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A relational approach to understanding interactions in interactive art

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Summary

Interactive art is often characterised as a dialogue between an audience and an artwork. Yet with the advancement of the field of interactive art, the emergence of increasingly complex and diverse forms of interaction demands an expanded conceptual framework that better captures nuances in dynamics among interacting elements and provides the structure to allow uses of analytical tools. This thesis addresses this gap by proposing a relational approach to understanding interactive dialogues, which analyses existing artworks and seeks to inspire new forms of interaction. The main aims, questions, and the approaches used to address them are further discussed in Chapter 1.

Chapter 2 introduces a relational model of interaction, designed to systematically dissect and analyse interactions within interactive art. The model identifies key *elements* (e.g., audience members, art systems), examines their *actions* (e.g., movement, display updates), and maps the resulting *communication* patterns. By treating all elements equally, the model accommodates complex, multi-participant scenarios while encouraging creative experimentation by allowing elements to assume unconventional roles.

To operationalise this model, we developed the Relational Modelling Tool (RMT), a web-based application detailed in Chapter 3. RMT combines structured input fields for describing interactions with an automated graph-based visualisation, ensuring analytical precision while supporting the modelling process. Its standardised data structure enables cross-comparison of diverse interactive artworks and potentially supports the generation of novel interaction forms.

Subsequently, we applied RMT to analyse a selection of interactive artworks. These case studies not only validate the modelling capabilities of RMT, but also reveal insights into the different types of interaction. Chapter 4 examines eight artworks featuring co-located audience interaction, where multiple participants engage simultaneously with both the artwork and one another. The relational model captures action-reaction patterns, and in addition the influences between actions that are crucial to understand the underlying interactive dynamics. A key finding underscores the inherently social nature of co-located interaction, suggesting that

art systems can foster audience connections by leveraging the different communication patterns among them. These insights open opportunities to conceive new interactive dialogues by subverting or exchanging the roles of audience and art systems.

Chapter 5 analyses five artworks showcasing more-than-human interaction between humans and nonhuman organisms. RMT revealed a general pattern of active human participation and passive nonhuman involvement, alongside diverse mediated communication forms (e.g., nonhuman-to-human via art systems, or art system-to-nonhuman via humans). In addition, we also examined different ways in which art systems reconfigure interspecies relationships. Building on these findings, we propose that future research in more-than-human interactive art could explore: (1) involving nonhuman organisms as active participants, (2) devising novel forms of mediated communication with nonhuman organisms based on human communicative abilities, and (3) creating technical systems as interaction participants.

Beyond interactive art, we hypothesise that the concepts and descriptors of the relational model and RMT can be adapted to describe participatory processes in broader artistic contexts. In Chapter 6, we applied RMT to model two participatory artworks with distinct forms of audience engagement, neither of which is, strictly speaking, interactive. It demonstrates the analytical versatility of RMT across artistic domains, while revealing how insights from these practices can reciprocally inform the development of interactive art.

Furthermore, Chapter 7 presents findings from a workshop we organised to evaluate the modelling and generative capabilities of RMT with a broader user group. To facilitate discussions on generating interactive dialogues, we developed a data-driven component that automatically produces new elements and behaviours based on the existing artwork collection and draws novel connections among them by randomly assigning new forms of communication and conditions for actions. Key insights from the workshop centred on the interface design, potential improvements to RMT, and its various application scenarios and potentials. Based on the participant feedback, we iteratively refined RMT and reflected on lessons related to designing intuitive interfaces, user involvements in development processes, understanding the benefits and limitations of RMT, and clarifying its scope and positioning.

In Chapter 8, we present the conclusion of the thesis by synthesising the key findings and research contributions. It provides comprehensive reflections addressing the core research questions established in Chapter 1, critically examines the methodological challenges, and proposes future research directions. One intriguing direction is to explore how art systems can be conceived and developed as participants in their own right. This line of inquiry inspires the creation of novel forms of interaction, as well as challenges our assumptions related to the roles of technical systems, opening possibilities for exploring new human-computer relations.