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Digital communication, data economy and the rationalization of time: algorithms, market and control in the Age of bits

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Abstract

This article deals with the processes of digital communication and datafication of life, observing how the notion of time is treated by the emerging data-based economy. The objective is to develop a conceptual and theoretical analysis of this problem, contributing to a better understanding of its current functioning mechanisms. The study points to three analytical axes that involve the control and rationalization of time and that are at the heart of the data industry, namely: (a) the datafication of time as commodity; (b) the positivation of time as commodity and; (b) the projection of time as capital goods. From a descriptive and analytical approach, the study highlights the main features of these dimensions as concrete and structuring phenomena that today tend to expand in all directions of human activity; vectors typical of the new economic movements of this century.

Keywords

Big data; Digital Surveillance; New Economy.

Introduction

Social change and technical transformation usually happen with economic forces that influence historical movements. The 21st century was an important turning point characterized by the intense process of digitalization of human practices (including commercial dimension) that is now a reality in most countries. These transformations were not always homogeneous, but this phenomenon is certainly global and it is becoming bigger.

Data Economy is flourishing precisely from this situation. The new economy does not mean overlapping the previous one. Indeed, part of the capitalist system has adapted, incorporating and taking into account data dynamics, its characteristics and *modus operandi*. Data Economy, within a broader economic system context, reflects a powerful business model that has innovative structures anchored by their social and cultural impacts. This includes the exploration and extraction of new kind of raw materials; the emergence and operation of new industrial machinery; besides strengthening new ways of rationalizing consumption or, in other words, managing user-consumer behavior, adapting it to the production chain.

Rationalizing does not mean making something positively rational, but making something methodologically rational. It means a systematical way, with rational guidance, and on purpose (this can be ethical as well as unethical). If in the 19th and 20th centuries, economic rationalization focused on the role of advertising and the mass media seeking the production of desire and symbols linked to consumption (Campbell, 2001; McCracken, 2003; Featherstone, 2007), in the 21st century this happens through the rationalization of time, which becomes a fundamental object in the logic of Data Economy.

Considering this background, this article aims to characterize how the new economy deals with the dimension of time. In other words, how is time interpreted and processed by economic agents and for new market trend? The objective is to develop a conceptual and theoretical analysis on this problem, contributing to a better understanding of its mechanisms. In other words, here we can find an overview of this horizon, and its impacts.

This article brings as analytical axes three dimensions of rationalization in which the *modus operandi* of the data industry happens through: (a) datafication of time as a commodity; (b) positivation of time as a product and; (c) the projection of time as a capital good. These three axes are economic forces that enable and characterize the commercial activity of companies in this context. These elements enable us to know better how time is treated in this new bit-based industrial relation. This phenomenon started small with new digital intermediaries, but now it is expanding to economic macro-structures, with a strong rootedness in the contemporary cultural fabric.

To address these issues, the article is divided into three sections that will discuss each of the previous analytical dimensions mentioned. These axes are essential today to understand, critically, the role of time in the new Data Economy.

Datafication of time as commodity

An important feature of Data Economy is datafication. In simple terms, datafication is the record of an action or phenomenon (life action, social action, natural or artificial events, etc.) transformed into a structured and indexable data, that is, when something is represented as a data in a logical and structured way, allowing future analyzes and statistical interpretations (Mayer-Schonberger; Cukier, 2013; Dijck, 2014; Schäfer; Es, 2017).

Datafication becomes culturally and socially important when the daily use of digital devices (mainly mobile phones) reaches large numbers of individuals, even in the case of countries where the

digital divide persists¹. For most people, being constantly connected via mobile communication devices is now part of everyday life. This is directly linked to all different activities such as driving, studying, working, dating, chatting, having fun etc. In Brazil, for example, in 2017 almost 70% of the population had a mobile phone. Among internet users, about 96% are connected via mobile devices, mainly smartphones (CETIC, 2018). In practice, it means that almost the whole population has a monitoring device close to their bodies 24 hours a day, capturing personal information (whether in the pocket, at the workplace, at the dinner or next to the bed in bedtime). Such devices are oriented to collect, register, and send information, even when it is apparently inactive.

Historically, datafication is a phenomenon that becomes relevant with the microinformatics birth (in the 1970's), followed by the use of computers in the work routine and at home (from the 1980's), reinforced by the expansion of the infrastructure that enabled wireless internet access (mainly from the first decades of this century). All of these elements have created a huge technical-social apparatus for the massive collection of processable data, on human activity, through the same technical base and with increasing capacity for analysis. As pointed out by Helbing et al. (2017), "It is estimated that in 10 years' time there will be 150 billion networked measuring sensors, 20 times more than people on Earth. Then, the amount of data will double every 12 hours".

Datafication is a convergent tool towards surveillance actions, however, conceptually it should not be considered simply synonymous of surveillance. Datafication means structured recording and not necessarily a systematic observation of people to control their behavior. In this sense, Van Dick (2014) proposes a useful distinction between surveillance and dataveillance:

Dataveillance—the monitoring of citizens on the basis of their online data—differs from surveillance on at least one important account: whereas surveillance presumes monitoring for specific purposes, dataveillance entails the continuous tracking of (meta)data for unstated preset purposes. [...] Dataveillance is thus a far-reaching proposition with profound consequences for the social contract between corporate platforms and government agencies on the one hand and citizens-consumers on the other (Van Dick, 2014, p. 205).

For this reason, several digital intermediaries do not always practice surveillance when they collect data, but dataveillance. Therefore, we must understand this aspect as a potential surveillance, that is, the massive recording of data that can be converted into surveillance. This feature does not mean that data industry is neutral and the practice of dataveillance can then be allowed. Due to its strong surveillance potential, dataveillance poses a permanent risk of human rights violations and, therefore, needs to be treated as such.

From a Data Economy perspective, dataveillance means producing a particular raw material. It is a structured information about how individuals use their lifetime. What do they consume? What are the statistical trends relating to the people behavior? Indeed, this information is valuable commodities for the new industry and it is becoming a rule for the good performance of companies in the 21st century (Galloway, 2004; Steiner, 2012; Güzel; Baban, 2016; Helbing et al., 2017; Van Dick, 2014)

This economic feature is certainly linked to privacy because the massive recording of data usually goes beyond the apparent purpose of the product. For this reason, companies' privacy terms are quite generic and allow a wide collection of information in different situations that can potentially violate civil rights (Fernback, Papacharissi, 2007; Venturini et al., 2016; Silva; Caesar; Luciono, 2018). This also affects the cultural and economic macrosystem:

¹ For example, compared to some Asian (like Japan and South Korea) and Nordic (like Denmark and Norway) countries with better access indicators (internet users exceed 95% of the population), Brazil has a significant digital divide. Until 2017, about 67% of the population was internet user. This means that almost 1/3 of Brazilians do not use the internet (CETIC, 2018).

Moreover, the character of the corporation is also important for the relation between the political economy and the culture of surveillance. The Big Five corporations now dominate not only the Internet but also the economic mode of operation, which has moved beyond the managerial and financial modes of accumulation that characterized the later 20th and early 21st century (Lyon, 2017, p. 827).

In this context of media ubiquity, some analysts and activists have argued that privacy could only be effectively preserved if information about people's online lives is not recorded (Woo, 2006; Assange et al. 2013). From this viewpoint, the most effective way to preserve the right to privacy in a data-based world is to be more radical and prevent data collection.

Why does radical anonymity (the non-registration of the user's life) seem so impossible today? Why does the proposal for radical privacy tend to receive so much resistance (from corporations, governments and also law-makers)? The answer to these questions is not simple, but we can propose a hypothesis: in practical terms, this would mean the downfall of powerful data industry. The suspension of the datafication of individuals' actions over time would result in the end of the raw material that feeds the new economy: the databases². Therefore, we must understand people's time-datafied as a typical commodity³ of this century planted at the end of the last century.

Furthermore, the eventual ban on this commodity is difficult to achieve precisely because it is taking root in social and cultural practices. We can make an analogy with oil industry. In a world characterized by the heavy use of petroleum-based products (plastic, solvents, cosmetics, transport, etc.), suspending this commodity would mean changing not only the oil industry but a whole way of life.

The commodity role of datafication is clear in laws on the protection of personal data, such as the General Data Protection Regulation of the European Union (2016/679), approved in 2016, and the Brazilian Personal Data Protection Law (Law No. 13.709 / 18), approved in August 2018. In drafting these laws (as well as other similar legislation) the main disputes have focused on defining the responsibilities of companies. Although some of these laws are celebrated as an instrument to protect citizens' rights (and in fact, this is essential today to guarantee individual and collective freedoms), these laws do not prohibit datafication, but rather regulate it, on the one hand, as a commodity; on the other, as a right imposing limits and safeguards (Borgesius, 2016; Bhaimia, 2018; Barbosa, 2018). In practical terms, the collection and processing of structured data on a large scale means a new way of generating wealth as a typical feature of this century. National and regional regulatory frameworks, international treaties and commercial contracts have already realized this dimension.

Positivization of time as a product

On the one hand, datafication has been consolidated as an important way of rationalization of time that operates as a commodity; on the other hand, there is a time positivization by algorithms and digital systems applied to the development of daily routines or interactions. We consider positivization in two main ways: (a) First, digital applications and online platforms help us to execute everyday actions more quickly, that is, they produce a positive result for the user, which means saving time (time "extracted" from

² Database means structured data. It is data organized into some kind of structural (usually file) readable by machines, that is, by algorithms (examples of files with structured data: CSV, JSON, XLS, XML etc.). From the viewpoint of data processing on platforms and digital systems, structured data must be understood not as refined data, but as "ordered data", in a raw stage. Structured data is not the end product of this industry. This is, in fact, its raw material. Cross tabulation, statistical analysis and applications are the actual refinement process of this commodity.

³ The concept of commodity adopted in this work must be understood (conceptually in a globalized economy) as raw material usually in a rough stage or with a low degree of industrialization. Commodities can be refined, processed and manufactured thus creating different types of products. Oil, soybeans, iron ore, gold, wheat, sugar are examples of global commodities that today are the basis of many industries (automobile industry; pharmaceutical industry; cosmetics industry; food industry etc.).

the rationalization of the action). Algorithms perform repetitive activities (in less time) and in a more productive way (with better performance) when it is organized by logical structures:

[...] “algorithm” refers specifically to the logical series of steps for organizing and acting on a body of data to quickly achieve a desired outcome.[...] The “algorithm” that might follow, then, is merely the steps for aggregating those assigned values efficiently, or delivering the results rapidly, or identifying the strongest relationships according to some operationalized notion of “strong” (Gillespie, 2014).

In other words, digital applications are increasingly ubiquitous in our lives, intermediating the execution of different tasks. This gives us a perception of more free time when compared to offline activities, because when we use algorithms to perform recurring tasks (such as driving a car, paying bills, shopping, researching, etc.) what we get back, as a product manufactured, it's time. The perception of saving time is the final product that keeps us using some online services offered by different types of digital intermediaries in our routine⁴.

(b) Second, digital platforms are planned to make our digital experience, including interaction, more positive in the sense of being more comfortable, safer or more enjoyable. Social media are good examples of this kind of time positivization. Social media platforms seek to keep users connected as long as possible, posting, commenting or reading content. For this, the user experience needs to be predominantly positive (negative experiences keep people away or encourage users to delete their account). For example, as Vaidhyanathan (2018, p. 33) explains: “Facebook researchers have been trying to identify and thus maximize exposure to the things that push us to be happier and minimize exposure to things that cause us anxiety or unhappiness.” We use apps to save time or to do something better, in a comfortable way or some kind of pleasure / gratification. All these forms of positivization of time are sold as merchandise in the Data Economy structure. It is an important asset to understand this industry foundation.

In these two dimensions analyzed, the positivization of time must be understood as a substrate involving convenience, facility and well-being. Paradoxically, it may have wider implications and a negative impact on the individual autonomy.

This economic relationship - characterized by time manufactured from people's routines and sold as a commercial good - tends to affect the individual agency. This simulates a neutral and rational meaning, giving us time and making it more efficient, but in practice, it makes us more dependent on algorithms, protocols and digital systems that influence our actions, behavior and routines. One of the biggest problems is the growing power of certain digital intermediaries (mainly OTTs - Over-the-Top Media Services), whose targets are not aligned with the protection of individual rights or individual autonomy, but linked to the financial-market horizon and profit, due to its ontological nature. For this reason, companies seek to create algorithms not as rigid systems but as cultural structures adaptable to individuals and their features (based on machine learning and Artificial Intelligence), through platforms or logical superstructures that are mixing with people's time management experience:

When we realize that we are not talking about algorithms in the technical sense, but rather algorithmic systems of which code *strictu sensu* is only a part, their defining features reverse: instead of formality, rigidity, and consistency, we find flux, revisability, and negotiation. [...] These algorithmic systems are not standalone little boxes, but massive, networked ones with hundreds of hands reaching into them, tweaking and tuning, swapping out parts and experimenting with new arrangements (Seaver, 2013, p. 9).

⁴ For example, when we use an app to help us drive in a city (like Google Maps, Waze etc.), the app does not sell the map route, but the lifetime saved by follow the fastest route, avoiding traffic jam, accidents etc. At the same time, this gives us convenience and security.

This is quite evident when we look at the business model of digital intermediaries that is deeply characterized by the idea of saving time and this is followed by some convenient guarantee. Although part of the users' routine has been transferred to a digital system in order to execute it, generating dependence on these systems, this is psychologically (and paradoxically) linked to power and greater command and autonomy feeling:

Despite the fact that everyone objectively has the same amount of time, powerful individuals could subjectively perceive having more time. Why might power increase one's perceived amount of time? We propose that power leads people to feel as though they have more control over their time, which results in more optimistic time assessments (Moon; Chen, 2014, p. 97).

For this reason, in Data Economy, time is extracted by the routine of individuals and returned as a product in which other layers of meanings are added, such as freedom, convenience, power, speed, ease and efficiency. Such meanings are usually exploited by the marketing of data-based products or services.

This transfer of the individual's routine to digital logical systems and also the feeling of more time are embedded in the Internet of Things (IoT). In this emerging market the main function of the algorithms is to produce objects that save us time. Connected devices (such as bots, refrigerators, cars, homes, drones, clothes with sensors, etc.) give us more time, more convenience and optimize tasks that previously required more time and effort to perform.

In the 19th and 20th centuries, capitalism was based on the processing of commodities in a serial and rational way through Fordism and this was driven by the rationalization of consumption with the production of desire via advertising. In the 21st century, time datafication and the transformation of personal data into commodities have simultaneously generated a new way to supply the desire for consumption: less time to perform routine activities and more time to do other activities. Although digital platforms allow us to save more time, in many cases, especially on social networks, this time is consumed by the platform itself when the individual uses it, thus resulting in a zero-sum game (or even negative).

In this scenario, it is not so simple to give up online platforms. In fact, there is such a strong penetration of these technical devices in the people life. Therefore, the usage of these digital systems has become a cultural dimension. In a datafied world, citizens who do not allow the data collection by the platforms (avoiding feeding dataveillance) are choosing an isolation, excluding themselves from various amenities that this connected system offers. This kind of people will have a hard life, with less convenience. In the end, the greatest problem of privacy today is linked to the practical-logical bias inherent in digital culture, which ultimately means better living, even if with less autonomy.

Projection of time as a capital good

In a "Data Economy" time datafication means commodity and time positivization means product. Similar to other industries, to transform commodities into products it is necessary to have capital goods and expertise to generate manufacturing processes.

In classical Economic Theory, capital goods are the assets (usually as a technical apparatus) necessary to manufacture products. There are some variations and details on this concept, however, we are interested in the perspective of capital goods as instrumental goods necessary for industrial operation, enabling the processing of resources and the transformation of raw materials into manufactured products.

In Marxist theory, these instruments of production (together with the labor power and the production relations) are fundamental to define the way of production of a society (Marx, 1996). This is directly linked to the concentration of power, because who owns capital goods has a strong influence on the system. The Marxist perspective is interesting because it seeks to understand and critique the role of capital goods as a control mechanism in an economic system. However, this paper does not intend to

propose that, with digital, there is a new mode of production, in the Marxist sense. But it is reasonable to say that there is a set of technical elements - within the scope of Data Economy - that behave like capital goods. This tends to affect the balance of power and the functioning of the contemporary economic system as a whole.

In the data industry, these capital goods are represented by the set of infrastructural elements (machines, processors, datacenters, operational equipment, backbones, backhubs, etc.) plus the set of logical applications (algorithms, bots, Big Data processing systems, security systems against cyber-attacks, logical datagram transport systems, etc.).

In this sense, the ability to project time must be understood as a relevant part of the means of production on which the new economy is based. This exists because today there is a large dataveillance apparatus performed by several agents; distributed across all types of devices; collecting all types of data; along with the growing statistical-predictive capacity of the players. Given this, what we have today is a powerful structure for projecting time, either towards the past, the present or the future. For this reason, all this logical machinery works as a kind of time machine in three directions. Firstly, rescuing the past, recording in detail the events of the present and making historical regressions, reconstructing narratives from the digital tracks left by individuals. As Pasquale explains (2015):

Everything we do online is recorded; the only questions left are to whom the data will be available, and for how long. Anonymizing software may shield us for a little while, but who knows whether trying to hide isn't itself the ultimate red flag for watchful authorities? Surveillance cameras, data brokers, sensor networks, and "supercookies" record how fast we drive, what pills we take, what books we read, what websites we visit. (p. 3)

For example, think about the reconstruction of a crime scene that occurred in the past. The sequence of facts can be restored by crossing data records from different devices, such as elevator cameras; traffic cameras; cell phone (moving the device over the space); a purchase made by credit card; access to social networks etc. The reconstruction of narratives from the past and their details tend to become more and more efficient.

Second, predicting the future. The ability to collect and process a large volume of data from a huge contingent of users - identifying statistical patterns and trends - is transformed into prediction: the past serves as an oracle that answers about the future, that is, repetitive events teach us about the future.

Such predictive capacity can only work if there is a large technical and logical apparatus operating constantly. This, of course, requires the ability to collect and transform raw data about the past into a real statistical estimate of the future, something that tends to gain more and more economic importance. As Van Dick (2014) points out "(meta)data are presented as "raw material" that can be analyzed and processed into predictive algorithms about future human behavior—valuable assets in the mining industry" (p. 201).

Third, affecting the present. Knowing the past and predicting the future only has real practical value when it serves to rationalize (control) events in the present time. This happens when prescriptive actions based on past statistical observations are widely documented, whether through target marketing or nudging (Bruno, 2008; Safko, 2013; Berger, 2014; Helbing et al, 2017, online).

This time machine and its ability to rationalize time have some collateral effects:

In these predictive systems, the past is prologue, as the data generated through our earlier interactions shape the textual world selected for us. No 'surprises' or 'unwanted' encounters, just uncannily familiar themes and variations. This logic extends into the informational domain as well, where it has been the subject of sharper critique, mostly focused on the argument that such predictive systems create an echo chamber in which our existing views of the world are reinforced but rarely challenged (Uricchio, 2017, p.131).

In this same perspective, other analysts (Leurs and Sheperd, 2017; Graham, 2004; Morozov, 2017) also call attention to the massive data collection about what we do and how we live that can generate concentration of power, discriminatory actions or strengthen the establishment. This can be quite conservative, because the statistics are based on the past:

The use of statistics and probabilities tends to “eternalize” inequalities and reinforce segregations in a veiled and indirect way. For example, when a bank does statistical analysis based on Big Data to decide whether an individual can take out a loan, the algorithm can indirectly reinforce racism by prioritizing lending to white people who, statistically, due to historical processes, have best “indicators” according to the interpretation of the code. The algorithm will not always take into account the fact that this group has historically been privileged by the social system (Silva, 2017, p. 36).

Like many capital goods, this logical-predictive machinery can generate side effects: violation of privacy, psychological manipulation, induction, leaks, discrimination etc. Although this is taken into account in the discussion that precedes regulatory frameworks and laws on the protection of personal data, such a system is regulated to continue to function, albeit with some restrictions (e.g. limits on the use of sensitive data or responsibilities and penalties in case of security failure or leaks, etc.). From the point of view of Data Economics, those who do not have this predictive-logical machinery (to a lesser or greater extent) tend to be swallowed up by the competition. Companies that have efficient and relevant information collection and processing systems can better monitor their surroundings, more easily identify threats, better understand their field of action, the behavior of their consumers and their market. For this reason, these companies tend to predominate over those that do not have a fully functioning predictive system.

Final considerations

This article addressed aspects inherent to the processes of digital communication and life datafication, observing, in this context, how the notion of time is treated by the emerging data-based economy. The objective was to develop a conceptual and theoretical analysis of this problem, seeking to contribute to a better understanding of its current work mechanisms.

In this sense, I argued how the rationalization of time is an important element for this emerging market, understanding rationalization as a systematic and methodological mode of action, aiming at a specific effect (in this case, economic), not taking into account whether this is necessarily positive or ethical.

The article pointed out three analytical axes that involve the rationalization of time that are fundamental aspects in the functioning of the data industry: (a) the datafication of time as a commodity; (b) the positivization of time as a product and; (c) the projection of time as a capital good.

As a commodity, datafication means the structured and chronological data recorded from the largest number of events around human activity. I argued that this datafication process should not be considered purely synonymous of surveillance, because the data recording does not mean its use: this data collection may not be used for the purpose of controlling the behavior of individuals, as the idea of surveillance requires (the data can be used for other purposes.). At the same time, I argued that datafication is not surveillance per se, but it has a great potential to be surveillance, because it contains features that enable surveillance actions.

Therefore, datafication of time results in raw material (in the form of a commodity) about how individuals use their lifetime. This economic characteristic is strongly linked to the privacy issues of individuals. It can produce violation of rights and affect the autonomy of individuals.

I discussed how this raw material can also be manufactured and transformed into a product,

because the rationalization of time by digital systems can optimize processes and routines, creating a sense of acquired time. This perception acts as an important cultural and psychological mechanism for consumer loyalty. This must be understood as another layer of symbolic action linked to the products. This does not exclude the strategies previously created by advertising and marketing that emphasized the social value and the value of desire in the marketing of products.

In the third analytical axis, we could see that today we have a powerful time management structure that works as a kind of time machine: (a) rescuing the past by recording in detail the events and making historical regressions, reconstructing it from digital tracks; (b) anticipating the future based on the collection and processing of large volumes of data, identifying patterns and statistical trends; and (c) prescribing the present, seeking to control and influence consumer behavior.

All three dimensions presented in this article must be understood as ways of rationalizing time that are fundamental to the *modus operandi* of the data industry. This is a phenomenon that deserves to be studied in depth to better understand it and also to measure their effects in the long term. These aspects, typical of this century, have flourished at the dawn of the digital economy and tend to expand as macrostructures directly linked to the expansion of the use of digital algorithms and systems in all directions of social, cultural and political activity.

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