

12 Implications of Aristotelian theory on ICT

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12.1 Abstract

Human being has the ability to improve himself by perceiving and continuously pursuing knowledge, which in order to be produced there has to be a certain flow of information. In the ancient times and especially in Athens, that was believed to be one of the cultural centers of the world, the role of the information channel was played by the great philosophers like Aristotle, who were discussing matters openly in the Academy of Athens. Nowadays, we live in the world of information and in combination with the rapid technological advancements all the necessary information is being processed by the Information and Communications Technology, hence ICT.

Bearing in mind that ICT has an impact on our social life, social networking is considered to be a part of ICT. The purpose of this paper is to make effort to identify the philosophical implications on ICT, and especially those of the Aristotelian theory. After a brief introduction of Aristotle and his basic elements of theory, as well as a short listing of the recent developments on ICT, we are going to see how the agents' theory as well as the theory of friendship affect ICT. Then along with the theory on privacy we are going to examine the moral and ethical issues on ICT.

Keywords: ICT, Aristotle, friendship theory, privacy theory, ethics

12.2 Introduction

Human by his nature is an evolving species and throughout this evolution process technology was always a steady companion. Even from ancient times there are great examples of civilizations that used the given technology of the period in order to thrive and grow their empires. For example ancient Greeks were very fond of technology that was adding value to their everyday life and was assisting them in various tasks, with many paradigms of early automations being invented so as to aid them with their daily activities. Even Aristotle was admiring the capability of his generation to come up with numerous pieces of machinery aiming to ease the everyday life. After all he was a student of Plato who was the first to compliment the excellent work of the technicians of his time. Aristotle in his "Mechanics" expressed the belief that the proper use of technology will accelerate our way of acting and will offer us the ability to deal with difficult to solve situations. Furthermore instead of only admiring the technology he was also experimenting with it and a great example is the hydraulic alarm clock he created in order to wake up after a short period and keep up with his work.

Aristotle instead of viewing just the problem he was trying to cope with every single detail that caused the problem having in this way the whole procedure of the situation that went faulty. This kind of logic was inspirational for generations and generations of scientists from

all the fields. One of the followers of Aristotle's logic was the British mathematician and philosopher George Boole. Boole made an effort to convert Aristotle's logic of existing or not into a mathematical expression with the use of only two numbers, one and zero. Through a system of equations he managed to turn logic into a mathematical expression. Needless to say that Boole's system was the predecessor of the way of the computers are functioning.

Nowadays technology has reached to a whole new level and is beyond any doubt a part of our everyday life and it even some times defines our activities. The most crucial element that operates technology is the flow of information, therefore ICT plays important role in the way the world is moving forward. Each piece of information is critical to the survival of technology, both formal and informal, therefore all social interactions and especially the trend of the social media that has been developed the recent years is considered a valuable tool in the information exchange. In this context the last years we have seen or we expect to experience networks operating in a 5G range, allowing not only for fast connection but also interconnection of various networks, the network of fiber optics being expanded everywhere, virtualization of all networks, accessibility for everyone, big data exchange networks, advancing cyber-security technologies, communications respecting the environmental and energy efficiency measures, continuously evolving smart mobile technologies, more intensive work on internet governance and finally the discovery and experimentation on molecular communications.

The purpose of this paper is to try to combine the theories and beliefs of Aristotle with the rapidly growing ICT. So, after a short description of how Aristotle perceived things around technology and not only, we are about to identify parts of his theory that affect the way technology works even today. Based on the theories of agents and friendship we will attempt to understand to what extent the new technologies are affected by those theories. Continuing with the theories of privacy, morality and ethicality we are going to see to what extent the new technologies are affected by those terms.

12.3 Aristotelian Logic

According to Aristotle the logic (λογική) derives from the verb say (λέγω) which actually is the expression of the human spirit towards a problem that may have more than one solutions and it is important to understand that logic is not the filling of a blank but a completion of a whole. Aristotle used to depict critical problems that were offering him a chance to judge initially the existing conditions, express light distinctions and then move forward to locate the core of the philosophical dilemma. The very first solution that is promoted used to be his, offering most of the times however more than one alternative answers. After all he considered more important the discussion leading to a philosophical explanation than the explanation itself.

Furthermore he is convinced that each science is ruled by their own principles, method and even language. Ethics for example cannot be faced in the same way as physics because the human act does not obey the laws of nature. There is even the chance two different fields within the same science, like biology and cosmology, to adopt their own distinguish set of principles.

The work of Aristotle affected a plethora of researchers of the pathway of logic and as it is natural he created both rivals, as well as followers. The most characteristic rivals of Aristotelian theories were Locke and Kant who ironically considered that Aristotle wanted to be God by introducing humans to logic and that after him the logic did not move any forward. On the other hand there are some admirers of Aristotelian logic like Ross, who insisted that the only thing that Aristotle did was to show to humans the way they were always thinking,

as well as Leibnitz, who characterized Aristotelian theory as the most beautiful actualization of human spirit. Moreover the British mathematician and philosopher George Boole based his algebra on the Aristotelian logic that was testing if one condition is true or false, thus generating the binary numerical system on which the philosophy of later computers was based.

Finally logic and the characterization of a condition as true or false depends not on words but on signals and body language, therefore is international and never local. Also according to Aristotle in the sequence of logic, quality leads than quantity and approval comes first from denial.

12.4 Agent's Theory

In his *Metaphysics* Aristotle moved one step further than the Parmenidian and Platonic dichotomy of being versus non-being, introducing us the theory of agents. According to Aristotle everything that is consisted of substance and tends to make a spatial movement is called an agent. From plants and animals to human being and even the celestial bodies of the universe. He was actually convinced of the existence of a divine entity, which he named the prime unmoved mover, that had a separate way of thinking and was generating primordial instincts causing this spatial movement of the agents, therefore none of them can be characterized as soulless. There is always a cause for such movement and for the animals for example may be the search for food, however, any slight movement affects other agents too.

Aristotle presents human as the most intelligent of the agents due to his intellectual skills and the possession of knowledge of how to produce something external to the agent, which is called *techne* (τέχνη). In his *Politics* Aristotle introduces us various other types of human agents like politicians, kings, managers, family heads, masters and slaves. According to Aristotle each one of these agents was using necessary tools in order to preserve the well-being of his commandment. For example masters used both living tools, the slaves, as well as tools without soul, so as to produce the necessities for the preservation of their household. However, he introduces us and a third type of tools, the artificial ones, which are produced within the household in order to increase the productivity of the other tools. Actually he admired the ability of some of those artificial agents to operate autonomously and he expressed the belief that if mankind reaches to a point that has for example machines that play music by themselves, eventually there is not going to be any need for the use of slaves.

The most important thing was that master had the total control of what was being produced and he was the one to decide which part of it was going to be sold in the market for money. In Ancient Greece masters were always men as they were considered more capable to deal with all these situations. How the master was going to manipulate the tools in hand so as to sustain a worthy level of living, was totally up to him. It is more than understandable that the pursuing of more money through the sale of the production was preserving a life but not necessarily a good one. If he managed to keep all of the household actions on a viable level then we could speak for the virtuous agent.

Nowadays ICT and biotechnology has been rapidly developed, in order to reach to a point of creating a new form of life. There are numerous examples of ICT being used as a digital implant, so as to support humans, generating this way the cyborgs. Also the various kinds of robots may have parts of living beings, introducing this way a new species of life. However, the important thing is that all these robots are controlled by their programmers and they tend to learn whatever their programmers plan. They are not allowed to take autonomous series

of actions, at least not outside the framework that has been established by the programmer, following this way the perception of Aristotle on the matter of ownership. It is beyond any doubt acceptable the fact that we are counting more and more on various digital data such as biometrics in order to preserve our well-being and from this point of view we have excelled what Aristotle perceived as sustaining of a good life. There may be even a time that all these technologies are going to be more autonomous and operate without the support of the human, but scientists believe that this day will not come soon. However, it must be clarified that there is no possibility of the artificial life to mimic the natural effects on the human body, such as illness or facticity, thus human bodily existence is considered ambiguous while these technologies being actually immortal.

12.5 Friendship Theory

In the information exchange process there are two major channels through which this transaction is materialized, both formal and informal ones. Through the recent decade has been an exceptionally development of the informal route with the increase of the social media. However, the meaning of a social network is not at all new. Generally we could say it is a formation of people with common interests in order to exchange views, ideas and even other pieces of information. In a sense from our birth we participate in a bunch of social networks with the very first of them being our family, our classroom and school community in general, as well as our friends from the neighborhood. Within this context Aristotle developed his friendship theory that we analyze bellow.

In Ancient Greece the word friendship (φιλία) stated the mutual attraction between two people and in a sense our friends can be anyone from our family, neighborhood friends, people from the same town or region, our colleagues, our brothers in arms etcetera. According to Aristotle friendship is based on the search of something loveable, which can either be the virtuous, the pleasurable or the useful, generating in this way the three levels of friendship. These are, the friendship of utility that is based on certain characteristics that attract one another, like money and very highly profiled acquaintances, that someone can exploit for their own benefit, friendship of pleasure, where simply one enjoys the companionship of the other over simple things, like the love for the same style of music or the same board games and finally the virtue friendship, which is based on mutual admiration of each other's character and values. Of course Aristotle considered the third kind of friendship being the ideal one and the one that is more durable in time as it is based less on self-interest. Furthermore he considered essential the fact that both persons that characterized as friends should feel the same way for each other, otherwise this kind of relationship is something else rather than friendship.

A new kind of friendship has been developed the recent years and it is called online friendship, which is not necessarily taking place only on social media networks as it has been mentioned above, but also through multiplayer online gaming platforms, or even other online communities. People just sit in front of a computer and interact with other people that are in front of their computer, either via exchanging instant messages, or through video chatting. The face to face contact of the friends has been lost and this is something that concerns a lot the philosophers, who can see clearly that the virtue friendship that Aristotle was describing has been sacrificed due to the virtual one. They realize that in most of the cases of online friendship the levels of utility and pleasure friendship can be covered, however, they believe that the Aristotelian virtue friendship cannot be achieved mainly due to three reasons. Firstly the selected presentation of oneself online prevents us from truly knowing our friend's character. Secondly the multiple filters in communication online can

lead to distortion and loss of important clues, as well as the inability to engage in a variety of activities with our online friend. And finally there is an increased skepticism regarding the way that the Internet and especially social networking sites tend to shape how we interact and relate to one another. Especially young people who interact via these networks tend to search for fast-paced and shortened contacts, something that keeps them away from the Aristotelian ideal.

There are critics who believe that filtering any means of online friendship via the Aristotelian approach tends to appeal that online friendship is purely artificial and cannot be compared to offline one that can reach the levels of virtue friendship. On the other hand there is a number of critics that can reassure us that the virtue friendship can occur even in the online digital world. It is purely up to the interpreter of the Aristotelian framework of friendship how they will depict the actualization of the various levels of friendship.

12.6 Privacy Issues

As Aristotle expressed “we are social animals”, therefore our involvement in the digital world of online societies is inevitable and a matter of safety of the information that is filtered through these channels and up to what level the exploitation of anyone’s information respects the privacy boundaries occurs. Anything that is posted online on the social media is directly becoming a public good that anyone can use or reproduce as they like. Therefore we should all be very careful when we are expressing our beliefs and ideas within these communities and we share them online. There is always the possibility for some people to use such information in order to harm us willingly or not. Apart from other persons there are also companies that may wish to exploit our preferences with the sole purpose of gaining more publicity that is translated into money.

With the rapid advancements technology can play important role in protecting the privacy of the users and every online meeting point or community should fulfil a list of criteria, regarding privacy protection, which are based on the following principles:

- The implementation of Value Sensitive Design methods establishes a set of rules and regulations with respect to human values and engulfs various approaches, like the Privacy by Design or the Privacy Impact Assessment approach, which adopt a list of guidelines for those who operate online and the boundaries they should respect. Moreover there is a set of rules adopted by the International Organization for Standardization (ISO) that is considered a worthy privacy tool, in total accordance to the Data Protection Directive issued by the European Union.
- Privacy Enhancing Technologies can ensure the anonymity and freedom within the privacy boundaries that any user of the online facilities should enjoy. For example increased sensitivity of the security protocols serves as the best method for implementing a privacy respectful digital environment.
- Modern cryptographic techniques ensure the trusted pathway that any online user would be willing to follow. Especially homomorphic encryption guarantees that the user will be able to come up with the results he desires, through a totally safe environment.
- Identity Management techniques can assist the companies into providing a more client-oriented and personalized environment. Through the use of cookies companies can achieve more information on the habits of the person of interest and therefore send for example a more personalized advertising.

12.7 ICT Ethics

For Aristotle ethics is a virtue, therefore it cannot be characterized as a purely intellectual condition, rather than an action that involves appropriate emotional responses and stands as the mean situation between two extremes, excess and deficiency. For example the courageous person is the mediocre between coward and rash person. However, he emphasizes that in our effort to find the mean we should not let our emotions overwhelm us, like when we are angry we should always be aware of not exaggerating and not undermine the reason. Furthermore not every effort of finding the mean situation is measurable, as not all the problems are quantifiable. To overcome such conflict the virtuous agent equips the weapon of logic, in order to reach to the most appropriate decision. After all Aristotle believes that the person who acts virtuously does so for the greater good and not motivated by any self-interest.

The important thing that Aristotle points out is that the theory of the mean may act as a guideline in identifying other similar attributes, however, the theory of ethic by itself is not able to lead anyone to a decision making process. This depends always on the circumstances that take place around the problem in hand and it is clearly up to the agent how they are going to interpret them, in order to reach to a decision they consider desirable. Also according to Aristotle there are certain emotions that are always wrong regardless the circumstances and in order to tame them actions should be determined by a governmental system, or simply follow some rules.

It is always upon the agent to choose to involve in the ethical process, which usually demands practical reasoning, the limits of which are determined by the virtuous agent that acquires it. Also it depends on the character of the person how he is going to face a situation and if he is going to adopt a virtuous act and therefore determine the concrete ends and justifiable means of the ethical approach.

The early approaches on computer ethics suggested the formulation of a set of rules that each professional of the computing field should follow, in order a moral action to be produced. In addition a program was being developed by Gotterbarn that was aiming to assist individuals, companies and organizations in determining likely ethical impacts of software development projects. It was upon the professionalization and ethical maturation of the computing practitioners that the activities of those projects are characterized as ethical or not.

In fact the situation with artificial agents is that both sides, programmers and artificial technology, learn from each other. There is even the belief that human could use the artificial agents in order to come up with moral issues and philosophical dilemmas that otherwise were left being unexplained, like the nature of evil. Also in the twentieth century the American philosopher John Dewey expressed his theory that solving problems in ethics is like solving problems in algebra, therefore ethics and morality are computable problems and the creation of information technology that embodies moral systems of thought is possible.

Another great researcher, Floridi, stated his belief that information is a legitimate environment of its own, thus it engulfs its own moral values and ethical concerns. This belief led him to the design of a theoretical model of moral action using the logic of object oriented programming. The model consists of seven components:

1. The moral agent a
2. The moral patient p
3. The interactions of these agents
4. The agent's frame of information

5. The factual information available to the agent concerning the situation the agent is attempting to navigate
6. The environment the interaction is occurring in
7. The situation in which the interaction occurs

12.8 Conclusion

Although accused of trying to impose his ideologies on humans and with this way to steal a little from God's magnitude, Aristotle merely did some observations of the human activity and expressed the sensible actions of virtuous person, in his search for the well-being of his family or community. This kind of observations covered many fields of the human activity and therefore became common ground for every form of science. Indeed the theories of Aristotle are, as we have seen throughout this paper, applicable even today and help us understand a lot of things that are happening in our world. The most important thing is that still we are able to guide the technology we have in hand, in order to be more helpful in our lives and that the only way that it could harm us is if we show false intentions. If the user or the programmer of the technology does not have moral idiosyncrasy how do we expect from the technology to perform moral or ethical actions?

12.9 Bibliography and Internet Sources

Αρχαία Ελληνική Γραμματεία «Οι Έλληνες», Αριστοτέλης: Άπαντα, Τόμος 23, Κάκτος, 1992

<http://www.iep.utm.edu/aristot/>

http://www.greek-language.gr/digitalResources/ancient_greek/history/filosofia/page_055.html

<https://en.wikipedia.org/wiki/Aristotle>

<http://www.tovima.gr/opinions/article/?aid=434307>

<http://kotsanas.com/gb/exh.php?exhibit=0204007>

<http://www2.iefimerida.gr/news/233855/o-mathimatikos-poy-me-2-arithmoys-kai-3-praxeis-epinoise-tin-noimosyni-ton-ypologiston>

https://en.wikipedia.org/wiki/Information_and_communications_technology

<http://www.comsoc.org/blog/top-10-communications-technology-trends-2015>

<http://www.capurro.de/agents.html>

http://download.springer.com/static/pdf/961/art%253A10.1007%252Fs10676-016-9384-2.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs10676-016-9384-2&token2=exp=1479972969~acl=%2Fstatic%2Fpdf%2F961%2Fart%25253A10.1007%25252Fs10676-016-9384-2.pdf%3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com%252Farticle%252F10.1007%252Fs10676-016-9384-2*~hmac=3305a4405a76264e6f0612e789f5e9d1a3524a3f17ad927c3f701d2b91205e23

http://www.pi-schools.gr/books/gymnasio/anth_c/math/s_082_106.pdf

<https://plato.stanford.edu/entries/it-privacy/>

<http://plato.stanford.edu/entries/it-moral-values/>

<https://kar.kent.ac.uk/25512/1/Mingers%20MISQ%20ethics%20final%20.pdf>

[http://www.academia.edu/432393/Identifying the Ethics of Emerging Information and Communication Technologies An Essay on Issues Concepts and Method](http://www.academia.edu/432393/Identifying_the_Ethics_of_Emerging_Information_and_Communication_Technologies_An_Essay_on_Issues_Concepts_and_Method)

<https://plato.stanford.edu/entries/ethics-computer/>

<https://www.abine.com/blog/2010/social-media-and-privacy/>

<https://plato.stanford.edu/entries/aristotle-ethics/>