

# My Beautiful Paper About Stuff

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## 1 Introduction

The historical model for determining the responsibility of a company or an individual that develops an AI system isn't valid when looking at autonomous systems. A new perspective is needed to effectively discern the full extent of human responsibility when a system is said to be able to "act on its own".

The main goal of this article is to underline the presence of a responsibility gap (Matthias 2004) when analyzing all kinds of autonomous systems (in particular those capable of "learning"), and to provide possible approaches and solutions in order to tackle the problems that may arise from applying classical frameworks of responsibility in current and future contexts that employ AI technology. The issue at the core of this paper has already been studied by many (Matthias 2004; Sio and Mecacci 2021; Coeckelbergh 2020; Novelli, Taddeo, and Floridi forthcoming), offering different points of view and valuable insight, however, to this day there are still a lot of questions that remain unanswered. This paper is not aiming to give definitive answers to the issue at hand, instead it will just focus on the presented thesis by providing argumentative evidence and relevant case-studies with a particular focus on

LAWS (Lethal Autonomous Weapon Systems); to do so, in section 2 it will start by giving semi-formal definitions of *responsibility* (including some peculiar variations) and its applicability on non-autonomous systems following the classical framework, while section 3 is devoted to presenting, assessing and analyzing the opposite situation, highlighting the flaws of the previous approach; section 4 will focus on the possible long and short term consequences of erroneous handling of the presented issues, while section 5 will offer some plausible solutions to mitigate and possibly prevent those consequences; to conclude, section 6 is dedicated to the acknowledgement of eventual points of objection and section 7 will wrap up the paper.

## 2 Analyzing Responsibility

The term *responsibility* is often used as a broad expression to convey the notion of "someone" (which can be a person, an institution, a corporation or more generally, an *agent*) having the duty of upholding certain expectations defined by another (or the very same) agent towards a given goal. It's important to acknowledge the presence of derived terms that represent different "flavors" of *responsibility*, in this section we will focus on the specific expressions that are most relevant to this paper, nevertheless, it's important to note that numerous taxonomies can be formulated.

In the Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment, *accountability* is defined as a term which refers to the idea that one is responsible for their ac-

tions and consequences, therefore they must be able to explain their aims, motivations, and reasons (Commission, Directorate-General for Communications Networks, and Technology 2020 as cited in Novelli, Taddeo, and Floridi [forthcoming](#)); it is essential to note the presence of an authority in charge of supervising the conduct of the agent held accountable and thus, sitting closely to the definition of *answerability* (Nissenbaum 1996) in contrast with the notion of *moral responsibility*, which assumes an internal analysis against the very own moral values of the agent of interest. In addition, it's also possible to identify the *patient of responsibility* figure as someone that is affected by the actions of the agent and is entitled to demand accountability for those actions (Coeckelbergh 2020).

An important distinction that needs to be made is the difference between *active responsibility* and *passive responsibility* (Poel, van de and Royakkers 2011): while the first term is appropriate for addressing the continuous and preemptive effort that one must make to care about a certain goal while it is being attained, the second is applicable in the event that something undesirable has already happened instead and can be subdivided in *accountability*, *blameworthiness* (indirect responsibility) and *liability* (economical/legal responsibility) according to (Poel, van de and Royakkers 2011). Another important aspect of responsibility is its context, as the notion of *role responsibility* suggests, in our daily life we partake in social roles which come with their respective responsibilities that may be conflicting; in particular, *professional responsibility*, is a particular type of role responsibility which concerns the professional life of an agent (Poel, van de and Royakkers 2011).

Feinberg identifies two main causes for an agent to be held morally blameworthy for any given harm: *causality* (the agent's actions contributed in causing the harm) and *faultiness* (the actions were intentionally harmful or a result of negligent behavior) (Feinberg 1985). Another viable interpretation is the aristotelian one, which specifies the *control condition* (intent and

freedom of action) and the *epistemic condition* (awareness or non-ignorance) (Fischer and Ravizza 1998). It's easy to see how these frameworks fit quite well with most engineering tasks due to the fundamental instrumentality of the produced artifacts, for example .

insert example

### 3 The Responsibility Gap

In his seminal work, Andreas Matthias mentions the presence of a *responsibility gap* (Matthias 2004) in the process of ascribing responsibility to agents involved in the activity of creating and interacting with learning automata. First of all, it's important to understand in which ways autonomous learning systems differ from traditional engineering artifacts; in most cases a learning automaton is able to return outputs following a certain logic that wasn't directly coded by a programmer, but it was "learned" by providing examples of expected behavior, this particular approach makes it possible to achieve outstanding feats but at the same time it may raise some concerns on the actual *control* that any agent may have on the system.

As we have discussed in the previous section, *knowledge and control* of the agent over the system are fundamental prerequisites for ascribing responsibility (and even more so accountability) in the traditional frameworks; however, when facing a system that has the properties of a *black box* we cannot assume that anybody would be able to know its inner workings, not the creator of the automaton, let alone its potential users. In addition, even the *causality* conditions may not be satisfied if we consider what is known in the literature as the *problem of many hands* (Poel, van de, Fahlquist, et al. 2012; Coeckelbergh 2020; Nissenbaum 1996) and consists in the impossibility of generalizing the single agent responsibility to a collective entity, as an unfeasible unfolding of long and convoluted chains of events is needed to fully understand the contribution of each agent. The problem of many hands is not restricted to the learning automata case, but it is certainly amplified by the fact that

AI models are usually composed of many different modules (*problem of many things* Coeckelbergh 2020) which are the product of contributions given by many different people with different skills, ideals and goals.

We hereby provide an example that contextualizes the non-applicability of the traditional framework to AI systems in a plausible scenario:

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## 4 Societal and Technological Consequences

In the previous section we have observed that applying traditional responsibility frameworks to AI systems may be an unwise decision, now we are going to explore the possible consequences of this choice. With technologies that are constantly being improved upon and a society that seems to be lagging behind it's important to understand that some issues can't be left unattended. The array of possible negative outcomes that may result from a mishandling of the core problem is wide as there are numerous different types of imbalances that could influence the consequences in different ways.

If we decide to neglect the responsibility gap, the first undesired outcome becomes apparent: companies would be incentivized to distance themselves from their responsibility roles, shifting them on end users instead, resulting in frequent overlap for the *patient* and *agent* figures. As much as this solution is dubious but not completely erroneous from a moral responsibility perspective (assuming that the system provider takes enough care in making sure that the end user has a certain level of knowledge about the system which is, in itself, another crucial issue), this approach shows its true criticality when seen from a blameworthiness perspective. In this scenario the underlying culpability gap (Sio and Mecacci 2021) is even more apparent: the end user realistically doesn't possess the same amount of knowledge about the system as the engineer who designed it, consequently the

end user is unfairly being asked to take the blame for the system's actions.

On the other hand, if an increasing number of authorities opts for enforcing a strictly traditional conception of responsibility for autonomous systems, we may observe the opposite effect: companies could lose interest in developing and utilizing new AI technologies, considering them too hazardous or outright unprofitable given their inherent unpredictability. In this scenario, AI research would be confined to theoretical and controlled environments, thus limiting its real life applicability, impeding the process and depriving humanity of the benefits that could have been derived by the advancements in this field. To this day, a lot of autonomous systems have already been deployed and internalized by society as useful tools for the daily use, removing them would impact the livelihood of many people, thus generating an additional moral dilemma on top of the issues that have been mentioned previously.

## 5 General Approaches

This paper will try to lay out a comprehensive approach that highlights a series of general responsibility practices for learning autonomous systems. This isn't meant to be a perfect or original solution to any of the problems that have been identified so far as our approach focuses on the analysis and comparison of pre-existing ideas.

Analyzing these consequences through a sociotechnical lens is fundamental for fully understanding the whole extent of the matter at hand (Theodorou and Dignum 2020; Novelli, Taddeo, and Floridi [forthcoming](#)); realizing that companies, corporations and their profit-driven approach has become the main driving force of AI development in the past years is the starting point for making any meaningful change. For a sociotechnical approach it is important to not only manufacture technical solutions, but also take into account the underlying social structure towards a joint optimization of the two compo-

nents. This is the main pitfall of the *solutionism* approach, as it implies that a general and absolute solution to the problem can be achieved by just means of new legal or technical tools (Morozov 2013; Stilgoe 2018; Sio and Mecacci 2021).

Sio and Mecacci give an in-depth description of the main approaches to the central problem, together they identify the two main perspectives collocated at the two opposite extremes of the debate: *fatalism* and *deflationism*. While fatalism looks at the responsibility gap as an unresolvable dilemma, seeing the development of learning systems and human moral responsibility in strict mutual exclusion (Matthias 2004); deflationism takes the opposite stance and, while admitting that responsibility gaps exist, tries to depict their presence as an inevitable side effect that could be accepted and internalized by society since (as it happened with many technologies in the past) the benefits outweigh the drawbacks (Hayenhjelm and Wolff 2012; Simpson and Müller 2015).

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## 6 Contrasting Viewpoints

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## 7 Conclusions

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