

This is the peer reviewed version of the following article:

Bertolaso, M., & Rocchi, M. (2020). Specifically Human: Human Work and Care in the Age of Machines. *Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>

which has been published in final form at

<https://onlinelibrary.wiley.com/doi/10.1111/beer.12281>.

This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Use of Self-Archived Versions.

## **Specifically Human: Human Work and Care in the Age of Machines**

Marta Bertolaso, University Campus Biomedico

Marta Rocchi, DCU Business School

### **Abstract**

This paper aims to show how the frequently asked question about the future of work, i.e. whether human beings are going to be replaced by machines and robots, arose, and why the way such question is posed is inadequate to account for the human and social value of care professions. We discuss how the dimensions entailed in care professions are specifically human and argue that any kind of human work actually reflects them (and will reflect them in the future), irrespective of the impact of technological changes. The present argument also aims to unveil the extent of the effects of the postmodern epistemological crisis regarding the concept of work, to re-formulate the question about the future of human work, and to offer a characterization of care as a specific component of human work in the age of machines.

**Keywords:** work; care; 4th industrial revolution; dynamic and relational view; dependencies.

### **1. Introduction**

The columns of the most prestigious economics and business reviews (Bartleby, 2018; Pistrui, 2018), recent reports of high ranked universities (Stanford University, 2016) and of top consulting companies and research institutes (Chui et al., 2016; van Est & Kool, 2015), as well as leading global organizations (Ryder, 2018; World Economic Forum, 2018) express reflections on and concerns about the future of human work in the age of machines. The question addressed most frequently is whether human beings will be replaced by robots in their

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

daily jobs, and whether there will be room at all for humans to continue working and developing specific activities in service of communities and societies.

In the context of the Fourth Industrial Revolution (Schwab, 2016), this article discusses such emerging concerns, mainly showing the inadequacy of their epistemological assumptions to capture and understand the real meaning of human work, especially if compared with the activities performed by machines.

On the one hand, the failure of Taylorism as a model of the organization of work born on the heels of the Second Industrial Revolution left enough space in managerial and organizational studies to build new models of work according to the changing culture (Witzel & Warner, 2015) that are more comprehensive of the different dimensions involved in human work. The main characteristic of the inherited model of work, in fact, is functionalist in nature, i.e. it mainly deals with the capability of covering specific tasks in a chain of functions oriented to a specific goal and towards the production of measurable outcomes. On the other hand, the emergence of “care” professions (González & Iffland, 2014) highlighted a tension between this existing conception of work and the ontology of human work that lies behind care professions, leading to question mere functional approaches to work.

Our working hypothesis is that the epistemological gap from which these tensions originated has not yet been filled, leaving open questions about what kind of framework is best apt to interpret the current disruptive wave of technological innovation and the emerging concerns about human work and machine activities. How should we thus understand the dichotomy between the current concerns about the future of human work in the Fourth Industrial Revolution and the emerging care professions, which show the existence of wider dimensions of work? What is the best paradigm to characterize these kinds of jobs and what is, if any, the epistemological framework that best describes a wider sense of human work as inherently different from the activities of machines?

We argue that a double reductionism is behind such a perspective on humans, living beings and machines (Marcos, 2001; Bertolaso, 2016): mechanism,<sup>1</sup> at the epistemological level,

---

<sup>1</sup> With mechanism we are referring here to the philosophical position that endorses a view of living beings and humans as mere mechanical systems fully explained by linear and efficient causalities. We are thus not considering here more sophisticated philosophical views, like the new mechanism that tries to recover a systemic or even organizational view of living dynamics, etc. For a deeper analysis of what mechanism and mechanism entails cf. also Bertolaso et al. (2013).

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

with its ethical counterpart in utilitarianism. At the crossroads of both we can find, in fact, a functionalist view of human beings that is interestingly reflected in the conception of human work as well. Relying on previous studies on how mainly epistemological reductions showed their limits in accounting for living dynamics and growth (Bertolaso, 2016) and on how living and mechanical epistemologies differ (Bertolaso, 2019), we suggest that a relational understanding of human work in light of the intrinsic dimensions of livings' integral developmental processes clarifies the relationship and intrinsic difference between human work and machine activity, offering a way out from the tension we highlighted above. We will describe such processes as dynamics that operate “by origin,” “by doing,” and “by holding.” The argument that we will present unveils the effect of the postmodern epistemological crisis on the concept of work, and leads both to a reformulation of the question about the future of human work and to the characterization of care as a specific component of human work as opposed to (and eventually complementary of – see Wilson & Daugherty, 2018) machine activity.

This article intends to contribute to enhance research on the epistemological perspective to be adopted in order to account for an adequate relationship among humans and machines and an integral development of the human work in the current age. While many efforts have been devoted thus far to the way humans and machines will interact with respect to work as mere “doing” and “performing,” this contribution broadens the view to an integral perspective on human work, beyond the mere fact of producing a measurable and discrete outcome.<sup>2</sup>

The article will proceed as follows: Section 2 analyses the reasons why we still (unconsciously) rely on a reductionist conception of human work as an effect of the epistemological crisis which occurred during the last couple of centuries as described by thinkers such as Spaemann, Ratzinger, and MacIntyre. Section 3 presents the key features of care professions and their contribution, on the one hand, to the evidence of the shortcomings of a reductionist conception of work, and on the other hand, to the development of a new interpretive framework for human work. In Section 4 we introduce a dynamic and relational viewpoint on the living dynamics to account for development and claim that “care” is an essential part of the most important

---

<sup>2</sup> In this journal, there are contributions related to the main topic of this article from different perspectives. In particular, it is worth mentioning the effort of Visentin (2014), who suggested the recovery of a Thomistic reflection in order to broaden a functionalist perspective in social science, and the work of Procópio (2019), who suggested a way to expand the reductionist epistemology behind mainstream decision-making frameworks.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

dimension of this paradigm. In this section, we thus make the effort of translating this paradigm, devised in the context of biomedical sciences, into a language that is understandable for the social sciences. In doing so, we challenge the reductionist view of work within a wider framework that takes into account the complexity of human beings, their need for meaningful activities, and the embeddedness of their practices in a social relational context. Section 5 (Conclusions) collects the theoretical outcome of this article, highlights potential practical implications, and illustrates areas for further foundational research that needs to be conducted in order to lay a solid groundwork for asking the relevant question about human work in the age of machines.

## **2. The Failure of a Reductionist Narrative on Work. In Search of a New Epistemology**

This section discusses three key ideas: (i) that there was, in the history of ideas and of practice, a period in which human work was reduced to a task-performing activity, and that period happened especially during the First and Second Industrial Revolution; (ii) that even if we moved to alternative theoretical paradigms as for managerial approaches and organization of work, there is still an epistemological heritage of the concept of work as “doing” and “performing;” (iii) that this reduction is due to a wider epistemological crisis that has as its primary result a reductive concept of man and, consequently, of human work.

(i) During the First and Second Industrial Revolution,<sup>3</sup> the impact of technological changes on human work was particularly evident in terms of the organization of work and the perception of the role of the worker. The character played by Charlie Chaplin in *Modern Times* (Chaplin, 1936) is the cinematographic narrative of the struggle for survival of the worker in the new industrialized world; this movie displays in images a critique of the structure of society as a consequence of the new structure and shape of work. Indeed, in the wake of the Second Industrial Revolution, technological changes led to the formulation of new models for the organization of work due to the existence of the first industrial forms of automation and large-scale production. Above all, Scientific Management – commonly known as Taylorism, from

---

<sup>3</sup> This article mentions the different Industrial Revolutions with the purpose of highlighting how technology has affected production and human work in different times throughout history. The context of the present contribution is the Fourth Industrial Revolution, a term coined by Klaus Schwab, founder and executive chairman of the World Economic Forum, who dedicates a book to the topic (2016). For a brief historical excursus across the four industrial revolutions, see Schwab (2016: 6-8).

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

the name of its father, Frederick Taylor (Taylor, 1998[1911]) – was affirmed in managerial theory and practice. Witzel and Warner (2015) review in great detail the rise and fall of Taylorism, arguing that this theory descended from the technology of the Industrial Revolution and the culture of the Enlightenment. Witzel and Warner highlight the connection between Enlightenment culture and Taylorism as management theory, and list some distinctive traits of Taylorism: (a) it focuses on the task instead of on the company as a whole, (b) it is grounded in the methodology of engineering and physical sciences, (c) it thinks about the best way possible to achieve given goals (Witzel and Warner 2015).

The change of culture during the 20<sup>th</sup> century produced a change in managerial theory and practice as well, making it possible for new theories to be born and affirmed: Industrial Relations, Human Relations, Management Science, Organizational Behavior, Human Resource Development, and Employee Relations (see Witzel and Warner 2015: 63). Even though Witzel and Warner recognize the advent of these new managerial and organizational theories, they still reach the conclusion that “Taylorism appears to remain alive and well today, in the mediated version of the ‘lean’ principles of management” (2015: 65); and thus, we argue, the same conclusion applies to the culture and perception of work on which this model is built, with its (limited) epistemological framework. Witzel and Warner’s thesis seems to be confirmed by *The Economist*’s columnist Schumpeter, who wrote about Amazon’s alleged “Digital Taylorism” and the way the delivery company tends to measure everything related to its employees’ jobs, almost as if they are back to a Taylorist model of organization but digitally based (Schumpeter, 2015).

(ii) This brief historical excursus leads to our second claim. Even if the culture has changed and technology is rapidly changing, the influence of Taylorism, even if evidently failed from a human resources development point of view and even if substituted by current organizational theories, seems to have an effect on the way we understand human work, posing a question about its philosophical and epistemological assumptions. Taylorism’s focus on tasks and processes produces, in fact, an unbalanced attention on the means of production and the way processes are structured, instead of on the richness and wider purpose of human work. Both employees and employers, in the Tayloristic epistemological framework, do not need to question the reason why they are doing what they are doing.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

This portrait recalls a more recent description of the manager, described by the moral philosopher Alasdair MacIntyre as a character who “treats ends as given, as outside his scope; his concern is with technique, with effectiveness in transforming raw materials into final products, unskilled labor into skilled labor, investment into profits” (MacIntyre 2007[1981]: 30). It seems that the work of a manager happened to be reduced to merely functional dimensions, without any exploration of the ends involved in his or her work. MacIntyre speaks of this kind of manager in his attempt to find in the history of ideas those responsible for the epistemological crisis which has brought us to obscure the relevant questions about human nature and human actions, which are under the effect, he affirms, of the emotivistic culture and analytical philosophical enquiry. It seems that, for various cultural and philosophical reasons, and from the beginning of the 20<sup>th</sup> century till almost its end, an epistemological crisis obscured the understanding of the deepest meaning of human actions and behavior and – we shall add – this epistemological crisis has also affected the understanding of human work. Interestingly, MacIntyre also discusses how the postmodern plague of compartmentalization (MacIntyre, 2006, 2008) actually compromises and weakens the unity of individual life and the understanding of every single life’s narrative within the larger tradition where each story is born and develops, going as far as to affirm that the divided self, the fruit of compartmentalization, lacks a unitary conception of excellence, conceiving and attempting to achieve “excellence in role performance” rather than “excellence as human being” (MacIntyre, 2006: 200). In this fragmented and compartmentalized framework, the question as to whether machines will replace human work makes sense. In fact, machines are, by definition, task-oriented and programmed to fulfill their aim in the most efficient way possible. Their final goals are always productive and measurable in quantitative terms.

(iii) As a final step of the first part of this inquiry into the adequacy of the current question regarding human work in the scenario of the Fourth Industrial Revolution, we need to complete the panorama presented with a deeper reflection on the reasons why a reductionist vision of work has been so successful and influential. Well-known authors claimed the existence and extent of an epistemological crisis which has affected not just our perception of work, but the understanding of the human condition itself (MacIntyre, 2007; Ratzinger, 2004; Spaemann, 2006; Spaemann & Löw, 2013). For the purpose of the present article, we must now consider how the abovementioned anthropological crisis is reflected in other spheres of human action, which means that human work in general will eventually be influenced in its entirety by this

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

crisis as well. In this line of reasoning, Spaemann (2006) discusses in a concrete way how we have witnessed the exploitation of the systematic knowledge of the sciences, especially the sciences of nature and life, for the sake of the revolution of the praxis of human life, i.e. for the sake of the expansion of human domination over the limits that nature seems to impose. This extension of practice on pragmatic purposes brings with it an inherent deception, pragmatic in its own nature and therefore even more pervasive and less conscious in most cases, so we have tended to react, for example, to the scarcity and limited number of possibilities by aiming for an *infinite expansion of possibilities*.

However, and pointing in a very different direction, life sciences in their broad sense (from biology to ecology to bio-medicine and pharmacology) have repeatedly made us realize in recent decades that there is an intrinsic unpredictability and uncertainty in the natural world, which is not subject to mechanistic laws and interventions. The high non-linearity of natural processes is causing us to reconsider that the context in which living dynamics take place, play a fundamental role in the final outcome. In other words, what was considered a secondary element (the boundary conditions and the contextual factors) acquires a dominant role in the explanation of complex processes, of specific functions of the elements of a system, leaving little room for a merely reductionist and functionalist approach to account for living dynamics.

This evidence corresponds to the progressive failure of mechanistic models, especially in the bio-medical sciences, to account for biological development and growth. Concretely, for example, attempts at explaining biological development by merely focusing on the molecular parts do not explain or account for emergent properties such as tissue level properties or systemic reactions (e.g. cancer or immune responses, etc.) to external or stress environmental factors (Gilbert, 2005; Gilbert & Sarkar, 2000; Mitchell, 2003; Noble, 2006). In fact, genetic, epigenetic, topological, and environmental factors have to be considered simultaneously. For similar epistemological reasons, such tension also explains, to some extent, the current emergence of human ecology studies and ecological ethics attempting to go beyond dominant utilitarian paradigms (cf. the analysis offered by Marcos, 2001).

Something very similar also seems to happen in our understanding of work: reductionist and functionalist approaches fall short in the interpretation of what work really is. They tend to reduce our understanding of human work to a mechanistic process, without taking into account the conditions under which this process takes place and is effective, who is actually making it

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

happen, how biographical aspects of the worker impact the way he or she works, or how relevant the impact of environmental conditions is on the quality of the outcome and on the wellbeing of the worker.

Moving on from this analysis, we see more clearly the effects of this anthropological crisis on the post-modern (in the language of Spaemann) world we inhabit. With MacIntyre (2007[1981]) and also following Spaemann's analysis, we argue that the crisis of contemporary man is in fact an epistemological crisis, a crisis of his way of living in the world, which human beings know also through their work.

This crisis is thus clearly affecting both the process by which we know (i.e. human work) and knowledge itself, so that (i) we remain with the "shape" of the concepts that we use, having lost their real meanings; and (ii) we are not aware that this is happening and this is an additional problem (MacIntyre 2007[1981]). In a world driven by production, our way of thinking and behaving mainly relies on judgments about *valid* systems, not about *true* dynamics: this means that the criteria for decision-making follow what can be empirically or experimentally validated and proved, leaving aside the question about truth and the value of human actions, goals, and endeavors.

This analysis is somehow also reflected in Ratzinger (Ratzinger, 2004), who stresses how in our age what man can really know is eventually only what is repeatable: *verum quia ens* has thus been substituted by the *verum quia faciendum*. In this way, *techné* has become more important, for example, than history. The truth about human beings and their living in the world has been thus measured within a functionalist paradigm that characterizes a large part of the technological development of recent centuries. However, human behavior is heavily influenced by historical factors too, as well as by their origin either biological or environmental.

The epistemological crisis described in Section 2 has thus invaded the methodology followed by both the biological and social sciences. The limits of a reductionist viewpoint in the biological sciences have been shown, but it seems time for social sciences as well to rely on a new paradigm. Section 3 shows how care professions challenge reductionist epistemological paradigms in the present social and technological context.

### **3. The Challenge Posed by Care Professions to a Reductionist Understanding of Work**



This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

This Section will (i) present the challenge that care professions pose to a reductionist paradigm of work, and the need for the formulation of an epistemological paradigm for human work that embraces the dimension of “care,” integrating it in a radically different way than a functionalist account would; and (ii) characterize distinctive traits of “care.”

(i) In recent years, there has been an increasing attention to care professions, i.e. those jobs whose focus is on the person or on her living habitat and environment, i.e. on the specific context where she is (Brizi & Bertolaso, 2018; González & Iffland, 2014). By “context” here we refer to the specific familiar, socio-cultural, physical, and environmental circumstances in which a person lives at a particular moment of her life. This brings attention, on the one hand, to the institution of professional figures, whose job is centered on “care” and, on the other hand, to the emergence of a discussion at the academic level about what care actually means and what it means to consider it human work.<sup>4</sup>

As Gonzalez and Iffland (2014) argue, there are challenging historical and demographical conditions that are pushing for the development of specific figures dedicated to the work of care. On the one hand, the individualization of society produces an individualization of care, which brings care outside the traditional environment where it has usually happened, i.e. the extended inclusive concept of family and participative neighborhoods. This first factor consequently leads to the new social and economic demand for specialized caregivers, whose professionalization is synonymous with the request for a professional standard of care giving, which increases the high-quality standard specialization of care and its related costs. On the other hand, the authors take into account the emergence of chronic diseases and the increase of life expectancy as factors that often make a family unable to provide within itself the care necessary for its members who need it.

To give an illustrative example, it is possible to think of the way that care for an elderly person is conducted in the context of a society where the tendency to change geographical location and social condition is relatively low: the closest member of this person’s family or even closest neighbors tend to be in charge of caring for this person. On the contrary, in the context of a

---

<sup>4</sup> From now on, we shall use the terms “job” and “profession” interchangeably, with the ultimate minimal meaning of human work. We are aware of the existence of an extensive literature which develops the argument for the status of “care” as “profession”; however, for the sake of the development of our argument, we shall not deal with the richness of this literature (Agulles Simó, 2014; Debeljuh & Destéfano, 2015; Hugman, 2014). On the contrary, the distinction this article maintains as significant is that of speaking about “work” when it refers to human beings, and “activity” when it refers to tasks performed by machines.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

society where the same elderly person finds herself living in personal and geographical isolation due to her personal story (the increasing number of people that find themselves living alone, to name one of the possible causes) or to her relatives' choices (changing cities to have better working conditions, massive increase in the participation of women in the labor market, etc.), the caregiver is no longer a member of the family, but is someone who usually starts sharing the same house of the person in need of care in order to provide all those services for the person that were previously taken care of within the family. Thus, care is not only seen as a human need, but also points towards certain qualitative standards on a large-scale so that caregivers should increasingly meet historical, contextual, and functional expectations of the person being cared for.

These three (historical, contextual, and functional) dimensions were somehow previously embedded in the domestic environment, in family life and relationships so that it hardly seems possible to merely outsource and delegate the emerging complex social demand for care services, especially if the expectation should be fulfilled by a mechanistic and functionalist understanding of caring and of its related jobs.

Several types of care professions, as different as "health care providers, educators, homemakers, and social workers" (Gonzalez and Iffland, 2014: 3) are, in fact, usually not expected just to comply on the scale of measurable outcome, rather they are expected to be able to establish a positive relationship with the person in need of care. Caregivers are requested to be skillful as well as emotionally empathetic and truly concerned. The adequate standard by which to evaluate care is, therefore, its efficacy more than its efficiency. The former more than the latter usually better meets personal well-being and satisfaction requests. That is, the excellent fulfillment of a functional task is quite often insufficient (sometimes not even necessary) to pursue the overall improvement of the quality of life of a given person, its status and identity (cf. Pennacchini et al., 2011).

(ii) What has just been discussed highlights the need to define the status of care as characterized by specific features that are not embraced by a mere functional characterization of work. Thus there is a need to develop a specific epistemological framework that is able to take into account the specificity of the work of care. This effort will be more valuable as long as the design of this framework shows how the specific features of the care professions call for a different understanding both of the most essential dimension of care professions from an

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

epistemological point of view *and* of how this most essential dimension is proper and essential to *any kind* of human work from an ontological point of view too. Even those jobs that seem to require a less direct relationship with other human beings would, therefore, entail this caring specificity in terms of attitude, mode of action, style, and intention.

In a first place, even if there is a tendency to associate care with the emotional sphere as opposed to one of rationality and functional logic, care is usually conceptually portrayed according to both an objective and a subjective dimension.<sup>5</sup> *Caring about*, described as the caregiver's attitude of concern for the person in need of care, constitutes the subjective dimension of care; *caring for*, described as the directedness of the action of the caregiver towards the personal flourishing and well-being of the person who is receiving care, is the objective dimension (Gonzalez and Iffland, 2014). However, how can we describe the peculiar mode of action that is common to both dimensions? The approach to a person understood as a narrative unity that takes into account the three abovementioned dimensions (historical, contextual, and functional) seems to be the specific feature we all look for in caregivers' attitudes and actions towards those in need of care: our history, our contingent role in society or in the community in which we live, and the contextual or environmental factors that make things easier or harder for us.

Considering the different perspectives on a person as a narrative unity brings the reflection to a further level: care by its own nature is care in *particular*, it does not deal with abstract human beings but with the specific historical and spatial *particularities* of a specific person. If care deals with general and generalizable realities, it is not care anymore; it falls short of its status. The specificity of care is to be of the particular person. Gonzalez and Iffland already clearly explain this point: "*Insofar as care is not directed to human beings in the abstract but rather to concrete individuals, the act of caring for someone presupposes the capacity to understand and decipher all their individual particularities*" (2014: 4, emphasis in the original). What we are adding here is a specific emphasis on the "mode of action," on the "style" that entails an integrated and integrating caring attitude.

---

<sup>5</sup> In what follows, we refer to the objective and subjective dimension entailed in care professions. We acknowledge the existence and relevance of academic literature considering the objective and subjective dimension of human work in general. This specific distinction was made by John Paul II in *Laborem Exercens* (1981). It would go beyond the scope of this article to review these contributions, which indirectly nourish our argument and which have been essential to start escaping from a reductionist and materialistic conception of human work, while accounting for a relational dimension of both objective and subjective dimensions of human work.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

Now, if care means being attentive to someone, in the first place, by ensuring and improving those conditions that remind the person who she is in her historical, contextual, and relational dimensions, we can also easily consider the relevance of the family and domestic environment. Heidegger (1993) used to refer to the human capability of caring in terms of “dwelling” which implies precisely the relationship of mutuality that is typical of and specific to human co-existence and co-habitation (Marcos & Bertolaso, 2018; Marcos & Pérez Marcos, 2018). Such a domestic environment brings with it an enormous amount of personal and biographical information, while also the place for functional tasks and solutions for specific needs. In other words, material contextual factors eventually play a fundamental role in the process of caring for someone. In this sense, care can thus be considered the ethical complement of our spatial-temporal ontology.

In other words, the ethical dimension of care lies in the responsibility of each person to take care of her own and others’ historicity, something that machines cannot do precisely because they lack any true historicity and biography, i.e. a personal existential synthesis of perceptions, experiences, emotions, and thoughts. Such a synthesis can only be shared among human persons, because it is conceptual: through experience we can change the name of things; for example, we can change our narratives, something that a machine will never do by definition and as a default state. Understanding a person’s historicity and the consequent requests of care is ultimately the main challenge of any care activity, either creating or “being home” for another person will be the ultimate goal of good caregivers. It is implicit in our argument that those who are unable to take care of themselves will not be able to take care of others. Any caregiver is first of all a self-caregiver: a person who is aware of her own historicity, who understands her life as a narrative unity, and who looks at herself in the network of virtuous dependencies (Bernacchio, 2019) that she both creates and inhabits. Developing this point further would deviate from the central aim of the article; however, it is important to remark that care is an attitude not simply towards others and the world, but towards oneself first and foremost.

Finally, all this brings into consideration that the proper “object” of care has to be understood in relational terms, i.e. in terms of the spatio-temporal and relational circumstances of every specific person. In other words, the ultimate question regarding care does not relate to the identification of the content of the well-being associated with the action of care, but with the foundations of the individual particularities as specifically characteristic of an inner *relational* nature of the action of care. In this sense, as already mentioned, the caregiver becomes part of

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review. <https://doi.org/10.1111/beer.12281>***

the “home” of the person being cared for. The care relation touches the person in her very nature by taking care of the contextual circumstances as ultimately constitutive of one’s historical identity, thus confirming co-existence and relationality as ontologically constitutive of human beings, not accidental to them (Polo, 2015). The person is thus valued because she *is present*, not because she *does something*. This is the reason why each act of care starts from those conditions which can seem to be collateral (e.g. setting up a room, a bed, etc.), while it is central to properly address them in order to make the person re-discover who she really is. Establishing a relationship, knowing the history of that specific person, her past, the reasons for her current conditions, will help in performing any “task” from the perspective of making the person flourish, even if frustrated by the new needs she experiences.

Table 1 presents a comparative synthesis of the reductionist conception of human work, and of the dynamic and relational account of human work that emerges in looking at care profession through the lens of the historical, contextual, and functional dimensions that they embrace.

**Table 1: Comparing the Reductionist Account of Human Work and the Dynamic and Relational Account of Human Work**

	<b>Reductionist Account of Human Work</b>	<b>Dynamic and Relational Account of Human Work</b>
<b>Epistemological background</b>	Mechanicism – Reductionism	Systemic
<b>View of human being</b>	Individuals and collectivities: relations are contingent	Persons and communities: relations matter
<b>View of human work</b>	Task-performing activity	Empowering practice
<b>Mode of action</b>	Functional and linear production Fulfilment of functional needs	Historical, contextual, and relational dynamics Empowering of person’s narrative unity

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review. <https://doi.org/10.1111/beer.12281>***

<b>Product</b>	Measurable outcomes	Quality of life, personal flourishing
<b>Measure of success</b>	Quantitative, Efficiency	Qualitative, Efficacy

#### **4. The Dynamic and Relational Paradigm for Work**

The relational foundations of care activity and the ultimate characterization of the action of care *qua* care only exist if relational, historical, and social components are embedded, leading us now to derive a final lesson from the biological world regarding the specific dependencies of the genealogical (i.e. genetic origin), functional (i.e. specific role and interactions in a given environment), and contextual (i.e. topological or environmental factor) dimensions of any living being's development and healthy behavior or growth. As often happens, biological dynamics offer, in fact, a suitable and fruitful metaphor to describe and account for societal dynamics (e.g. Archer, 2013; Donati, 2013).

This section thus discloses the nucleus of our proposal, which is the application of what we learn from the organism and from its systemic disease that is cancer, to social sciences' issues and, in particular, to human work.<sup>6</sup> This will help to address the wider dimensions of human work, as those emerged in the analysis of the concept of care, and, hopefully, in "shaping the fourth industrial revolution to ensure that it is empowering and human-centered, rather than divisive and dehumanizing" (Schwab, 2016: 4).

Reductionist and mechanistic approaches in bio-medical sciences have showed their limits in accounting for complex dynamics. There are no specific or unique genes responsible for complex diseases and behaviors, and the behavior of molecular components very much depends on the functional environment within which they are embedded. All complex and multilevel processes in our body equally require a systemic approach in order to be studied, so that networks and processes will be mainly responsible for integrated functioning of the organism and for its capability of recovering a healthy state (examples can be found in the immune system's reaction, in the regenerative capabilities of many tissues, etc.). It has also

---

<sup>6</sup> It is important to warn the reader about the specificity of the methodology that we are following, which is related to relational ontology (Bertolaso, 2018; Bertolaso & Ratti, 2018). There is also a history of failures associated with the transposition of paradigms which are valid for the natural world into policies that are applicable on a societal scale, e.g. the drift of Darwinism into Social Darwinism (Dickens, 2000); however, we are moving along a different level of analysis.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

clearly shown how the organism does not work maximizing efficient processes but as a “tinkering,” quite often making a perfect use of imperfections. Still, beside such contingent complexity the unitary functioning of an organism is striking, as its capability of recovering lost functional states is impressive. In its fragility, the living organism appears to be extremely robust.

A dynamic and relational paradigm seems, therefore, to better account for the living organism. Bertolaso (2016) has concretely proposed, in a philosophical reflection on cancer, a *dynamic and relational view* of cancer and of the organism as a suitable alternative model to both reductionist and mechanistic paradigms. Different attempts, in fact, have been made to understand the exact causes for the manifestation of such pathology; however, the lack of consideration of the body as an established unity led to unsatisfactory results. The recent formulation of a “dynamic and relational view on cancer” allowed a look at this phenomenon in light of different dimensions entailed in the life of every single cell of a human body.

We must briefly present this paradigm so that we can perform the exercise of translating this biological paradigm into a language that can easily enter into dialogue with the epistemology of social sciences. This approach recognizes the existence, for each cell of a human body, of three different dimensions of analysis: each cell is characterized by its origin (genome), its function, and its spatio-temporal relationship with all the other cells and tissues where it is located. These three dimensions can be easily recognized by analyzing the dynamics that they contain. In concrete terms, those three dimensions seem to give stability to the overall functional activities of the organisms with reference to their different ontological dynamics: “by origin” refers to the biological origin of a cell that is associated with the capability of each cell to transmit its genetic code; “by doing” refers to its actual integrated functioning, that is, the specific role through which a cell contributes to the overall functioning, for example, of the tissue in which it is embedded; and “by holding” refers to the context which sustains the existence of that specific cell: the microenvironment, in fact, brings biological information with it; the topological structure of a tissue and the chemical-physical properties of an organ, for example, include historical information about the developmental process and are particularly sensitive to macro-environmental changes.

What is even more interesting is that once the third dimension is constituted, it shows a dominant role in maintaining the functional stability of the cells’ function and even of their

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

genomic constitution. This means that if, for example, we compromise the topological structure of a tissue by stressing the cellular micro-environment over time, sooner or later the cells will easily lose their functional activity and, as in the case of cancer, their biological stability and identity (i.e. their genome will accumulate mutations and will eventually change their genomic status). This means that what comes later in temporal terms shows a priority in ontological terms. The environmental factors are more relevant for the overall stability of cellular functions than their DNA integrity, which is something that, within a reductionist view of the living organisms, has no solution or adequate understanding.

We can now easily return to the dimensions that emerge as crucial in the process of caring and to the limits that a reductionist account of human work has showed. The “by origin” dimension concerns the biological roots of a person. It expresses where a person comes from, who /her parents are, what her geographical origin is. The “by doing” dimension relates to the actions a person performs, and more particularly to specific tasks linked to a role the person has in a personal and professional context. Even if this dimension is important in the dynamic building of a person’s identity, this dimension is not essential: someone can *be* without necessarily *doing*. The “by doing” dimension relates to a physiological development of a human person. There are moments in a person’s life which are physiologically unable to perform a specific “doing,” like early childhood and old age. There are people who are unable to “do” something due to lack of autonomy on account of various factors (illness, for example). The “by holding” dimension is the hardest to define, because it is the one where the other dimensions actually take place, but we can say that it mainly refers to her biography: her training and cultural environments, who her teachers were, what books she reads, what kind of tastes she has. In a way, when a person arrives in a place, she brings with her this dimension, which is particularly complex and nuanced, but she also contributes through her behavior and work to changing the environment around her, imposing new information that will become structurally relevant in stabilizing living dynamics and in the innovation possible in her own growth process. Human work thus principally generates culture, which always plays a crucial role in societies’ stability and dynamics.

The “by holding” is thus the invisible network of relationships that bind someone to her story and help to disclose and make one aware of her identity. Looking at a 3D puzzle, if you take off a piece, you can see the pieces by which the removed piece was surrounded. They define that piece’s border, and the borders define identity. If you find that piece on a desk without all



This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

the other pieces, you would consider it useless because it lacks the context that gives it meaning. With this image in mind, we can see how the “by holding” dimension makes the context a *bearer of meaning*. At the same time, even if the image seems appropriate, it is important to understand how the relationship of a person with her context is not that of a piece to the whole. We shall argue that “by holding” is the most important of these three dimensions, and that this dimension is the underpinning of the concept of care.<sup>7</sup>

Over-simplifying for the purpose of an easier understanding, the following image summarizes the interactions between these different dimensions: if we look at a family, for example, the “by holding” dimension is constituted by the relationship between all its members: the fact of being a family, a home. This emerges as soon as one of the members is someone for someone else (and it is eventually externally evident through the “by doing” dimension: acting as a daughter or a son, the fact of being a mother, a father, a wife, a husband); the relationship is reciprocated and the other members of the nucleus are enriched by the existence of this relationship, which reshapes all the others. The “by origin” relates to the factual existence of other people who have made the existing member of that family actually existing: it is ideally represented by a genealogical tree. The “by doing” dimension is ontologically and epistemologically dependent on the “by holding” dimension; the first is constituted by the most radical familiar value of specific tasks that each member performs in the context of the family, while the latter relates to the specific relationship entailed in being a family. If your grandfather has a chronic disease, that makes it impossible for him to recognize you and to act “as if” he is your grandfather, it does not mean that he stops *being* your grandfather. So in the “by doing,” there are the acts proper to the role, not the role itself. We are referring as well to very material aspects of the life, for example, common to all those material tasks that, in a household, have been taken over by technology.

Table 2 summarizes the three dimensions of the Dynamic and Relational Paradigm.

### **Table 2 – Dimensions of a Dynamic and Relational View**

---

<sup>7</sup> In addition, it follows that jobs based on care can be replaced only in their “doing” dimension by machines; however, there is no possibility for the replacement of the other dimensions: even if a robot could be trained to re-act to *what I need*, we wonder whether it is conceivable that it could understand *who I am*, and how “what I need” and “who I am” are profoundly ontologically related. There are seminal studies in this direction: for example, Robson (2018) argues that, given that robots cannot be considered moral agents, they cannot, therefore, perform works based on care, linking “care” to the specificity of being human. Entering into this discussion would require the development of other arguments, which are beyond the aim of the present paper.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

<b>Dimensions of a Dynamic and Relational View</b>	<b>Description</b>
Functional or “by doing”	It addresses the specific role of the person in a given environment.
Genealogical or “by origin”	It takes into account the biological origin of the person.
Contextual or “by holding”	It considers the topological and environmental factors, together with the complex network of relationships that a person has.  The context bears meaning.

The suggested characterization of the three dimensions’ dependencies, which is evident for care professions, lies in a perhaps less intuitive way in *any* other human work: even those jobs that imply a less intense degree of human contact always have the opportunity of being performed as a mere set of subsequent operations or as a meaningful part of a larger history. The two fishing crews portrayed by MacIntyre in his explication of his concept of “practice” (MacIntyre, 1994) can be used as an illustrative example in support of our argument.<sup>8</sup> The philosopher depicts two fishing crews, one exclusively oriented to the profit deriving from the activity, and the other oriented to both the profit of the activity and the excellence of the activity itself. The members of the profit-oriented fishing crew are exclusively oriented to the “by doing.” They do not feel they belong to their profession or to their crew, and in times of difficulty, they are not willing to keep taking care of their work, which is a mere activity that they would not mind to exchange for another. This fishing crew is “organized and understood as a purely technical and economic means to a productive end” (MacIntyre, 1994; 284): production and discrete measurable outcomes (number of fish and profit) are the purpose of its existence. On the contrary, the members of the other fishing crew are aware that they belong to a specific history, and that they are on the path to pursuing personal and professional excellence. They value the specific historicity and social dimension of their work, and they care for their work, for those working with them, and for the families of their co-workers. If a

---

<sup>8</sup> See also Sinnicks (2019) for a connection between this example provided by MacIntyre and different attitudes towards human work.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

machine were to replace the fact of catching fish, in the case of the first crew, it would simply substitute an activity; in the case of the second crew, the machine can catch fish, but it cannot replace the essence of the work of that particular crew. The “understanding of and devotion to excellence in fishing and in playing one’s part as a member of such a crew” (MacIntyre 1994: 285) is typical of that particular fishing crew. This individual and common striving for excellence while working is the essence of human work, and it reveals its dynamic and relational view. MacIntyre adds: “the interdependence of the members of a fishing crew in respect of skills, the achievement of goods and the acquisition of virtues will extend to an interdependence of the families of crew members and perhaps beyond them to the whole society of a fishing village” (MacIntyre 1994: 285). Real human work is never an isolated episode; it is always part of a larger individual and social narrative. Human work is human work only in so far as it entails the genealogical, functional, and contextual dimension, with a dominance of this latter.

At this point it is easier to understand why caring for apparently environmental aspects actually entails taking care of the whole person and in a more radical way than just offering functional services. At the same time, it is easy to think that any human work will be able to include such a dimension independently of the specific task it is supposed to fulfill; it will always remain human. Finally, in the scenario in which machines might eventually be able to take over all our functional tasks, human beings will always have the possibility of employing their energies and resources in creating culture, caring for others, etc. Perhaps this will be the right moment to (re)discover the essential, perennial feature of human work: knowing the world by caring for it.

## **5. Conclusions**

This paper (i) reframes the question about whether human work can be replaced by machines and robots from an epistemological point of view, (ii) discusses the main reasons for the inadequacy of the existing reductionist epistemological framework, shedding light on the constant demand of professions based on care, and (iii) develops a wider epistemological paradigm which entails different dimensions that characterize human work, paradigmatically represented in care practices: this is the translation into the language of social sciences of what

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

we have learnt about the work of living beings in general in the biophysical and bio-medical sciences (Bertolaso 2016).

Section 2 shows that: (i) throughout history, technological changes have been accompanied by changes in the organization of work, and the organization of work is not a standalone issue, but is dependent on a culture; (ii) when we faced the need for a new organization of work, the epistemological crisis of postmodernity did not allow a proper human-centered evolution in the way we think about work at the same pace as technological changes and managerial theories, so we still ask whether human work will be replaced by machines, because we have a limited concept of human work; (iii) the epistemological crisis that generated this legacy in the current understanding of human work is the fruit of a wider crisis of man in the postmodern age.

Section 3 highlighted the existence of jobs whose understanding goes beyond mere task-orientation. We mainly showed that (i) there are professions based on care whose specific features are not captured by a reductionist paradigm of human work, and that there is a need for the elaboration of a new epistemological paradigm that takes into account the dimension of “care;” and that (ii) “care” is the embodiment of the effective existence of a specific relational context for every person, a context that has its specific features and architecture that bring meaning and information. Section 4 presents: (i) the bio-logic paradigm in the domain of bio-medical sciences; (ii) the characterization of the three dimensions specific to this paradigm and their significance beyond the biological domains; (iii) how this paradigm interprets the essence of human work and epistemologically restores its specificity when compared to the activity of machines.

To work thus means recovering and collaborating with the historicity of each person, valuing the narrative condition of each human existence: something that is paradigmatically realized in care professions. Caring becomes the paradigm for all other work, a source of value and of dignity for both the caregiver and the cared-for person: something accessible to anyone but that is extremely difficult to understand in a functionalist and utilitarian society such as the one in which we live. Taking into account “care” as described in this article and in the literature examined would make the Fourth Industrial Revolution an advanced frontier not just for the future of technology but also for human culture and, ultimately, in the understanding of human beings.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

From a theoretical point of view, the limit of this research approach can be found, as mentioned, in the use of an analogical/metaphorical way of thinking: there are witnesses to the negative effects of the translation of scientific theories into social sciences (e.g. Social Darwinism). The application of a relational ontology to the domain of social sciences has still a long path before becoming an affirmed theoretical construct, and there are the first examples of a conscious elaboration of this perspective (e.g.: Argandoña 2018; Donati, Malo, and Maspero 2016; Abdelmonen and Argandoña 2020). As for future research, the dynamic and relational paradigm introduced in this paper and applied to human work, creates a space for the characterization of work as specifically human in at least three directions: a sociological perspective, an economic perspective, and an ontological perspective. Seminal efforts show the awareness of a foundational relational view for social sciences (Magatti, 2018; Mercado, 2018).

Practical implications also follow: if the epistemological gap is filled, the co-evolution of new technologies and of human work can be progressively understood in terms of an *empowering practice*. Technology will help generating new forms of work, which will remain specifically human as far as they take integral care of human needs and deeper desires. The attention will shift from the solution of material problems to the creation of new spaces of reflection on what it is really worth realizing. When the possibilities are already multiplied, the reflection is about which of them is worth realizing. Human work will focus on quality instead of quantity, on continuum more than discrete outcomes. The Fourth Industrial Revolution can be the age of critical thinking and practical wisdom, which will need to be exercised in the face of a multitude of possibilities. Moreover, current ways of doing existing jobs can also be more valued in light of the dynamic and relational paradigm: for example, effective telework practices (see Gálvez et al., 2020) can acquire new value and significance in light of the consideration of the three dimensions suggested by the paradigm.

This scenario also discloses a new perspective for the training of workers: awareness of the three dimensions – “by origin,” “by doing” and “by holding” – can definitively impact professional and academic education for an integral human development. The development of study curricula that can actually help in the perception of the dominance of the contextual dimensions is a concrete challenge for the present and future of education at different levels.

This research can finally open new scenarios in the characterization of care professions in the age of machines. Robson (2018) opens this discussion, which can be further developed, also

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). Specifically Human: Human Work and Care in the Age of Machines. *Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

taking into account how different cultures understand the concept of care in the changed technological scenario. Is it possible to leave children with a robot baby-sitter? And dogs with a robot dog-sitter? And what about a robot chef? There is a potential for a robot to perform these activities; however, it would be questionable to delegate this kind of works which are a clear premise of our being human. Eventually and more in concrete, the topic of the home as the place where “we dwell” is also a line of research that can be enriched by a relational approach and paradigm.

## References

- Agulles Simó, R. (2014). The Value of Care within the Home Environment. In R. Cavallotti & C. León (Eds.), *II International Conference Family and Society* (pp. 691–697). UIC Barcelona.
- Archer, M. S. (2013). Social Morphogenesis and the Prospects of Morphogenic Society. In M. S. Archer (Ed.), *Social Morphogenesis* (pp. 1–22). Dordrecht: Springer.
- Abdelmonen, M. G., & Argandoña, A. (2020). *People, Care and Work in the Home*. Routledge.
- Argandoña, A. (Ed.). (2018). *The Home. Multidisciplinary Reflections*. Edward Elgar Publishing.
- Bartleby. (2018, July 12). The Robots Coming for Your Job. *The Economist*. Retrieved from <https://www.economist.com/bartleby/2018/07/12/the-robots-coming-for-your-job>
- Bernacchio, C. (2018). Networks of Giving and Receiving in an Organizational Context: Dependent Rational Animals and MacIntyrean Business Ethics. *Business Ethics Quarterly*, 28(04), 377–400.
- Bertolaso, M. (2016). *Philosophy of Cancer: A Dynamic and Relational View*. New York, NY: Springer Berlin Heidelberg.
- Bertolaso, M. (2018). The Threshold of Scientific Rationality. The Relational Ontology of Levels: Emerging Epistemology for Biological Sciences. In H. Velázquez (Ed.), *Interdisciplinaria y naturaleza. Un acercamiento de la filosofía a la biología, y viceversa* (pp. 83–102). Ciudad de Mexico: Tirant Lo Blanch.
- Bertolaso M (2019), Artificialmente e Umanamente: Epistemologie a Confronto, in S. Zamagni (Ed.), *Transizione digitale, Paradoxa*, 2, 137–149.
- Bertolaso, M., O'Brien, J., & Manier, A. E. (2013). Mechanisms & Biological Mechanism. In R. L. Fastiggi, J. W. Koterski, & V. M. Salas (Eds.), *New Catholic Encyclopedia Supplement 2012-13: Ethics and philosophy*. Detroit: Gale.
- Bertolaso, M., & Ratti, E. (2018). Conceptual Challenges in the Theoretical Foundations of Systems Biology. In M. Bizzarri (Ed.), *Systems Biology* (Vol. 1702, pp. 1–13). [https://doi.org/10.1007/978-1-4939-7456-6\\_1](https://doi.org/10.1007/978-1-4939-7456-6_1)

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

- Brizi, M. R., & Bertolaso, M. (2018). The Long Road Towards Sustainability: The Contribution of Domestic Work. In F. J. Insa Gómez (Ed.), *Il volto del lavoro professionale* (Vol. 5). Rome: Edizioni Santa Croce.
- Chaplin, C. (1936). *Modern Times*. United Artists.
- Chui, M., Manyika, J., & Miremadi, M. (2016). *Where Machines Could Replace Humans - And Where They Can't (Yet)*. Retrieved from McKinsey website: <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>
- Debeljuh, P., & Destéfano, Á. (2015). *Hacia un nuevo pacto entre el trabajo y la familia: Guía de Buenas Prácticas*. Buenos Aires: Baar.
- Dickens, P. (2000). *Social Darwinism: Linking Evolutionary Thought to Social Theory*. Buckingham [England] ; Philadelphia: Open University Press.
- Donati, P. (2013). *La famiglia: il genoma che fa vivere la società*. Soveria Mannelli: Rubbettino.
- Donati, P., Malo, A., & Maspero, G. (2016). *La vita come relazione*. Roma: ESC.
- Gálvez, A., Tirado, F., & Alcaraz, J. M. (2020). “Oh! Teleworking!” Regimes of Engagement and the Lived Experience of Female Spanish Teleworkers. *Business Ethics: A European Review*, 29(1), 180–192.
- Gilbert, S. F. (2005). Mechanisms for the Environmental Regulation of Gene Expression: Ecological Aspects of Animal Development. *Journal of Biosciences*, 30(1), 65–74. <https://doi.org/10.1007/BF02705151>
- Gilbert, S. F., & Sarkar, S. (2000). Embracing Complexity: Organicism for the 21st Century. *Developmental Dynamics*, 219(1), 1–9. [https://doi.org/10.1002/1097-0177\(2000\)9999:9999<::AID-DVDY1036>3.0.CO;2-A](https://doi.org/10.1002/1097-0177(2000)9999:9999<::AID-DVDY1036>3.0.CO;2-A)
- González, A. M., & Iffland, C. (Eds.). (2014). *Care Professions and Globalization*. <https://doi.org/10.1057/9781137376480>
- Gray, D. (n.d.). Robot revolution: AI and the future of work. Will the rise of artificial intelligence make you more or less likely to find your dream job? *The Economist*. Retrieved from <http://shapingthefuture.economist.com/robot-revolution-ai-and-the-future-of-work/>
- Heidegger, M. (1993). Building, Dwelling, Thinking. In M. Heidegger (Ed.), *Basic Writings* (pp. 343–364). New York, NY: Harsper.
- Hugman, R. (2014). Professionalizing Care - A Necessary Irony? Some Implications of the “Ethics of Care” for the Caring Professions and Informal Caring. In A. M. González & C. Iffland (Eds.), *Care Professions and Globalization* (pp. 173–193). <https://doi.org/10.1057/9781137376480>
- John Paul II. (1981). *Encyclical Letter Laborem Exercens*. Libreria Editrice Vaticana.
- MacIntyre, A. C. (1994). A Partial Response to My Critics. In J. Horton & S. Mendus (Eds.), *After MacIntyre: Critical Perspectives on the Work of Alasdair MacIntyre* (pp. 283–304). Cambridge: Polity Press.

This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

- MacIntyre, A. C. (2006). Social Structures and Their Threats to Moral Agency. In *Selected Essays, Volume 2* (pp. 186–204). Cambridge: Cambridge University Press.
- MacIntyre, A. C. (2007). *After Virtue: A Study in Moral Theory* (3rd ed.). Notre Dame, Ind: University of Notre Dame Press.
- MacIntyre, A. C. (2008). What More Needs to Be Said? A Beginning, Although Only a Beginning, at Saying It. *Analyse & Kritik*, 30, 261–276.
- Magatti, M. (Ed.). (2018). *Social Generativity: A Relational Paradigm for Social Change*. Abingdon, Oxon ; New York, NY: Routledge, an imprint of the Taylor & Francis Group.
- Marcos, A. (2001). *Ética ambiental*. Valladolid: Secretariado de Publicaciones e Intercambio Editorial, Universidad de Valladolid.
- Marcos, A., & Bertolaso, M. (2018). What Is a Home? On the Intrinsic Nature of the Home. In A. Argandoña (Ed.), *The Home*. <https://doi.org/10.4337/9781786436573>
- Marcos Martínez, A. F., & Pérez Marcos, M. (2018). *Meditación de la naturaleza humana*. Madrid: Biblioteca de Autores Cristianos.
- Mercado, J. A. (Ed.). (2018). *Personal Flourishing in Organizations*. Cham, Switzerland: Springer.
- Mitchell, S. D. (2003). *Biological Complexity and Integrative Pluralism*. Cambridge, UK ; New York, N.Y: Cambridge University Press.
- Noble, D. (2006). *The Music of Life: Biology Beyond the Genome*. Oxford ; New York: Oxford University Press.
- Pennacchini, M., Bertolaso, M., Elvira, M. M., & De Marinis, M. G. (2011). A Brief History of the Quality of Life: Its Use in Medicine and in Philosophy. *La Clinica Terapeutica*, 162(3), e99–e103.
- Pistrui, J. (2018, January 18). The Future of Human Work Is Imagination, Creativity, and Strategy. *Harvard Business Review Digital Articles*.
- Polo, L. (2015). *Why a Transcendental Anthropology?* Leonardo Polo Institute of Philosophy Press.
- Procópio, M. L. (2019). Moral Standards in Managerial Decisions: In Search of a Comprehensive Theoretical Framework. *Business Ethics: A European Review*, 28(2), 261–274.
- Ratzinger, J. (2004). *Introduction to Christianity*. San Francisco, CA: Communio Books.
- Robson, A. (2018). Intelligent Machines, Care Work and the Nature of Practical Reasoning. *Nursing Ethics*, 096973301880634. <https://doi.org/10.1177/0969733018806348>
- Ryder, G. (2018, October 22). As Tech Disrupts Our Jobs, It's Not Too Late to Turn Pain into Gain. *World Economic Forum Online*. Retrieved from <https://www.weforum.org/agenda/2018/10/tech-disrupt-jobs-fourth-industrial-revolution-ilo/>
- Schumpeter. (2015, September 10). Digital Taylorism. *The Economist*.



This is the peer reviewed version of the following article:

**Bertolaso, M., & Rocchi, M. (2020). *Specifically Human: Human Work and Care in the Age of Machines. Business Ethics: A European Review*. <https://doi.org/10.1111/beer.12281>**

- Schwab, K. (2016). *The Fourth Industrial Revolution* (First U.S. edition). New York: Crown Business.
- Sinnicks, M. (2019). Moral Education at Work: On the Scope of MacIntyre's Concept of a Practice. *Journal of Business Ethics*, 159(1), 105–118.
- Spaemann, R. (2006). El final de la modernidad. In R. Alvira & K. Spang (Eds.), *Humanidades para el siglo XXI* (1. ed, pp. 101–124). Pamplona: Ediciones Universidad de Navarra.
- Spaemann, R., & Löw, R. (2013). *Fini naturali: storia & riscoperta del pensiero teleologico*. Milano: Ares.
- Stanford University. (2016). *Artificial Intelligence and Life in 2030*.
- Taylor, F. W. (1998). *The Principles of Scientific Management*.
- van Est, R., & Kool. (2015). *Working on the Robot Society*. Rathenau Instituut.
- Visentin, M. (2014). Happiness and the Market: The Ontology of the Human Being in Thomas Aquinas and Modern Functionalism. *Business Ethics: A European Review*, 23(4), 430–444. <https://doi.org/10.1111/beer.12061>
- Wilson, H. J., & Daugherty, P. R. (2018). Collaborative Intelligence: Humans and AI Are Joining Forces. *Harvard Business Review*, (July-August), 114–123.
- Witzel, M., & Warner, M. (2015). Taylorism Revisited: Culture, Management Theory and Paradigm-Shift. *Journal of General Management*, 40(3), 55–70.
- World Economic Forum. (2018). *The Future of Jobs Report*. Retrieved from Centre for New Economy and Society website: [http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs\\_2018.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf)