The Eclipse of the Automaton: A Phenomenological Framework for Subtractive Design in Social Robotics

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Abstract

The current Socially Assistive Robotics (SAR) paradigm is afflicted by a categorical error: the assumption that social acceptance is directly proportional to the accumulation of anthropomorphic mimetic signals. This paper introduces the Phenomenological Subtraction framework, which reverses the traditional design vector from "additive" (the accumulation of social cues) to "subtractive" (instrumental transparency). Synthesising technical transparency (Heidegger), intentional spatiality (Husserl) and resistance to optimisation (Dostoevsky), the framework presents a model in which an artificial agent's efficacy is determined by its capacity to withdraw. By integrating the concepts of ontological honesty and sensory attenuation, the model provides solutions for safeguarding "ontological privacy" and ensuring compliance with the transparency requirements of the EU AI Act. Ultimately, the paper posits that algorithmic silence represents the pinnacle of ethics and aesthetics in human-machine interaction.[1]

Keywords: AI Ethics, Social Robotics, Phenomenology, EU AI Act, Human-Robot Interaction (HRI), Subtractive Design.

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[1] Luciano Floridi, *The Fourth Revolution: How the Infosphere Is Reshaping Human Reality* (Oxford: Oxford University Press, 2014), 102.

1. Introduction: The Additive Fallacy and the Crisis of Presence

Over the last two decades, the development of human–robot interaction (HRI) has been guided by what can be defined as the "additive fallacy": the belief that the effectiveness of a social agent is directly proportional to the saturation of anthropomorphic signals.[2] This paradigm has driven engineering efforts towards quantitatively maximising artificial social traits, such as facial micro-expressions, prosodic modulation and mimetic gestures.

However, empirical evidence from elite caregiving and hospitality contexts reveals a paradox: rather than fostering integration, the hyper-presence of the machine often generates cognitive saturation and ontological rejection. Users perceive robots not as discrete support, but as "invasive *simulacra*" competing for their focal attention. In this paper, I argue that overcoming the current HRI crisis requires a paradigm shift towards phenomenological subtraction. Rather than "adding" artificial humanity, I propose an architecture where the value of technique lies in its ability to render itself invisible.[3]

2. Historical Roots: From Leonardo's Mechanics to Biometric Reductionism

To understand the psychological resistance to social robotics, we must analyse Western science's trajectory towards the mechanization of living things. As Azzolini highlights, there has been a millennial trend of mapping life through calculation.[4]

From Leonardo da Vinci's "mechanics of man", which treated the body as a set of levers and pulleys, to modern robotics, the human body has been increasingly viewed as a "*Körper*" (objectified body). Contemporary social robotics represents the pinnacle of this process, claiming to "read" the interiority of the subject through biometric reductionism. However, phenomenological subtraction sets a limit to this trend by recognising the ontological boundary at which technique must stop to allow for subjectivity.

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[2] Brian R. Duffy, "Anthropomorphism and the Social Robot," *Robotics and Autonomous Systems* 42, no. 3–4 (2003): 177–90.

[3] Mark Weiser, "The Computer for the 21st Century," *Scientific American* 265, no. 3 (September 1991): 94. Weiser's concept of "Calm Technology" is the precursor to the subtractive model.

[4] Monica Azzolini, "Leonardo da Vinci's Anatomical Studies in Milan: A Re-examination of Sites and Sources," in *Visualizing Medieval Medicine and Natural History, 1200–1550*, ed. Jean A. Givens, Karen M. Reeds, and Alain Touwaide (Aldershot: Ashgate, 2006), 147–76.

3. The framework: The Three Pillars of Subtractive Design

3.1. The ontological pillar: Heidegger and technical transparency

In Being and Time (1927), Martin Heidegger distinguishes between an object that draws attention to itself (*Vorhandenheit*) and a tool that disappears in the act of its use (*Zuhandenheit*).[5] Paradoxically, a social robot today is a perpetually vorhanden entity; it interrupts the users "life-world" by seeking social interaction devoid of functional purpose.

Ontological subtraction requires the machine to tend towards technical transparency: the ideal robot operates as an invisible background and reaches its maximum efficiency as a medium (*zeug*). By reducing unnecessary social signals, the robot "fades" into the environment, allowing the user to remain the sole protagonist of their existential project. Furthermore, excessive anthropomorphism in SAR design inevitably results in an "ontological breakdown". When a social robot fails to sustain the mimesis it projects, it ceases to be a transparent extension of the environment and becomes a conspicuous, malfunctioning object. Subtraction prevents this breakdown by aligning the robot's appearance with its actual ontological status as a tool.[6]

3.2. The Spatial Pillar: Husserl and Respect for the Leib

While classical engineering seeks to avoid collisions between physical masses (*Körper*), phenomenological subtraction recognises the robot's entry as a potential violation of the "living body" (*Leib*), which is the centre of intentional orientation and vulnerability.[7] Using advanced sensors integrated into platforms such as PAL Robotics' ARI or TIAGo,[8] the machine must monitor the user's autonomic stress levels in order to decide whether to withdraw, rather than intervene.

This negative proxemics ensures that the robot respects the "sacred space" of the user. This "retreat" is not a functional failure, but rather the technical recognition of intersubjective

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[5] Martin Heidegger, *Essere e tempo*, trad. Pietro Chiodi (Milano: Longanesi, 2005), 84–96.

[6] *Ibid*, 94-96.

[7] Edmund Husserl, *Idee per una fenomenologia pura e per una filosofia fenomenologica. Libro secondo: Ricerche fenomenologiche sopra la costituzione*, trad. Enrico Filippini (Torino: Einaudi, 2002), 153.

[8] PAL Robotics, "TIAGo & ARI Technical Specifications for Social Navigation" (Barcelona: PAL Robotics Press, 2023).

dignity.[9] Consequently, phenomenological subtraction encompasses more than just physical distance; it also involves sensory attenuation. To honor the *Leib*'s need for existential quiet, a subtractive agent must be capable of dimming its visual signals and lowering its vocal output, transforming the robot from a constant observer into a respectful presence.[10]

3.3. The Ethical Pillar: Dostoevsky Beyond the Crystal Palace of Optimisation

In Notes from Underground (1864), Fyodor Dostoevsky provides a radical critique of algorithmic paternalism. His "Crystal Palace" represents the systemic risk of proactive social robotics: the creation of an environment in which subjects are deprived of the freedom to act irrationally or experience suffering.[11]

In assistive contexts, proactive intervention by a robot attempting to "optimize" the user's mood constitutes a breach of autonomy. Dostoevskian subtraction silences the machine in the presence of human suffering.[12] The machine recognises the state of distress, but signals the need for human intervention, acting as an epistemic bridge rather than a psychological substitute.[13]

4. The Governance Bridge: Compliance by Design and the EU AI Act

Implementing Phenomenological Subtraction provides a practical model for compliance by design within the new European regulatory landscape.

- Risk Mitigation (Art. 52 AI Act): The framework mitigates the risk of prohibited emotional manipulation (Regulation 2024).[14] Moreover, the subtractive framework enhances the system's "explainability". By refusing to simulate non-existent subjectivity, the robot maintains "ontological honesty", thus fulfilling the Act's

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[9] Dan Zahavi, *La fenomenologia di Husserl*, trad. Federica Sossi (Roma: Carocci, 2011), 115.

[10] Edmund Husserl, *Idee per una fenomenologia pura e per una filosofia fenomenologica. Libro secondo: Ricerche fenomenologiche sopra la costituzione*, trad. Enrico Filippini (Torino: Einaudi, 2002), 162-67.

[11] Fëdor Dostoevskij, *Memorie dal sottosuolo*, trad. Paolo Nori (Torino: Einaudi, 2012), 28.

[12] Mark Coeckelbergh, *Growing Moral Relations: Critique of Moral Status Ascription* (Basingstoke: Palgrave Macmillan, 2012), 144.

[13] Peter-Paul Verbeek, *Moralizing Technology: Understanding and Designing the Morality of Things* (Chicago: University of Chicago Press, 2011), 11.

[14] European Parliament and Council of the European Union, Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), OJ L, 2024/1689, July 12, 2024, ELI: http://data.europa.eu/eli/reg/2024/1689/oj, Title IV, art. 52.

transparency requirements. This prevents vulnerable users from being deceived into misattributing human agency to a technical intermediary.[15]

- Ontological privacy: It safeguards the integrity of personal information against total objectification by limiting biometric monitoring to the "trigger of withdrawal".

- Epistemic trust: Trust in HRI stems from the tool's functional predictability, not the simulation of humanity. Eliminating social mimicry actually increases user reliance in high-stakes environments such as healthcare. [16]

5. Conclusion: The Challenge of Silence

Phenomenological subtraction marks a maturation in the field of social robotics, shifting the focus from the machine's performance to the user's existential integrity. Synthesising Heideggerian transparency, Husserlian respect for the Leib and Dostoevskian resistance to algorithmic paternalism, this framework redefines artificial agents as "silent media "rather than invasive simulacra.

The "eclipse of the automaton" is not an absence of technology, but rather its ultimate realisation: a state in which a robot's effectiveness is determined by the amount of space it leaves for human agency. As we move towards implementing the EU AI Act, "ontological honesty" and "sensory attenuation" are emerging as essential design principles to safeguard human dignity against biometric reductionism.

Ultimately, the most evolved technique is one that knows when to step aside, honoring the silence and freedom of the individual. In future elite markets, where hyper-connectivity becomes a burden, discretion and the capacity for withdrawal will be the ultimate luxury for machines.

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[15] Virginia Dignum, *Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way* (Cham: Springer Nature, 2019), 47–51.
[16] Amber Case, *Calm Technology: Principles and Patterns for Non-Intrusive Design* (Sebastopol, CA: O'Reilly Media, 2015), 18–22.

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