Human–AI Symbiosis and the Ethics of Care: Towards Care-Sensitive Design in Assistive Robotics

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Abstract

This article examines the ethical challenges raised by assistive robots from the perspective of human–AI symbiosis and the ethics of care. While dominant approaches in AI ethics and machine ethics often rely on principle-based frameworks, we argue that these are insufficient when robotic systems intervene in fragile, embodied, gendered, and asymmetrical relations of care. After reconstructing human–AI symbiosis as a condition of technological co-dependence and vulnerability, the article introduces care ethics as a framework capable of foregrounding dependency, relationality, bodily exposure, contextual responsiveness, and dignity. It then discusses Dyoub and Lisi's fuzzy-logic approach to the Patient Dilemma, showing how their model mediates between autonomy, beneficence, and nonmaleficence in assistive robotics. Building on this case, the article proposes a care-ethical reframing of intimate robotic care through the scenario of incontinence management. This scenario makes visible several intertwined vulnerabilities that are relevant. Finelly, we argue that care-sensitive design should include granular consent, privacy- and dignity-preserving operation, adaptive interaction, human handover, bias audits, inclusive datasets, and participatory design. The aim is to support robotic care without intensifying exposure, dependency, misrecognition, or loss of dignity.

Keywords

Human–AI symbiosis; ethics of care; assistive robotics; elderly care; machine ethics; care-sensitive design.

1. Introduction

Artificial intelligence (AI) has emerged as one of the fields characterized by the most rapid technological innovation over the past decade. The introduction, widespread diffusion, and pervasive use of AI tools across society are driving significant advances in numerous domains, particularly in areas such as precision medicine, where these technologies have the potential to enhance diagnostic accuracy, personalize treatments, and improve healthcare outcomes [1]. At the same time, however, the growing integration of AI systems into social and institutional contexts has also exposed a range of critical challenges and vulnerabilities [2]. Among the most widely documented concerns is the amplification of existing biases embedded in datasets,

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algorithms, and decision-making processes [3]. In this way, AI systems often performatively reproduce pre-existing forms of social discrimination and inequality, thereby raising important ethical, legal, and political questions regarding their development and deployment [4].

The aim of this paper is to engage with the complexity of these emerging dynamics by reconnecting with the growing body of literature on *symbiotic AI* [5], [6], [7], [8], [9]. This perspective conceptualizes human-AI interaction as a form of collaborative integration whose central theoretical objective is the development of relationships between humans and technical agents that are safe, reliable, and mutually beneficial. Forms of human-AI symbiosis are already becoming a tangible reality across multiple domains, and it is increasingly likely that such forms of sociotechnical teaming will expand on a large scale in the near future [10]. Within this context, the European Union has sought to regulate the development and deployment of these technologies from both ethical and legal perspectives. In 2018, the European Commission appointed a High-Level Expert Group composed of 52 specialists, which drafted the *Ethics Guidelines for Trustworthy AI*, published the following year [11], [12]. These guidelines aimed to promote a *human-centered* approach to AI while ensuring the robustness and safety of AI systems. The framework is structured around seven key requirements: (1) human agency and oversight; (2) technical robustness and safety; (3) privacy and data governance; (4) transparency; (5) diversity, non-discrimination, and fairness; (6) societal and environmental well-being; and (7) accountability. In parallel, the European Parliament approved the AI Act in 2024, the first binding regulatory framework governing AI applications through a risk-based approach. The regulation prohibits certain uses of AI deemed unlawful or dangerous, such as social scoring practices [13]. These are only two examples of the growing body of regulatory and ethical documentation produced in recent years. The primary aim of these frameworks is to establish guidelines and codes of conduct for the development and use of AI technologies, ensuring that they do not undermine or harm human autonomy. As argued by Luciano Floridi, the underlying objective is to preserve the Kantian principle according to which human beings must never be treated merely as a means, but always as an end in themselves [14].

However, one of the main weaknesses highlighted in the literature concerns the difficulty of translating ethical principles into concrete practice [15], [16]. As the symbiosis between humans and machines becomes increasingly pervasive, real-world scenarios emerge in which technical agents may be required to act in accordance with moral principles. In their pioneering book *Artificial Intelligence: A Modern Approach*, Stuart Russell and Peter Norvig define an agent as "anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors" [17]. In this sense, an AI system can be understood as an agent capable of receiving, processing, and interpreting information within a given environment [18]. The pressing challenge, therefore, is to integrate and embed ethical principles directly within such systems, so as to align their behavior with moral values and normative guidelines capable of orienting their actions [19], [20], [21]. This issue is currently explored within the field of machine ethics, a multidisciplinary branch of AI ethics concerned with the operationalization of ethical principles in AI and robotic systems [22].

The emerging symbiotic alliance between human beings and the artificial technical infrastructures within which they operate calls for particular attention to the phase in which ethical principles and normative frameworks are embedded, in order to safeguard human dignity and integrity. From an ethical standpoint, this requires moving beyond the mere articulation of abstract principles and instead examining how such principles can be

operationalized and translated into specific applied contexts. However, as is well known, there is no uniform agreement within the philosophical literature regarding which ethical approaches should be adopted [23]. Historically, several major traditions have been developed: deontological ethics, which emphasizes duties and adherence to moral rules [24]; utilitarianism, which evaluates actions based on their capacity to maximize overall happiness or utility [25]; consequentialism more broadly, which judges actions according to their outcomes [26]; and virtue ethics, which focuses on the cultivation of moral character and virtues rather than on rules or consequences alone [27]. In this paper, we propose to consider a different ethical framework that has so far received limited attention within the field of AI ethics and machine ethics: the ethics of care [28], [29], [30], [31], [32], [33], [34]. Originally developed at the intersection of philosophy and psychology by Carol Gilligan, this approach emerged prominently with the publication of her 1982 monograph *In a Different Voice* [30]. In this work, Gilligan challenges the dominant theory of children's moral development advanced by Lawrence Kohlberg, which identified the highest stage of moral maturity with the ability to abstract from concrete situations and engage in principle-based reasoning [35].

Gilligan's intervention is particularly relevant because it does not merely introduce an alternative moral theory but also challenges the very model of moral subjectivity presupposed by dominant ethical frameworks [36], [37], [38], [39]. Against the idea that moral maturity consists primarily in detachment, impartiality, and the application of universal principles, the ethics of care emphasizes the moral significance of dependency, vulnerability, relationality, contextual responsiveness, and responsibility [40], [41], [42]. Moral judgment is not understood as the abstract application of a rule to a case, but as a situated practice that requires attention to concrete needs, embodied conditions, affective relations, and asymmetries of power. This does not mean abandoning normativity or reducing ethics to emotion, rather, it means recognizing that moral aspects of life are always embedded within networks of interdependence [38].

This point becomes especially significant when applied to AI systems and robotic agents. If human–AI symbiosis is not merely a technical form of cooperation but a sociotechnical relation that increasingly affects the conditions of human flourishing, then the ethical question cannot be limited to whether AI systems comply with predefined principles. It must also concern how such systems participate in the constitution, transformation, or disruption of care relations. In other words, the problem is not only how to align artificial agents with human values, but also how to design technical agents capable of supporting, preserving, and responding to fragile relational contexts.

For this reason, the ethics of care offers a particularly promising framework for rethinking machine ethics beyond purely rule-based or principle-based models. While deontological, utilitarian, and consequentialist approaches tend to frame moral agency in terms of rules, outcomes, or computable preferences, care ethics foregrounds the situated and relational character of moral action. This is especially important in contexts where vulnerability, dependency, and embodied needs are central. Elderly care represents one of the most significant examples of such a context. Here, the introduction of robotic and AI-based systems cannot be evaluated only in terms of efficiency, safety, or functional performance. It must also be assessed in relation to dignity, trust, intimacy, autonomy, bodily exposure, emotional recognition, and the quality of the care relationship.

In this regard, Joan Tronto's political theory of care provides a particularly useful conceptual and normative framework. Tronto defines care as a species activity aimed at maintaining, continuing, and repairing our world so that we may live in it as well as possible [31]. Care is therefore not reducible to a private sentiment or a merely interpersonal disposition; it is a practice that involves material, institutional, political, and technological arrangements. Tronto's articulation of care into different phases — caring about, taking care of, caregiving, and care receiving — together with the corresponding moral qualities of attentiveness, responsibility, competence, and responsiveness, allows us to understand care as a dynamic process rather than as a single act [31], [40]. This processual understanding is particularly relevant for robotics, since it makes it possible to ask not only whether a robot performs a given task correctly, but whether it is able to participate appropriately in the broader ecology of care within which that task acquires meaning [28], [29], [32], [33], [34].

From this perspective, the development of care robots for medical assistance requires more than the implementation of safety protocols or abstract ethical constraints. It requires the design of systems that are sensitive to the relational and contextual dimensions of care. A care robot should not simply execute a function but should be able to recognize situations of need without reducing the cared-for person to a passive object of intervention; it should support autonomy without abandoning responsibility, protect bodily integrity without reinforcing surveillance, and assist caregivers without replacing the human and affective dimensions of care. The challenge, therefore, is to articulate what a care-ethically sensitive robot might mean within a human–AI symbiosis perspective.

This paper addresses that challenge by proposing a preliminary framework for the development of care-ethically sensitive robots in assistive domain. The central hypothesis is that the ethics of care can help reorient human-AI symbiosis away from a merely functional model of human-machine cooperation and toward a relational, situated, and context-sensitive model of sociotechnical cohabitation.

The article proceeds as follows. Section 2 reconstructs the theoretical background of human-AI symbiosis and argues that the increasing co-dependence between humans and technological infrastructures constitutes a specific ethical condition of vulnerability. Section 3 examines the limits of human-centred and principle-based approaches to AI ethics, introducing the ethics of care as a framework capable of foregrounding dependency, relationality, embodied vulnerability, and contextual responsiveness. Section 4 discusses Dyoub and Lisi's fuzzy-logic model [43] for the Patient Dilemma [44], showing how their approach mediates between autonomy, beneficence, and nonmaleficence in the context of assistive robotics. Section 5 proposes a care-ethical reframing of intimate robotic care through the case of incontinence management, outlining preliminary criteria for care-sensitive design attentive to dignity, bodily exposure, consent, privacy, gendered vulnerability, and the relational quality of care.

2. Human-AI Symbiosis and the Emergence of Vulnerability as an Ethical Condition

To conceptualize the increasingly complex relationship of human-AI interaction and collaboration, recent scholarship has begun to employ the metaphor of *symbiosis* [5], [6], [7], [8], [9], [10], [45]. The term *symbiosis* (from the Greek *σύν βίος*, meaning "living together") dates

back to the nineteenth century, when the botanist Bernhard Albert Frank introduced it to describe the structure of lichens [46]. Lichens are complex biological entities formed through the association of two taxonomically distinct forms of life: an autotrophic organism, such as a cyanobacterium capable of photosynthesis, and a heterotrophic organism, such as a fungus. In 1967, the American biologist Lynn Margulis published her seminal article, entitled *On the Origin of Mitosing Cells* [47]. Here, she theorized that the emergence of eukaryotic cells is due to the process of *endosymbiosis* between bacteria and prokaryotic cells. This endosymbiosis led to the formation of mitochondria and ribosomes, which are essential for the metabolic process of nucleated cell respiration [48], [49]. This discovery has set a revolution in the field of evolutionary biology showing that the function that drives evolution is symbiosis rather than natural selection, as advocate by neo-Darwinists [50]. From these premises, Margulis argues "creation of novelty by symbiosis did not end with the evolution of the earliest nucleated cells. Symbiosis still is everywhere" [49]. In 1987 with his collaborator Dorion Sagan, they suggested that *humans are technologically dependent biological organisms*. They explain that "despite our machineless past, our autopoiesis now depends on machine organization in much the same way that cells of our body depend on human organization" [51]. This means that the trajectory of our evolution as part of a complex and heterogeneous environment is modified by the diffusion and ubiquity of new forms of technologies. Nevertheless, their reference to a machinic symbiosis remains vague and largely indeterminate. What kind of future are the authors anticipating here? And in which way would such a co-evolutionary relation be structured? Furthermore, the fact that Margulis appears as the second author of this contribution – whereas in her collaborations with her son, Dorion Sagan, she is almost invariably listed as the first – might suggest that this particular idea is primarily shaped by Sagan himself [52]. The very notion of endosymbiosis is grounded in a mechanism that N. Katherine Hayles calls *reversible internality*: a process that displaces the human and reveals it as emerging from something *other*, in this case, from the bacterial symbiosis that made cellular respiration possible [53]. This process ultimately culminated in the *Great Oxidation Event*, during which the metabolic activity of cyanobacteria radically transformed the Earth's atmosphere, enabling the evolution of aerobic life and reshaping conditions for complex biological organization [54].

In 1960, computer scientist Joseph C. R. Licklider developed for the first time the idea of Man-Computer Symbiosis [55]. He used this term to refer to a specific kind of man-computer collaboration. First of all, he defines symbiosis in relation to the thesis developed by J. D. North of a "mechanically extended man", that is, a kind of relationship that considers "the mechanical parts of systems" as "mere extensions, first of the human arm, then of vision" [55]. This is clearly a prosthetic type of relationship that considers tools as an extension of human body. Symbiosis, on the other hand, "aims to actually bring computational machines into thought process that must take place in real time" [55]. In this sense, Licklider outlines for the first time a form of symbiosis that is neither biological nor ethological, but one that connects the organic and the inorganic [56].

Building on these premises, Licklider was appointed in 1962 as the first director of the Information Processing Techniques Office (IPTO) at ARPA, the Advanced Research Projects Agency, a military research agency engaged in the development of telecommunications and information-processing technologies during the Cold War. This research trajectory culminated in 1969 with the creation of ARPANET, the Advanced Research Projects Agency Network, widely regarded as the first interconnected computer network and as the technological

precursor of the modern Internet. As Katherine Hayles comments: "Sixty years later, we can appreciate the prescience of his vision, at the same time noting how much further along we are from his scenarios [...] With contemporary AI systems, computers do far more than construct models to test hypotheses. They discern subtle patterns in very large datasets; they perform correlations that, in the view of some, make causal reasoning unnecessary; supplemented by sensing systems of many kinds, they not only create the data on which decisions are made but make the decisions themselves" [6]. What the metaphor of symbiosis, when applied to the technological domain, invites us to consider is precisely *the co-evolutionary relation between the human species and technology*.

André Leroi-Gourhan's paleo-anthropological studies show that the human being and technics are not two separate terms that subsequently enter into relation, but rather constitutive poles of a *transductive process*: neither term exists outside the specific relation through which both are formed. His analysis of hominization suggests that the specialization of the lower limbs for locomotion is inseparable from the liberation of the hands, the acquisition of upright posture, and the development of specifically human manipulative capacities. In this sense, the emergence of technical objects, among which the *chopper* can be considered one of the earliest and most elementary examples, does not simply follow biological evolution as an external supplement. Rather, the manipulation and production of tools retroactively transform the conditions of human development, contributing to the very process of hominization [57], [58], [59], [60].

Technics and human evolution must therefore be understood as two essential and inseparable dimensions of the same *ontogenetic process*. Neither possesses logical or ontological priority over the other; both participate in the constitution of the human form of life. This intuition has been further developed, and in part empirically supported, by Material Engagement Theory and neuroscience. According to this approach, cognition does not take place exclusively inside the brain but emerges through the active engagement of human agents with material culture, tools, gestures, and artefacts. *Technical objects are constitutive elements of cognitive and anthropological becoming* [61], [62], [63].

In the history of AI, emphasis has often been placed on automation and the replacement of human agency, while the question of our co-evolution with technical systems has remained comparatively underdeveloped [64]. Yet, today, an increasing number of our ordinary activities require interaction with complex technological infrastructures. Our social environments are pervaded by artificial agents which, by virtue of their computational power, perform functions that have become essential to the maintenance of social life and, in many cases, to human survival itself. As Katherine Hayles writes: "if computational media were to malfunction on a massive scale, the toll in human lives and in social chaos would be enormous [...] What would be the result? Cars and trucks would not start; railroad command centers would not function; airline towers could not communicate with or control the airplanes, which would be flying blind; ATMs would not work; Wall Street trading would collapse in chaos; the electrical grid, controlled by electronic components, would be disabled; cell phones would be useless; water would not flow from taps; food and supply networks would be disrupted; and so forth. I list this depressing litany not to forecast an apocalypse (which of course I fervently hope never happens), but to vivify how deeply we have entered into alliances with cognitive assemblages and how dependent we have become on their proper functioning" [53].

To think our relation to AI in symbiotic terms therefore means to confront the *vulnus* of this relation: the disturbing condition of co-dependence that binds human life to the technological infrastructures it has itself produced. This co-dependence is potentially dangerous because exposes a structural *vulnerability*, but it also opens up unprecedented possibilities [2], [41]. As Bernard Stiegler argues, technics is a *pharmakon*: following the Greek etymology of the term, it functions at once as poison and remedy [65], [66]. It enables us to imagine more equitable, egalitarian, and democratic futures, while also exposing us to the destructive and harmful effects that may emerge from these same relations.

For this reason, as we will argue in what follows, a merely principle-based approach is insufficient. It is not enough to guarantee the ethical primacy of the human, as in the human-centred perspective promoted by the European Union, which is primarily concerned with safeguarding the inviolability of human rights and prohibiting malicious uses of AI. What is required is a further imaginative and normative effort: one capable of designing beneficial, sustainable, and non-destructive forms of co-dependence between humans, artificial agents, and the broader environments in which they are embedded.

This is one of the central ethical challenges opened up by human-AI symbiosis. It requires, as Hayles suggests, that we "endorse programs, procedures, and rules that turn the energies of capitalism toward planetary health and sustainability rather than toward the destruction of environments and habitats. It also requires extending the *domain of care* beyond the human, toward nonhuman beings, technical systems, and eventually cognitive media" [53]. In this sense, the ethics of care may offer a crucial starting point for rethinking the normative conditions of human-AI symbiosis.

3. Theory of Justice vs Ethics of Care

The Enlightenment tradition that emerged in Europe and was later consolidated in classical liberalism conceived the human subject as the sole and individual bearer of inalienable rights, which guarantee both equality among all members of the species and individual freedom [67], [68]. The normative framework of AI has partially inherited this orientation: its declared objective is that of "protecting human dignity and fundamental rights" [69]. In particular, the AI Act adopts a risk-based approach in order to regulate the potentially harmful effects of AI systems. More broadly, the Ethics Guidelines discussed in the introduction articulate seven ethical principles intended to guide the development, design, and use of these technologies [12].

What emerges from this framework is that, at least at the normative level, the field of AI ethics has largely been structured around compliance with principles. Comparatively little attention has been devoted to the relational dimension of human–AI interaction and to the forms of dependency, vulnerability, and interdependence that these technologies produce. For this reason, this section introduces the ethics of care, which originally emerged as a critique of the tendency to regard conformity to abstract principles as the only genuine and universal form of ethical reasoning.

The theoretical significance of the ethics of care can be fruitfully transposed into the field of AI, where it allows us to reconsider some of the limitations of dominant approaches to AI ethics and machine ethics. In this section, we briefly reconstruct the emergence of care ethics within moral psychology in order to show how it provides a conceptual framework capable of reorienting the ethical discussion on artificial agents.

The purpose of this approach is not to abandon the formulation of principles, guidelines, or ethical codes, rather it is to supplement principle-based frameworks with a relational perspective that places vulnerability, dependency, narrativity and contextual responsiveness at the center of moral evaluation. From this standpoint, the ethical problem is not only whether AI systems can be aligned with predefined values, but also how they participate in concrete relations marked by asymmetry, trust, embodied needs, and care.

It is also important to emphasize that, precisely because of its attention to relational and contextual dimensions, the ethics of care allows us to take seriously the gendered, embodied, and material conditions through which social interactions are structured. Care is never a neutral or abstract practice. It is always situated within concrete relations of power, historically organized through gendered expectations, bodily exposure, affective labor, and material dependency. In this sense, care ethics makes visible the symbolic and material arrangements through which power relations are embodied and reproduced in everyday social interactions [70], [71]. Gender is therefore not an external or secondary issue within the ethics of care, rather, it constitutes the very diffractive prism through which Carol Gilligan was able to formulate her critique of Lawrence Kohlberg's model of moral development [39].

The ethics of care originates in Carol Gilligan's *In a Different Voice*, where she criticizes the universalistic framework underlying Lawrence Kohlberg's theory of children's moral development [35]. Kohlberg's work represented one of the most influential attempts to describe moral maturity in terms of progressively more complex forms of moral reasoning [72]. His aim was to identify the structure of reasoning through which subjects justify their moral decisions. This methodological orientation is clearly illustrated by the famous Heinz dilemma [73]. Dilemmas play a pivotal role in ethical analysis, since their resolution provides one of the closest approximations—although still within a hypothetical or figurative framework—of how ethical principles may operate in quasi-real contexts [74]. In its basic formulation, Heinz's wife is gravely ill, and a pharmacist possesses a drug that could save her life. Since Heinz cannot afford the drug and the pharmacist refuses to give it to him, the question is whether Heinz should steal it. For Kohlberg, the decisive issue is the kind of justification offered: whether the reasoning is based on fear of punishment, instrumental exchange, interpersonal approval, respect for social order, appeal to rights, or universal principles of justice.

On the basis of responses to dilemmas of this kind, Kohlberg organized moral development into six stages, grouped into three levels: pre-conventional, conventional, and post-conventional morality. At the pre-conventional level, moral reasoning is oriented toward punishment, reward, and individual advantage [75]. At the conventional level, moral judgment is shaped by interpersonal expectations, social approval, and the maintenance of rules and institutions. At the post-conventional level, moral reasoning is expected to transcend particular conventions and appeal to principles such as rights, justice, reciprocity, and universalizability. In this model, the highest form of moral maturity corresponds to the capacity to adopt an impartial standpoint and to evaluate moral dilemmas from the perspective of all those involved.

The Heinz dilemma is the experimental and conceptual device through which Kohlberg's model becomes intelligible. It allows him to distinguish between the empirical answer given by the subject and the cognitive structure that organizes moral judgment. A subject may claim that Heinz should steal the drug because he fears social blame, because he values marital loyalty, because human life is more important than property, or because a rational moral order must give priority to the equal worth of persons. These different justifications correspond to different

stages of moral development, even when they lead to the same practical conclusion. This framework explains both the strength and the limits of Kohlberg's theory. Its strength lies in the attempt to understand moral development as a progressive expansion of reciprocity and role-taking. Moral maturity is defined by the capacity to distance oneself from immediate interests, local attachments, and conventional expectations in order to assume a more general standpoint [31]. Yet this is also where the most significant critiques emerge. If moral maturity is identified with abstraction, impartiality, and universalizability, then the model risks presenting moral reasoning as if it developed independently of the social conditions that shape it, including gender, class, race, education, and access to institutional forms of participation [76].

Kohlberg himself recognized that moral development depends on opportunities for role-taking and participation in social institutions. However, these opportunities are not equally distributed. Class, race, gender, and social position shape access to the very experiences through which moral development is supposed to occur [77]. As a result, a theory that presents itself as universal may end up legitimizing a hierarchy between those who have access to the social conditions required for post-conventional reasoning and those who are interpreted as remaining at lower stages of moral development [78].

Gilligan's critique of Kohlberg is both methodological and substantive. Methodologically, she observes that Kohlberg's original research was based on an exclusively male sample and that its evaluative framework therefore risked presenting a partial model of moral development as if it were universal. Substantively, she argues that Kohlberg's theory privileges a specific moral orientation—centered on justice, rights, rules, and abstract principles—while marginalizing another moral voice, one organized around care, responsibility, relationships, and responsiveness to concrete situations [38]. This difference becomes particularly clear in Gilligan's analysis of the Heinz dilemma. In *In a Different Voice*, Gilligan discusses her use of the Heinz dilemma in the context of her interviews, focusing in particular on the contrast between the forms of moral reasoning displayed by two figures, Jake and Amy [30]. When asked whether Heinz should steal an overpriced drug in order to save his dying wife, Jake responds by accepting the dilemma *as a conflict between life and property*, so as a conflict between two different and abstract principles. His reasoning follows the logic expected by Kohlberg's framework: life has a higher value than property, and therefore Heinz should steal the drug. Jake's answer is clear, deductive, and hierarchically organized, just like an equation. It transforms the dilemma into a problem of moral logic, in which the task is to identify the superior principle and apply it correctly [30].

Amy's response, by contrast, initially appears hesitant or evasive. She does not simply answer that Heinz should or should not steal the drug, rather, she suggests that there may be other ways to solve the problem: Heinz might borrow the money, negotiate, or find another way to obtain the drug without stealing it. Her reasoning does not focus primarily on the opposition between law and morality, property and life, or individual rights and universal principles. Instead, she attends to the *relational and temporal consequences of the action*: if Heinz steals the drug and is sent to prison, his wife may become ill again and he may no longer be able to care for her. The problem, for Amy, is therefore not exhausted by the immediate act of theft, *but extends to the network of relations and responsibilities that surround the situation.* The significance of Amy's answer lies precisely in this shift of perspective. She is not answering the question as Kohlberg's framework formulates it: "Is stealing right or wrong?" *She is instead*

asking whether stealing is the best way to respond to a situation in which someone's life is at risk and several relationships are implicated. In this sense, Amy does not fail to reason morally but, rather, she refuses to reduce the moral problem to an abstract opposition between competing principles. She reconstructs the dilemma as a *narrative of interdependence*, in which the preservation of life cannot be separated from the preservation of relationships, responsibilities, and future possibilities of care [30], [79], [80].

Gilligan's analysis therefore reveals that what appears, from the standpoint of justice-based moral reasoning, as uncertainty or lack of abstraction may in fact *express a different moral competence. Amy's voice displaces the center of moral judgment from the isolated agent to the relational field in which action takes place. The moral question is no longer simply what an individual is entitled or required to do, but how a response can sustain rather than destroy the web of relations upon which vulnerable lives depend.* Her reasoning is contextual, narrative, and temporally extended: it considers not only the act itself, but also its consequences for dependency, care, trust, and ongoing responsibility [30], [31], [36], [38], [39], [80], [81]. This is why Gilligan's intervention is so important for the development of care ethics. She does not merely add a feminine perspective to an already complete theory of morality, she exposes the limits of a moral framework that identifies maturity with abstraction, impartiality, and detachment from concrete relations [80]. The "different voice" is different because it brings into view dimensions that Kohlberg's model tends to render secondary: vulnerability, dependency, affective bonds, embodied needs, and the moral importance of sustaining relationships over time [31]. At the same time, it is important not to interpret Gilligan's argument in an essentialist way: the point is not that women are naturally more caring than men, nor that care ethics should be reduced to a specifically feminine morality. The gendered dimension of Gilligan's critique shows how certain forms of moral reasoning have historically been devalued because they are associated with women, domestic labor, affective work, and practices of care [30], [38], [70], [71], [81]. Gender functions here as a critical lens through which the supposedly neutral standards of moral maturity can be questioned. What has been presented as universal moral development appears instead as a model shaped by specific assumptions about autonomy, rationality, independence, and abstraction.

4. Ethics of Care for assistive robots

As argued above, the agentic capacities of AI systems have enabled their deployment across a wide range of environments and social domains. Recent studies on symbiotic-AI have explored, in particular, the use of robotic systems in healthcare and medical assistance [16], [43], [82], [83], [84], [85]. In this section, we examine the work of Abeer Dyoub and Francesca A. Lisi on the use of fuzzy logic to assess the ethical risks related to the deployment of an assistive robot responsible for administering medication to a patient [1 6], [43], [86]. Their approach fits effectively within a principalist ethical framework, while also showing significant sensitivity to contextual variables. Through the analysis of the classic patient dilemma, in which a competent patient refuses medication, forcing the robot to balance respect for autonomy with the prevention of harm, the authors develop a method for mediating between the patient's requests, the ethical constraints governing medical care, and the robot's task of administering the prescribed medication. What we seek to show in this section is that, if one adopts the

perspective of the ethics of care, the ethical problem can no longer be framed exclusively as a compromise between principles and context, or between the application of a rule and the patient's request. Rather, ethical analysis must be extended to the entire relational environment in which this form of care takes place. To make this point clearer, we propose a new dilemma that allows us to identify the vulnerabilities at stake in this relation and to determine which dimensions should be included within ethical reasoning about human-AI care.

In their work Dyoub and Lisi argue that the development of ethical AI cannot rely on the mere availability of abstract rules, in fact, if clear and universally applicable rules were sufficient, AI would already have solved many of the problems associated with unethical behavior, such as bias, manipulation, and harm. Instead, they suggest that moral norms for AI systems should emerge from experience, through ethical reasoning about concrete situations in specific domains, and should remain open to revision over time [43]. On this basis, they propose a modular framework for deriving practical ethical rules for AI systems, aimed at making moral decision-making more transparent, adaptive, and domain-sensitive. Their approach is illustrated through medical case studies, precisely because the medical domain makes the difficulty of translating ethical principles into situated action especially visible [16], [43], [86].

They discuss the so-called *Patient Dilemma Problem* [44]. In this case, a care robot approaches a competent adult patient in order to administer medication at the appropriate time, but the patient refuses to take it. The robot must then decide whether it should try again to persuade the patient or accept the patient's decision as final. The dilemma arises because different ethical principles appear to pull in different directions: insisting may risk undermining the patient's autonomy, while accepting the refusal may expose the patient to physical harm and therefore conflict with the duties of beneficence and nonmaleficence. The case is usually framed through the principles of biomedical ethics, especially respect for autonomy, nonmaleficence, and beneficence [44], [87]. More specifically, the model they propose, evaluates the ethical risk of physical harm by taking into account two main input variables: the severity of the patient's health condition, which is provided by the physician and stored in the patient's medical record, and the patient's mental or psychological condition, which the robot assesses through dialogue and observation. Both variables are measured on a scale from 0 to 10 and then converted into fuzzy sets. The severity of the health condition is classified as very low, low, medium, high, or very high, while the psychological condition is classified as very good, good, average, bad, or very bad. Through a set of fuzzy inference rules, the system calculates an ethical risk level ranging from 0% to 100%, likewise classified as very low, low, medium, high, or very high. The resulting risk level then guides the robot's decision: if the risk is low, the patient's refusal may be accepted; if the risk is higher, the robot may be justified in trying again, insisting, or consulting the doctor. In this way, the authors attempt to mediate between patient autonomy and the duties of beneficence and nonmaleficence without reducing the dilemma to the mechanical application of a single abstract principle [43].

This example is crucial because it shows that the care robot is not simply applying a rule to a neutral situation, but it is intervening in a relationship marked by dependency, bodily vulnerability, asymmetry, and trust. For this reason, the Patient Dilemma could also be read as a care-ethical situation in which the central issue concerns the *quality of the relation established between the robot and the patient*: *how the refusal is interpreted, how the patient's vulnerability is recognized, how responsibility is assumed, and how the robot can respond without reducing the*

patient either to an autonomous decision-maker abstracted from his/her/them condition or to a passive body to be protected against his/her/them will.

In this sense, Dyoub and Lisi's analysis of Patient Dilemma provides an important starting point, but it can be integrated through the ethics of care. Their framework correctly identifies the difficulty of embedding ethical principles into artificial agents and shows the need for practical, context-sensitive moral reasoning but care ethics can radicalize this insight by showing that the relevant context is not only a set of variables to be evaluated, but a relational field in which vulnerability, dependency, responsibility, and responsiveness are continuously negotiated in the fragile ecologies of care.

In many care situations, and especially in intimate ones, what is morally decisive is not exhausted by the balancing of autonomy, beneficence, and non-maleficence, but concerns the possibility of establishing a form of care that is clinically adequate without being humiliating, invasive, or relationally blind [88], [89], [90], [91], [92]. For this reason, we propose a more revealing case, that of a robot assisting an older person with incontinence management, the replacement of absorbent devices, and the monitoring of skin irritation or infection in a domestic or residential setting. Here refusal cannot be read solely as an autonomous decision to be either respected or overridden; it may also register shame, fear, trauma, discomfort with bodily exposure, or the failure of the caring interaction itself [93], [94], [95]. This is precisely why intimate care is ethically denser than the medication-reminder scenario: empirical work shows that older adults generally prefer human assistance for personal-care tasks involving delicate touch and close bodily interaction, such as bathing, grooming, dressing, or feeding, even though more care-dependent older adults may become less averse to robotic assistance when human support is limited [96], [97], [98], [99], [100], [101], [102], [103], [104]. At the same time, the literature on social dignity has argued that, for some non-social activities of daily living, especially those related to private hygiene, robotic assistance may in certain cases preserve dignity better than human intervention, because privacy itself can be an ethically relevant good [93], [95], [105], [106].

This is the point at which Joan Tronto's ethics of care becomes methodologically and normatively indispensable [31]. Rather than asking only which principle should prevail, Tronto allows us to ask what good care would require in practice: she describes four essential moments of a good care practice—attentiveness, responsibility, competence, and responsiveness—make it possible to redescribe the scenario in relational terms [31], [40].

1) **Attentiveness** requires that the robot register not merely a yes/no refusal, but the plurality of needs expressed in the situation: clinical risk, bodily shame, fear of pain, distress linked to a gender-coded voice or appearance, prior trauma, or the perception of invasion [107], [108].
2) **Responsibility** implies that moral accountability cannot be offloaded onto the robot as though it were an autonomous caregiver; the system must remain embedded in a wider network of human oversight and shared responsibility.
3) **Competence** has to be understood not only technically but relationally: the task is not simply to execute a procedure successfully, but to carry it out in the right manner, with the right tempo, distance, language, and sensitivity.
4) **Responsiveness** finally requires that the patient's reaction to care be treated as ethically decisive, since care is not complete unless it is received as care. Recent work explicitly applying Tronto's framework to social robots in aged care has shown that

good care depends on effective collaboration among older adults, caregivers, and designers, and that robot-mediated care can either augment or undermine care values depending on how this triadic relation is organized [28], [29], [32], [33], [34].

From this perspective, the ethical questions become more concrete and more demanding than those usually posed in a principalist register. Can the robot recognize discomfort linked to gender without turning gender into a rigid stereotype? Can it adapt voice, language, physical distance, tempo, and modality of assistance? Can it distinguish between an informed refusal and a refusal generated by shame, trauma, confusion, or felt invasion? At what point should it activate a human operator rather than continue the interaction? Does the system, while apparently automating care, in fact displace additional emotional labor onto a female family caregiver who remains responsible for supervision, mediation, and repair? This is also where the methodological advantage of the case becomes visible.

Several layers of vulnerability converge in this kind of scenario, and their interaction is precisely what makes intimate robotic care ethically demanding.

1) First, there is a *bodily vulnerability* tied to nudity, physical contact, pain, skin fragility, and the constant risk of lesions, irritation, or infection. Incontinence management exposes the body in one of its most fragile conditions, so that even technically correct assistance may still be experienced as invasive or distressing [109], [110].
2) Secondly, there is a *moral vulnerability*, since the person may experience humiliation, a loss of modesty, a painful sense of exposure, or forms of infantilization that undermine self-respect and dignity. These experiences cannot be dismissed as merely subjective reactions, because they shape the very meaning of care as it is lived by the recipient [88], [89], [90], [91], [92].
3) A *relational vulnerability* is also at stake: the replacement of human contact by a device may intensify loneliness, foster isolation, or encourage an excessive delegation of care to the technological system, thereby weakening the interpersonal fabric on which good care often depends. In addition, one must consider *epistemic vulnerability*, insofar as the system may misread refusal, fail to grasp its emotional or relational causes, or project stereotyped assumptions onto the person's preferences, including assumptions linked to gender [111], [112], [113].
4) *Social vulnerability* further enters the picture whenever the robot embodies binary norms, reinforces exclusionary models of identity, or marginalizes trans, non-binary, or LGBT+ users whose experiences do not fit the categories presupposed by the system [114], [115], [116].
5) Finally, there is the *vulnerability of caregivers* themselves: far from simply reducing care work, the introduction of the robot may increase the hidden burden of supervision, maintenance, interpretive labour, and emotional mediation, a burden that in practice often falls disproportionately on women within the family or care network [117], [118], [119].

Taken together, these different forms of vulnerability show that the ethical problem of intimate care robotics concerns the broader question of how care can be organized without deepening exposure, misrecognition, or dependency. It allows one to retain Dyoub and Lisi's structure—concrete scenario, moral dilemma, ethical evaluation, risk assessment—while integrating the concerns regarding bias, non-discrimination, and data governance of sensitive information, such as health status, skin condition, intimate habits [43]. One must ask, for

instance, whether the robot has been trained on allegedly "standard" needs that in fact erase gendered differences; whether relational preferences have been collected at all; whether the system treats gender as rigidly binary [4], [114], [116]; and whether it can accommodate users whose embodied identities or histories do not fit dominant assumptions. The ethical literature on gender stereotyping in eldercare robotics is directly relevant here, because it shows that gendered robot design can affect autonomy, care, and justice at once, and that responses limited to explanation or neutralisation may be insufficient; this is why some authors now consider queering strategies and even the prospect of gender-fluid robots worthy of serious ethical attention. Similarly, recent value-sensitive design research insists that socially assistive robots must be designed with, rather than merely for, marginalised groups, including LGBT+ older adults, whose values and vulnerabilities are otherwise easily erased by default assumptions built into the technology [4], [114], [115], [116].

What follows from this is that a care robot should operate through thresholds, transitions, and relation-sensitive adjustments. A *care-oriented design* would require the system to [34], [120]: 1) detect the need; 2) request consent in a non-pressuring manner; 3) explain why assistance is being proposed; 4) offer non-stereotyped options of personalization; 5) register refusal without treating it immediately as error; 6) explore the reasons for refusal through brief and respectful prompts; 7) evaluate signs of distress and clinical risk, withdraw; 8) and reschedule when the risk remains low, and propose the handover to a human caregiver chosen or accepted by the patient when the interaction becomes ethically or emotionally compromised. Escalation should occur only under transparent and predefined clinical thresholds.

Such a design should also include granular consent [121], [122], [123], privacy- and dignity-preserving modes of operation [78], [79], [80], memory of relational preferences, bias audits across gender identity and social position, co-design involving older adults [108], [127], [128], professional and family caregivers, and gender experts, as well as clear functional limits preventing the robot from colonising the entire caring relation [70]. This is consistent both with the shift in care-robot ethics from abstract normative evaluation to design-oriented analysis and with UNESCO's *Recommendation on the Ethics of Artificial Intelligence*, which places human dignity, equality, including gender equality, life-cycle governance, and multi-stakeholder responsibility at the center of AI ethics [129]. The core issue is whether it can enter a relation of care without reproducing gendered vulnerability, stereotype, epistemic misrecognition, or loss of dignity. On this point, the ethics of care offers a more adequate framework than deontologism alone, because it evaluates not only the formal correctness of a decision, but the concrete quality of the relation through which care is given and received.

5. Conclusions

This article has argued that the ethical challenges raised by assistive robots in elderly care, particularly within emerging forms of human-AI symbiosis, cannot only be addressed through principle-based approaches. While principles such as autonomy, beneficence, nonmaleficence remain indispensable, they are insufficient if treated as abstract norms to be applied externally to concrete situations. In contexts of care, and especially in intimate forms of care, ethical evaluation must also account for the relational, embodied, affective, and situated conditions through which care is actually given and received. Human-AI symbiosis is therefore a deeper

reflection on the vulnerable relations of co-dependence that bind human beings, artificial agents, caregivers, institutions, and technological infrastructures.

By examining Dyoub and Lisi's fuzzy-logic approach to the Patient Dilemma [43], [44], the article has shown the importance of translating ethical principles into operational models capable of guiding robotic action in concrete situations. Their framework offers a valuable example of context-sensitive machine ethics, since it does not simply impose a rigid rule but evaluates ethical risk by mediating between patient autonomy, beneficence, and nonmaleficence. However, from the perspective of the ethics of care, the relevant context must be understood as a relational field in which vulnerability, dependency, trust, dignity, shame, bodily exposure, and responsiveness are continuously negotiated.

For this reason, the article proposed the case of robotic assistance in incontinence management as a more ethically revealing scenario. Intimate care exposes the body in one of its most fragile conditions: it involves nudity, touch, pain, skin vulnerability, risk of lesions or infection, and the possible loss of control over one's own bodily boundaries. At the same time, it exposes the person to moral vulnerabilities such as humiliation, infantilization, loss of modesty, shame, and the erosion of self-respect. These dimensions shape the very meaning of care from the perspective of the person receiving it. A technically correct intervention may still fail ethically if it is experienced as invasive, humiliating, stereotyping, or relationally blind.

Against this background, care-sensitive design can be understood as an attempt to translate the ethics of care into design criteria for assistive robotics. Such an approach requires robots to be designed not merely as task-executing devices, but as technical agents embedded in fragile ecologies of care. A care-sensitive robot should be capable of detecting need without reducing the person to a passive object of intervention; requesting and renewing consent in a granular and non-pressuring manner; adapting its voice, distance, timing, language, and modality of assistance to the patient's preferences and reactions; recognizing refusal as morally meaningful information; preserving privacy and dignity during intimate procedures; and activating human handover when the interaction becomes clinically, emotionally, or relationally compromised.

Care-sensitive design also requires attention to the broader social and political organization of care [42]. The introduction of robots into elderly care should not reproduce gendered expectations, binary assumptions, or stereotyped models of dependency and vulnerability, nor should it simply displace additional interpretive, supervisory, or emotional labor onto family members and professional caregivers, often women. For this reason, care-sensitive robotic systems must be developed through participatory and value-sensitive processes involving older adults, caregivers, clinicians, designers, and marginalized users whose needs are often erased by default assumptions. Bias audits, inclusive datasets, memory of relational preferences, privacy-preserving modes of operation, transparent escalation thresholds, and clear limits to automation are therefore not secondary technical features, but constitutive elements of ethical design (Fig. 1).

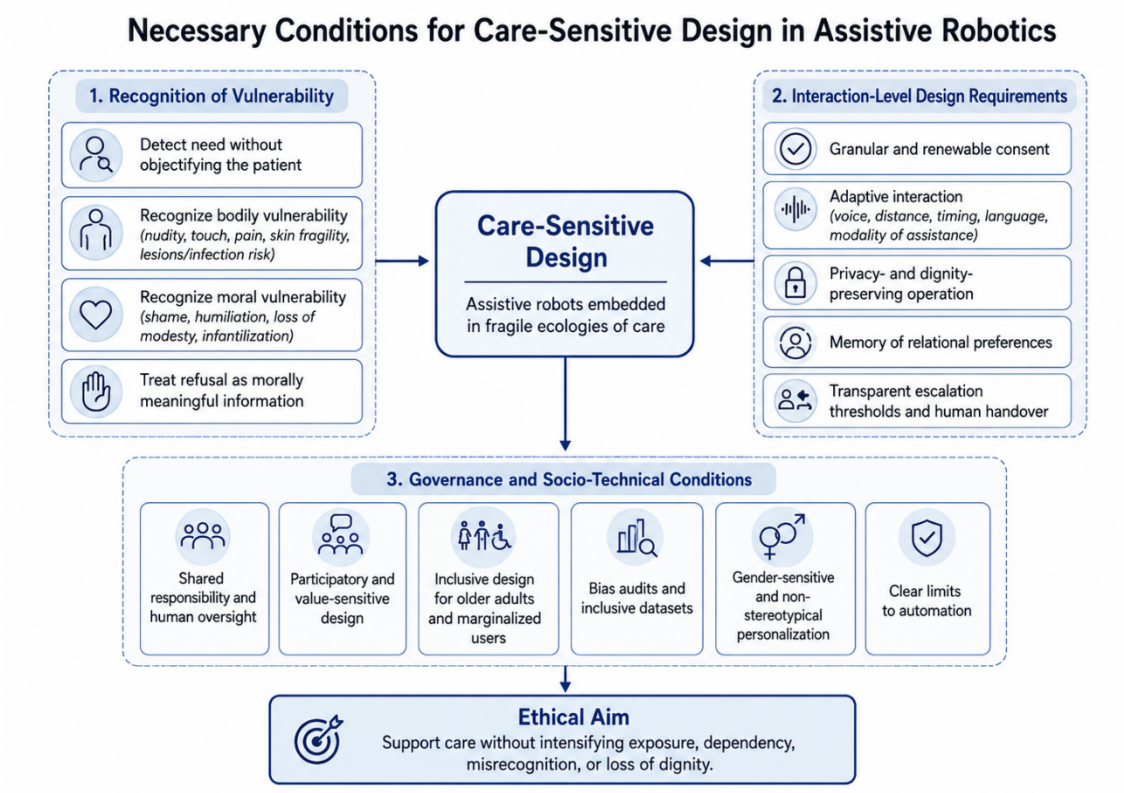


Figure 1 - Conceptual diagram of care-sensitive design in human-AI symbiosis, generated with the aid of GPT-6.

Declaration on Generative AI

The authors have used GPT-6 for figure 1 in order to: genering the structure of the table. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

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