

Agent Personality as Social Augmentation: How AI Traits Shape Human Perception and Decision-Making in XR

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Abstract

Extended Reality (XR) technologies increasingly mediate how social interaction is perceived and interpreted. While prior work in Social XR has focused on adaptive behaviors and emotional feedback, less attention has been given to the structural role of agent personality in shaping social meaning. In this position paper, we argue that personality functions as social augmentation: a persistent communicative layer that frames expectations, modulates perceived intent, and influences trust calibration in immersive environments. We conceptualize agent personality as social infrastructure shaping relational comfort, perception, and decision-making processes. Using personality similarity, we discuss both the opportunities and tensions of personalization in XR, including risks of reinforcement, normative bias, and long-term effects. We outline a research agenda addressing perceptual mechanisms, decision-making dynamics, longitudinal impacts, and inclusive design. By reframing personality as a consequential design dimension rather than cosmetic customization, this work contributes to principled approaches for responsible Social XR systems.

Keywords

Social XR, Agent Personality, Personality Similarity, Social Augmentation, Trust Calibration, Immersive Interaction

1. Introduction

Extended Reality (XR) technologies are transforming how social interaction is mediated, interpreted, and experienced. Rather than simply replicating face-to-face communication, XR environments enable designers to amplify, suppress, or reconfigure social and emotional cues [1, 2]. Through embodiment, spatial presence, and real-time responsiveness, immersive systems can reshape how intent, affect, and relational stance are perceived. These capabilities position XR not merely as a communication medium, but as an infrastructure for social augmentation.

Within these environments, virtual agents increasingly function as socially situated actors [3, 4]. Beyond delivering information or executing tasks, they express communicative styles, emotional tones, and interpersonal orientations that shape how users interpret interaction. While prior research has examined embodiment, empathy strategies, and adaptive dialogue [5, 6, 7], less attention has been given to the structural role of agent personality in shaping social meaning.

Personality traits—such as warmth, assertiveness, or expressiveness—operate as persistent social signals that frame expectations and modulate perceived intent [8]. In immersive XR contexts, where agents may be experienced as co-present partners, these signals can influence not only immediate impressions but also users' perception of support, trust calibration, and decision-making processes [9, 10, 11]. Agent personality therefore represents a consequential yet under-theorized dimension of social augmentation.

In this paper, we argue that personality should be treated as a foundational design dimension of Social XR. By conceptualizing personality as a structural layer that shapes perception and decision-making, we outline key tensions, risks, and research directions for responsible personality-based personalization in immersive environments.

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2. Social Augmentation in XR

Social augmentation refers to the intentional shaping of social perception and interaction through technological mediation [12]. In XR environments, designers are not limited to reproducing real-world cues; they can strategically amplify eye contact, exaggerate gestures, modulate vocal tone, or introduce adaptive behavioral responses [13]. Such interventions alter how users interpret social signals, potentially enhancing clarity, emotional resonance, or perceived alignment. XR therefore functions not only as a medium for communication but as a system that reorganizes the conditions under which social meaning is constructed.

This capacity has enabled applications ranging from collaborative training to wellbeing support. For example, XR systems can enhance shared attention in teamwork scenarios, provide emotionally responsive feedback in educational settings, or simulate empathic engagement in therapeutic contexts [14, 15]. In each case, social augmentation operates by adjusting the visibility, intensity, or framing of interpersonal cues. These adjustments influence users' perception of presence, trust, and relational dynamics.

Much Social XR research operationalizes interaction through embodied cues such as gaze, gesture, vocal expression, and avatar-mediated communication [16, 17]. By contrast, comparatively fewer studies examine how persistent structural features — such as stable identity representations, reputation systems, or long-term norm formation — frame interaction across time. Persistent characteristics, including visual identity, communicative style, and personality traits, may exert more subtle yet more sustained influence over how interactions unfold. Unlike isolated supportive statements or feedback signals, these features frame expectations before and throughout engagement.

Recognizing XR as an infrastructure for social augmentation invites a shift in perspective: instead of asking only what agents do, we must also examine how their stable social characteristics influence interpretation, trust calibration, and decision-making. This perspective sets the stage for understanding agent personality as a structural mechanism within Social XR systems.

3. Agent Personality as Social Infrastructure

Personality in virtual agents refers to the stable patterns of expression through which traits such as warmth, assertiveness, expressiveness, or restraint are conveyed [18, 19]. These traits are communicated through consistent verbal tone, pacing, linguistic framing, gesture style, gaze behavior, and affective modulation. Unlike transient behaviors, such as offering reassurance or providing feedback, personality operates as a persistent layer that shapes how all subsequent interactions are interpreted.

In immersive XR environments, this persistence becomes particularly significant. When agents are embodied and spatially co-present, users may respond to them as social partners rather than abstract interfaces [20]. Under such conditions, personality functions as a form of social infrastructure: it frames expectations about credibility, empathy, authority, and alignment before specific content is evaluated. Identical advice may be interpreted differently depending on whether it is delivered by an agent perceived as confident or tentative, warm or formal. Personality thus modulates not only relational comfort but also how guidance is cognitively processed.

This structural role suggests that personality influences both perception and decision-making. Perceptually, it shapes judgments of trustworthiness, competence, and emotional resonance. In decision-relevant contexts—such as learning, collaboration, or wellbeing support—it may also affect how users weigh recommendations, calibrate reliance, or interpret uncertainty. Personality is therefore not merely aesthetic customization; it is a design dimension that can reconfigure social meaning in XR.

Understanding personality as social infrastructure shifts attention from surface-level trait matching to systemic design implications. Rather than asking whether users prefer certain personalities, the more consequential question is how stable trait expressions shape interpretive frames, relational dynamics, and downstream judgments over time. This perspective motivates closer examination of personality similarity as one concrete lens through which these broader dynamics can be explored.

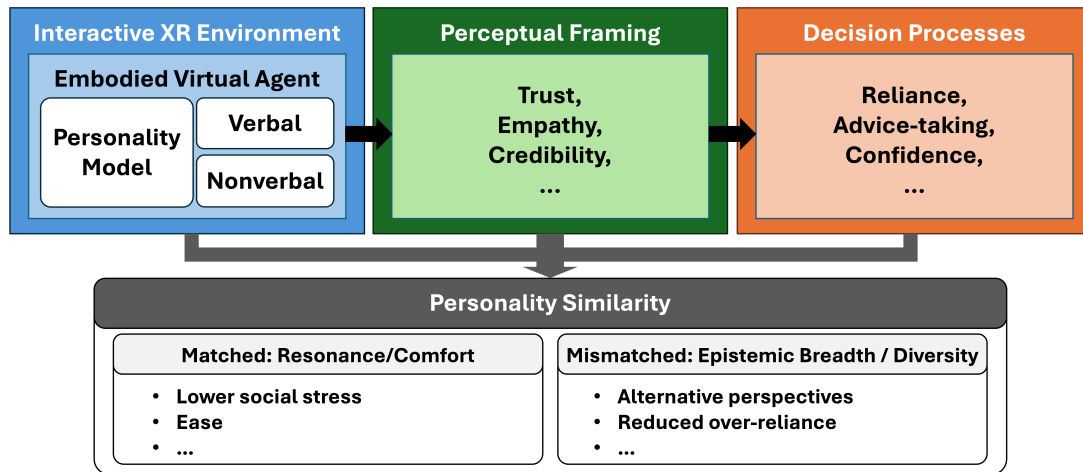


Figure 1: Conceptual model of agent personality as social augmentation in XR. Personality functions as a persistent interpretive layer that shapes perceptual framing and downstream decision processes, while similarity introduces a design tension between resonance and epistemic breadth.

Figure 1 illustrates a conceptual model, positioning agent personality that can shape perceptual framing and downstream decision processes, while highlighting similarity as a source of design tension.

4. Personality Similarity: Opportunity and Tension in Social XR

One prominent approach to personality-based personalization is personality similarity between user and agent. In human–human interaction, perceived similarity in traits is associated with greater interpersonal comfort, attraction, and trust [21, 22]. Translating this principle into XR systems suggests that aligning an agent’s personality with the user may enhance relational ease and perceived support.

Within immersive environments, personality similarity may amplify feelings of alignment and psychological safety. When an agent communicates in a style that mirrors a user’s dispositional tendencies—whether calm and reserved or expressive and assertive—its guidance may be perceived as more authentic or empathetic. Such alignment could strengthen trust calibration, reduce defensiveness, and increase openness to advice in emotionally sensitive or decision-relevant contexts.

However, similarity-based personalization also introduces important tensions. First, excessive alignment may unintentionally reinforce existing cognitive or emotional patterns, limiting exposure to alternative perspectives. In decision-making scenarios, this could increase comfort without necessarily improving judgment quality. Second, personality is culturally mediated and socially interpreted; optimizing for similarity risks embedding narrow norms about what constitutes “appropriate” support. Third, adaptive systems that continuously tailor personality expression may subtly shape users’ expectations about social interaction over time.

These tensions suggest that personality similarity should not be treated solely as an optimization variable but as a consequential design choice. Rather than asking whether similarity increases comfort, designers must consider when alignment supports meaningful engagement and when diversity in interpersonal style might be beneficial. Personality-based personalization thus becomes a balancing act between relational resonance and epistemic breadth. Framing similarity as both opportunity and constraint underscores the need for principled approaches to personality design in Social XR. The next section outlines key research directions for responsible implementation.

5. Research Agenda for Personality in Social XR

Conceptualizing agent personality as social infrastructure calls for systematic investigation beyond preference matching. We outline several research directions to guide future work in Social XR.

Perceptual Mechanisms Future studies should examine how personality traits shape users' interpretation of identical content in immersive settings. How do variations in warmth, assertiveness, or expressiveness alter perceived empathy, competence, or credibility? Understanding these perceptual pathways is essential for clarifying how personality reframes social meaning rather than merely enhancing likability.

Decision-Making Effects Personality may influence not only relational comfort but also reliance, confidence, and judgment under uncertainty. Research should explore how different trait expressions affect trust calibration, advice-taking behavior, and risk perception in XR-based learning, collaboration, and wellbeing contexts. Importantly, increased comfort should not be assumed to correspond to improved decision quality.

Longitudinal and Adaptive Dynamics Because XR systems can maintain persistent identities over time, personality effects may accumulate. Long-term exposure to aligned or adaptive personalities could shape users' expectations, attachment patterns, or interaction norms. Investigating these temporal dynamics is critical for understanding sustainable social augmentation.

Inclusivity and Ethical Design Personality traits are culturally mediated and socially constructed. Future work should examine how personality expression is interpreted across diverse populations and how personalization systems can avoid reinforcing narrow normative assumptions. Transparency, user agency, and controllable personalization mechanisms may be necessary components of responsible implementation.

Taken together, these directions shift inquiry from whether personality similarity works to how personality shapes perception, judgment, and social norms in immersive environments. Advancing Social XR requires treating personality not as cosmetic variation but as a consequential design layer with cognitive and ethical implications.

6. Conclusion

As XR technologies increasingly mediate social interaction, the design of virtual agents becomes a question not only of functionality but of social structure. This paper has argued that agent personality should be understood as a form of social augmentation: a persistent layer that shapes how users interpret support, calibrate trust, and approach decisions in immersive environments. Rather than treating personality as surface-level customization or simple trait matching, we position it as a consequential design dimension that reframes social meaning.

By examining personality similarity as both opportunity and tension, we highlight the need for principled approaches to personalization in Social XR. Alignment may enhance relational comfort and perceived support, yet it may also shape decision processes and interaction norms in subtle ways. Designing personality in XR therefore requires careful consideration of perceptual mechanisms, long-term effects, inclusivity, and ethical responsibility.

Advancing Social XR demands moving beyond isolated behavioral strategies toward a deeper understanding of how stable agent characteristics structure interaction. Treating personality as social infrastructure provides a pathway for investigating how immersive systems can foster meaningful, responsible, and sustainable forms of human–AI engagement.

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Declaration on Generative AI

During the preparation of this work, the author(s) used ChatGPT in order to: Grammar and spelling check. After using these tool(s)/service(s), the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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