

Towards Robotics Leadership: An Analysis of Leadership Characteristics and the Roles Robots Will Inherit in Future Human Society

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Abstract. This paper aims to present the idea of robotics leadership. By investigating leadership definitions and identifying domains where humans have failed to lead, this paper proposes how robots can step in to fill various leadership positions. This is exemplified by referring to two examples, stock brokering and transportation, and explains how robots could be used instead. Furthermore, this paper aims to provoke discussion by identifying firstly some potential limitations of robots in leadership positions and secondly by proposing that our current technological ecosystem not only is suited for machines to assume leadership positions but rather is inherently headed towards it.

Keywords: Robotics Leadership, Lovotics.

1 Introduction

As the responsibilities of robots within our society takes on increasing importance, consideration of the role of robots is ever evolving. Much like the rights of man has been displaced by the rights of humankind, as well as the elevation of the rights of animals and all living things, robots are increasingly exerting their “right to exist” [17].

Their progress climbing the social ladder can be mirrored by major points in human history. When robots were initially created, the role of master and

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slave was clear. Their invention was intended to assist and even replace the functionality of humans. In some sense, early robots could be perceived as slaves to their human masters.

As technology progresses, robots have evolved from their position of service providers to that of social entities. We see some robots take on the role of companion, even as therapeutic providers in some circumstances. In some cases these robots were no longer perceived as mere machines. In many ways, they have become our companions, much like pets are. Their perceived value to improving human life quality has elevated their own inherent “life worth”.

We are currently seeing an emergence of robots inheriting more emotional positions in our lives. Since the advent of Lovotics¹, robots can now participate, albeit in a limited capacity, as emotional counterparts. The ability for robots to love and be loved by humans places in us a responsibility to consider and anticipate the future roles that robots will become responsible for in our society. One aspect of this could be the role of robots as managers of resources, and in this case, the management of human capital.

In this paper we discuss aspects of robot leadership. First we try to understand what it is to be a good human leader by looking to works that discuss ideal leadership qualities. By identifying these, we can attempt to define and outline some of these characteristics within the context of robot leadership. We then postulate what a perfect robot leader could be as well as look to specific domains where robotics leadership could be applied. We conclude with an analysis of possible benefits and drawbacks when using robots as leaders.

2 Definition of Leadership

What characteristics make a good leader continues to be an important question to address. There has been literally thousands of studies regarding the topic of leadership, and the term has been redefined and conceptualized in many different ways [2,19].

These studies share enough points to recommend a standard definition of leadership. According to 221 definitions of leadership by Joseph Rost [14], it could be recognized that leadership is about one person getting other people to do a task. Where the definitions differ is in how leaders motivate their followers and who has a say in the goals of the group or organization [10].

The same concept above is mirrored by other definitions. For instance Ciulla’s defines leadership as “the ability to impress the will of the leader on those led and induce obedience, respect, loyalty, and cooperation... leadership is an influence relationship between leaders and followers who intend real changes that reflect their mutual purposes” [6].

Barker reviewed definitions of leadership that are currently used and conclude that leadership is about process and behavior [1].

Kotter defines leadership as “the process of motivating a group (or groups) of people in some direction through (mostly) no-coercive means” [11].

¹ www.lovotics.com

In another study Miller and Sardais [12] tried to propose a baseline conception of leadership by dividing the concepts defined in literature up to that time into two groups of *too broad* and *too narrow* definitions stated in the following.

From the broad definition perspective, “leadership is a process that influences behavior. This conception accounts for 40 percent of the 45 post-1940 leadership definitions that refer to “influence”. Leadership is a process that influences the will of followers. Each of these definitions encompasses a wide variety of disparate situations. Influence may include persuasion, setting an example and coercion”.

From the narrow definition perspective, “leadership is a process in which a leader changes the convictions of a group of people or an organization or a subordinate. Leadership can certainly have an impact on the mindset of a group, yet it can also concern and influence an individual. Also, it need not occur within a formal organization or between superior and subordinate. It may span organizational boundaries, originating with a subordinate that changes the convictions of a boss”.

“Leadership is a process in which a leader exercises his or her power, authority or status . However, leadership also might involve the persuasion of peers or even superiors using argument or emotional, moral or factual appeals”.

“Leadership exerts a positive moral force, articulates vision, instils meaning, embodies values, inspires to excellence, or actualizes goal achievement. Leadership is a process in which there is a conscious connection between leader and follower. Leadership may take place even when the follower cannot identify the leader. For example, some role-models change others simply by behaving in a certain way. Leadership is a role, a job, a calling, and is something continuously performed. Leadership can also be an act or an event” [12].

With the above definitions in mind, it can be concluded that they share a common characteristic: “Leadership occurs when someone imparts his or her convictions to another”. With this in mind we may conclude for our own purposes that leadership is about managing in order to motivate and convince people to do a specific task.

Definitions of leadership often address the nature of the leader. For example B. Winston et. al. present an integrative definition of leadership that states: “A leader is one or more people who selects, equips, trains, and influences one or more follower(s) who have diverse gifts, abilities, and skills and focuses the follower(s) to the organization s mission and objectives causing the follower(s) to willingly and enthusiastically expend spiritual, emotional, and physical energy in a concerted coordinated effort to achieve the organizational mission and objectives” [18]. Finally, the standard definition of leadership assumes that “leadership is a relation between leaders and followers”.

3 Human Failings and How Robots Could Do It Better

There can be no doubt that humans are fallible. More often than most, emotions can greatly influence the performance of a person tasked with a specific responsibility [16]. Through emotions, human beings can either perform for better or for

worse, and it can be assumed that human emotion influences decision-making. The issue with human decision-making is that the human would need to balance logic and emotion in order to make a rational yet empathetic decision. This is easier said than done.

In a robot leader, it can be argued that emotional states can enable a robot to make better decisions, yet it should be noted that some emotional states can be more beneficial than others. As emotional beings, humans feel a torrent and flood of emotions. The filtering of these emotions becomes critical, yet in some cases emotions get the better of people and bad decisions can occur.

Lovotic robots on the other-hand are in the end programmable. With this in mind, a robot leader can be instilled with adequate programming that could include certain emotional states that are beneficial to completing the task at hand, yet exclude emotions that would be detrimental. In this section we look at examples where human leaders have been compromised by their emotions and offer a *what if* perspective, speculating where robotic leaders could possibly perform better in the described situations.

3.1 Stock Brokering

Since the financial crisis in the late 2000s, researchers have discussed the attribution of the financial crisis to many factors. One of the more interesting and compelling ones is that of the contribution of human behavior to the development of the crisis [4]. Rogue trading and other people involved in highly risky activity are adversely effected by stress. Studies such as “How To Be A Rogue Trader” [8] show that stress affects risk aversion in the yellow-eyed junco sparrow. The rogue trader is no different.

What if a robotic trader was deployed in place of a human being to handle high-risk trading? Discipline, research and strategy are some of the key attributes that make a stock broker good, but who is to say that these attributes could not be instilled into a robot? As the previous study mentions, when high stress factors in the junco sparrow occur, the sparrow places itself into higher risk situations in order to get food. In a sense, it takes a gamble. Human traders, also effected by high stress will also make the same gambles [3]. A robot that has no feeling of stress, would not.

Robots as leaders that manage resources in situations such as stock brokering could maintain rational decision-making without the effects of stress. They could base their entire model for stock trading on information pulled form all over the Internet, from stock situations in other markets, to research on how weather effects commodity stocks in wheat and corn, to the effects of Christmas shopping on the chocolate market and beyond, all in real-time, and make an informed decision based on this.

3.2 Transportation

Another interesting area where robots could replace humans as leaders could be the avionics sectors. The Air France flight 447 was shown through data analysis

of the flight recorder (or “black box”) that human error was at least partially attributed to the crash. This includes the transcript of the conversation between the pilot and cockpit staff, which paints a picture of confusion and chaos ².

Would a robot do better in this situation? It is questionable ³, but much of the human error that occurred on Air France flight 447 could have been avoided. Whether human passengers would be willing to place their lives in a robot that is not necessarily concerned with its own self-preservation is a concern, but in the a future where Lovotics robots could be programmed with a level of empathy is possible. Cargo planes could be the first responsibilities for such robots, while the operation of passenger planes could follow.

With so many factors to consider, argument towards and against robots as leaders in these particular fields is up for debate and beyond the scope of this paper. The authors do think it is important to consider these factors when discussing such a subject, and welcome researchers to further explore these topics, as it will be crucial to the development of robots as leaders in the future.

4 Robots That Lead Robots

In order to allocate robots into positions of responsibility, it will be ideal to selectively choose and assign appropriate character traits. This way it can be ensured that the robot will perform the assigned tasks in the optimum way. By referring to Plutchik’s basic emotions and human feelings [13] we can identify that feelings like Aggression and Contempt are unwanted in most situations. These feelings are both associated with the emotion of Anger, an emotion which can be safely left behind when programming a robot aimed to interact in a social environment.

A successful leader needs to develop a relationship with their subordinates and then attempt to influence their will by persuasion, coercion or by setting an example. In order for the robot to be influenced by a leader, they need to have a basic understanding of success and failure, a rating scale of where they rank and the will to rise in those ranks.

By referring to the example mentioned previously, the robot assigned to handle high-risk trading should have not only have character traits which will ensure that it will constantly remain analytical and disciplined, but it should also be instilled with a sense of disappointment and shame towards other robot associates. This will promote a sense of competitiveness which aims to make the robot more resourceful in successfully accomplishing its tasks ahead of the rest of its co-workers. Disappointment and shame can sometimes produce negative consequences in humans like for example, stress and depression. Robots however, since they would not be programmed to understand those emotions would remain largely unaffected.

² What Really Happened Aboard Air France 447, <http://www.popularmechanics.com/technology/aviation/crashes/what-really-happened-aboard-air-france-447-6611877-2>

³ Would You Fly on an Airplane With No Pilot? <http://www.freakonomics.com/2006/12/04/would-you-fly-on-an-airplane-with-no-pilot>

5 Against Robots and Artificial Intelligence

Hubert Dreyfus, an American philosopher and currently a professor of philosophy at the University of Berkeley has constructed a rather harsh critique of artificial intelligence, arguing that computers will never be able to replace humans or live amongst humans as equals [7]. Dreyfus thinks that robots will never be able to understand the world, as it is “organized by embodied beings like us, to be coped with by beings like us”. Dreyfus continues and says that in order for the robot to not get completely lost in the space, it needs to be able to gain experiences with each action it performs, like a normal human body. In order for this to happen, AI researchers need to replicate and instill inside the robot a model of the world and a model of the body in order for the associations to be made. Dreyfus says that this so far this has been proved to be unachievable, and without it the world is just utterly un-graspable by computers in the same sense as their human counterparts.

A second claim against the possibility of robot leadership is the limitation of creativity. One necessary ingredient for creativity is the ability to think critically. Goldenburg in his *book* “Creativity in Product Innovation” [9] claims that suspending criticism and thinking that any idea is possible or good may ultimately be destructive to creativity. Humans have the ability to criticize themselves, where as computers cannot. Even though machines can write music and poetry [5] it is eventually up to humans to decide whether the work is of any worth. Will robots be able to think creatively? As creative thinking is considered to be an essential part of leadership it is definitely an interesting topic for further discussion.

6 Critical Thinking, When Does a Robot Stops Being a Tool and Starts Becoming a Leader?

Robots, when taken in the context of programmable machines created to perform specific tasks, have been servicing humans for close to 80 years. Humans have become completely reliant on machines and in more situations than not, they do not understand the complexity of most of their computational requests. By referring to a simple example, a user searching for the quickest route between two locations on a GPS system, even though the process of actually displaying the information on a screen is not as simple as it appears, the complexity is undertaken by an elaborate artificial intelligence system that runs in the background. This AI system needs to make specific choices and decide on certain actions that are guided solely by the purpose of accomplishing the task it was created to do. The user trusts and blindly accepts what the system has shown, as the computer in this situation is employed simply to perform a given task, making this system a robot laborer.

Going a step forward, if there is more than one route to the required destination, the user could tell the system to choose the quickest one. Even though this gives even more decision making to the system, it still acts as a labourer.

Will there be a time when machines are no longer acting as labourers and are therefore actually guiding humans? What if the GPS machine says, “No, I will not show you the fastest way to the grocery store, your fridge is currently full. I will however suggest you visit the barber, your last haircut was 2 months ago”. Robot technologies are becoming intelligent enough to become part of a person’s every day routine by being instructed to monitor and suggest actions. By programming gadgets that have the ability to perform a number of tasks, we give them the ability to choose for us. Through this exhibition of absolute trust, we are already setting down the ground-work to create robots that can act as our leaders.

Robots have already shown to have a number of advantages over humans [15] making them ideal for assuming leadership positions. Even though imagining now the possibility of replacing our current leaders with robots might sound absurd, by observing the current technological trends, the way technology is penetrating into our daily lives and our open acceptance to the change it affords, we could argue that giving robots positions of responsibility is not only unavoidable but is rather something desired and that we are trying to achieve.

7 Conclusion

In this paper we presented the idea of robots as leaders in the broadest sense. We have presented works by researchers that include theories of human leadership and have identified possible attributes that could be inherited by our robotic counterparts. By presenting instances where human failing could be fixed by possible robotic alternatives, we proposed a future where robots would be elevated in our society to function in roles beyond that of mere service entities, but actual allocators of resources and influencers of people. Finally, we briefly discussed the role of robot leaders and robot subordinates, as well as mentioned the possible failings of robots as leaders, and what makes them leaders as opposed to tools. It is in the hopes of the authors that discussions regarding the above topics takes center stage, as the issues raised will in no doubt become an eventuality. How prepared the human race will be when faced with future challenges regarding robot leadership remains to be seen.

Acknowledgement. This research is carried out under CUTE Project No. WBS R-705-000-100-279 partially funded by a grant from the National Research Foundation (NRF) administered by the Media Development Authority (MDA) of Singapore.

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