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How are Realities Enacted by Data? Analysis of the Practices and Knowing of Professionals Working with Data in Light of the Actor-Network Theory

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Abstract

Purpose – In the context of growing interest in the use of data to create mathematical models that can predict future behavior and assist in business decision making, this theoretical-empirical article aims to understand how realities are enacted by data, identifying and describing the practices and knowing of two professional groups working with data.

Theoretical framework – Actor-Network Theory and Practice Theory.

Design/methodology/approach – This study was carried out within the methodological framework of Actor-Network Theory, from November 2017 to September 2018, including interviews and observations of daily work.

Findings – The findings suggest that realities portrayed in predictive models are constituted of arrangements of human and non-human elements, situational and emerging, contemplating data, technological potential and constraints, and political choices that permeate these configurations.

Practical & social implications of research – The research demonstrates that knowledge and predictive models generated by data cannot be understood without taking into account their contexts of origin, which makes it possible to question their supposed neutrality and objectivity. Given these compositions, models may lead to process optimization, but also to unexpected effects, such as errors in scenario forecasting.

Originality/value – The research contributes by making visible the configurations of human and non-human elements, situational and emerging, through which organizations and realities are enacted, based on data practices.

Keywords: Professionals working with data, predictive models, enacted realities, actor-network theory, practice theory.

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1 Introduction

The data generated from the use of digital technologies such as computers, smartphones, and social networks are thought to be the new oil, since they generate significant profits for the companies that extract, store, and analyze them (Zuboff, 2021). Making decisions based on data such as big data, instead of intuition, is thought to be a capacity that distinguishes the most successful companies. This finding is based on the belief in the neutrality, objectivity, and veracity of the data (Boyd & Crawford, 2014; Esposti, 2014; Iliadis & Russo, 2016).

The organization and hierarchization of data and the relationship between those data are established through architectures present in computer systems, known as databases. These have become a source of power and knowledge, as they are used to elaborate predictive models to represent populations (Ansorge, 2011) and prevent and act on human behavior (Zuboff, 2021). These models are elaborated based on algorithms, which are mathematical formulas that perform computational tasks, such as cross-checking data. Because of that, the knowledge that emerges from these databases is called algorithmic (Fuchs & Chandler, 2019).

The interrelationships between data, algorithms, and organizations are epistemological, as they produce knowledge for decision making, as well as supporting the supply and improvement of products and services. But they are also ontological, as they produce models that are thought to be representative and capable of enacting certain realities (Glaser et al., 2021; O'Neil, 2016). The predictive models generated in this association are used to determine whether someone will be granted a loan to buy a house or not and what rate they will pay for it; to define if someone will advance or not in the stages of a selection process; and whether they will be fired or not (O'Neil, 2016).

Considering this context of increasing use of data to create mathematical models capable of predicting future behaviors and helping in business decision making, this theoretical-empirical article aims to understand how realities are enacted through data. For that, we employ Actor-Network Theory (ANT) as a theoretical-methodological approach to identify and describe the practices and knowing of two groups of professionals that work with data.

Within the field of organizational studies, research tends to emphasize the role of guidance by data and digital technologies in process optimization, without taking into account the situational arrangements that can result in unexpected effects (Glaser et al., 2021; Trittin-Ulbrich et al., 2020). Digital technologies such as algorithms are not immutable, independent, and neutral, as usually understood in studies, since they emerge and cause effects on specific configurations (Glaser et al., 2021).

According to Cooren (2020), there are no independent entities with inherent characteristics and the organizational studies fail by continuing to treat the material world as something tangible and distinct from the world of affects. After all, every organizational phenomenon is material and relational. The assumptions and objectives that form the basis for the selection, analysis, and understanding of data, as well as the narratives that are formed based on them, are not neutral and objective as positivist studies argue, since they derive from political choices reflected in routines and ways of organizing (Dourish & Cruz, 2018; Labatut et al., 2012; Ratner & Gad, 2019; Vesa & Tienari, 2020).

Considering this contextualization, we highlight as a research contribution to the area of organizational studies our shedding light on the configurations of human and non-human elements, situational and emerging, through which organizations and realities are enacted, based on data practices. We intend, through this exposure, to problematize naturalized understandings in the area of Administration regarding the objectivity, neutrality, and veracity of the world models created based on data, by demonstrating that the knowledge generated emerges in specific configurations. Considering those compositions, these models can lead to process optimization, but also to unexpected effects, through errors occurring in the projection of scenarios.

Initially, we present the Actor-Network Theory and its contributions to the understanding of the configurations of human and non-human elements that enact organizations and realities. In the methodological framework we describe how we operationalize ANT as a method throughout the research, to identify the practices and knowing of the data professionals. Then, in light of ANT, we describe and analyze the interrelationships between practices, knowing, and the enactment of realities. Finally, we present the concluding remarks of the study.

2 Actor-Network Theory

The Actor-Network Theory, known in the beginning as the Sociology of Translation, forms the umbrella approach known as Practice Theory or Practice-Based Research (PBR) (Gherardi, 2012). Despite the diversity, some understandings about the nature of practices are common to the PBR approach: (1) holistic and qualitative – practices are formed by a set of activities that acquire sense and make them a unit, a way of enacting throughout the whole organization; (2) temporary – they persist in time, by being repeated several times, becoming a normal way of doing things. However, this reproduction is not mechanical and varies depending on the elements and conditions that affect its re-edition; (3) legitimacy – they are socially recognized through their negotiated normative aspects, involving ethical, esthetic, and technological aspects; and (4) they are ways of ordering the world and organizational environments in a temporary and precarious way, activating a network involving human and non-human elements.

ANT is a theory and method of French origin, originating from science and technology studies in the social context (Mol, 2010). Its first wave was centered on concepts such as actor, network, translation, and technoscientific practice. The second one was based on the notion of process through the concept of enactment (Camillis et al., 2020) and broadened the field of studies beyond technoscience. More than a theory or method, ANT is understood as a practice: a way of doing and engaging in the world (Farias et al., 2020).

The reality for ANT is not exterior, singular, or definitive, but the result of ever-emerging associations between human and non-human elements, such as language (semiotics), organizations, objects, and animals, which mark its relationist ontology (Law, 1999). Knowledge is similarly perceived as a result of the "successful alignment of human and non-human elements ('heterogeneous engineering') and the human capacity to produce effects over the world" (Nicolini et al., 2003, p. 19).

By shedding light on the action of non-human elements, ANT seeks to retrieve the complexity and heterogeneity that constitute reality, relegated up to a certain point in sociological studies, portraying the tensions that exist between agency and structure, actor and network (Latour, 2012; Law, 1999). Respecting the ontological differences between humans and non-humans, both are symmetrically considered as capable of agency, that is, of generating effects on a network of relationships (Camillis et al., 2016).

For a non-human to receive that nomenclature, this element cannot be passive, as it should be capable of making the difference in the network (Camillis et al., 2016). Non-human elements can act as mere intermediaries, when they merely transport without transformation, or as mediators, when they present an active role, modifying and distorting contents, producing and reproducing the social in its multiple forms (Latour, 2012).

The theoretical perspective adopted in this research fits the second wave of ANT, post-ANT or ANT and After, as denominated by Law (1999). It is a reformulation derived from criticisms directed at the concept of translation, by naturalizing, simplifying, and stabilizing the ways of ordering the world, suggesting that it occurs in a particular, prescriptive, and non-problematic way (Alcadipani & Tureta, 2009). The term enactment comes to be used, indicating that reality is in constant transformation and continuity, where stability is an exception.

2.1 ANT, knowing, enactment of realities

The term enactment reinforces that ordering is a constant process derived from practices and relationships (Law, 1999). For ANT, all things are understood as enactments, that is, effects that are continually produced in relationship networks (Fenwick & Edwards, 2010). In other words, ANT does not deny stability, but demonstrates that it is not fixed and coexists with the chaos of reality.

Mol (1999, 2002) clarifies that, as reality is enacted, it is multiple, since it is not possible to characterize it as unique or definitive, and it is constituted based on the variety of historically, culturally, and materially located practices. Another term proposed by the author that reinforces the question of naturalizations is political ontology, used to demonstrate that the condition of possibilities is never given, as it is a permanent production process. Therefore, facts and possibilities are produced and negotiated, emerging in certain contexts. That is, reality does not precede but rather is shaped by practices, and it can always be of another form.

By studying knowing through ANT, this is understood as an enactment, an effect of the alignment of heterogeneous elements in a network and not simply an individual and cognitive process or a social realization (Fenwick & Edwards, 2010). Just like organizations,

knowing is relational, dynamic, and provisional, enacted in daily life and in the realization of practices, based on networks of heterogeneous relationships and the subjects' experiences (Bussular & Antonello, 2018).

This vision comes close to the concept of knowing-in-practice, according to which learning occurs in a procedural way, throughout the realization of daily work, and it is inseparable from practices. Thus, knowledge is at the same time explicit and tacit, collectively built and continually modified and reproduced in our engagement with the world. It cannot be directly transferred, as it is not a product contained in the individual's mind, not at the managerial level of organizations (Antonello & Godoy, 2011; Gherardi, 2006).

Based on the above, Table 1 summarizes the main concepts used in the research.

According to Cooren (2020), the advantage of assuming a relational ontology lies in recognizing that every organizational phenomenon is at the same time social and material. For the author, the organizational studies fail by treating sociality and materiality as distinct elements that at some point influence each other, when in fact they are properties present in everything that exists. This means to say that the predictive models of realities cannot be understood without reference to the data practices, human choices, and contexts in which they are developed.

Along this same line, Glaser et al. (2021) recognize that by analyzing digital technologies, such as algorithms, outside their dynamic contexts of relationship, development, and application, we lose sight of the nuances and complexities of their actions and effects. Just like with algorithms, data only acquire sense and constitute knowledge contextually when they are immersed in socially, historically, and culturally situated narratives (Dourish & Cruz, 2018).

Within the scope of organizations, ANT has been used as a reference in studies focusing on the implementation of information systems, especially from a translation viewpoint, as it enables a demonstration of the role of different human and non-human actors and their negotiations, in the success or failure of these initiatives. Examples include the study developed by Holmström & Robey (2020) regarding the organizational consequences and changes derived from the implementation of an information technology for financial management; the research conducted by Papadopoulos & Kanellis (2011) about the agency of human and non-humans elements during the implementation of a business intelligence system in a bank; and that of Rivera & Cox (2014) on the political negotiations involved in the implementation of a collaborative technology focusing on human resources practices.

Other examples of studies in which ANT has been employed for studying contemporary technological contexts was the one developed by French (2014) to map challenges and changes in the informational practices derived from the process of implementing a public health system based on big data in Canada; as well as the one conducted by Wickramasinghe et al. (2010) that used ANT to analyze processes for creating and transferring knowledge in organizations, demonstrating the complexity that involves knowledge management in these contexts.

Besides the questions of success and failure in technological implementations and knowledge transfer, ANT enables us to explore how the knowledge, narratives,

Table 1
Main concepts used in the research

Concept	Definition	Author(s)
Practice	"way, relatively stable in time and socially recognized, of ordering heterogeneous items in a coherent configuration."	Gherardi (2006, p. 34).
Knowing-in-practice	the learning occurs in a procedural way, throughout the realization of the daily work, inseparable from the practices.	Antonello & Godoy (2011), Gherardi (2006, 2012).
Enactment	the reality is in constant transformation and continuity, where stability is an exception. The ordering and all elements of reality are understood as effects that are continuously produced in relationship networks.	Fenwick & Edwards (2010), Latour (2012), Law (1999).
Multiple ontologies	the constitution of realities occurs based on the variety of historically, culturally, and materially located practices, and is not unique or definitive.	Mol (1999, 2002, 2008), Moraes & Arendt (2013).
Symmetry	Human and non-human elements are capable of agency when in a relationship, affecting the network.	Camillis et al. (2016), Latour (2012).

and truths are constituted around the data in organizations, shedding light on heterogeneous and situational contextual elements, which participate in the process of making sense of the data (Dourish & Cruz, 2018); as well as political decisions permeated by intra- and inter-organizational relationships present in the formation of databases and reports based on data, including the choices regarding what data will be analyzed and what will be excluded (Ratner & Gad, 2019).

Although ANT does not establish the separation between theory and method, for the purposes of organizing the article, the next section advances in the methodological aspects of ANT and particular aspects of the research.

3 Methodological Framework of the Research

The research was conducted in the period from November of 2017 to September of 2018, contemplating interviews and non-participant observations of work routines and meetings, in two different companies, in a complementary rather than in a comparative way. For questions of privacy, the participants' names were modified and we will call one of the companies Upsilon and the other Omicron.

Through the research we sought to identify what elements and how their relationships contributed (Schafer, 2017) to the enactment of realities. In the research, that meant recording the relationships established between the practitioners, conversations, but also silences and ignored comments; and the influence of non-human elements, such as computers, the server, and software, on work routines, when these failed, or even the constant involvement that enabled the activities to be carried out.

Following the actors, a key methodological procedure of ANT, implies monitoring, describing, and analyzing the relationships considering humans and non-humans, based on the principle of symmetry (Lee & Hassard, 1999). The Actor-Network Theory approach highlights that, in principle, we cannot discriminate who are the actors that act, who constitute a social action (Latour, 2012). A focal actor is chosen and their links are followed, wherever they lead. In both companies, the focal actors were initially the managers, by indication of the companies themselves. In each observation, a new focal actor was highlighted. Examples include a professional who was on an important project or a new work tool, always analyzing based on the rearrangements caused in the work practices.

To identify and record the relationships established between human and non-human elements, the movements and stabilizations of the work practices, we remained in the companies one day a week for a shift, generally in the afternoon, where we sat at a table with the tablet, which served as a field diary. The fact that most of the company environments were open, with no divisive walls, facilitated the monitoring of the work. As much as possible, the notes on what was observed were taken *in loco*. Others could only be recorded after leaving the field, for example when the observation was participant, in rare situations given that the companies requested that the research strategy adopted be non-participant observation so as not to interfere in the progress of the work.

We made observations based on a script (Appendix A) developed in the exploratory phase of the research, considering the objectives, the academic literature on the topic, and the particularities of the companies. For the semi-structured interviews, we also elaborated a script (Appendix B), adjusting it various times until carrying out the pilot interview in the company Upsilon. The interviews enabled us to deepen the understanding and obtain confirmation regarding what was observed, including what the researchers did not have access to, as it was concentrated on the screen of the computers of those being researched. The interviews were preceded by the participants signing the informed consent form. The interviews lasted 30 to 40 minutes on average and were subsequently transcribed and sent for validation by the research participants. These resulted in 138 sheets.

The analysis unit was the practice (Gherardi, 2006). In treatment of the collected data, with the aim of identifying the practices and associated knowing, we systematically read the field diaries and interview transcripts various times. This procedure enabled us to identify the elements that repeatedly emerged in the observed activities and practitioners' speech. As the heterogeneous configurations of work ordering were repeated, they were considered as practices, which were confirmed throughout the interviews, when the practitioners recognized them as usual ways of doing the work, which even when modifying, maintained common characteristics.

More specifically, the data analysis covered four stages: (1) we listed the human and material elements that compose the company networks studied, cited by the practitioners during the interviews, present in the physical environment of the companies and which were handled or mentioned during the observations; (2) based on the concept of symmetry, we mapped moments in

which human and non-human elements aligned in the course of the action, causing changes in the usual way of carrying out the activities, for example, when a system update prevented the professionals from Omicron from accessing their computers; (3) we described the usual way of carrying out the activities, the practices, both those mentioned by the research participants and those that we could note through the repetition throughout the observations; (4) we mapped the decisions taken by the practitioners throughout their activities and in what way these were reflected in the final result of their work, as well as where to collect data and what information to include in a client's report.

This analysis occurred during the entire research process, when we then sought to identify the actors in their relationships, culminating with the organization and establishment of themes, such as the data collection and analysis practices. We sought in the records and also in the writing of the article to respect as much as possible what was addressed by the participants and how, without interpretations. This stance is consistent with the principles of ethnomethodology, according to which the actors constitute their own theory and vocabulary that enable us to explain what they do, how they do it, and why they do it (Latour, 2012). Before presenting these themes that emerged from the field, we will characterize the companies and participants.

3.1 Presenting the companies studied and the participants

Upsilon was founded in 1998 and currently has offices in Porto Alegre and São Paulo. Its main focus of activities is the area of competitive intelligence. Omicron was founded in 2016, it has an office in a technology park in Rio Grande do Sul, and its main focal activities are in the area of data science. Both work by projects and also offer products to their clients, classified by the participants as the startup part of the companies.

Seven collaborators participated in the interviews in Upsilon, chosen by the company CEO, each one representing a different area of activity within the organization. In Omicron, six of the eight collaborators directly invited to take part in the research participated. Table 2 summarizes the interviewee profiles.

4 Practices and Knowing of the Groups that Work with Data: from Statistical Modeling to the Enactment of Realities

This section was produced based on the similarities between the companies studied. The main one lies in the configuration of the work, which involves data, computers, and humans. At the end, there is a figure summarizing the practices and knowing identified.

4.1 Collecting data and constituting databases based on them

Competitive intelligence or data science work is developed based on data that are collected to form databases capable of providing information about a particular phenomenon, supporting decision making, for example, what is best location for installing a medical clinic? The data can derive from different sources. They

Table 2
Interviewee profiles

Name	Company	Activity
Alan Poe	Omicron	Research and development of the scientific, economic, and statistical part
Aline	Omicron	Administrative Assistant
Arthur	Omicron	Infrastructure Manager
Davi	Omicron	Software Engineer/Architect
Gabriel	Omicron	Data scientist focused on machine learning algorithms
James	Upsilon	Chief Operations Officer
Jason	Upsilon	Technical Leader
João	Upsilon	Data Intelligence Leader, but sometimes performs the role of accounts and/or project manager
Lúcio Machado	Upsilon	Data analyst, but considers himself a data scientist
Marcelo	Omicron	Business Director
Meliodas	Upsilon	Technical Leader and Software Architect
Miguel	Omicron	In transition between developer and data scientist
Pedro	Upsilon	Responsible for the Design area

can be provided by client companies; captured by bots (virtual robots); collected manually by humans; or be the result of cross referencing between different sources, such as internal databases of clients combined with ones from the internet captured by robots or humans.

The choice of where and how the data will be collected is the result of negotiations between practitioners and their clients, based on the business question that motivates the data collection. It also involves specific technical knowledge about what elements are needed to answer the question, where that information is available, and, based on the data consultations, what should be included and discarded.

The databases are formed based on these choices, but they are not static. The capture should be a continuous process, as the news on the competitive business environment changes frequently, and access to the internet, such as social networks, generates new data about our behavior in each new use. Not all these data are big data. One of the references used by the professionals to make that differentiation is that data that fit Excel spreadsheets are not big data; however, there is no consensus in relation to that definition, both among professionals from the area and in the academic literature.

Data capture, when carried out by humans, can be done by entering news portals, such as newspaper and magazine websites, and collecting reports about a certain company and its competition; or *in loco*, visiting companies as a mystery shopper to experience the quality and failures of their services. After the collection, the data are compiled in spreadsheets or reports and consolidated to answer the questions that mobilized their capture, such as providing a general overview of the reputation of a company and its competition.

In order for the capture to be carried out automatically, virtual robots are usually used. These are programed using algorithms, requiring time and specific knowledge to be developed not only on how to codify them, but also on the way the means with which they will communicate will function. The human and machine interaction is carried out through programing languages. These last work based on codes and rules that "tell" the robot what it should do, for example, where it should look for data, how it should cross-check them, and how to tabulate and list them.

There are various programming languages used by humans to communicate with bots, such as C++, C#, Java, R, and React. The choice of language depends on the practitioner's knowledge, the cost of its use for the company (contemplating the budget for each project or product), and research on what the best technology is to resolve a particular problem, on websites such as Stack Overflow, social media pages of referenced professionals in the area of technology, or consulting more experienced work colleagues. In the case of a lack of specific knowledge, the professionals can opt or be incentivized to engage in learning situations.

Once the robots are put into action, or any other type of technology, adjustments may be needed, called maintenance. The example below reports an example of a fault that mobilizes the reconfiguration of the data collection practice:

> *Today we have a monitoring screen. Within the tool we use, there are some metrics. Let's suppose I have 50 agents there capturing, so we know more or less how much he captures a day, a week, a month. We have an average. So, if the day's capture is below average, it is signaled with a color there, yellow. If (...) it's zeroed or he hasn't captured anything for two days (…) a little red signal appears. So, we look at that screen (...) we detect the problem and (…) look for the solution (…) generally, it's a website that changes its structure. Or the program was made to surf a website and follow a certain structure within the site, it goes to the search page, then it goes to the detail, a little later that search screen has changed all of that, it's no longer even at the same address. So we say that the agent broke the program, it's really not working any more.*

Having detected the reason for the fault of the capture agents, the change in the structure of a website, corrections are made in the technology and it is tested and executed again. Not all technologies are monitored in that way, meaning that some problems are detected only when the client makes a complaint, or when the data analysis does not appear to make sense, where it is "totally outside the patterns," as Meliodas explains. Another possible fault is the collection of wrong data, which are not consistent with what is needed to meet the capture objective, as is the case of fake news.

At the moments in which the technology fails it is possible to identify the agency of non-humans destabilizing the work practices, which is generally unnoticed. These faults are enactments, resulting from problems in the development of the bots, changes in systems with which

the technologies relate, or even the inadequate use of the technology by a client. That is, they are an effect and generate effects based on a network of relationships (Latour, 2012).

There are technologies that prevent the action of bots, called captcha. But they are not impenetrable and can be circumvented using practices such as those of hackers. In places that use captcha technology, it may be preferable to prioritize human collection, but that may become unviable in relation to big data. The fact that data capture can be carried out by humans and by robots can prevent the identification of who is acting, as in the example below.

In Omicron, during the observations, while one practitioner looked at the flow of searches on the website with information about the job market, one of the company's products, he perceived an atypical movement: directional searches in one region were conducted in very specific intervals, suggesting the action of a robot. A search was begun to identify the machine being used to conduct these searches, which were immediately closed. It was not possible to identify whether the action was of a bot or not, but the situation led the team to rethink its security practices, recognizing the need to protect the business' data, a new element emerging in the network.

The data collection practice is heterogeneous and although it is apparently stable when the capture works without complications, it is precarious and easily destabilized. Other situations that affect that practice are: databases made only partially available by clients for questions of privacy; duplicate or redundant data; or problems in the categorization and labeling of the data.

From the technical viewpoint, the greater the quantity of data available that are representative of a particular phenomenon, the greater the quality will be of the proposed model. Few data are not capable of providing significant corrections (Lee, 2019), increasing the chance of modeling errors. Moreover, the area of machine learning has not yet been sufficiently developed to deal with uncategorized data, compromising the use of large quantities of data that are available on the internet (Tian et al., 2017).

Another subject that emerges from these practices is ethics and legality. It is common for people to agree with terms of consent to provide their data, without reading them, and when they discover that their data were used for some purpose they feel uncomfortable with that (Iliadis & Russo, 2016). To deal with questions such as this, both companies have professionals responsible for assessing whether certain data can be collected or not. To make that assessment, one of the points considered is Law 13,709/18 (Decree-law n. 13,709, Brasil, 2018), called the General Data Protection Law (GDPL), sanctioned on 08/14/2018 to define aspects of privacy and data protection.

After collecting the data, the raw material for the work, listing and choosing those that will be used and discarded (data cleansing process), they go on to be analyzed, as James explains.

4.2 Analyzing, modeling, and communicating the data

When the companies project their own products, the analyses aim to provide relevant knowledge for potential buyers based on: market needs identified in formal or informal contacts with clients, colleagues, or friends; possibilities that they envisioned considering shortcomings in their previous work experiences; or other opportunities. The creation of Sigma, for example, a product of Omicron, occurred to fit the startup model, a requirement for joining the technology park, but also due to the perception that the labor market data the company uses had not yet been explored commercially.

In the case of the projects, the data are analyzed according to the demands presented by the clients, which does not discard the use of creativity and the reflexive capacity of whoever is appreciating them, as Lucio Machado explains:

> *Especially in the beginning, it's a reflection of our curiosity. We see a set of data that are complementary and we see that they are more relevant for telling the whole story than sometimes even a secondary question that was brought (…) we always try to bring the maximum data in that initial process and then we choose based on the initial questions per se, which is generally a sort of artistic process, where we have to convert a demand (…) of the type (…) Milkybar launched a new type of sugar (...) we do in-depth research around four, three or four pages more or less and it's something that takes around twenty to thirty hours of work (…) the theme itself was not the bar, the theme was innovation. What was the motivator for generating that new product? What was developed on top? How will that affect the market? How will that affect Nestlé itself? So,*

> *the questions that come from that are already, of course, questions specifically tailored to the client's demand, but they have more to do with why (…) that important subject? That is the key question and it ends up generating more questions ahead.*

As expressed in the example, one question generates others and based on them the analysts make choices about new data collections and the inclusion of certain information in the report. Another function of those who analyze the data is to exert their critical capacity to verify if the correlations found are relevant or "spurious," as Alan Poe recognizes. The example of a correlation that makes no sense is given by Lucio Machado:

> *if you find (...) that people in yellow socks are late more than people in red socks. Does the color of their socks really have anything to do with it? No. The variable probably has something to do with their personality, which is ultimately reflected in the person's clothes.*

Although the conducting of analyses is generally based on a previous objective, atypical demands can arise, such as that of one client of Upsilon who sent a database of their company and asked them to verify what it would be possible to extract from it. Occurrences such as this can destabilize the data analysis practice, as well as: the perception that the data collected make no sense when combined; the collection is not enough to establish significant correlations that answer the clients' questions; or when the clients send new reports or ask for additional data to be included in the analyses, where it is necessary to repeat the collection and/or the organization and categorization of the databases.

Similarly to the collection, the analyses can be automated through algorithms, such as the machine learning ones developed by Gabriel, which serve for:

> *Predictions (...) in that context, it's not a black box (...) a crystal ball, but rather a methodology that when applied to a series of data (…) gives you very satisfactory results in relation to that (…) statistical methodologies that people use, to be able to (…) learn about a dataset and therefore (…) based on that dataset, make predictions or inferences about new datasets.*

One of the problems in the use of algorithms is that they can become so complex that they impair a precise understanding of how they are working (O'Neil, 2016). Alan Poe explains that there are many codes available on the internet that, when applied to a database, generate a result, but "sometimes you don't even really know what you're putting there and you think you have a big model." The professionals themselves sometimes try to circumvent the systems, a common practice in the area of information technology, to seek new forms of doing a particular job (Pontes, 2015) that, in that context, can lead to them creating mistaken models.

Another point to be considered is that to make sense of the data it is not enough to merely establish relationships between them; it is necessary to contextualize them (Iliadis & Russo, 2016). For that, the professionals need to understand and often study the client's business area, as Alan Poe explains:

> *in depression, the person is depressed because they got divorced or they got divorced because they're depressed, or a little of each thing, they got fat because they're depressed, they got thin because they're depressed. You know, what caused what. So, understanding the interaction (…) between the variables (…) Understanding the problem. Even if you don't know in the beginning, you have to study and understand how it occurs.*

After the analysis, the data are communicated through reports. Some are automatically produced based on the use of software, such as those that Sigma issues with job market information. Others are generated by the professionals. As reports for the same company, with the same topic, become frequent, the layout becomes standardized and only the data and information are updated. In Upsilon, Pedro is responsible for elaborating the designs of the reports, based on the information provided by the data analysts and also considering the client profile, for example the preference for quantitative or qualitative information:

> *it's necessary to know how I'll organize that information so it's easy to read, so that it's presentable. Because, for example, we have various data, but we're not going to send the client a word file, we need something more presentable. So all that information comes to me and I need to create infographics, making (…) those data more visual. Because a lot of them (…) are documents that need to be read very quickly so it's something that needs to facilitate the reading as much as possible.*

When communicated, the models assume their enactment and political nature, as they will support decisions and actions by the client companies, becoming reality as their predictions are confirmed (Bruno, 2013). And these decisions will affect social life, as is the case of the workers of the company Starbucks, whose work schedules are defined by an algorithm based on data such as customer flow in the store and weather conditions, among others (O'Neil, 2016). So, besides producing knowledge, these models constitute realities (Ansorge, 2011): the best work schedule, the best investment, the best time to plant, the reputation of a company.

The next section presents other practices identified that also form part of the day to day of the groups studied.

4.3 Crossing other practices

The practices described up to here are crossed by methodologies that serve as a reference for more general definitions of how the work should be done and what legitimizes it. In Omicron, the data science methodology serves as a guide, based on a course that the company partners took, provided by Johns Hopkins University through the Coursera educational platform. Practicing data science, according to Arthur, means carrying out the stages of data collection and cleansing, analysis, establishment of correlations, and creation of predictive models. For him, using "big data or Hadoop (…) software or specific tools for data science" is not doing data science; it is necessary to use it as what it is, a methodology.

In Upsilon, competitive intelligence is practiced. However, James and João understand that it is necessary to understand what this concept means or use the intelligence cycle or tree. For them, the work methodology should be adapted to each project and the most important thing is to understand the "pain" and need of each client, which will serve as a guiding element for planning and executing the project.

Based on these definitions, it was possible to identify that in Omicron the practitioners are divided according to the stages of the data science methodology. However, in projects that involve handling a smaller quantity of data, the same practitioner can be responsible for all of the stages of execution of the project. In Upsilon, the teams are divided into services, technology, and administrative area. The technology team is responsible for developing systems infrastructure and robots; the services team carries out the data analysis and elaborates the reports for clients; and the administrative team is involved in commercial, legal, financial, and human resources questions. Despite that division, in Upsilon the teams are reallocated to each new project or product according to the demands identified.

The concepts used by the companies, such as those of data science and intelligence, as well as those of services and technology, reveal that the nomenclature organizes the individuals, constituting heterogeneous units of humans and their work materials, recognized and legitimized, but temporarily, through the continuous reallocation of the teams according to the work demands. These concepts are characterized as discursive practices (Gherardi, 2006) in the companies studied.

Another practice that crosses and connects with the others is that of task management. In-person meetings on demand are scheduled for coordinating jobs, especially when starting a new project or product, together with the use of visual management software. Meliodas uses Trello with his team and the collaborators of Omicron use Azana. Both software packages are elaborated based on the Kanban methodology, enabling a record of the activities that need to be carried out, those that are underway, those that are finalized, who is responsible for them, and the deadlines. However, as Miguel mentions, not all the demands are recorded in the software, as they are implicit in the organization of each team member.

Based on what has been set out up to here, the next section is dedicated to answering how the realities are enacted based on data.

4.4 How are realities enacted based on data?

In the various aspects of ANT the ontological question is reconfigured by highlighting that the reality is enacted based on a variety of practices and, consequently, the reality is multiple. With the reality being the result of social practices, different ways of enacting realities have repercussions, effects that also go beyond the immediate situation of the action. Therefore, the forms of enactment have political connotations. In the words of Mol, "the reality does not precede the practices of the world in which we interact, but it is reshaped by these practices. Thus, the term politics enables the reference to this active type of shaping asset and the fact that its nature is both open and contested" (Mol, 1999, p. 75).

So, by adopting ANT we are accepting that there is a multiplicity of ways of enacting technologies and their products coexisting in the present that end up raising questions associated with choices that have political connotations. What options do the professionals who work with data have to work with and shape the data? How do they choose them? Should they make those choices? How do they make those choices? What is impacting their choices? These reflections are consistent with the ideas of Law and Mol (Law & Mol, 2002; Mol, 2002, 2008), who introduce a specific inflexion in ANT, emphasizing enactment more than the stabilization of objects in networks (Moraes & Arendt, 2013).

Considering the results of the research, we can problematize the neutrality, objectivity, veracity of the data, and the constitution of knowledge based on them to answer the questions raised, indicating the heterogeneous configuration that permeates the practices and knowing of the professionals studied. The decisions concern: how, where, and what data to collect and present in reports; the quality of the data and the capacity to answer a particular question; whether the analysis makes sense or not; they are carried out by the professionals based on their previous experiences, contacts with other professionals and clients, available data and technologies, time to carry out the project, discursive practices that organize the work, among other elements. When deciding about how to work with and shape the data, the professionals are never alone, as their deliberations are situational and emerging, depending on the heterogeneous alignment between human and non-human elements, such as those mentioned.

The decisions taken materialize (Cooren, 2020) in the reports, which are treated as reliable sources, portraits of the realities, without taking into account that during the processes from collection to analysis, technologies may have failed, and professionals had doubts about the best path to take and consulted numerous sources to take what they believe to be the best decisions, often intuitively. The choices of these professionals are codified (O'Neil, 2016) in the bots, in machine learning algorithms, in automated reports, as well as in the manual activities they carry out. The assumptions that are made based on the data are sometimes reflected in the organizing as well as disorganization practices (Ratner & Gad, 2019), guiding how the companies take decisions when managing processes and people, enacting intra- and inter-organizational realities.

To understand the dynamics of the power and organization, we should start from the assumption that there are relationships and what we should study is the development of those relationships (Law, 1992). The predictive models generated based on data practices enact realities by inciting actions and new reorganizations by the practitioners, the companies studied, and their clients, resulting in decision making that alters the usual course of activities, events, and processes.

Despite ANT having been widely used in studies focused on the implementation of technologies and knowledge transfer in organizations (French, 2014; Holmström & Robey, 2020; Papadopoulos & Kanellis, 2011; Rivera & Cox, 2014; Wickramasinghe et al., 2010), our study shows that it can also make visible the configurations of human and non-human, situational and emerging elements through which knowing, narratives about the world (Dourish & Cruz, 2018), and realities are enacted, based on data practices.

Besides contemplating the human agency in decisions, ANT enables us to identify how non-human elements have also participated, enabling or hindering certain actions (Holmström & Robey, 2020; Huizing & Cavanagh, 2011), showing that the technologies are not purely technical, nor are the decisions purely human. In this sense, the technologies and their products are mutable elements depending on the configurations that are included (Glaser et al., 2021). This reveals their potential to exert unexpected effects, which are usually neglected by organizational studies, by celebrating the optimization of processes through technologies (Trittin-Ulbrich et al., 2020).

By exploring the political ontology (Mol, 1999), ANT has been revealed to be a theoretical-methodological framework that helps in understanding the world in its political dynamics and relationships, confirming what Alcadipani & Hassard (2010) suggest in their theoretical essay, the critical potential of the theory in the field of organizational studies, also enabling the empirical refutation of some criticisms frequently raised by authors such as Walsham (1997), Whittle et al. (2008), and Mendes (2010), who say that ANT is morally and politically neutral.

Figure 1 summarizes the practices and knowing of two groups of professionals who work with data, which enables us to answer the question: how are realities enacted based on data? Knowing is placed at the center of the image, to reflect the recursive and procedural way (Antonello &

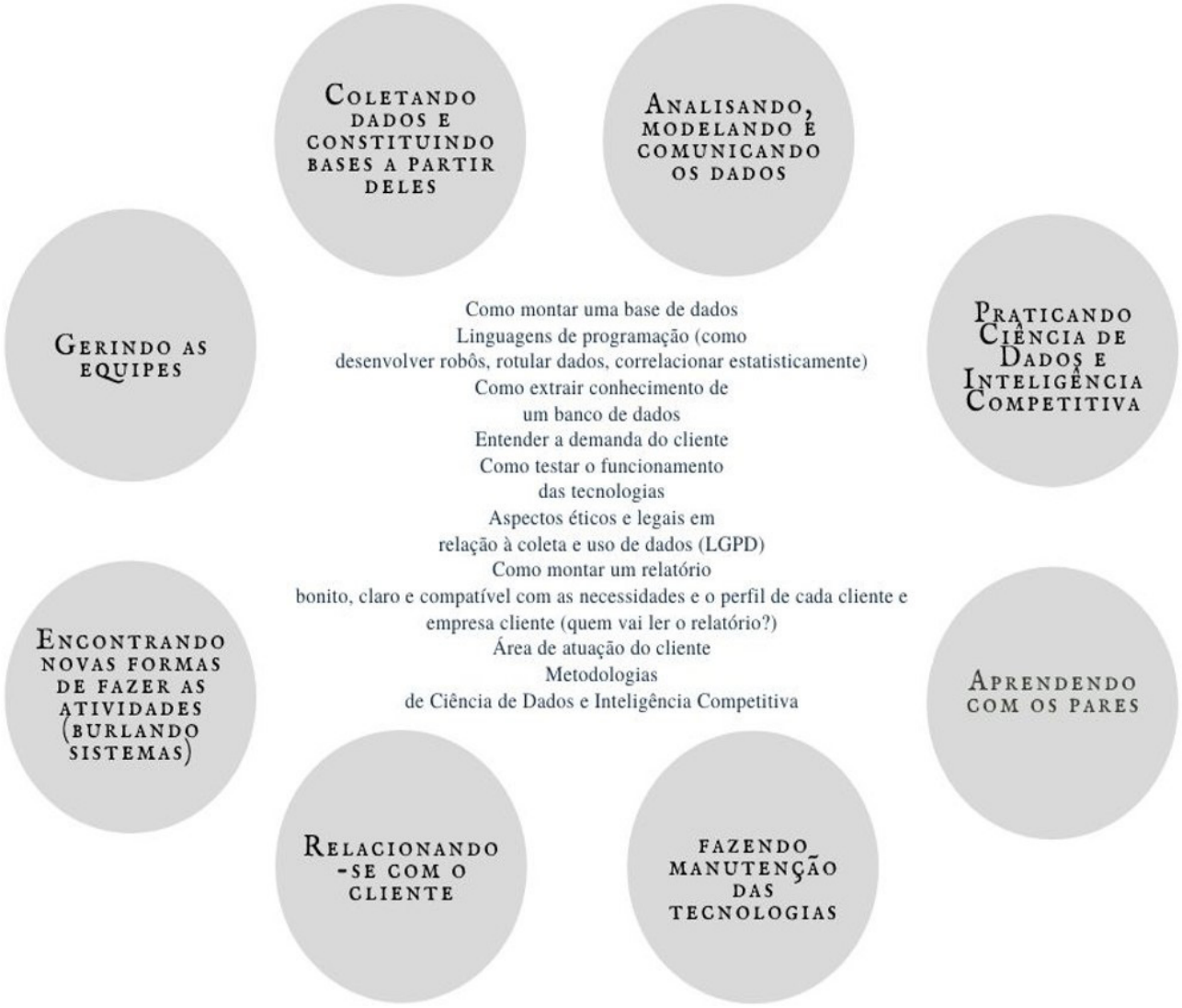

Figure 1. Constellation of practices and knowing (in Portuguese).

Godoy, 2011; Bussular & Antonello, 2018) it shapes and is shaped by the network of practices identified.

5 Concluding Remarks

The practices and knowing of the groups of professionals that work in Omicron and in Upsilon reveal how realities are enacted, based on the treatment that these professionals give to the data. This occurs through the overlapping of practices of: data collection and constitution of databases based on them; analysis and communication of the data; data science and competitive intelligence; learning with pears; maintenance of technologies; relationship with clients; cheating and team management.

The practices could be identified according to their precarious and temporary stabilization (Gherardi, 2006; Latour, 2012). The descriptions given show that although they are apparently stable, they are affected by the agency of human and non-human elements, such as clients and bots, which cause constant reconfigurations. Due to their practices, both companies, respecting their singularities, were shown to be heterogeneous and mutable environments, characterizing their organizing (Duarte & Alcadipani, 2016).

Knowing, such as that of compiling a database and extracting knowledge from it, was constituted based on the relationships established between data, technologies, and humans. They were created and recreated through the practices constituted as they became necessary during the development of a particular project, product, or task. Similarly, the realities portrayed in the predictive models were constituted based on arrangements involving data,

technological potentialities and constraints, and human choices emerging in these configurations.

As contributions of the study, through investigating the practices and knowing of the professionals, ANT enabled us to make visible the configurations of situational and emerging human and non-human elements permeated by political choices, through which organizations and realities are enacted based on data practices. Constituted in specific configurations, the knowledge generated from the data is dependent on their context or origin and liable to being problematized for their supposed neutrality, objectivity, and veracity. The results also show that professional practices that in an initial approximation could be understood as highly structured and rational are continuously reconstituted in our engagement with the world.

We suggest that future studies focus on understanding how data modeling is being more directly reflected in organizations and more broadly so in social life. Finally, we consider as limitations of this study the fact that the observations were limited to the corporate environment, in the non-participant format, and it was not possible to interview more participants from Upsilon to expand the analyses.

References

ALCADIPANI, R., & HASSARD, J. (2010). Actor-Network Theory, organizations and critique: Towards a critique of organizing. *Organization*, *17*(2), 419-435. http://dx.doi.org/10.1177/1350508410364441.

ALCADIPANI, R., & TURETA, C. (2009). Teoria ator-rede e análise organizacional: Contribuições e possibilidades de pesquisa no Brasil. *Organizações & Sociedade*, *16*(51), 647-664. http://dx.doi.org/10.1590/S1984-92302009000400003.

ANSORGE, J. T. (2011). Digital power in world politics: Databases, panopticons and erwin cuntz. *Millennium*, *40*(1), 65-83. http://dx.doi.org/10.1177/0305829811409178.

ANTONELLO, C. S., & GODOY, A. S. (2011). Aprendizagem organizacional e as raízes de sua polissemia. In C. S. Antonello & A. S. Godoy (Eds.), *Aprendizagem Organizacional no Brasil* (Cap. 1, pp. 31-50). Bookman.

BOYD, D., & CRAWFORD, K. (2014). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information Communication and Society*, *15*(5), 662-679. http://dx.doi.org/10.1080/1369118X.2012.678878.

Brasil. (2018). *Decreto-lei n. 13.709, de 14 de agosto de 2018. Lei geral de proteção de dados pessoais (LGPD)*. Diário Oficial da República Federativa do Brasil. Recuperado de http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/l13709.htm

BRUNO, F. (2013). *Máquinas de ver, modos de ser: Vigilância, tecnologia e subjetividade*. Sulina.

BUSSULAR, C. Z., & ANTONELLO, C. S. (2018). Organizing and knowing: Finding approaches in a processual manner. *Teoria e Prática em Administração*, *8*(2), 103-125. http://dx.doi.org/10.21714/2238-104X2018v8i2S-39962.

CAMILLIS, P. K., BIGNETTI, B., & PETRINI, M. (2020). Percursos da teoria ator-rede nas pesquisas brasileiras em administração. *Revista Pensamento Contemporâneo em Administração*, *14*(4), 93-114. http://dx.doi.org/10.12712/rpca.v14i4.44341.

CAMILLIS, P. K., BUSSULAR, C. Z., & ANTONELLO, C. S. (2016). A agência a partir da teoria ator-rede: Reflexões e contribuições para as pesquisas em administração. *Organizações & Sociedade*, *23*(76), 73-91. http://dx.doi.org/10.1590/1984-9230764.

COOREN, F. (2020). Beyond entanglement: (Socio-) materiality and organization studies. *Organization Theory*, *1*(3), 1-24. http://dx.doi.org/10.1177/2631787720954444.

DOURISH, P., & CRUZ, E. G. (2018). Datafication and data fiction: Narrating data and narrating with data. *Big Data & Society*, *5*(2), 1-10. http://dx.doi.org/10.1177/2053951718784083.

DUARTE, M. F. & ALCADIPANI, R. (2016). Contribuições do organizar (*organizing*) para os estudos organizacionais. *O&S*, *23*(76), 57-72. http://dx.doi.org/10.1590/1984-9230763.

ESPOSTI, S. D. (2014). When big data meets dataveillance. *Surveillance & Society*, *12*(2), 209-225. http://dx.doi.org/10.24908/ss.v12i2.5113.

FARIAS, I., BLOK, A., & ROBERTS, C. (2020). Actor network as a companion: An inquiry into intellectual practices. In I. Farias, A. Blok & C. Roberts (Eds.), *The Routledge companion to actor network theory* (pp. 20-35). Routledge.

FENWICK, T., & EDWARDS, A. (2010). A way to intervene, not a theory of what to think. In T. Fenwick & A. Edwards. *Actor-network theory in education* (Chap. 1, pp. 1-23). Routledge. http://dx.doi.org/10.4324/9780203849088.

FRENCH, M. (2014). Gaps in the gaze: Informatic practice and the work of public health surveillance. *Surveillance & Society*, *12*(2), 226-243. http://dx.doi.org/10.24908/ss.v12i2.4750.

FUCHS, C., & CHANDLER, D. (2019). Big data capitalism: Politics, activism, and theory. In D. Chandler & C. Fuchs (Eds.), *Digital objects, digital subjects: Interdisciplinary perspectives on capitalism, labour and politics in the age of big data* (pp. 1-20). University of Westminster Press. http://dx.doi.org/10.16997/book29.a.

GHERARDI, S. (2006). From organizational knowledge to knowing in practice. In S. Gherardi. *Organizational Knowledge: The texture of workplace learning.* (Chap. 1, pp. 1-44). Blackwell Publishing.

GHERARDI, S. (2012). *How to conduct a practice-based study: Problems and methods.* Edward Elgar Publishing Limited. http://dx.doi.org/10.4337/9780857933386.

GLASER, V. L., POLLOCK, N., & D'ADDERIO, L. (2021). The biography of an algorithm: Performing algorithmic technologies in organizations. *Organization Theory*, *2*(2), 1-27. https://doi.org/10.1177/26317877211004609.

HOLMSTRÖM, J., & ROBEY, D. (2020). Materiality and organizing: Actor-network theory Revisited. In B. Czarniawska and T. Hernes (Eds.), *Actor-Network Theory and Organizing* (Chap. 2, pp. 177-201). Studentlitteratur AB.

HUIZING, A., & CAVANAGH, M. (2011). Planting contemporary practice theory in the garden of information science. *Information Research Journal*, *16*(4), 497. Recuperado de https://pure.uva.nl/ws/files/1347576/113765_Planting_contemporary_practice_theory_in_the_garden_of_information_science.pdf

ILIADIS, A., & RUSSO, F. (2016). Critical data studies: An introduction. *Big Data & Society*, *3*(2), 1-7. http://dx.doi.org/10.1177/2053951716674238.

LABATUT, J., AGGERI, F., & GIRARD, N. (2012). Discipline and change: How technologies and organizational routines interact in new practice creation. *Organization Studies*, *33*(1), 39-69. http://dx.doi.org/10.1177/0170840611430589.

LATOUR, B. (2012). *Reagregando o social: uma introdução à teoria do ator-rede.* Edusc.

LAW, J. (1992). *Notas sobre a teoria do ator-rede: Ordenamento, estratégia e heterogeneidade*. Recuperado de http://www.necso.ufrj.br/Trads/Notas%20sobre%20a%20teoria%20Ator-

LAW, J. (1999). After ANT: Complexity, naming and topology. *The Sociological Review*, *47*(1), 1-14. http://dx.doi.org/10.1111/j.1467-954X.1999.tb03479.x.

LAW, J., & MOL, A. (2002). *Complexities: Social studies of knowledge practices.* Duke University Press. http://dx.doi.org/10.1215/9780822383550.

LEE, K.-F. (2019). *Inteligência artificial: Como os robôs estão mudando o mundo, a forma como amamos, nos relacionamos, trabalhamos e vivemos.* Globo Livros.

LEE, N., & HASSARD, J. (1999). Organization unbound: Actor-network theory, research strategy and institutional flexibility. *Organization*, *6*(3), 391-404. http://dx.doi.org/10.1177/135050849963002.

MENDES, J. M. O. (2010). Pessoas sem voz, redes indizíveis e grupos descartáveis: Os limites da teoria do actor-rede. *Análise Social*, *45*(196), 447-465. Recuperado de https://www.jstor.org/stable/41012812

MOL, A. (1999). Ontological politics: A word and some questions. *The Sociological Review*, *47*(1), 74-89. http://dx.doi.org/10.1111/j.1467-954X.1999.tb03483.x.

MOL, A. (2002). *The body multiple: Ontology in medical practice.* Duke University Press. http://dx.doi.org/10.1215/9780822384151.

MOL, A. (2008). *The logic of care: Health and the problem of patient choice.* Routledge. http://dx.doi.org/10.4324/9780203927076.

MOL, A. (2010). Actor-network theory: Sensitive terms and enduring tensions. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *50*(1), 253-269. Recuperado de https://www.researchgate.net/publication/254915340_ActorNetwork_Theory_Sensitive_Terms_and_Enduring_Tensions

MORAES, M. O., & ARENDT, R. J. J. (2013). Contribuições das investigações de Annemarie Mol para a psicologia social. *Psicologia em Estudo*, *18*(2), 313-321. Recuperado de https://www.scielo.br/j/pe/a/MzTKpvHdLJvbNZ7qxHDDFhC/?lang=pt#:~:text=As%20pesquisas%20de%20Mol%20se,as%20pesquisas%20em%20psicologia%20social

NICOLINI, D., GHERADI, S., & YANOW, D. (2003). Introduction: Toward a practice-based view of knowing and learning in organizations. In D. Nicolini, S. Gheradi & D. Yanow (Eds.), *Knowing in Organizations: A Practice-Based Approach* (Cap. 1, pp. 3-31). M.E. Sharpe.

O'NEIL, C. (2016). *Weapons of math destruction: how big data increases inequality and threatens democracy.* Crown Publishers.

PAPADOPOULOS, T., & KANELLIS, P. (2011). Understanding the role of stakeholders during business intelligence implementations: An actor-network theory perspective. *Internacional Journal Information and Decision Sciences*, *3*(1), 85-105. Recuperado de https://www.inderscienceonline.com/doi/abs/10.1504/IJIDS.2011.038843

PONTES, L. R. (2015). Reflexões sobre o ato de burlar sob o olhar da TAR. *Estudos e Pesquisas em Psicologia*, *15*(4), 1451-1464., http://dx.doi.org/10.12957/epp.2015.20281.

RATNER, H., & GAD, C. (2019). Data warehousing organization: Infrastructural experimentation with educational governance. *Organization*, *26*(4), 537-552. http://dx.doi.org/10.1177/1350508418808233.

RIVERA, G., & COX, A. M. (2014). An evaluation of the practice based approach to understanding the adoption and use of information systems. *Journal of Documentation*, *70*(5), 878-901. http://dx.doi.org/10.1108/JD-06-2013-0080.

SCHAFER, H. (2017). Relationality and heterogeneity: Transitive methodology in practice theory and actor-network theory. In M. Jonas, B. Litig & A. Wroblwski (Eds.), *Methodological Reflections on Practice Oriented Theories* (Chap. 2, pp. 35-46). Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-52897-7_3.

TIAN, Y.-H., CHEN, X.-L., XIONG, H.-K., LI, H.-L., DAI, L.-R., CHEN, J., XING, J-L., CHEN, J., WU, X.-H., HU, W.-M., HU, Y., HUANG, T-J., & GAO, W. (2017). Towards human-like and transhuman perception in AI 2.0: A review. *Frontiers of Information Technology & Electronic Engineering*, *18*(1), 58-67. Recuperado de https://link.springer.com/article/10.1631/FITEE.1601804

TRITTIN-ULBRICH, H., SCHERER, A. G., MUNRO, I., & WHELAN, G. (2020). Exploring the dark and unexpected sides of digitalization: Toward a critical agenda. *Organization*, *28*(1), 1-18. http://dx.doi.org/10.1177/1350508420968184.

VESA, M., & TIENARI, J. (2020). Artificial intelligence and rationalized unaccountability: Ideology of the elites? *Organization*, 1-13. http://dx.doi.org/10.1177/1350508420963872.

WALSHAM, G. (1997). Actor-network theory and IS research: Current status and future prospects. In A. Lee, J. Liebenau & J. Degross (Orgs.), *Information systems and qualitative research* (pp. 467-480). Chapman and Hall. http://dx.doi.org/10.1007/978-0-387-35309-8_23.

WHITTLE, A., SPICER, A., & WHITTLE, A. (2008). Is actor network theory critique? *Organization Studies*, *29*(4), 611-629. http://dx.doi.org/10.1177/0170840607082223.

WICKRAMASINGHE, N., TATNALL, A., & BALI, R. K. (2010). Using actor-network theory to facilitate a superior understanding of knowledge creation and knowledge transfer. *International Journal of Actor-Network Theory and Technological Innovation*, *2*(4), 30-42. http://dx.doi.org/10.4018/jantti.2010100104.

ZUBOFF, S. (2021). *A era do capitalismo de vigilância: A luta por um futuro humano na nova fronteira do poder.* Intrínseca.

Appendix A – Observations script

1. The main group practices; how they are established and become routines in the daily work.

2. How the human and non-human elements relate, creating opportunities for learning, reflexivity, informational exchange, and decision making.

3. How and in what way the agency of the humans and non-humans occurs in the practices.

Appendix B – Interview script

1. What do you do here? How would you describe your role? What is your work like?

2. Do you follow any methodology to carry out your work? How does it work? Exemplify. Is it followed to the letter?

3. Is there a single and/or right way of doing your job? Why?

4. How are the activities divided? And how is it defined who will work on each project?

5. How does your work relate with that of the other teams? Or the other collaborators (including those who are in other physical spaces of the company)? And with the outsourced companies/workers?

6. How does the interaction occur with colleagues who work remotely?

7. Do you take part in meetings? How often and what types? What is their role for your work?

8. What are main concepts/terms that you use in your day to day?

9. How do you relate with the clients in your work? Describe a situation that shows that relationship.

10. I perceived in the observations that at various times the room goes quite quiet. What is the role of silence for your work?

11. In what way do the personal data protection law, ethical questions, and the discussion regarding open data relate with your work?

12. How did you learn to do your job? Exemplify.

13. What is the knowledge and skills that someone needs to have to do your job? Exemplify with situations where they have been required.

14. What do you do to continue learning? Exemplify.

15. Have you ever needed to teach someone to do the work? How did you do it? If you never have, how would you if it was necessary?

16. How do you decide on what data to capture, use, analyze, and include in the report?

17. How do you create an algorithm (if you carry out that activity)?

18. How do you guarantee the quality/accuracy of the data or model created?

19. What are the strategies you use to do your work? How often? Why? Exemplify.

20. What materials are needed to do your job? Exemplify or describe a usage situation. Which ones are essential?

21. What tools do you use and how often? Why? Do you create or have you ever created some work tool? How did that occur?

22. What is the role of the earphones and the two monitors in your work? Comment.

23. What is the role of the bugs for your work? Comment.

24. What is the role of the white board for your work? Do you take part in updating it? How often is it updated?

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