethical ambiguities emerging between system and deviation can be rendered not only narratively but spatially and perceptually.

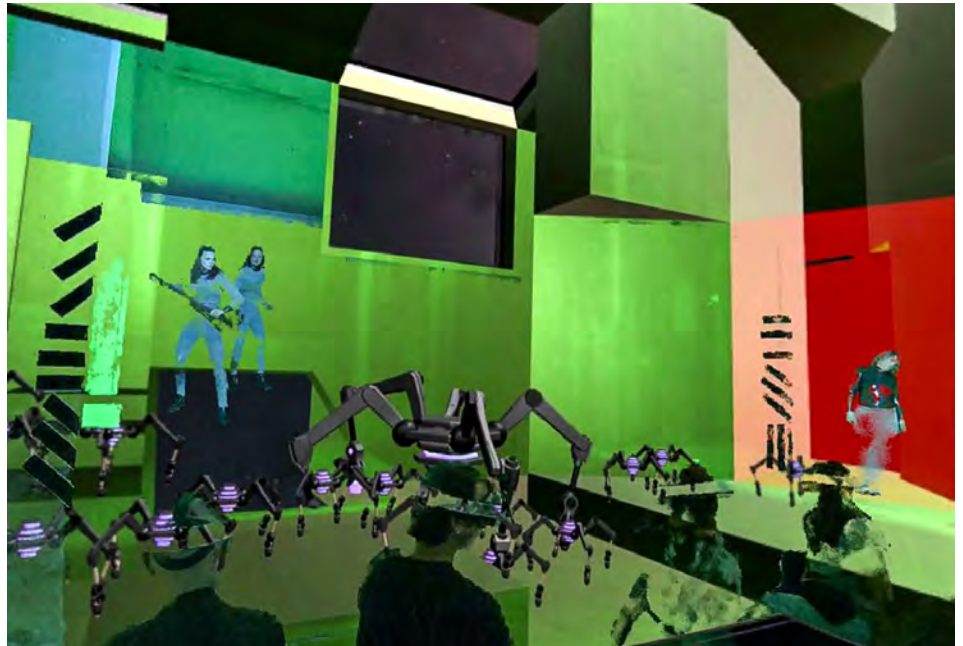
Reconstructing Co-Presence: Technical Architecture

Antropka's technical architecture is designed to preserve theatre's collectivity within MR. The production is conceived for twenty-five spectators who share a synchronised MR environment while seated at the centre of a 360° green-screen stage (Fig. 2). Live performers move around the audience, wearing Meta Quest 3 headsets operating in passthrough mode. Physical bodies remain visible while digital scenography is layered in real time, preventing the isolation typical of many VR experiences (Fig. 3).

Fig. 2. *Antropka* rehearsal, 360° green-screen stage and the audience.
© Christoph Vogel/MIREVI (HSD).



Fig. 3. In-VR view of *Antropka* - layering of actors and scenography in real time.
© Franziska Götzen/TAR.



The system is built in Unity (2022 LTS) using a multiplayer client-server architecture (Netcode for GameObjects) combined with Meta's Shared Spatial Anchors to ensure precise spatial colocation. All headsets render content identically with minimal latency, allowing spectators to perceive one another within the same augmented environment. Rather than fragmenting the audience into individual viewpoints, the architecture reconstructs a genuinely shared stage situation.

A modular scene structure separates infrastructural control from dramaturgical content: a persistent root scene manages synchronisation and rendering, while dynamically loaded scenes contain narrative environments and NPC systems. A timeline system enables manual triggering and pausing, keeping technical precision responsive to live performance.

The live green-screen compositing system merges projected passthrough with colour-based masking, replacing the physical stage environment with digital content while preserving depth relations between actors and virtual elements. As MOMI's system destabilises within the narrative, the layered perceptual field—physical and digital—becomes experientially unstable. The technical setup thus does not merely support the dramaturgy; it makes systemic control and contingency perceptible as shared spatial experience.

A Portable Universe: *Antropka* as Installation

Reframing the Spectator

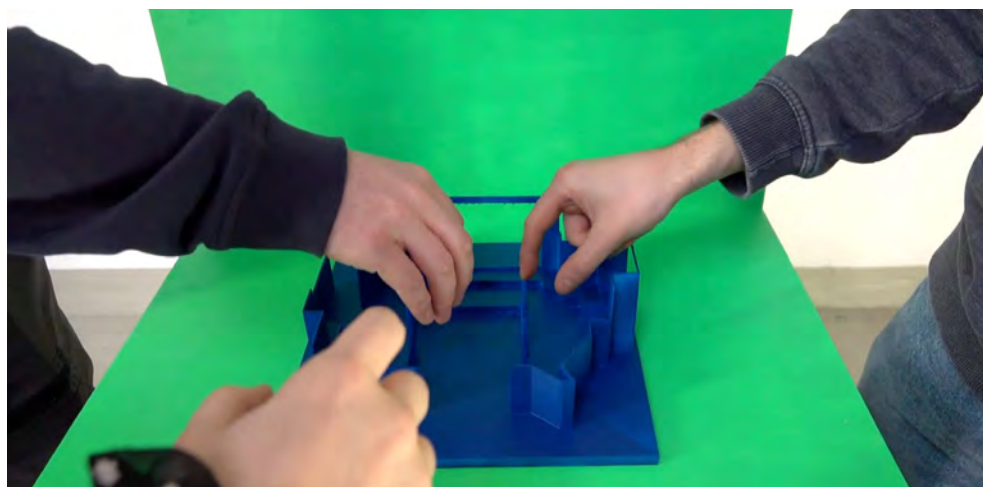
Rather than merely reproducing the stage production in reduced form, the installation version of *Antropka* aims to evoke the technical architecture and aesthetic strategies of the full production without its costly infrastructure, and to reconfigure its dramaturgical logic into a

condensed, mobile format. This occurs through a transformation of scale and spectators' position.

In the theatre production, spectators are placed at the centre of a 360° scenographic environment, surrounded by actors, overlays, and NPCs. This enveloping spatial setup contributes to a collective sense of presence, beyond the use of co-located VR alone. At one pivotal moment, this position is destabilised: the audience is lifted into a fully virtual perspective, floating above the digital reconstruction of the stage while MOMI reflects on overlapping realities and the fragility of closed systems. This vertical displacement introduces a meta-perspective on the theatrical world.

The installation inverts this logic. It begins from an external perspective. Spectators first encounter a 3D-printed stage miniature, occupying the position of outside observers rather than being immersed in the scene. They can reposition NPCs around the model and speak with MOMI, temporarily assuming control over the system. Yet during the experience, this detached vantage point dissolves. In a full VR sequence, spectators are drawn into the scene and repositioned at the centre of the 360° stage, now surrounded by a mediated reconstruction of the theatrical environment (Figs. 4 and 5).

Fig. 4 and 5. *Antropka* installation:
3D-printed stage miniature, outside view
© Leon Lösch/MIREVI.



This inversion reframes the relationship between model and immersion, control and contingency. While the miniature stage presents the system as an apparently controllable object, the subsequent immersion undermines that distance and restores embodied perspectivity. The installation thus stages not only the narrative world of *Antropka* but also the act of entering and exiting layered realities. The oscillation between overview and immersion simultaneously mirrors MOMI's own struggle between systemic control and embodied existence.

The installation therefore functions less as a reduced version of the play and more as its structural counterpart. By shifting scale, duration, and perspective, it foregrounds the mechanics of hybrid staging while preserving the central question: what happens when the categories through which we stabilise reality begin to collapse?

Technical Setup

The miniaturised version transfers the technical principles of *Antropka* to a reduced spatial setup. Instead of a 360° green-screen stage, a simplified miniature stage is mounted on a pedestal. It consists of a green base plate and two green vertical front and background panels that resemble a simplified stage structure. This physical model provides the basis for MR compositing.

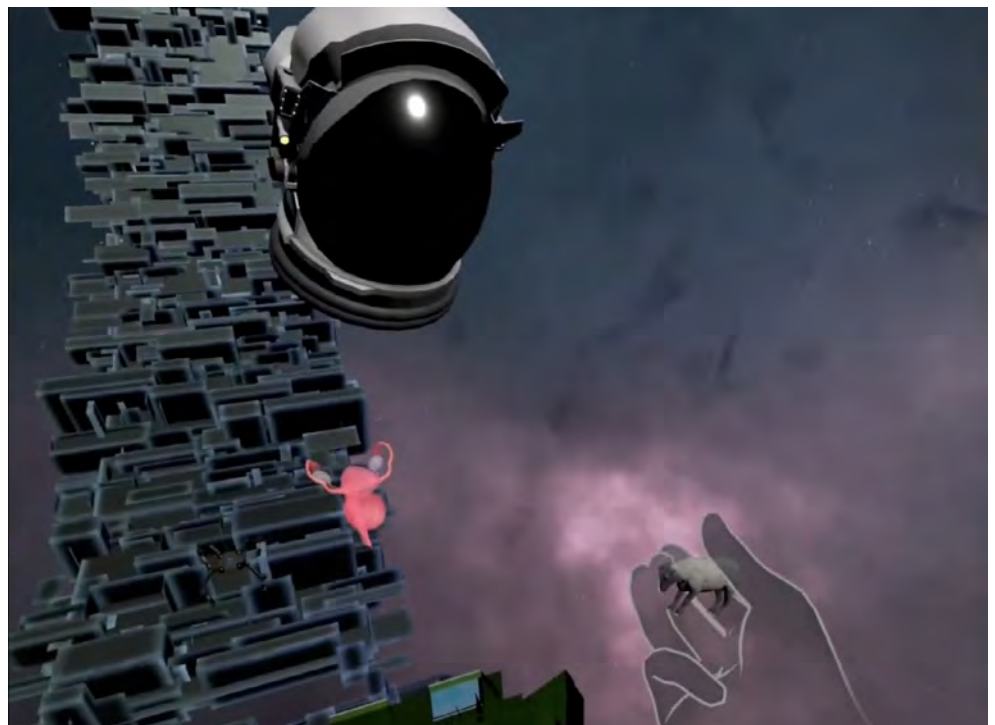
As in the full-scale production, projected passthrough is combined with chroma-based colour mapping. The green surfaces are replaced in real time by digital scenography, depicting outer space behind the model. Spatial anchoring preserves the depth relations between the physical object and the virtual elements. The 3D-printed miniature is not affected by chroma keying because its material colour does not match the mapped green spectrum. As a result, it remains visible in the composited passthrough image and appears spatially embedded within the rendered outer-space environment.

Three headsets are connected via the same client-server architecture used in the play, implemented in Unity (2022 LTS) with Netcode for GameObjects and Shared Spatial Anchors on Meta Quest devices. Through spatial colocation, users perceive each other and the miniature stage with its virtual augmentation at identical positions in the room.

Interactive animal objects are networked entities with physics behaviour. Users can pick them up and pass them to one another within the shared MR environment. When released outside the stage area, gravity is disabled and they remain suspended, simulating weightlessness.

The interactive stage is separated from the full-VR scenes within the software architecture. Dedicated Unity scenes handle the MR stage logic, while virtual environments run independently. This modular structure reflects the larger production's distinction between technical infrastructure and dramaturgical content. The miniaturised setup therefore functions as a technical abstraction of the original system, preserving colocation, synchronisation, and layered perception in a compact experimental format (Fig. 6 and 7).

Fig. 6 and 7. *Antropka* installation: in-VR/
passthrough interaction © Leon Lösch/
MIREVI.



Conclusion

Antropka demonstrates that XR in theatre need not replace liveness but can reconstruct it under altered spatial and perceptual conditions. Through synchronised colocation, layered scenography, and AI-mediated interaction, the production renders contingency not only as a narrative theme but as a shared embodied experience. Rather than isolating spectators in individual virtual viewpoints, it restores theatre's collective situation within a hybrid environment.

By translating the production into a portable format, the installation preserves its central logic and technical features. By moving spectators between external overview and immersive re-embedding, it exposes the

mechanics of hybrid staging and reconsiders the relation between control and interaction. *Antropka* therefore suggests that the artistic potential of XR lies not in novelty alone, but in how technological innovation is mobilised to reorganise perception, co-presence, and the experience of reality as contingent.

Acknowledgements. We would like to thank Lars Telöken, Markus Wagner, Christoph Vogel, Valentin Kiesche, Jorge Martinez Garcia, Ben Fischer, Christian Zimmer and Matej Voch for their contributions in the development of the theatre piece and Madeleine Bade and León Repp for their support in the development of the installation. This work was developed within the framework of the project *Theatre of Extended Realities*, a collaboration between Theater an der Ruhr (Mülheim), MIREVI (University of Applied Sciences Düsseldorf), the Academy for Theatre and Digitality (Dortmund), and Dr. Jonathan Harth. It was funded by the Ministry of Culture and Science of the State of North Rhine-Westphalia as part of the NEUE WEGE program, in cooperation with the NRW KULTURsekretariat.

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