



From Embodiment to Social Incorporation: Robotization, Delegation, and New Forms of Action

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Abstract: Research on artificial intelligence and robotics has long been structured by questions of autonomy, cognition, and embodiment. Whether in engineering, cognitive science, or philosophy of mind, the dominant concern has been how machines can perceive, act, and interact within their environments. This article argues that such perspectives are no longer sufficient to account for the contemporary transformations associated with intelligent technologies. The central claim advanced here is that the key issue is not machine autonomy but social incorporation. Robots and AI systems become socially significant not because they increasingly resemble humans, but because they are progressively integrated into networks of practices, institutions, and forms of life that incorporate them into collective action. Contemporary robotization should therefore be understood less as a technological evolution than as a reconfiguration of social regimes of delegation. Drawing on socio-semiotics and Science and Technology Studies (STS), the article develops a theoretical framework that distinguishes three interconnected forms of delegation: operational delegation, cognitive delegation, and decision-making delegation. Through these processes, intelligent technologies increasingly participate in the production of action, interpretation, evaluation, and choice. As a result, agency and responsibility become distributed across complex assemblages involving humans, algorithms, sensors, infrastructures, and organizations. The article further examines contemporary warfare as the most visible and radical manifestation of these dynamics. Autonomous drones, AI-assisted targeting systems, and automated command platforms reveal how mechanisms of delegation extend beyond technical assistance and increasingly shape processes of identification, classification, and decision-making. Far from being confined to the military sphere, these transformations illuminate broader changes affecting healthcare, logistics, security, and everyday life. Building on these observations, the article proposes the foundations of a geosemiotics of robotization, understood as an analytical framework capable of articulating sociotechnical imaginaries, social practices, infrastructures, and geopolitical power relations. From this perspective, the fundamental challenge posed by intelligent technologies in the twenty-first century is not the replacement of humans by machines, but the ongoing

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reconfiguration of action, decision-making, and responsibility within hybrid collectives composed of human and nonhuman actors.

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1. Introduction

Contemporary debates on artificial intelligence and robotics are often dominated by a series of now-classic questions: Can machines think? Can they become autonomous? Will they one day be capable of replacing human beings in certain cognitive, relational, or decision-making activities? For several decades, these questions have shaped both technological imaginaries and research programs devoted to intelligent technologies. This emphasis on machine autonomy can be traced back to the intellectual legacy of cybernetics and classical artificial intelligence, which conceived cognition primarily as information processing (Wiener¹, 1948; McCarthy et al.², 1955). Critiques developed by Dreyfus³ (1972) and later by Brooks⁴ (1991) progressively shifted attention toward situated and embodied forms of intelligence. In the field of robotics, these concerns have long been associated with the issue of embodiment. How can machines be endowed with a body? How can they be enabled to perceive their environment, interact with it, and develop a form of physical presence that would make them more effective or more socially acceptable? A significant portion of robotics research has therefore focused on the motor, perceptual, and interactional dimensions of machines.

Contemporary transformations, however, invite us to shift our perspective. The decisive issue is no longer simply that of machine autonomy or embodiment. It now concerns their social incorporation. The fundamental question is not so much what machines are capable of doing, but rather how they are progressively integrated into chains of delegation, cooperation, trust, and decision-making that now permeate virtually every sphere of human activity. The central argument advanced here is that we are witnessing less a revolution in artificial intelligence than a profound transformation in the social regimes of delegation. Robots and AI systems are increasingly becoming actors embedded within complex networks in which capacities for action, responsibilities, and decision-making processes are redistributed. This evolution affects not only the ordinary activities of everyday life but also some of the most sensitive domains of collective action, including healthcare, security, and warfare.

A socio-semiotic and Science and Technology Studies (STS) perspective is particularly well suited to capturing this transformation. Such an approach invites us to consider technologies not as isolated objects but as socio-technical arrangements embedded within social

¹ Wiener, N. (1961). *Cybernetics: Or Control and Communication in the Animal and the Machine* (2nd ed.). Cambridge, MA: MIT Press.

² McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). *A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence*. Hanover, NH: Dartmouth College.

³ Dreyfus, H. L. (1992). *What Computers Still Can't Do: A Critique of Artificial Reason*. Cambridge, MA: MIT Press.

⁴ Brooks, R. A. (1991). "Intelligence Without Representation." *Artificial Intelligence*, 47(1–3), 139–159.

practices, collective imaginaries, and specific geopolitical configurations. It resonates with Simondon's⁵ (1958) analysis of technical objects as entities that evolve within associated milieus, as well as with Latour's⁶ (2005) conception of technologies as actors participating in the composition of the social world.

2. From diffuse Robotization to social incorporation

For a long time, robots were perceived as specialized technical objects designed to operate in industrial environments or in exceptional situations. They were associated with assembly lines, automated factories, underwater or space exploration, and hazardous or radioactive environments. This situation has changed profoundly. Robots are no longer confined to specialized settings. They have increasingly entered homes, hospitals, logistics warehouses, urban infrastructures, security services, and battlefields. This widespread diffusion can be described as a process of diffuse robotization. From an STS perspective, this evolution can be understood as an extension of sociotechnical networks rather than as the simple proliferation of technical devices. Robots increasingly operate as nodes within assemblages connecting infrastructures, data flows, institutions, and human actors (Latour, 2005). Drones provide a particularly revealing example of this evolution. Initially designed as tools for observation and surveillance, they have gradually become platforms capable of integrating advanced artificial intelligence systems. They no longer merely execute preprogrammed tasks; they increasingly participate in processes of detection, identification, and, in some cases, target selection.

This phenomenon extends far beyond the military domain. The same technological architectures are used to monitor agricultural crops, detect pollutants, map territories, and manage logistical flows. As a result, the boundaries between civilian and military applications are becoming increasingly blurred. This convergence reflects what Bratton⁷ (2016) describes as a planetary computational infrastructure in which technological architectures circulate across civilian, industrial, and military domains. At the same time, other robotic forms are proliferating. Domestic cleaning robots, assistive robots, robotic dogs used in security operations, and humanoid robots deployed in logistics centers all testify to the growing presence of machines in everyday activities. What characterizes this transformation is not simply an improvement in technical performance. The decisive phenomenon lies in the normalization of their presence. Robots are progressively becoming ordinary components of contemporary social environments. The question, therefore, is no longer simply: What can robots do? Rather, It becomes: how do robots participate in the structuring of everyday social practices?

This transformation invites us to reconsider one of the central themes in research on intelligent technologies: embodiment. Much of contemporary robotics has focused on designing machines capable of perceiving their environment, moving through it, and interacting with human beings. The central concern was that of physical presence and bodily integration. This orientation owes much to phenomenological approaches, particularly Merleau-Ponty's⁸ (1962)

⁵ Simondon, G. (2027) *On the Mode of Existence of Technical Objects* (C. Malaspina & J. Rogove, Trans.). Minneapolis: University of Minnesota Press.

⁶ Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

⁷ Bratton, B. (2016). *The Stack: On Software and Sovereignty*. Cambridge, MA: MIT Press.

⁸ Merleau-Ponty, M. (1962). *Phenomenology of Perception* (C. Smith, Trans.). London: Routledge & Kegan Paul.

conception of the body as the primary condition of access to the world, as well as to embodied cognition theories developed by Varela, Thompson, and Rosch⁹ (1991). However, as several studies in Science and Technology Studies (STS) and ethnomethodology have suggested, the fundamental issue may not lie in the body itself but rather in the forms of life within which machines are embedded. Borrowed from Wittgenstein¹⁰ (1953), the notion of forms of life shifts attention from technical properties to the social practices and interpretive contexts through which technologies become meaningful. Research conducted by Alac¹¹ and her colleagues on social robots has shown that users interpret robots through the interactional frameworks in which they are situated. What matters is not merely their appearance, but the ways in which they participate in everyday exchanges. From this perspective, a robot never exists simply as a technical object. It becomes an interpreted actor. Its identity is produced through the interactions, expectations, and meanings that individuals attribute to it. As Suchman and other authors – cited in another article, by Alac et al.¹² – also pointed out, the issue was, and still is, to conceive of machines as a “special form of social practice,” “a form made more interesting by AI’s own concerns with the delegation of social practice to machines.” Another highly influential sociologist and ethnomethodologist, Harold Garfinkel, also emphasized – in relation to one of the earliest experiments in dialogic and interactive artificial intelligence, such as ELIZA – that the meaning of actions – including those of machines, AI systems, and thus robots – does not depend primarily on the intentions or capabilities of an individual actor (in this case, software or a non-human), but on “the interpretive activity of recipients.”

The authors mentioned had conducted an in-depth ethnographic study in a setting where several children and two teachers interacted with a domestic robot “disguised” in a vaguely anthropomorphic form: a shape resembling a body, two eyes, and so on. In other cases, they observed interactions with more conventional humanoid robots, sometimes even compared to pets or puppets. What comes into play here is the robot’s body, but as a “body-in-interaction” – that is, a body constituted through the gazes, gestures, and words of those present. More generally, this concerns the various interactional engagements of robots within social situations. Furthermore, another key author in Science and Technology Studies, Harry Collins, emphasizes that, when it comes to artificial intelligence and robots, the central question lies in the relationship between action and verbal language itself. From this perspective, one might think that the immense current success of contemporary artificial intelligence – from ChatGPT to Claude – a success that is at once social, economic, and technological – stems precisely from its conversational and linguistic-interactional capabilities. However, there is an important distinction when it comes to robots understood as entities endowed with a material structure and physical hardware. Robots socialize and function when they enter spatial environments of action. They participate in concrete, situated situations in which their presence is embedded in space and in interaction.

⁹ Varela, F.J., Thomson, E., & Rosch, E. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: MIT Press.

¹⁰ Wittgenstein, L. (1953). *Philosophical Investigations* (G. E. M. Anscombe, Trans.). Oxford: Blackwell.

¹¹ Alac, M. (2011). *Handling Digital Brains: A Laboratory Study of Multimodal Semiotic Interaction in the Age of Computers*. Cambridge, MA: MIT Press.

¹² Alac, M., Movellan, J., Tanaka, F., “When a robot is social: Spatial arrangements and multimodal semiotic engagement in the practice of social robotics.” *Social Studies of Science*, 41 (6) 893–926.

The case of domestic robots is particularly revealing. After several weeks of use, many users develop forms of familiarity with these devices. They sometimes give them names, interpret their behaviors, and incorporate them into the routines of the household. This phenomenon cannot be reduced to the machine's technical capabilities; rather, it reflects a process of socialization. The central issue therefore becomes that of social incorporation. Robots do not become socially meaningful because they possess a body, but because they are progressively integrated into systems of practices, norms, and collective interpretations. It is precisely at this point that the question of delegation emerges as a critical turning point. Once incorporated into social activities, machines no longer merely assist human action. They increasingly participate in its production. Understanding contemporary robotization therefore requires examining the various forms of delegation that develop through these technologies, as well as the transformations they introduce into regimes of responsibility, decision-making, and authority.

3. Machines as Devices of Delegation

If contemporary robotization appears first and foremost as a social phenomenon rather than a purely technical one, it is because it is accompanied by a profound transformation in the modalities of action. The central issue lies not only in the growing capabilities of machines but also in the ways they become vehicles for new forms of delegation. Every social organization relies on mechanisms of delegation. Individuals constantly delegate tasks to institutions, rules, technical devices, or other human actors. From this perspective, robots and artificial intelligence systems do not create delegation *ex nihilo*. They do, however, profoundly transform its scale, nature, and consequences. One of the defining features of contemporary technologies is their capacity to perform operations that were once carried out directly by human beings. This evolution no longer concerns only the material execution of tasks. It increasingly extends to the cognitive, interpretive, and, in some cases, decision-making dimensions of activity.

The first form of delegation is undoubtedly the oldest. It concerns the execution of action. Industrial machines have long functioned as devices of operational delegation. They performed repetitive, strenuous, or hazardous tasks in place of human workers. Industrial robots remain largely embedded within this logic today. Domestic robots extend this dynamic. Autonomous vacuum cleaners, cleaning robots, and automated maintenance systems take over everyday activities that were once carried out directly by household members. In such situations, delegation remains relatively limited. Goals continue to be defined by humans, while machines primarily execute prescribed operations. Contemporary systems, however, do more than act. They also analyze their environments. They detect obstacles, recognize patterns, identify situations, and generate information intended to guide action.

We thus enter a second level: cognitive delegation. Image-recognition algorithms, AI-assisted medical diagnostic systems, recommendation platforms, and predictive analytics software now participate in interpretive operations that were once reserved for human actors. This evolution does not necessarily imply that machines understand the world in a human sense. It does mean, however, that certain activities of classification, identification, and evaluation are increasingly entrusted to them. Contemporary robots are therefore no longer merely instruments

of action. They can also be understood as components of distributed cognitive systems in Hutchins¹³ (1995) sense, where information processing is shared between human actors and technical artifacts. They become then devices for the production of operational knowledge.

A third form of delegation is emerging today in a more gradual and controversial manner. The issue is no longer simply one of executing or interpreting but of participating in decision-making. In many sectors, artificial intelligence systems now contribute to shaping decisions regarding credit approval, candidate selection, patient prioritization, the monitoring of suspicious behavior, or the management of logistical flows. Decisions are not always made directly by machines. Nevertheless, the recommendations generated by algorithmic systems exert a significant influence on human actors who remain formally responsible. This situation gives rise to hybrid configurations in which decisions result from interactions between humans and technical devices. The boundary between assistance and decision-making thus becomes increasingly difficult to identify. It is precisely within this intermediate space that many of the major ethical and political challenges associated with artificial intelligence emerge.

Every act of delegation presupposes a regime of trust. When an individual delegates a task to another actor, they accept a form of dependence. They relinquish direct control over the entire process of action. This mechanism lies at the heart of contemporary robotization. Users trust their navigation systems. Healthcare professionals increasingly rely on diagnostic support systems. Companies depend on automated platforms to manage logistical operations. Military organizations progressively integrate systems capable of identifying or selecting potential targets. In each of these cases, the central issue is not the technical autonomy of machines but the social conditions that render such trust acceptable. Technologies are never adopted simply because they work. They are adopted because they gradually become credible, legitimate, and reliable in the eyes of social actors. Delegation therefore appears as a simultaneously technical, social, and symbolic phenomenon. It does not simply transfer tasks; it reconfigures the structure of collective action itself by redistributing capacities for action across humans and nonhumans (Latour¹⁴, 1999).

The expansion of delegation mechanisms produces a major consequence: the redistribution of responsibility. In traditional configurations, identifying those responsible is relatively straightforward. A decision can be linked to a clearly identifiable actor or institution. Contemporary systems make such attribution considerably more complex. When an algorithm contributes to a faulty diagnosis, when an autonomous vehicle causes an accident, or when a robotic system generates unforeseen consequences, responsibility tends to be dispersed among multiple actors: designers, programmers, operators, users, organizations, and technical infrastructures. This dispersion constitutes one of the defining features of contemporary technological environments. Action becomes distributed. Decision-making becomes distributed. And responsibility itself increasingly becomes distributed. It is precisely this transformation that prepares the ground for analyzing the contemporary battlefield.

For while delegation is already present in the ordinary activities of social life, it reaches an unprecedented level of intensity in situations of war. Robotic technologies and artificial intelligence systems no longer merely participate in action; they intervene in processes of

¹³ Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, MA: MIT Press.

¹⁴ Latour, B. (1999). *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.

identification, classification, and, in some cases, target selection. War thus emerges as the ultimate laboratory of the transformations that are reshaping contemporary forms of action.

4. War and violence; the extreme laboratory of delegation

If processes of delegation now permeate all spheres of social life, they find their most radical expression in situations of war. The battlefield thus emerges as a privileged site from which to observe contemporary transformations in technological action and responsibility. What unfolds there in dramatic and often spectacular ways sheds light on dynamics that are already present in other sectors of society.

For a long time, military technologies were primarily conceived as instruments designed to enhance the capacity for action of human combatants. Weapons, vehicles, and communication systems remained fundamentally extensions of human agency. Strategic and tactical decisions continued to be made by identifiable actors. Recent developments, however, seem to introduce a qualitative shift. Contemporary systems no longer merely execute orders. They now participate in processes of detection, identification, classification, evaluation, and, in some cases, target selection. Autonomous drones, AI-assisted targeting systems, and automated command-and-control platforms exemplify this transformation. Chamayou¹⁵ (2015) has shown that drones do not merely constitute a military innovation; they transform the regimes of visibility, distance, and responsibility through which contemporary violence is exercised. Contemporary warfare therefore appears as the space in which the different forms of delegation described earlier tend to converge.

Operational delegation is present when robotic devices carry out surveillance, reconnaissance, or strike missions. Cognitive delegation emerges when algorithmic systems analyze massive quantities of data in order to identify behaviors, movements, or individuals deemed relevant. Finally, decision-making delegation appears when the outputs generated by these systems directly shape operational choices. The case of the Israeli Lavender system, widely discussed in international public debate, provides a particularly significant example in this regard. The system relies on the automated analysis of vast datasets intended to identify individuals who may be considered military targets. Beyond debates concerning its precise functioning, this type of system reveals a fundamental transformation: artificial intelligence is no longer mobilized merely to assist human action but increasingly participates in processes of classification and selection whose consequences may be lethal. This shift leads to a profound reformulation of the question of responsibility. Traditional debates surrounding military technologies focused primarily on the human use of weapons. The contemporary issue is considerably more complex. When multiple human actors interact with algorithmic systems, sensors, databases, and robotic devices, it becomes increasingly difficult to determine precisely where responsibility for an action lies.

The decision-making chain thus tends to fragment. Engineers design algorithms. Programmers develop systems. Operators interpret the information produced. Military command authorizes operations. Technical devices execute specific tasks. In such configurations, responsibility does not disappear; rather, it becomes distributed. This situation

¹⁵ Chamayou, G. (2015). *A Theory of the Drone* (J. Lloyd, Trans.). New York: The New Press.

echoes Suchman's ¹⁶ (2007) reflections on accountability within complex sociotechnical systems, where responsibility becomes increasingly difficult to locate within a single actor or institution. It represents one of the major challenges addressed by contemporary discussions of responsible innovation. The more automated systems acquire advanced capabilities, the more necessary it becomes to reflect upon mechanisms of control, oversight, and responsibility attribution. War thus reveals something that extends far beyond the military domain. It highlights a broader transformation in contemporary regimes of action. The configurations of distributed agency that emerge on the battlefield can also be observed - albeit in less visible forms - in healthcare, transportation, digital infrastructures, and automated management platforms.

From this perspective, war is less an exception than a revealing lens. It makes visible mechanisms that now traverse contemporary societies as a whole: the proliferation of delegation devices, the growing automation of cognitive operations, and the redistribution of responsibility between humans and machines. This is precisely why a strictly technical analysis of robotic systems is insufficient. Understanding contemporary robotization requires simultaneously examining the imaginaries that make these technologies desirable, the practices that render them operational, and the political structures that organize their implementation. Today, the battlefield constitutes the extreme laboratory of these transformations. It is within this space that tensions between technological autonomy and human control, operational efficiency and moral responsibility, technological innovation and political legitimacy manifest themselves with particular intensity. The decisive question, therefore, is no longer simply what machines are capable of doing. Rather, it concerns the new forms of power, decision-making, and violence that their social incorporation makes possible.

5. Toward a Geosemiotics of robotization

The preceding developments invite us to view contemporary robotization not merely as a technical phenomenon, but as a deeper transformation of the regimes of meaning, forms of action, and configurations of power that structure contemporary societies. Such an evolution calls for an analytical framework capable of articulating the technical, symbolic, social, and geopolitical dimensions of intelligent technologies simultaneously. It is within this perspective that the foundations of a geosemiotics of robotization may be proposed. Such an approach rests on a simple observation: robots and artificial intelligence systems never circulate in isolation. They are always embedded within networks of actors, institutions, narratives, infrastructures, funding mechanisms, and power relations that shape both their development and their use. Understanding their significance therefore requires moving beyond an approach focused exclusively on the devices themselves and toward the environments within which they acquire meaning.

A first dimension concerns sociotechnical imaginaries. The concept draws on Jasanoff and Kim's (2015) work, which defines sociotechnical imaginaries as collectively held visions of desirable futures made attainable through science and technology. No innovation becomes

¹⁶ Suchman, L. A. (2007). *Human-Machine Reconfigurations: Plans and Situated Actions* (2nd ed.). Cambridge: Cambridge University Press.

established solely because of its technical performance. Technologies are always accompanied by narratives that render them desirable, legitimate, or, conversely, threatening. Figures such as the assistive robot, the artificial companion, the autonomous soldier, or the creative artificial intelligence contribute to the production of collective representations that shape social expectations and economic investments. Media, digital platforms, industrial discourses, and cultural productions all participate in constructing the interpretive frameworks through which technologies become socially acceptable.

A second dimension concerns social practices themselves. Robots do not become actors because they possess certain intrinsic properties. Rather, they become actors because they are progressively integrated into ordinary activities: cleaning a home, assisting a patient, monitoring a public space, managing a logistics chain, or supporting a military operation. Technologies acquire significance through the uses that incorporate them into contemporary forms of life. This incorporation gradually generates new regimes of trust, cooperation, and delegation.

A third dimension concerns the material and political infrastructures that make these technologies possible. Behind every artificial intelligence system lie data centers, supply chains, energy resources, public and private investments, industrial strategies, and military interests. Contemporary robotization therefore emerges as a profoundly geopolitical phenomenon. This dimension resonates with Bratton's (2016) analysis of planetary-scale computational infrastructures and their role in reshaping sovereignty, territory, and global power relations. It participates in competition among states, in the reconfiguration of technological sovereignty, and in the emergence of new forms of economic and strategic dependence.

This perspective helps explain why war occupies such a central place in contemporary analyses of intelligent technologies. The battlefield is the space where the three dimensions described above converge. Technological imaginaries are particularly powerful there. Mechanisms of delegation reach unprecedented levels. Geopolitical stakes appear in their most visible form. Contemporary conflicts thus reveal broader transformations that affect societies as a whole. From this perspective, diffuse robotization should not be understood merely as a process of automation. Rather, it corresponds to a gradual redistribution of agency between humans and nonhumans. Decisions, interpretations, and actions increasingly emerge from complex assemblages involving algorithms, sensors, digital infrastructures, institutions, and human actors. Action thus becomes progressively more distributed.

This redistribution of agency is accompanied by a parallel transformation of regimes of responsibility. The boundaries that traditionally made it possible to identify the authors of decisions and actions become increasingly difficult to trace. As technical devices participate in processes of perception, evaluation, and decision-making, responsibility itself becomes distributed across ever more complex networks. The central challenge of contemporary robotization may therefore not be the replacement of humans by machines. Such a vision remains largely rooted in classical imaginaries of automation. The fundamental issue concerns the ways in which intelligent technologies redefine the very conditions of collective action. They transform modes of cooperation, forms of trust, mechanisms of delegation, and decision-making procedures that organize contemporary societies.

A geosemiotics of robotization would be tasked precisely with analyzing these transformations. Its object of study would be neither the isolated machine nor the human actor

considered separately, but rather the relational configurations within which regimes of meaning, action, and power are simultaneously reconfigured. Viewed in this way, robotization appears less as a technological revolution than as an anthropological, social, and political transformation. Robots and artificial intelligence systems do not merely alter what humans can do. They progressively transform the ways in which societies define action, assign responsibility, and organize coexistence between human actors and technical devices. It is probably within this redefinition of the boundaries of action, decision-making, and responsibility that the major challenge of intelligent technologies in the twenty-first century resides.

6. Conclusion

Contemporary debates on artificial intelligence and robotics continue to be largely dominated by a recurring question: to what extent will machines become autonomous? Behind this question often lies another concern - the possibility that human beings may eventually be replaced by increasingly sophisticated technical systems. Yet the analysis developed in this article invites us to shift our attention toward a different and perhaps more fundamental issue. The decisive phenomenon is not so much the emergence of increasingly intelligent machines as their progressive incorporation into the social practices, institutions, and environments of action that structure contemporary societies. The central question is therefore no longer simply that of the technical autonomy of these systems, but rather that of the forms of delegation their presence makes possible.

From this perspective, the shift from embodiment to social incorporation emerges as one of the major conceptual developments in contemporary research. A significant body of work in robotics has focused on the challenge of endowing machines with bodies, perceptual capacities, and interactive abilities. These questions remain important. However, they are no longer sufficient to account for the ways in which robots and artificial intelligence systems are now embedded within ordinary forms of life.

Intelligent technologies acquire social significance less because they increasingly resemble human beings than because they are progressively integrated into networks of cooperation, trust, interpretation, and decision-making. They become actors in collective life not because of some hypothetical artificial consciousness, but because they now participate directly in the production of social action itself.

This transformation is accompanied by the continuous expansion of mechanisms of delegation. Machines no longer merely perform operational tasks. They increasingly intervene in processes of classification, evaluation, orientation, and, at times, decision-making. Through these technologies, new forms of distributed agency emerge, bringing together humans, algorithms, sensors, platforms, and technical infrastructures within complex assemblages.

Contemporary warfare undoubtedly constitutes the most visible and radical expression of this evolution. Autonomous drones, AI-assisted targeting systems, and automated command platforms reveal with particular intensity dynamics that are already present in other sectors of social life. The battlefield thus appears as the extreme laboratory of transformations that also affect healthcare, logistics, security, and everyday domestic activities. The central challenge therefore becomes one of responsibility. As action is increasingly distributed among a plurality

of human and nonhuman actors, traditional mechanisms for assigning responsibility become more complex. The question is no longer simply what machines are capable of doing, but rather how capacities for action, decision-making authority, and accountability for the consequences of action are being redistributed.

It is precisely at this level that a geosemiotic approach can make a distinctive contribution. Such an approach invites us to analyze simultaneously the imaginaries that render technologies desirable, the practices through which they are incorporated into everyday activities, and the geopolitical configurations that shape their development. This perspective makes it possible to move beyond the classical opposition between technological enthusiasm and technological critique, focusing instead on the social, cultural, and political conditions of contemporary robotization.

The fundamental challenge posed by intelligent technologies in the twenty-first century may therefore not be the domination of humans by machines. Rather, it lies in the ways the boundaries of action, decision-making, and responsibility are being progressively redefined within hybrid collectives in which human actors and technical systems jointly participate in the production of the social world. Contemporary robotization thus appears less as a simple technological revolution than as a profound transformation of the forms of collective action. In this sense, robotization can be understood as part of the ongoing co-individuation of technical systems and human collectives described by Simondon (1958), whereby technologies do not simply operate within society but participate in its continuous transformation. Understanding this transformation is undoubtedly one of the major tasks facing the social sciences today.

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