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► **To cite this version:**

Céline Pieters, Emmanuelle Danblon, Philippe Souères, Jean-Paul Laumond. Talking about moving machines. *Interaction Studies*, 2023, *Interaction Studies*, 23 (2), pp.322-340. 10.1075/is.22005.pie . hal-04269587

HAL Id: hal-04269587

<https://laas.hal.science/hal-04269587>

Submitted on 5 Dec 2023

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Talking about moving machines

An argumentative perspective

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Globally, robots can be described as some sets of moving parts that are dedicated to a task while using their own energy. Yet, humans commonly qualify those machines as being intelligent, autonomous or being able to learn, know, feel, make decisions, etc. Is it merely a way of talking or does it mean that robots could eventually be more than a complex set of moving parts? On the one hand, the language of robotics allows multiple interpretations (leading sometimes to misreading or confusion in various contexts). On the other hand, the status of robots is challenged more and more by technical achievements and humans' own empirical beliefs. In this paper, we follow a linguistic approach in order to explore the relevance of these words when talking about robots. Since we note that the words impose themselves (even if opposed), we discuss the efficiency of a rhetorical strategy in order to work with such a lexicon in robotics. More precisely, we explore the argumentative technique of the dissociation of notions through the study of a practical case: the case of robot lawn mowers versus hedgehogs.

Keywords: rhetoric, ethics, intelligent robots, robot motion, robot autonomy

I. Introduction

WHILE scientific innovation and technical achievements challenge people's understanding and beliefs about robots, the language used to talk about a new technology is often pointed out as encouraging the confusion between machines and living organisms. As a matter of fact, many are the words used in robotics that are borrowed from the living: machines can *learn, think, feel...* are *intelligent, autonomous*, etc.

Commonly, the state-of-the-art dives into this problematic via a socio-cognitive perspective that addresses the question of how human perception of robots impacts their own representations and the way that they talk about them. Such a cognitive approach enables to observe how the human brain attributes intentions to objects, and gives leads about the reasons why people use these words in the first place (see for instance (Chaminade et al., 2012, Perez-Osorio & Wykowska, 2019, Malinowska, 2021). From such a point of view, the matter of anthropomorphism is obviously at the core of the problematic: the universal presence of the phenomenon in all cultures, in every environment and at all ages (see the work of Margaret Mead on the topic), also explains how the humanoid shape of a robot has an effect on human representations. (Dacey, 2017)

Yet, we propose in this paper to try out an alternative perspective on the problematic of the words of robotics; instead of starting from the cognitive mechanisms which tend to justify the agentive lexicon, we propose to reverse the reasoning by considering the linguistic uses in the first place, i.e. the words themselves.

Following this approach, the paper firstly highlights the fact that lexical borrowing is not a recent phenomenon and that it is not reserved to humanoid robots. The historical perspective shows that using words from the living is a phenomenon that concerns complex as well as elementary machines. In addition, it is argued that the borrowed vocabulary tends to impose itself (even if opposed).

Secondly, we question the relevance of the agentive lexicon by investigating the linguistic reasons that could explain why such a lexicon is spontaneously used (even in the case of speakers who consider robots as a set of moving parts, and nothing *more*). For this purpose, we propose to focus on the notion of movement while creating a dialogue between various cognitive and linguistic concepts. As we will see in the part of the paper dedicated to this topic, the understanding of the bond between motion perception and language enables to consider the agentive lexicon's potential in the context of robotics: despite the confusion that these words might bring, they also prove their practicality for talking about moving machines.

Yet, while using similar expressions to talk about the movement of a robot is relevant from this viewpoint, we note that such words still often appear uncomfortable notably to roboticists themselves. Would it then help to define the words more precisely? But how can we define being *intelligent* for instance? The contribution of our paper is to introduce the rhetorical technique of the dissociation of notions, which – precisely without defining the notions- responds to the problem of incompatible opinions about notions such as *intelligence*.

II. Talking about robots

The problematic of the language of robotics firstly demands a brief historical perspective. In this way, we aim to review the general use of the words borrowed from the vocabulary of the living in the context of robotics and artificial intelligence.

A. A brief historical perspective

As elementary as it can be, a machine can be defined as in the Cambridge dictionary: it is “a piece of equipment with many parts that work together to do a particular task. The power used by a machine may come from electricity, steam, gas, etc. or human power.” (Cambridge Dictionary) Consequently, machines embrace at least three characteristics: they are moving objects, they use a source of energy and they are dedicated to a task. In addition, machines eventually use an artificially converted energy, which is not the case of tools for instance. Hence, tools are only put in motion through some energy provided by animals (including humans) and through natural forces (such as gravity). The flying pigeon of Archytas (428–347 BCE) is generally considered as the first *autonomous* machine since it used compressed air in order to fly. The use of the utterance -autonomous- serves here a particular purpose: to enhance the fact that the mechanical pigeon was able, like never before, to fly thanks to an independent source of energy rather than to some living organism’s power. It was also the first machine to enhance the principles of aerodynamics. (Pieters, 2020) With the flying pigeon of Archytas, the ability for a machine to move by using its own energy in order to accomplish a task is thus no longer exclusive to the living. It becomes a common feature of both technical objects and the living organisms which, one thing leading to another, is represented by an analogy based on the broader notion of autonomy.

For machines to accomplish a task thanks to their own power is thus not a modern innovation. That being said, the 18th century and the golden age of automatons, as well as the Industrial Revolution of the 19th century, are marked by the mastery of the task that consists in transforming different kind of energy into mechanical energy. For instance, the principle of autoregulation was mastered with the machine created by James Watt (built between 1763–1788). Following the technical developments, more common characteristics can be found in both the machines and the living organisms’ categories. Also, according to the Cambridge dictionary once again, an automaton is “a machine that operates on its own without the need for human control, or a person who acts like a machine, without thinking or feeling”. (Cambridge Dictionary) Both technological objects and humans move independently and can thus function even without *thinking* or

feeling. This time, the common feature leads to an analogy based on the technical notion of automation and is applied to the living.

Later on, the emergence of cybernetics enabled the machines and the living to share even more characteristics. Still based on the Cambridge dictionary, cybernetics is “the scientific study of how information is communicated in machines and electronic devices, comparing this with how information is communicated in the brain and nervous system”. (Cambridge Dictionary) Hence, such a progress led humans to commonly describe both categories using such words as *perception*, *decision*, *learning*, etc., which brought the question of the clarification of the concepts in the meantime. On this matter, the well-known Macy conferences (1942–1953) gathered engineers, mathematicians, physiologists, psychologists, ethnologists and more, in order to give rise to the system theory. The debates would then continue with the development of computer science and the birth of the term Artificial Intelligence at the *Dartmouth Summer Research Project in Artificial Intelligence* in 1956. As a general comment, we note that the words borrowed from the living organisms’ category tend to magnify the technical objects whom they are applied to. On the contrary, the lexicon of machines tends to disqualify living organisms; as found in the Cambridge dictionary about the definition of *robot*: a robot is “a machine controlled by a computer that is used to perform jobs automatically”, as well as it refers to “someone who does things in a very effective way but never shows his or her emotions”. (Cambridge Dictionary) The second definition is labelled by the dictionary as “disapproving”.

From this brief historical perspective, we note that the analogy between living organisms and machines has long been considered relevant in order to describe the functioning of (even the most elementary) machines. Yet, as the machine development keeps on going, the vocabulary borrowed from the living seems to raise questions more and more. The reading of the word “autonomy” for instance does not seem as obvious when talking about contemporary robots than it does if considering the flying pigeon of Archytas. In this way, while the machines and the living organisms’ categories always shared common characteristics and words, our reading of that same vocabulary changes at the pace of technological progress. As a matter of fact, our understanding of machines (as being something more than a set of moving parts that is dedicated to a task while using its own energy) is commonly challenged by technical achievements and humans’ own empirical beliefs. Yet, are these beliefs (even more) encouraged by our choice of words when talking about robots? Such an idea is often brought out as an affirmation when discussing the problem of the representation of robots within the society. Many are the scientists who promote more neutrality in linguistic uses. However, can natural language be neutral?

B. Can language be neutral?

Coming back to the Dartmouth Project in 1955, John McCarthy (who was then a young assistant professor in mathematics) decided to gather a group of researchers in order to clarify the field of “thinking machines” where cybernetics, automata theory and other information processing were included. In order to avoid contributions about automata theory in the narrowest sense (automata theory being in the central focus at that time), McCarthy chose deliberately the term “artificial intelligence” that he considered as being more neutral:

He chose the name partly for its neutrality; avoiding a focus on narrow automata theory, and avoiding cybernetics which was heavily focused on analog feedback, as well as him potentially having to accept the assertive Norbert Wiener, guru or having to argue with him. (Nilsson, 2010)

In the proposal as well as at the conference, McCarthy argued thus strongly to distinguish the field of artificial intelligence from automata theory, even though other participants in the Dartmouth Conference objected to it:

“The word artificial makes you think there’s something kind of phony about this,” says Arthur Samuel, “or else it sounds like it’s all artificial and there’s nothing real about this work at all.” For years thereafter, Newell and Simon called their own work complex information processing, but the term *artificial intelligence* was the one to remain. (McCorduck, 2004)

The history of the word ‘artificial intelligence’ points out the common belief about natural language being supposedly able to achieve neutrality. While it is obvious that words gain to be chosen with care, this example illustrates however that no terms can ever be -essentially- neutral. As a matter of fact, multiple interpretations can always occur, and not always *where* we expect them. In the case of McCarthy’s choice of words, the term that was considered as inappropriate was ‘artificial’ rather than ‘intelligence’: the word ‘artificial’ would possibly compromise the seriousness of the new field of research. Nowadays however, the current debates clearly argue over the term ‘intelligence.’

In general, the language of robotics and artificial intelligence is characterized by vagueness in the sense that it allows multiple interpretations even in biased contexts (Pieters, 2018). Such a characteristic means that the words borrowed from the living have a high representational dimension when used in robotics. Because of that, this lexicon is convenient in order to raise interest about scientific matters within an audience. However, it is also hard to deal with it when describing scientific and technical matters: using the vocabulary of the living in robotics may feel uncomfortable (even undermining) for researchers willing to represent

their discipline through a technical point of view. (Sreenivasa et al., 2012, Bailly et al., 2018) Such a vocabulary offers indeed a good opportunity for sensationalism and is commonly associated to this tendency (Pieters et al., 2019). The roboticist and research director Gentiane Venture from the Tokyo University of Agriculture and Technology, shared her point of view on this matter at the workshop on “Wording Robotic”, LAAS-CNRS Toulouse:

I deal with robots all the time, I talk about robots all the time, I do presentations with robots all the time and I found myself using “he” (and not “it”) for the robot. I say things like: “Oh look at this cute guy, he is doing something here”, and if the robot suddenly says “battery drained” and does [like it has no energy anymore], I say: “Oh the robot is tired”. When I found myself saying that, I think: ‘Oh damn, what did I just said! I shouldn’t do that because I’m just playing in this game of the “artificial intelligence” and the agency... and [people] are going to actually think that yes, the robot is tired because he has been talking and walking too much, ... But it’s just out of battery. [...] This is making the way of talking about robots very complex.

Consequently, considering that the language of robotics carries multiple possible interpretations, that it involves the risk of confusion about the status of robots and that scientists can be uncomfortable with their own beliefs while using such words, why using this lexicon in the first place? In order to explore this problematic, we engage in a dialogue between general cognitive and linguistic concepts.

III. From motion perception to language: A link between robots and living beings

Are *autonomy*, *intelligence*, *decision*, *etc.* relevant words to talk about robots? The bond between the perception of movement and the agentive lexicon tends to confirm it. As we will see in the following section, the lexicon imposes itself spontaneously.

A. Dots in motion

If they are well situated and coordinated, only 4 moving dots on a screen can be sufficient to make humans enjoy the performance of a Caribbean dance. Similarly, the movement of 17 dots allows humans to recognize a football player hitting a non-existing ball and eventually, to grasp the feeling of the simulated pain within the fall. (Brun, 2018) The process of the motion capture itself (Mocap) exploits

such a principle as it records movements. In this way (or with similar techniques), we also enjoy a *shy*, *nervous*, or *playful* lamp in an animated movie. (see Figure 1)

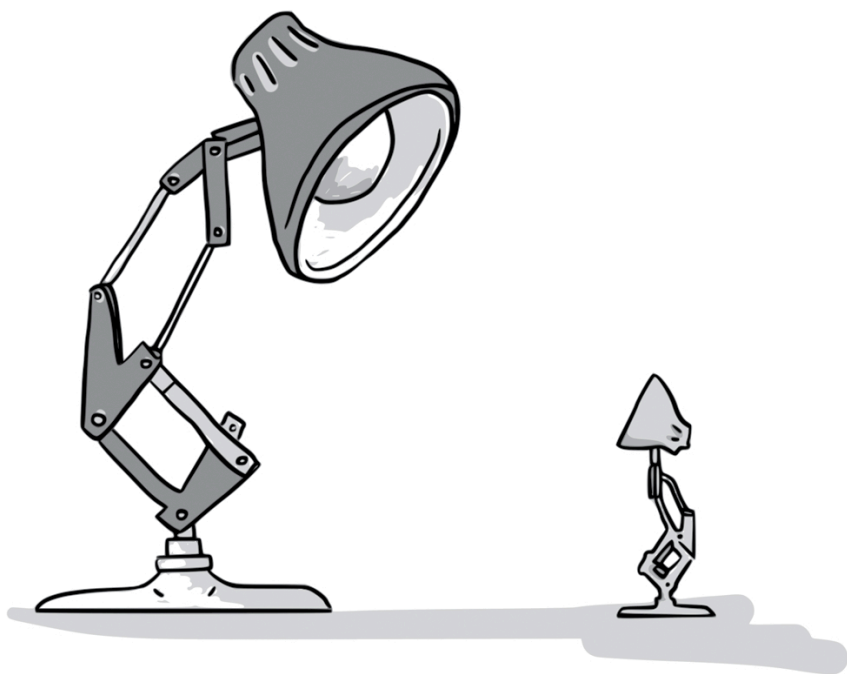


Figure 1. While some lamps are put in motion in an animated movie, they expose the importance of movement in humans' perception. (© Pieters)

This visual effect created by a dynamic movement of simple dots on a screen allows us to note a highly important fact about humans' spontaneous perception of moving machines: the animal-like shapes given to some robots do not explain (all) humans' spontaneous attribution of intentions, mental states, or motivations to objects. The evidence suggests indeed that "robots do not naturally [in the sense of spontaneously] induce the intentional stance in the human interacting partner" (Perez-Osorio & Wykowska, 2019). In fact, movement is one of the prior socio-communication activities such as action imitation, joint visual attention, and sensitivity to intentions related to action or attempted action. (Meltzoff & Brooks, 2007) On this matter, the importance of movement in humans' perception had already been noted by Lotze in 1852 (Lotze, 1852) as he affirmed that "spatial organization of visual sensations results from their integration with a muscular sense". Later on, the idea that the information that triggers a motor command is used by the brain to recognize movement was proposed by Helmholtz (Southall, 1962) (see review (Berthoz, 2000)). Briefly said, humans' ability to read

the world is partly and (importantly) driven by the ability to read movements and actions.

B. Traces in natural language

When the perception of motion leads to the attribution of intentions to objects, the traces of that cognitive process can be found in natural language. At least, various studies conclude that the activation of the cognitive process consists in attributing intentions (i.e. the adoption of the intentional stance (Heider & Simmel, 1944) from the fact that the participants of the experiment describe the action of the moving object by using an agentive lexicon, instead of mechanistic terms.

In 1944, Heider and Simmel showed how humans spontaneously attribute intentions to geometric figures moving on a screen. (Dennett, 2009) A series of short animations, each one involving a large triangle, a smaller one, and a circle that were all moving around a static rectangle, was presented to the participants. The pattern of the movements (rather than the physical appearance or properties of the geometric figures) triggered mentalistic descriptions and the use of agentive lexicon: the triangle *continues*, *attacks*, *follows*, etc. (see Figure 2)

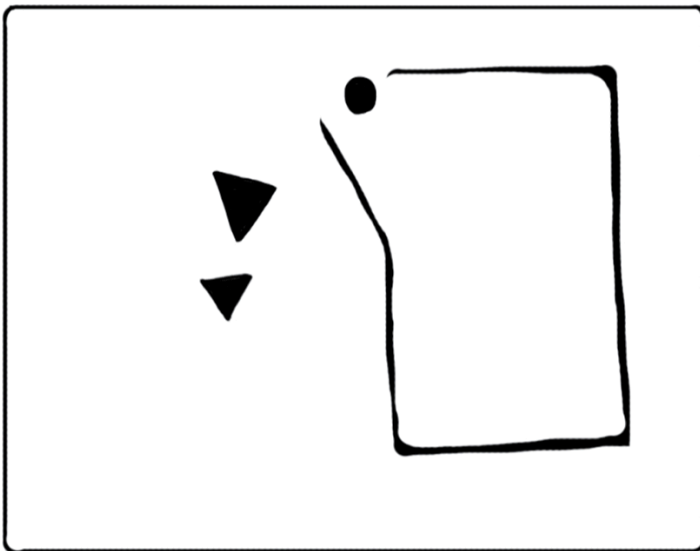


Figure 2. According to the experiment of Heider and Simmel, the movements of the geometric figures trigger mentalistic descriptions. (Dennett, 2009)

The validity of the self-reported method used to evaluate the spontaneous adoption of the intentional stance is however discussed. For instance, critics suggest that in the design of the experiment by Heider and Simmel, the participants' descriptions referring to perceived intentionality "might be the result of high order cognitive mechanisms like inference from the questions or the task, rather than the actual observations (Dennett, 2009), (Scholl & Tremoulet, 2000). Nevertheless, researchers have now methods that bypass that discussion, even though caution must be taken about the meanings given to the results. While the neuroimaging approaches, complemented with questionnaires and semi-structured interviews, make it possible to observe the neural systems underlying mentalizing (see for instance (Thellman et al., 2017), (Marchesi et al., 2019)), the methods applied usually address the need to evaluate specific technologies in very specific contexts. (Gaudiello & Zibetti, 2016)

Still, in the context of robotics, wherever movement affects the probability of adopting the intentional stance on its own or in combination with other factors, the linguistic traces left by the adoption of the intentional stance are, in all cases, considered as clues to humans' spontaneous ways of perceiving the world.

C. Physical stance, design stance and intentional stance

That being said, according to Dennett's theory, the intentional stance is not the only way to perceive actions and events. (Heider & Simmel, 1944) Humans use different strategies to understand and predict movements and actions such as the physical stance and the design stance. Before we discuss the questions raised by this distinction, let us review the definitions of those strategies given by Dennett.

- The *physical stance* refers to the way that humans predict the movement of simple systems, such as a pendulum for instance. It means that humans anticipate the behavior of the system (here, the pendulum) based on implicit knowledge of the variables that intervene in that system, such as gravity, acceleration, friction, etc. In such cases, humans rely on intuitive information on the laws of physics and the properties of things.
- The *design stance*, on the other hand, is more efficient as humans need to predict and understand actions that are more complex systems than a pendulum. At this level, humans are concerned with such things as purpose, function and design: the prediction of the event is based on the design characteristics of the system and its intended functionality. Adopting this strategy does not require knowledge of the physical constitution or physical laws that govern a system's operations but relies on conventional knowledge and previous assumptions (that are thus non-intuitive). The design stance is active when anticipating

the events related to an object (the function of which humans are aware of, like a car), or an animal or a plant (living things designed by evolution). For instance, humans adopt the design stance when they predict that a bird will fly when it flaps its wings, on the basis that wings are made for flying.

- Finally, comes the *intentional stance*, which is the one solicited when the design stance is not sufficient in order to understand and predict actions, notably in the case of complex systems. According to Dennett, this strategy is the most efficient for humans to represent and understand events. By treating a system as a rational acting agent who makes behavioral choices in line with its own goals or with the ways that lead to the achievement of a goal, humans' predictions generally pay off. Considering again the bird as an example: when humans predict that the bird will fly away because it knows that the cat is coming and is afraid of getting caught, humans adopt the intentional stance.

While theoretical, this distinction of stances enables us to address what seems like a paradox; while one adopts a *design stance* towards robots (which is likely the common stance of experts in robotics), why would they still spontaneously use the agentic lexicon to talk about robots (an agentic lexicon that is intimately bond to the *intentional stance*)? As a matter of fact, such an utterance as “*I was really annoyed, [the robot] Pyrène didn't want to move his right arm in front of the group of visitors during the demo [...]*” (Olivier Stasse, LAAS-CNRS Toulouse) is common to hear in every lab.

Surely, we must be cautious about what we conclude from the linguistic traces found within language: neither a stance nor a whole mindset can be grasped through the analysis of the lexicon only. As a matter of fact, the distinction of the two systems of thinking (fast thinking and slow thinking) defined by Daniel Kahneman supports this statement.

Known for his work on the psychology of judgment and decision-making, as well as behavioral economics, for which he was awarded the 2002 Nobel Memorial Prize in Economic Sciences (shared with Vernon L. Smith), one of Daniel Kahneman's central thesis proposes indeed a dichotomy between two modes of thought. (Kahneman, 2011) While the System 1 is fast, automatic, frequent, stereotypic and instinctive, the System 2 is slower, effortful, conscious and more deliberative. The Fast System refers to activities such as determining the distance of an object from another, localizing the source of sound, completing the sentence “butter and...”, etc., while the Slow System is in charge when digging into our memory to recognize a sound, counting the number of A's in a text, parking in a tight parking space, determining the validity of a complex logical reasoning, etc. Kahneman concludes that humans' decision making based on one or another system depends on coherence, attention, laziness, association, jumping to conclusions, WYSIATI

(What You See Is All There Is), and how one forms judgements. (Kahneman, 2011) Consequently, using Kahneman's dichotomy in our case, the linguistic traces that reveal a cognitive process in System 1 should not be mixed with the deep belief that would be formed in System 2. While the agentic lexicon reveals a process of attributing intentions towards inanimate objects happening in System 1, the deep understanding that one shapes about the object is a matter of System 2.

D. Is the agentic lexicon relevant when it comes to moving machines?

In the previous sections, we noted that when adopting the *intentional stance* towards moving machines, the use of the agentic lexicon is readily justified. On the contrary, while it is assumed that humans adopt the *design stance* towards robots (as it is reasonable to think about roboticists for instance), the use of the agentic lexicon is more difficult to explain. Yet, the distinction between the *slow thinking* and *fast thinking* of Kahneman allows to solve this so-called paradox concerning the linguistic phenomenon. Furthermore, the distinction between these two systems of thinking makes it possible to argue that if one uses spontaneously the agentic lexicon to describe robots, it can also only be for practical reasons. As a matter of fact, these words fulfill the rhetorical function of *enargeia*, i.e. they make facts and thoughts visible through language (Pieters et al., 2019).

From this point of view, using the words borrowed from the living when talking about robots does not appear as an irrelevant parallel or what one could call a misuse of language. The link between perception of movement and natural language, when considered under such perspectives, is a strong argument to support the idea that we, as humans, cannot totally avoid the spontaneous association of the living and the use of that vocabulary in robotics. While some utterances are obviously chosen following deliberate choices or simply by habit, such a spontaneous cognitive mechanism should certainly not be ignored as it cannot *a priori* be altered.

Yet, since these words often make many experts uncomfortable, would it help to define them more precisely so that we can avoid to create confusion between living organisms and *intelligent* machines? But, as we asked earlier in the paper, how to agree once and for all on the definition of *intelligence* for instance? In the next section of this paper, we show that the definition of the words is not an obligatory step in practical situations, i.e. in order to make critical decisions about *intelligent* robots, *autonomous* machines, etc.

IV. A rhetorical technique leading to decision making

We firstly introduce the rhetorical technique of the dissociation of notions. Secondly, we show how this technique can answer to practical situations by studying a judicial case: hedgehogs *versus* lawn mower robots.

A. The dissociation of notions

When words appear as obstacles to understanding, agreement or decision making, humans seek to define them so that they can clarify meanings. While such a strategy is efficient when it comes to describe, classify, specify, etc. the factual reality (i.e. raw facts (Searle et al., 1995)), the notions that belong to the social reality (i.e. values) strongly withstands to definition. Yet, it is precisely these notions that demand deliberation: as Eugène Dupréel pointed out in reference to the Sophists, the citizens have no use for deliberating about the hot or the cold, because this reality is beyond the reach of human decision. [...] The reality on which we can act through words [however] is the human, social reality. It is composed of values such as “justice”, “freedom”, “equality”, and it is human assembly which determines the scope of these notions, their hierarchy and the dynamic balance between them. (Danblon, 2002), (Dupréel, 1948) Following this, what is at stake with these values is decision-making. Rather than a clarified meaning, these notions demand an efficient method to be adjusted.

Among the rhetorical apparatus, Chaïm Perelman and Lucie Olbrechts-Tyteca distinguish the technique of the dissociation of notions, which, without defining the notions, responds to the problem of incompatible opinions about them (Perelman & Olbrechts-Tyteca, 1969). Even if defined finely, the notions can indeed always lead to incompatibilities or conflicts once faced with a particular case. In contrast, in this situation, the technique of the dissociation of notions proves to be an efficient tool (Gross & Dearin, 2002), (Danblon, 2002). This technique consists in dividing a single notion into two separate notions which are, in most cases, the object and its exception (Van Rees, 2008). The result of a dissociation is for instance to dissociate “intelligent” into “smart” like in smartphone, and “clever” or “wise”. In this case, the dissociation enables to stress the technical aspect of the object *versus* any link with the living.

This rhetorical tool thus enlightens the meaning of the notion in a specific case and in a specific context, and could be dissociated in another way for another case, according to different needs. The aim of this argumentative technique is to lead to a decision about a particular case rather than to depend on the orator’s ability to successfully justify a specific meaning to a given audience. Such a technique has already proven to be effective in multiple fields where discourses are

recognized as influent (politics, legal affairs, etc.) (Danblon, 2013). Let us now apply this technique in a case related to robotics. More precisely, we propose to consider a judicial case for which we will show the mechanisms underlying the dissociation of notions as well as the effects that one might produce by using it.

B. A case study: Robots vs. hedgehogs

In European backyards, robot lawn mowers are quite common. The self-driving technology uses a camera to autonomously drive around the garden in order to cut grass. While popular, these robots are also known to kill many hedgehogs (see Figure 3). The problem is all the more important that the hedgehog is a protected species: “the hedgehog benefits from a total protection status by the decree of 23 April 2007 (previously the decree of 17 April 1981), it is protected throughout the European Community, it is forbidden to destroy it, to transport it, to naturalize it, to put it on sale in application of the L articles”. Furthermore, the hedgehog is considered as being an endangered species. In Britain for instance, the *Guardian* reported in 2018 that the hedgehog population has fallen by 80% since the 1950s. In addition of robot lawn mowers, the populations have drastically reduced because of intensive agriculture, pesticides and motor traffic.

Following this situation, various debates emerged about the measures and actions to be taken in order to protect the small mammal. In Belgium for instance, the current Walloon Minister for the Environment, Nature, Forestry, Rural Affairs and Animal Welfare, Céline Tellier, encourages the state to forbid the use of robot lawn mowers at night and dawn. She also questions the responsibility of the manufacturers of the robot as she believes that the establishment of construction regulations “would solve the issue at the root of the problem rather than enacting hard-to-enforce usage restrictions”. As an answer, the manufacturer Husqvarna stated that they have been aware of the problem for more than three years. In a Facebook post, they claimed that one of their models “has been approved for the protection of hedgehogs and their babies”. But the argument has not convinced all the users: “the *hedgehog protection system is unreliable! An adult hedgehog that was seen on the grass in the afternoon was found dead the next morning. He had a back leg cut off at the fingers*”, deplored one client (DH.be, 2020).

In this case, who is responsible for the death of the hedgehog? How could the defendants of the animal cause convince the audience of the need of the establishment of precise and legal construction regulations? Should we forbid autonomous lawn mowers in the backyard? Which of these machines would then be considered as being autonomous? And what about the systems that are not yet invented and that would not be included in the definition of *autonomous* lawn mowers but yet, would harm hedgehogs?



Figure 3. Robots *versus* Hedgehogs. In Europe, various debates have emerged about the measures and actions to be taken in order to protect the small mammal from the robot lawn mower. (© Pieters)

This is where the argumentative technique of dissociation could serve their purpose about the self-driving technology. The notion of “autonomy” can be here dissociated into “blind autonomy” and “responsible autonomy” in order to plead for instance that “robots are only allowed to be on the market as long as they prove to have a full responsible autonomy, and not a blind autonomy”. The philosophical question about knowing what is *autonomy* or *responsibility* is thus here evicted. The rhetorical technique enables to dissociate a robot lawn mower which is able to execute the cutting task without the help of a human operator, from a lawn mower that ensure total safety by adapting its behavior to any unforeseen event (such as the presence of a hedgehog). In contrast with *blind* autonomy, the notion of *responsible* autonomy thus reflects here the fact that, as conceived by the constructor, the robot is efficient and secured in any situation, provided that the user follows the operating instructions. The dissociation of notion enables here to determine whether the sale of the robot lawn mower should be authorized for public uses, or not. Note that the law provides harsh penalties for harming a protected species (in Belgium, the fine amounts to 150 000 euros with a possibility of 2 years imprisonment). The strength and persuasive efficiency of this argumentative technique lies in the fact that a law can be quickly and efficiently decided without however for everyone to agree on the meaning of *autonomy*. These notions are considered as being *confused notion* in Perelman’s theory (Searle et al., 1995).

While this case is happening in a legal context, the technique of the dissociation proves to be equally useful in order to decide an issue where deliberation is often blocked at the level of the definition. It is the case for instance in the context of ethical discussions about robots: while we wonder whether working on *autonomous* machines is ethical, the debate often stops because of the belief that

a decision cannot be made until a fine definition (on which everyone agrees) is found. However, dissociating the notions can here be an efficient alternative solution in order to reach the fundamental question of the debate and to decision making.

V. Conclusion

The discipline of robotics borrows many words from the lexicon of the living. Since decades and without taking the complexity of the systems into account, humans talk about machines as being *intelligent*, able to *think*, to *feel*, to *decide*, etc. In the recent years however, this vocabulary raises question more and more and it is often considered as encouraging the confusion between robots and living organisms. In this paper, we addressed this linguistic problematic by creating a dialogue between various cognitive and linguistic concepts. In this way, we brought arguments which support the relevance of the use of such a vocabulary in the context of robotics (despite the uncomfortable sensation that it can give to speakers who consider robots as sets of moving parts and *nothing more*). While exploring the role of the perception of movement and its relationship to natural language, we indeed situated the spontaneous use of this vocabulary in the framework of a natural cognitive mechanism.

Yet, we also observed that this lexicon still appears as being inconvenient to many of us since the definition of these words is limited by their nature (notions such as “autonomy” or “intelligence” are social facts and cannot be defined once and for all). Following this observation, we proposed the use of the rhetorical technique of the dissociation of notions as a solution. The study of the case of the hedgehogs *versus* the robot lawn mowers showed that this argumentative technique can lead to concrete decisions about a practical case in robotics. While it bypasses the problem of the definition, the technique offers a way to avoid unproductive discussions. Let us note that this technique is not *a priori* reserved to debate and decision making in a political context. Among our work perspectives, we consider to highlight how this technique can also be used in the context of ethical discussions and science communication. In the first case, the technique of the dissociation of notions can be useful in order to bypass the problem of the definition. Using this technique, it is then not yet necessary to agree on what *intelligent* means for instance in order to be able to discuss potential societal problems related to the integration of robots. In the case of science communication, the technique of the dissociation can help any researchers willing to focus on technical aspects during a public presentation for instance.

Broadly speaking, it suggests that robotics would benefit from addressing the question of the status of language and the rhetorical technique upstream of ethical discussions.

Funding

This work was supported by the European Research Council Advanced Grant 340050 Actanthrope.

References

- Bailly, F., Pouydebat, E., Watier, B., Bels, V., Souères, P. (2018). “Should mobile robots have a head? A rationale based on behavior, automatic control and signal processing”, *Int. Conf. on Biomimetic and Biohybrid Systems (Living Machines)*, Paris, July.
https://doi.org/10.1007/978-3-319-95972-6_5
- Berthoz, A. (2000). *The brain's sense of movement*, vol. 10. Harvard University Press.
- Brun, R. (2018). “Qu'est-ce que la Motion Capture?” In *France Université Numérique*, editor, MOOC La Gesthothèque, conçu par l'Université Sorbonne Paris Cité.
- Cambridge Dictionary, <https://dictionary.cambridge.org/> (accessed February 3, 2021)
- Chaminade, T., Rosset, D., Da Fonseca, D., Nazarian, B., Lutscher, E., Cheng, G., et al. (2012). How Do We Think Machines Think? An fMRI Study of Alleged Competition with an Artificial Intelligence. *Front. Hum. Neurosci.* 6, 103. <https://doi.org/10.3389/fnhum.2012.00103>
- Dacey, M. (2017). Philosophy of Science, Anthropomorphism as Cognitive Bias, 84, 5, pp. 1152–1164. <https://doi.org/10.1086/694039>
- Danblon, E. (2002). *Rhétorique et rationalité: essai sur l'émergence de la critique et de la persuasion*. Editions de l'Université de Bruxelles.
- Danblon, E. (2013). The Reason of Rhetoric. *Philosophy & rhetoric*, vol.46, no. 4, pages 493–507. <https://doi.org/10.5325/phlrrhet.46.4.0493>
- Dennett, D. (2009). *Intentional systems theory*. The Oxford handbook of philosophy of mind, pages 339–350. <https://doi.org/10.1093/oxfordhb/9780199262618.003.0020>
- Dupréel, E. (1948). *Les Sophistes*, Ed. Du Griffon, Neuchâtel.
- Gaudiello, I. & Zibetti, E. (2016). *Learning robotics, with robotics, by robotics: Educational robotics*. John Wiley & Sons. <https://doi.org/10.1002/9781119335740>
- Gross, A. & Dearin, R. (2002). *Chaim Perelman*. SIU Press.
- Heider, F., & Simmel, M. (1944). “An experimental study of apparent behavior”. *The American journal of psychology*, vol. 57, no. 2, pages 243–259. <https://doi.org/10.2307/1416950>
- Kahneman, D. (2011). *Thinking, fast and slow*, Kindle Edition.
- Lotze, R. (1852). *Medicinische psychologie oder physiologie der seele*. Weidmann'sche Buchhandlung.
- Malinowska, J.K. (2021). Can I feel your pain? The biological and socio-cognitive factors shaping people's empathy with social robots. *International Journal of Social Robotics*, 1–15.

- Marchesi, S., Ghiglino, D., Ciardo, F., Baykara, E. & Wykowska, A. (2019). "Do we adopt the Intentional Stance towards humanoid robots?" *Frontiers in psychology*, vol. 10, page 450. <https://doi.org/10.3389/fpsyg.2019.00450>
- McCorduck, P., & Cfe, C. (2004). *Machines who think: A personal inquiry into the history and prospects of artificial intelligence*. CRC Press. <https://doi.org/10.1201/9780429258985>
- Meltzoff, A.N. & Brooks, R. (2007). "Intersubjectivity before language: Three windows on preverbal sharing." *Advances in Consciousness Research*, vol. 68. <https://doi.org/10.1075/aicr.68.14mel>
- Nilsson, N. (2010). *The Quest for Artificial Intelligence*, Cambridge University Press.
- Perelman, C. & Olbrechts-Tyteca, L. (1969). *The new rhetoric.(La nouvelle rhétorique). A treatise on argumentation*, vol 140. Univ of Notre Dame Pr.
- Perez-Osorio, J., & Wykowska, A. (2019). "Adopting the Intentional Stance Towards Humanoid Robots". In *Wording Robotics*, Springer. https://doi.org/10.1007/978-3-030-17974-8_10
- Pieters, C. (2020). The words of robotics: a rhetorical approach. *Automatic*. Institut national des sciences appliquées de Toulouse; Université Libre de Bruxelles (U.L.B.), Belgium.
- Pieters, C., Danblon, E. & Laumond, J.-P. (2018). "How do humans read robotics? The matter of the lexical ambiguity resolution." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. <https://doi.org/10.1109/IROS.2018.8594138>
- Pieters, C., Danblon, E., & Laumond, J.-P. (2019). "Beyond the conflict between "Touch" and "Feel" in robotics." In *Wording Robotics*, pp. 81–90. Springer, Cham. https://doi.org/10.1007/978-3-030-17974-8_7
- Scholl, B. & Tremoulet, P. (2000). "Perceptual causality and animacy". *Trends in cognitive sciences*, vol. 4, no. 8, pages 299–309. [https://doi.org/10.1016/S1364-6613\(00\)01506-0](https://doi.org/10.1016/S1364-6613(00)01506-0)
- Searle, J., Willis, S. et al. (1995). *The construction of social reality*. Simon and Schuster.
- Southall, J. (1962). *Helmholtz's treatise on physiological optics*: Translated from the third german edition. Dover.
- Sreenivasa, M., Souères, P., Laumond, J.-P. (2012). "Walking to Grasp: Modeling of Human Movements as Invariants and an Application to Humanoid Robotics", *IEEE Trans. On Cybernetics*, Part A, Vol 99, p1–14, January. <https://doi.org/10.1109/TSMCA.2011.2178830>
- Thellman, S., Silvervarg, A. & Ziemke, T. (2017). "Folkpsychological interpretation of human vs. humanoid robot behavior: exploring the intentional stance toward robots". *Frontiers in psychology*, vol. 8, p.1962. <https://doi.org/10.3389/fpsyg.2017.01962>
- Van Rees, A. (2008). *Dissociation in argumentative discussions: A pragma-dialectical perspective*, volume 13. Springer Science & Business Media.

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Publication history

Date received: 9 February 2022

Date accepted: 5 September 2022

Published online: 24 March 2023