

Luhmann's autopoietic epistemology: how qualitative analysis can be rigorously reflexive from a third order of observation – a case study of AI governance research.

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Abstract:

This paper reflects on an advanced qualitative research methodology through the application of Luhmann's social system theory as a methodological framework of third order of observation around the process of data collection, data familiarisation, data codification and data analysis. The results offer a deeper understanding of researcher's conditions, the exploration of meanings, the expansion of the understanding of Luhmann's theory, the development of questioning, and the increasing of the degree of research's reliability by anticipating and clarifying issues on how the data could be interpreted. Limitations have been noted in assessing the researcher's psychological system.

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Despite recognising the contributions from feminist and decolonised perspectives (Davies, 2023; Haynes, Stewart and Patton, 2023; Windchief, San Pedro and Kovach, 2023), the research methodology in discussion has been built under radical constructivism - as a change of paradigm proposed by Luhmann, understanding the acknowledgment of the world is socially constructed by communicative action, where everything is nowadays mediated and accelerated (Finlayson, 2005; Butler *et al.*, 2011; Clarke and Braun, 2013; Crane *et al.*, 2020; Deuze and McQuail, 2020; Harste, 2021). By differentiating from transcendental traditions (Kant, 2000), autopoietic epistemology as a philosophical approach is concerned with how knowledge is developed through researcher's position and subjective experiences (Ravitch and Carl, 2021), a self-referential reflection on the relationship between knowledge and object, making real what knowledge indicates as real (Luhmann, 1995). As simplified by Luhmann (1988),

"The epistemologist becomes himself/herself a rat in the labyrinth and has to reflect on the position from which he/she observes the other rats." (p. 24)

Following this assumption, the qualitative research is pointed as the most appropriate but also the most defiance strategy attempting to understanding how the actors of the social scene (Lick, 2022) are constructing the boundaries between AI and governance. Rigorousness is pointed by many scholars as one of the biggest challenges of qualitative research for its in-depth subjective investigation (Denzin and Lincoln, 2018; Devlin, 2021). Rigour in qualitative research means research quality and validity encompassed with a design that seeks complexity and contextualisation, preserving participants' experiences and voices through inductive and systematic approach to data collection and analysis, and addressing challenges and limitations of the study with transparency, including power relations and systematic bias. (Ravitch and Riggan, 2017; Ravitch and Carl, 2021). More specifically, a rigorous reflexive quality research is (Ravitch and Carl, 2021)

"the systematic assessment of researcher's identity, positionality, biases, assumptions, values, and subjectivities." (p. 13)

This paper aims to contribute to the reflexive analysis field by using Luhmann's autopoiesis theory as methodological framework (Besio and Pronzini, 2008) in a specific case of AI governance research by answering how to approach reflexive analysis through Luhmann's autopoietic system theory; how to address research's rigorousness by applying Luhmann's self-referential lens; which researcher's identity, positionality, biases, assumptions, values, and subjectivities need to be acknowledged to guarantee the quality and validity of analysis; and, finally, what contributions the self-referential observation provide to qualitative research.

Following Luhmann's theoretical claims, the first challenge of this paper has been the design of the methodology of the paper itself. How to develop the case study research's procedures from a general theory of society, a lens with complex orders of observation? Furthermore, how to design a methodological strategy that reflects the researcher's experience within a sociological autopoietic research? Assuming that the researcher's psychic system is not part of the analysis, only the communication of its own observation, it has been decided to structure the paper in three orders of observation. In the first level, it is observed the object of the case study and its conceptual framework, hence the AI governance and Luhmann's social system theory. In the second level, it is observed the methodology used in the AI

Governance's primary research, hence, the collection and analysis of experts' interviews. Finally, in the third level, the researcher's observation of own observations is analysed. In this final level, where self-referential analysis takes place, it has been used the functional differentiation approach incorporated by Luhmann (2013b) in his general sociological theory, as a natural process of refining what the researcher's identity is in the process of analysis from the acceptance that functional differentiated systems are not subordinated to any environment and determines its own identity through a binary coding that "*provide a negative correlate for all information*" (Luhmann, 2013a, p. 91), allowing the system to differentiate out by reflecting on opposite perspectives of each experience. As justified by Luhmann (2013a), the combination of theory of autopoiesis with functional differentiation contributes to the abandonment of both, redundancy and growing complexity. In other words, there is no research action outside the research and all irritations provoked by other systems, including researcher's psychic system, should be acknowledged and contained through structural coupling. Although, the structural coupling as defined by Luhmann (2013a) in his theoretical formulations is not a submissive state, but a process of self-refining structures to evolve in equilibrium with the environment.

First order of observation: observation of AI Governance

Artificial Intelligence is not a new phenomenon but in recent years, became a new reality for society due to its deployment in several social systems with drastic impact on people and environment (Rifkin, 2014; Kotler, 2015; Hughes, 2016; Broussard, 2018; Seldon and Abidoye, 2018; Dignum, 2019; Zuboff, 2019; Moore and Woodcock, 2021; McQuillan, 2022; Bridle, 2023; Pasquinelli, 2023; Alegre, 2024). The definition of this technology has been discussed over a century, following different levels of development, domains, and marketing intentions. For the purpose of this research, it has been agreed it is an umbrella term that includes all autonomous machines capable to make judgement, decisions and actions based on patterns, including machine learning, and Generative AI (Weizenbaum, 1976; Taddeo and Floridi, 2018; Heikkinen, 2019; Pelz-Sharpe and Kompella, 2019; Sarmah, 2019; Marcus and Davis, 2020).

Following authors agreed that technology governance should combine stability and flexibility, a balance of power relations between organisations and stakeholders by enabling trust and innovation, differing by which model or who should lead the relationship, for instance, the public or private organisations. The treatment of data is a central topic in the differentiation of tech governance models, being the data-sharing pool (DSP) the most flexible and the public data trust (PDT) model the most restrictive in protecting citizen's data (Albert, 2002; Chen, Richter and Patel, 2020; Michelli *et al.*, 2020; Koskinen *et al.*, 2023). Considering the new forms of digital agency such as AI, Floridi (2023) argues governance is a legitimacy of political power established under certain conditions and accountability, a power that could be equally withdrawn. Algorithm regulation is understood by Murray (2019) as a system that encode values and knowledge to execute informed regulatory decisions based on algorithms. From systems theory perspective, the primacy of governance is established by the structural coupling between social systems, such as legal and political systems in the form of constitution and standardization for economic systems (Luhmann, 2004; McFadden, 2021).

After serving as a Hitler Youth soldier in the Second World War, Niklas Luhmann finished a degree in law and travelled to United States a few years later to study systems theory with Talcott Parsons, a pioneer Harvard scholar in applying systems thinking to sociology field.

Since then, Luhmann's main preoccupation was to formulate a general social theory that embraced anti-totalitarian perspectives (Moeller, 2011; Luhmann, 2013b; Harste and Laursen, 2022). After 30 years of work, his social systems theory offered a highly abstract and complex theoretical formulation that proposed the change of paradigm of placing human beings outside social systems and connecting them through communication (Luhmann, 2013b). In contrast with other preeminent scholars of modern sociology (Habermas, 1985; Habermas, 1987; Habermas, 1990), Luhmann suggested a contingency approach that addresses the "*disasters caused by technology* (Luhmann, 2018, p. 304) as a problem of "*irreversible dependence of society on technology*" (p. 304). His claims permitted the application of his theory to AI governance context with great extent, resulting in the suggestion of further investigation of a reflexive expectation model to govern AI systems by its own kind (Simoes, Radosavljevic and Johnston, 2023).

Second order of observation: observation of experts' observation on AI Governance

In alignment with the qualitative strategy, semi-structured interviews with human and AI experts have been collected between July 2023 and January 2024. In the constructivist paradigm of interviews, the interviewer and interviewee co-construct the content of the ongoing conversation. For this matter, the analysis of the results should consider the context of this conversation, hence, not only what has been said but also how it has been said and which interventions have been made by both sides. The expert interview offered a fruitful way to approach knowledgeable people that could give views about hard-to-reach groups. An expert is described as someone "*particularly competent as authorities on a certain matter of facts*" (Flick, 2022, p. 7-8); in turn, competence is defined by knowledge, skills or the role this person has in a particular field. The theory-generating expert interview aims to develop a typology or a theory about an issue by reconstructing the experts' knowledge, concerning specific gaps and targets. The primary collection addressed the following research questions:

RQ1: How does Luhmann's reflexive expectation contribute to double contingency between AI-social systems?

RQ2: What limitations Luhmann's reflexive expectation encounters in regulating AI-social systems communication?

RQ3: What would be the advisable conditions for an AI expert system regulates AI - social systems relations?

Before deciding on the sampling strategy, it has been narrowed the most appropriate population. Considering the global impact of AI systems and the absence of any AI governance framework in the world, this selection has been a difficult task. Nevertheless, two populations with functional differentiated legal and political systems have been chosen as the best feasible representativeness of AI impact in the global society and AI contingency, the United States and the European Union. The US has been selected considering that the most successful AI developers – Google DeepMind and OpenAI, for instance - are currently North American companies (Koskinen *et al.*, 2023). On the other hand, the EU has been taken as the most advanced attempt of AI regulation, following the eminent AI Act (Radu, 2021; Schmitt, 2021; Cheng and Zeng, 2022; Schuetts, 2023). China also has been considered due to its rapid developments in AI technology and regulation (Zhao *et al.*, 2015; Jia, 2017; Wang, 2021; Cheng and Zeng, 2022); however, due to cost barriers, it has been disregarded.

Following the typical-case sampling strategy (Flick, 2022), 18 human sample selection has been planned, following a multicultural approach, considering gender and ethnicity balance. It has been collected names from the lists of speakers at events related to AI and tech governance, including AI For Good Global Summit (2020), Unfinished Live (2022), Cross-Cultural AI Ethics and Governance (2022), Scottish AI Summit (2022), Many Worlds of AI (2023). Those profiles have been double-checked on LinkedIn and/or official websites to review their current roles, areas of interest and accessibility. Applying the snowball technique (Gray, 2021), more similar profiles have been added to this list. The most notorious challenge in selecting the sample for the human expert interview was the multiplicity of roles that candidates occupy, some of them in conflict with the scope of this research. For example, academics and policy advisors often have a consultant role in the industry. Furthermore, considering the global dimension of the topic, numerous participants are occupying roles related to AI in Europe and North America concomitantly, being difficult to distinguish their more valuable local expertise. Finally, it was necessary to amplify the regional boundaries to include Canada and United Kingdom, due to intrinsically connected research and economic systems.

In total, 64 human experts' contact have been harvested, 59 contacts have been confirmed, and 22 interviews conducted. In Table 1, is possible to see the summary of final 21 human interviewees collected and validated, by region, gender, ethnicity, and main job role. The planned distribution of regions has been fairly achieved, with EU and UK being slightly above the expectation. The ethnical representativeness was the most difficult to be achieved, not for a lack of sample but mostly due to unavailable agenda or lack of feedback received from experts.

REGION	EU & UK	12
	US & CANADA	9
GENDER	Female	8
	Male	13
ETHNICITY	White	15
	Others (Black/Afro-descendant/Latin/Indigenous/Asian/etc)	6
PROFESSION	Consultant	7
	Policy-Maker	4
	Academic	10

Table 1: Sample of Human Participants

AI expert sample intended to collect from 5 Generative AI models and achieved the goal; however, with a few different models than planned, due to accessibility (Table 2). It has been interviewed the most updated AI models with a chatbot, where no technical skills would be necessary to set the communication. Snowball technique applied to human experts helped to amplify the population of AI models. Not all interview questions have been able to be addressed, since not all models offered the possibility to share the file of the proposed model (Figure 2) and ask related questions at the time. Furthermore, a few interviews needed to be taken twice or it needed to be divided in two occasions due to technical issues or limitation of access. As expected, US representativeness of AI models was highly above Europe. It is important to highlight that all organisations behind the AI models, despite have been founded in a specific geographical location, are multinationals, supported by global investors.

Human interviews' audios have been transcribed using the software called 'Offline Transcription' (Apple, 2024), which allows transcription without online connection. Before uploading the files from a laptop, the Wi-Fi tool has been disabled to double guarantee the files would not be shared by any instance. The result of transcription was a .txt file slightly unstructured and inaccurate, which required a review. The review of the text files took a time but also it has been highly beneficial for the data familiarisation process. First highlights came about and underlined by background colours (Figure 3). All cleaned transcriptions have been uploaded in the shared cloud folder, for supervisory checking and further coding process.

Academic 1: So, usually I'd say it's mostly a lack of **transparency and accountability** on a lot of different levels. So, this can be about what kind of content goes into the training of AI systems. So, this is a lot about what **kind of data has been selected**, how has it been filtered. But this is also about **explaining to users** how these systems affect them, how the input they themselves give into the systems affect them. And yeah, in how far AI systems are used **to make decisions that are relevant for people's lives**. And are relevant for the information they see. And in general, the problem is that sort of to govern and also to make this, accountability and transparency useful for people so that it's not just a law, but that you can really act on it is incredibly complex because it's often even hard to understand these processes as experts and then to really make them usable for users so that they can really act on it and also make their own decisions is very hard to do. Yeah.

Figure 3: Transcription's cleaning and structuration

In addition, and before bringing the data to codification process, the transcriptions were reviewed to reduce unnecessary redundancies and avoid exposing information that could jeopardise participants' anonymity. The AI interview transcription did not need the use of conversion tool or further cleaning or structuration since the interview was taken through writing format and results have been exported or copied to a Word document.

Braun and Clarke (2006) arguably consolidated thematic analysis as a broad category of qualitative research that involves analytical method of processing coding, developing theme, and capturing pattern of meaning. In further contribution, Braun and Clarke (2024) explained the thematic analysis method can be split in two main approaches, the "*Small q*" and "*Big Q*" (p. 387), being the first a rigorous method of discovery and the later a reflexive construction that involves researcher's philosophical, theoretical and political commitments. In other words, the objectivity of findings versus the organic interpretation of what is latent. They also considered the thematic analysis a bridge between quantitative and qualitative research, mostly if following the reflexive approach. Emergently, it has been realised that the analysis of this research follows the feminist-constructivist epistemological position (Clarke and Braun, 2019), considering that reality is created by subject's interactions with the world (Luhmann, 2013b) and women could construct a less distorted reality from their oppressed social position and a deeper reflection through their feelings and emotions (Gray, 2022; Browne *et al.*, 2023). Indigenous and global-south analytical research possibilities also have been explored but respectfully disregarded due to a lack of a strong standpoint legitimization from researcher's multicultural background. Furthermore, the researcher's perspectives embody the theoretical background of Niklas Luhmann's second order cybernetics approach (Moeller, 2006), hence, the observation of the reality "*taking in account its very observation*" (p. 71), and the political commitment of making an effective contribution to global society in dealing with a social destabilising technology such as AI. In consequence, the research could not avoid being aligned with a reflexive method. In preventing the potential risk of bias, it has been implemented a craft process of transcription, self-assessment, data familiarisation, dealing with the anxiety of encountering new topics as an opportunity of self-reflection and

further exploration of literature and practices. In sequence, a flexible coding process has been followed, broadly underlining what is more relevant for the research questions. The final themes have not been systematically extracted from the theory but have been granted the conditions to emerge in the final stage of the thematic analysis process (Braun and Clarke, 2024).

Third order of observation: observation of mutual observation of researcher and experts on AI Governance

The third order of observation is a more complex spot to be addressed, but not in the hierarchical sense. Luhmann (1995) argued the third order is nothing more than a second order observation that observe how two second order observations observe each other; hence, an observation of what others are observing. On the other hand, he pointed the reflexivity is a process whatever the self refers to itself by differentiating the self's conditions in before/after, combining multiple elements that constitute itself. In the self-referential process of this research, it will be assessed the conditions considered relevant for a qualitative analyst, named identity, positionality, biases, assumptions, and subjectivities. The researcher's values have not been considered as a "*symbolic generalised media*" of this research, since normative framework is considered by Luhmann a weak and abstract medium (Borch, 2011, p. 75). The before/after distinction will consider the awareness of conditions the researcher had before and after the primary data be collected.

- Before

The research journey presents many rewards and huge challenges. In the process of collecting and analysing data, it has been presented with a good sample of both, pushing further the researcher to break personal certainties and rebuild knowledge and "psychic" structures (Luhmann, 1995, p. 217). It has been highlighted in this section a few psychological and communicative researcher's conditions self-acknowledged before the data collection starts.

Narcissism/ Impostor Syndrome

Intellectual development has dual facades. At the same time, we are amplifying our world, understanding how much knowledge we ignore, we are also constructing it, and the temptation to build it as a mirror of the desired self or market interests is increasing (Eddy, 2023; Vargo, 2023). When the confidence increases, and the relations with colleagues, students, friends and family start to change from great expectations to some recognition, the risk to bold researchers' blind spots regarding themselves (Quitasol, 2022) to control community fellows' consciousness (Freire, 2018) increases considerably. In the case of the researcher, a Messiah's syndrome of saving or determining people's lives became a common feeling, which has been reinforced recently by unexpected communications with old friends and family members looking for psychological and social support. The researcher felt particularly conflictive in the political sphere, anxious to reveal the truth about AI and propaganda to the world; worse, anxious for recognition as the one who revealed 'the truth'. In consequence, the observation risked losing the focus on understanding the complexities involved in the problem. To regain clarity, the researcher reduced online interactions to minimum standards, publishing less in non-academic spaces of what is intrinsically related with research's narrows questions and selecting more carefully where to engage academically.

The risk of narcissism paradoxically is followed closely by the risk of self-diffidence, or the impostor syndrome, “*a phenomenon characterized by an inability to internalize academic success*” (Cope-Watson and Betts, 2010, p. 1). Being constantly confronted by unknown fields and incapable to deal with the plurality of gaps can be unbearable. Moments of doubts about cognitive and research capabilities were frequent, mostly during the problematisation of the impact of AI in society by using Luhmann’s social system theory as conceptual lens. This precise lack of confidence had less to do with unsolved psychic issues from researcher’s childhood or previous traumas, but it was more a recent socially constructed state of mind. Checking knowledges, skills, and experiences, it has been understood that the main source of self-untrust came from excessive challenge-taking in changing career path, this time from industry to academia, without a network of support from family or friends. In addition, it was influenced by sexist and patriarchal self-internalised cultural background that historically has considered intelligence a natural gift instead of a mix of experiences (Seldon and Abidoye, 2018) and women the latest gifted (Held, 2006). This precise reflexive exercise has been an on-going support to mitigate the risk of losing entirely the confidence in the research.

Rhetoric/ Overthinking

Following the great expectations of academic work, the second temptation was the misuse of communication tool, which the ancient Greeks Sophists knew a great deal about it (Herrick, 2020). In nowadays research profession, the researcher noted the ‘publish or perish’ goal orientation could put at risk the wise flow of discoveries (Van Dalen, 2021). While presenting the results of the problematisation at NITIM Doctoral Summer School (The University of Edinburgh, 2023), the researcher has been suggested by the session’s chair “*this could give you a few papers*”. What was a positive and encouraging feedback in the occasion, became an uncomfortable self-pressure later. Should the researcher reflect in terms of number of publications, or should let the results take the observer to where it is taking? The researcher felt the need to communicate more frequently even if there was not more or better developments to be shared. The moment the researcher realised it, in has been felt the risk of losing focus on progress. In response, the researcher reinforced the need to step down in the communicative actions, thinking more carefully of all events before making further commitments.

Logic and abstraction are essential elements of critical thinking, but it is difficult to combine both without losing focus through overthinking. Understanding the boundaries between reflective thinking and overthinking is not quite easy, since rumination has been associated with problem-solving (Flaherty, 2022). In addition, brain activities are surrounded by noisy communicative environment, where society is constantly interacting, sometimes coping, sometimes irritating (Moeller, 2011). The researcher found accelerating cognitive thinking to deal with multiple variables instead of slowing down thoughts and communications to think more clearly. An avalanche of general assumptions, instead of evidence, has been noted. In some moments, the researcher felt incapable to think logically at all. The author realised the risk of paranoia when the most trustful people started to become villains in the deepness of their thoughts, with no reason apart from a sequence of anticipations that proved no real. The emotional and physical impact included high levels of anxiety and frequent headaches. At this stage, and after receiving NHS’ Beating the Blues’ support (NHS, n.d), it has been understood the need to manage expectations and reduce commitments. By reducing the hours of teaching and research work, the flow of thoughts has been alleviated and more productive outcomes have been achieved.

- After

For Flick (2022), foreseeing the steps and issues to be faced during the collection and analysis helps to maximise the room to manoeuvre. Anticipation of those challenges have been made before and during the period of collection. Apart from checking weather forecast, transportation status and other conditions for interviews taking place physically or online, a reflexive process of re-evaluating the double contingency (Luhmann, 1995) between the researcher and interviewees surfaced after collection. The process of data familiarisation implies the immersion in getting to know the data and beginning the reflexive questioning about the content and the researcher, including lived experiences, beliefs and opinions (Braun and Clarke, 2024). In this research, the data familiarisation involved reflection on notes taken from data collection experiences, and will be analysed through Luhmann's self-differentiation approach (Luhmann, 2013b), expecting to anticipate the researcher's conditions that could compromise the integrity of the research or enrich the quality of analysis. The binary codes to be presented here have not been semantically extracted from interviews, therefore they have naturally surfaced from the interlacement of qualitative research's medium and reflexive process.

Privileged/ unprivileged

The researcher's privileged social-economic condition has been addressed by a few participants, raising a reflexion around the intersectionality of social privileges. When *US Consultant 1* said "*We're sitting here with iPhones. You have a Mac. I have a Mac. I mean, you know, we're the privileged.*" and *US Academic 3*, after agreeing to be interviewed in person in US, wrote by email "*You must have very generous funding!*", the researcher has been reminded of the impact of economic privilege has in conducting research. The economic wealth, presumptuously, is a researcher's privilege to have been born in an up-middle-class family, having the possibility to study in good private schools and universities, to travel the world, which proportionated multiple cultural enrichment and career opportunities, ultimately permitting the researcher to be in position to carry the interview with adequate resources. On the other hand, the set of difficulties and efforts of the researcher have not been taken in consideration and an automatic privilege tag has been given. As a matter of fact, the researcher left home at the age of 17, leaving behind an educated but unfunctional family to embrace a long journey of emancipation or "*self-realization*", as posted by Luhmann (2013b, p. 181). Furthermore, the researcher has the understanding that being in possession of an iPhone and a MacBook was a costly choice to avoid risk of technical failures and an attitudinal expression of male prestige and economic power (Friedl, 1967; Berry, 2016) to avoid bias experienced in the past, including sexism, ageism and racism. The funding received from researcher's university to carry the face-to-face interviews in US was not an act of generosity but an investment in a promising field and research, consequence of three years of problematisation well received by peer-reviewed publications (Simões, Radosavljevic and Johnston, 2021; Simões, Radosavljevic and Johnston, 2022; Simões, Radosavljevic and Johnston, 2023). Recognising both privileged and unprivileged conditions co-existence is a complex task that could help the researcher in balancing observations.

Powered/ unpowered

Acknowledgement of participants' professional background and eventual publications or contributions made in artificial intelligence, digital governance and/or social science domains have impacted the researcher's position of power. For instance, knowing that interviewee *US*

Academic 1 had expertise in German theorists that contrasts Luhmann's theoretical framework contributed to smooth the conversation, being more naturally open for conflictive ideas. As illustration, when this participant said "*I have my pessimism about it, but...*", the researcher has friendly replied "*Please, be my guest*", in an attempt to make the participant more comfortable to give his truly opinion about the proposed theoretical model, without damaging the self-confidence of the researcher during the interview. While interviewing senior scholars, the researcher felt the balance of contingency has diminished against the researcher's position. Being most of the researcher's professional background coming from advertising and tech industry, academia was considered at the time a complex community to be part of, with multiple gaps to be fulfilled. When *EU Academic 5* contrasted the proposed model by saying "*I find that quite misleading expert system because expert system is a very specific area of AI*", the researcher has not been able to elaborate an argumentation in defence of AI Expert System in the context of the research, despite the strong theoretical background supporting the age of AI Expert System, when it was understood as a computer system created to help people in analysing complex problems and making decisions in a given domain at the level of human experts. (Buchanan and Shortliffe, 1984; Harmon and King, 1985; Wolfgram, Dear and Galbraith, 1987; Giarratano and Riley, 1998). While interviewing *EU Academic 4*, Italian has been suggested by the researcher and accepted by the participant as the language of the interview, despite it is a language that the researcher never had used before in professional activities. Not planning about the possibility that interviews would be made in other languages, it had not been prepared the translation of terms in advance. In consequence, the researcher did not feel comfortable to intervene as much as in other interviews. Again, the double contingency between interviewer and interviewee has been slightly compromised, with the researcher saying more than usual times "*thank you*" and "*forgive me*".

Biased/unbiased

One of the biggest challenges of data collection and analysis has been the acknowledgement of researcher's own bias, specifically bias of bias. From a heuristic point of view, bias is understood by Gilovich, Griffin and Kahneman (2002) as a deliberate simplified judgement of an event that is too complex to be solved by a typical human mind. The researcher learnt new kind of biases from data collection, including "*deception bias*" highlighted by *US Academic 2* in "*people by default assume that they are being deceived*". In addition, the interviewer has been reminded about biases that disrupted researcher's professional and personal life in the past. During data collection, the researcher realised that being a Latin American woman in US is not so different from being in Europe in relation to the stereotype of immigration position (Riaño, 2003; Diekman *et al.*, 2005; Pike, 2010). After concluding the interview of *US Academic 3*, the participant invited the researcher to lunch and during following conversation, mentioned that a Brazilian woman married one of their relatives and divorced 6 months later, after being guaranteed the US permanent resident card. The first reaction that came to researcher's mind was to ask "*why are you telling me that?*" but the researcher opted to keep observing and amplifying perspectives, challenging the bias of what supposedly would be the interviewee's bias. The researcher mentioned the many possible reasons Brazilian immigrants leave their home country, for example, to scape all kind of violence or unfunctional systems or to pursuit an inauthentic cultural frame (Freire, 2018), more recently exacerbated by US-Brazil's relations (Smith, 2010). Furthermore, the researcher argued how most of immigrants do not have the social structure to deal with all difficulties, and how some opt for short cuts, something the researcher is not in position to judge. The researcher had a first intuition that the participant knew all those aspects,

nevertheless, the moment it became personal, the participant was trapped in this blind spot called bias. Further reflection and second intuition suspected the participant could be testing the researcher's response, since the conversation flowed well after researcher's contingency. In the past, the researcher would be frustrated, but despite the discomfort of the moment, the openness was appreciated. Most of the time, ideas about others and about us are constructed without reflecting or calling second perspectives, ultimately influencing decisions that impact people's lives. It is not possible to avoid bias completely or life in modern society would be impossible (O'Connor and Weatherall, 2019), however, it is important to keep trying to do better, to keep evolving to a wider metaphysical existence (Von Foerster, 2003). The described experience certainly impacted the researcher's perception of own position of observation. In general, the researcher found that the balance between generalisation and specification, and between own views and the views of others, is a wise and necessary goal, applicable to AI governance research.

Valid / non-valid

The first challenge encountered in this first stage of data immersion was the identification of patterns of meaning in the data, since the lead author noted more than one possible meaning in the same extraction, and not necessarily co-related at first. In consequence, the researcher started questioning how much those assumptions were valid subjective observations or corrupted notions based on blind spots. For instance, the participants' agreement on the lack of experts' AI knowledge. All agreed strongly there is not enough understanding of AI from the average user's perspective but also most claimed that experts, from a variety of social systems, lack knowledge in the AI domain. Regardless, all of them demonstrated good understanding in the field. The researcher's first thoughts were *"is it an interviewee's lack of confidence, dialogue or intention in recognising that the topic, for what it matters, is already well understood?"*. In further discussion with co-authors, the idea that the lead author's lack of confidence in the quality of sample – mostly senior experts - could be interfering in the perception of interviewees' representativeness of expertise in the AI field. Other aspect discussed was the possibility that the participants have realised many of those expertise points after the questions were addressed. For example, *US Academic 4* said *"It's a good question"* after been asked about *"Where do you think that the AI governance responsibility relies on?"* and, after a few seconds of thinking, gave an interesting contribution, starting with

"Um, well, I think there are different responsibilities, right?"

Arguably, to construct those answers would be necessary a knowledgeable background, or the engagement with the question would be shortly concluded with *"I don't know. That's exactly an area where I was never thinking about"* as postulated by *EU Consultant 1* in a different context. Nonetheless, deeper reflexive perspectives can emerge in the process of interviewer-interviewee interaction, which is inherent to the process and do not compromise the level of expertise of the participants (Braun and Clarke, 2024). Reflecting on these possibilities helped the researcher to gain confidence in the data quality and coding capability.

Simplifier / Complicator

By interviewing a variety of experts from distinct disciplines, opposite reactions were expected, however, their contributions brought a further code of analysis to this research

journey - should the researcher be a simplifier or a complicator in merging Luhmann's theoretical claims? AI consultants demonstrated stronger confidence in grasping the proposed reflexive expectation model (Figure 2), making comments such as

"Well, it's sort of what we've been talking about here in the sense of that there's a balancing act to be found between what is right and what is wrong."

US Consultant 1

"Okay. That's kind of cool. It's like when I took a negotiation course for my MBA program, (...) and I think that's a good thing."

US Consultant 2

"So it's a kind of loop, (...) it's a live system you're talking about here. So, bias in AI feeds into the expert system, of course, all the expert system is that the people that are actually designing it."

EU Consultant 4

Academics and Policy Makers, in contrast, were further less convinced:

"I think at this level, it's too limited, (...) Luhmann's thing is very freaking general, right?"

US Academic 1

"I struggle to fully kind of grasp the model. I mean, I'm not familiar with the work of Luhmann. So, I can see the potential, but I'm struggling to see it."

EU Academic 1

"If I don't understand your proposal, it's too complicated, too technical, or too specific, because only Luhmann's experts can really understand it."

US Policy Maker 2

Reading Luhmann over the past 3 years (Luhmann, 1991; Luhmann, 1995; Luhmann, 1996; Luhmann, 2000; Luhmann, 2004; Moeller, 2006; Luhmann, 2012; Luhmann, 2013a; Luhmann, 2013b; Luhmann, 2017; Luhmann, 2018) has been a challenging task to understand complex concepts and formulate argumentations capable to grasp Luhmann's theoretical framework. The understanding of Luhmann's novel meanings and position needed to be supported by a few scholars that generously dedicated to explaining Luhmann's vocabulary (Baraldi, Corsi and Esposito, 2021), and change of paradigm (Moeller, 2006) in contrast with Luhmann's contemporary sociologists (Harste, 2021). Luhmann (1995) himself boldly remarked

“complicated conceptual relationships of this kind may intimidate sociologists” (p. 488)

In such level of complexity and opposite fashion, should the researcher *“show the flag”* (Luhmann, 1995, p. 488), even if its position has a long distance from other scholars? How the researcher’s implying presuppositions can make contributions to science and to society as a whole, without addressing the necessary dialoguing with other subsystems of science, for instance? Should not the researcher be an interpreter, a *“cultural broker”* (Bauman, 1978, p. 28)? How can the process of distinguishing codes into emergent knowledge claim universal validity and reflects the researcher’s identity and experiences of being a mixed-race woman with multicultural background? The researcher realised the need to reduce complexity in the interpretation of Luhmann by increasing the proficiency within his theoretical framing, one of the reasons to carry on this reflexive analysis.

Self-referential Analysis

For Luhmann (1995), the differentiation between psychic and social system is made by choosing consciousness or communication as the operative mode. When the researcher decided to report their own thoughts regarding the collection and analysis of primary data outside the psychic system, it became communication. Furthermore, all forms of communication are synthesised by *“information, utterance and understanding”* (Luhmann, 2018, p. 309). Following these premises, the final stage of analysis of the lead author’s reflexive insights will be carried by following those three thematic elements focused on the unity of the communication that produces a synthesis (Luhmann, 2013b) of researcher’s reflexive process and contribution.

Information or Input

Luhmann (2013b) pointed that information in communicative operation refers to the data, *“a sort of commodity”* (p. 216) that is selected, taking in consideration the possibilities and the actual choice based in the case of communication. The current new hype of AI topic provoked by the fourth industrial revolution in society posted a second challenge for managing information and select quality materials. Impacted by the *“attention economy”* (Hershock, 2021, p. 70), and as per Kitchin and Fraser (2020), we are addicted to digital life, constantly checking updates of messages and elaborating responses, a societal expectation that is not only a personal, but institutional and structural problem. As highlighted by Seldon and Abidoye (2018),

“living too much in a world of cyberspace (...) is one of the factors contributing to rising mental health worries among students.” (p. 265)

In the expectation of coping with this ongoing world (Jaccard and Jacoby, 2020) and be functional in selecting observations, it has been observed the development of input strategies. For example, Luhmann’s reading has been supported by scholars dedicated to explaining Luhmann’s meanings. Collecting relevant trending topics about artificial intelligence has been achieved by identifying influential experts in the field on corporate social media and academic events. The selection of the second order of observations to make this reflexive paper has been made organically by reading notes taken during and after interviews and supervision meetings. In the process of analysis, slowing down researcher’s communications, especially digital interactions, has demonstrated to be an efficient approach to observe and

select more critically the relevant inputs, mitigating the impact of bias and unbalanced power relations.

Utterance or process

Despite avoiding to explaining “*in great detail*” (p. 218) the meaning of utterance in his theoretical formulation (Luhmann, 2013b), it has been understood as the process or the act of communication, through what the information is produced rather than transmitted (Baraldi, Corsi and Esposito, 2021). Language functions as the efficient possibility of utterance, not “*the action*” (p. 206) itself but fixing information that would be ultimately understood (Luhmann, 2013b). The text, whether it is in writing or oral format, is the memory of social system that shapes an observation, for example, distinguishing between past and future (Luhmann, 2018). The lack of proficiency in English, Italian and technical languages at certain extend during the data collection and analysis have been noted as a great challenge. Given the lead author is a Portuguese native speaker, communicating the self-observation in a different language represented an artificial self-description. Communicating in a technical language without being a computer scientist represented even more an “*inward looking search for meaning*” (Luhmann, 2018, p. 347), increasing the complexity of reflection. In consequence, the process of communicating the information involved multiple steps of checking dictionaries and literature, correcting grammar, reading notes and drafts repeatedly, with an endless process of rebuilding self-confidence.

Understanding or Output

In Luhmann’s social systems theory, the concept of understanding does not rely on psychic state of who understands but on the communication’s conditions with which information passes on. Misunderstanding, from Luhmann’s perspective, does not stop autopoiesis of communication, since actors could carry on the communicative operation by understanding the other’s misunderstandings (Luhmann, 2013b). It has been observed that despite the lack of researcher’s expertise in certain topics, the interview has not been interrupted, and the researcher has been able to record and take notes that later could have been better understood. The use of both, voice transcriptions and paper notes, helped to register the message accurately and subjectively from researcher’s understandings, contributing with “*several layers of operational guideline*” (Luhmann, 2018, p. 349). In consequence, the next steps of data familiarisation and codification have been supported by double and gradual evidence, which increased the rigorousness of reflexive analysis by preserving contextualisation of participant-researcher interactions. Once the data has entered in researcher’s psychic system, it encountered an effervescent environment, stimulated by years of reading and questioning on interdisciplinary fields, more specific on Luhmann’s social systems theory, ultimately giving certain confidence to develop an analytical model using Luhmann’s autopoietic epistemology. The self-differentiation, in combination with functionalism, suggested the analysis of the researcher’s communication in binary coding, ultimately eliminating what is not part of research function. As anticipated, in the qualitative research field, and from the Luhmann’s constructivist paradigm, researcher’s identity, positionality, biases, assumptions, and subjectivities are inexorably part of analysis, however, not as a pre-coded strategy but as an emergent double contingency (Luhmann, 1995), in sense that at the same time the researcher’s condition influences the data analysis, the researcher is influenced by the analysis of data, as outlined in Table 3. In this summary, it is possible to see the differentiation from the ‘before’ purely researcher’s conditions of inputs and outputs to the ‘after’ qualitative researcher’s conditions emerged in the third order of observation,

indicating the final conditions could also vary in intensity and direction of differentiation. Furthermore, it stressed the complexity of self-differentiation of the “*black boxes*”(Luhmann, 1995, p. 109) - the psychic and social systems - which remained opaque to each other, only transparent enough to permit this reciprocal observation that ultimately is absorbing uncertainty, stabilising expectations, and offering alternative solutions to the research problem. Particularly, it has been noted without great surprise that the early-in-life economic privilege and confidence have not overcome the lack of empowerment of the researcher during data collection, which surfaced mostly from gender and social-economic participants’ biases. Regardless the researcher’s perception of their lack of legitimation to observe participants’ claims from a singular ethnic perspective due to researcher’s multicultural background, it became clear the researcher’s experience has been impacted by stereotyped socio-cultural expectations. Observing participants’ bias also gave the researcher a deep sense of reflection on own bias, improving the quality of the researcher’s observations and the validity of own assumptions. It has been understood with great confidence how codes emerge in reflexive qualitative analysis and how valuable those codes are when rising naturally, reducing the anxiety of contribution. Nonetheless, to increase the dialogue with scholars from interdisciplinary fields, it would be necessary a simplified interpretation of Luhmann’s lens. Taking in consideration the on-going research status, the researcher also considered inappropriate to remark a final self-realization, letting the self-referential analysis open to new contingencies.

Before/ After		Identity	Position	Bias	Assumption	Subjectivity
		Privileged/ unprivileged	Powered/ unpowered	Biased/ unbiased	Valid/ non-valid	Simplifier/ Complicator
input	Narcissism / Impostor syndrome	Moderate narcissism differentiated to moderate privileged identity.	Impostor syndrome differentiated to moderate unpowered position.	High impostor syndrome differentiated to slightly biased observation.	High impostor syndrome differentiated to valid assumptions.	Moderate narcissism differentiated to highly complicated subjectivity.
output	Rhetoric / Overthinking	High overthinking differentiated to unprivileged identity.	High overthinking differentiated to highly unpowered position	Moderate overthinking differentiated to slightly unbiased observation.	Moderate rhetoric differentiated to moderate valid assumptions.	Moderate rhetoric differentiated to moderate complicated subjectivity.

Table 3: Self-referential Analysis (Developed by Researcher)

As mentioned before, the achievement of reflexive analysis does not refer to researcher’s psychic analysis, since the application of Luhmann’s theory had no scope to directly assess researcher’s consciousness, only exploring connectivity with sufficient transparent ‘inputs/outputs’ that helps to guide the autopoietic reproduction of qualitative research. In the same regards, analytical rigour is not understood as a perfect balance between two extremes but in accepting the improbability of normality and the acceptance of noise as a valuable “*uncoded*” (Luhmann, 1995, p. 142) information instead of mere disturbance. It means the researcher’s analytical capability has been given a systematic reflexive procedure to increase

the confidence of results, not as evidence of ‘true/false’ (Godfrey-Smith, 2009), therefore as a tool capable to grasp the complexity of the researcher’s dimension and the variety of researcher’s conditions to permit knowledge to emerge qualitatively.

In conclusion, this paper challenged the researcher’s observations of primary research by suggesting the application of Luhmann’s autopoietic epistemology to explore researcher’s position, biases, and other subjectivities that could limit the validity of the findings or enrich the quality of thematic construction. It has been deeply complex to understand how to manage qualitative analysis through Luhmann’s lens, however, rewarding to see the level of observation this kind of analysis can generate. As main contributions, in addition to classical reflexive approach (Braun and Clarke, 2024), the self-referential analysis helps in anticipating research contribution’s expectations by experiencing risks in a rehearsal mode and safer environment, hence, before final thematic analysis takes place. Also, it was a beneficial process to expand criticality through binary observations, challenging first biased thoughts and opening the analysis to emerging topics. Clearly speaking, this exercise has been proved useful as a risk self-assessment, in allocating flags of alert for potential divergences and breaking downs, a laboratory of contingency that could be applicable to other social systems analysis. Moreover, the self-referential epistemology applied in this paper forced the scientific system to a novel level of reality, viewing the world in a new way and yet bounded internally to claim universal validity. Conversely, limitations have been noted in reporting researcher’s thoughts as it was conceived in the mind, in corresponding “*with what really happened*” (Baraldi, Corsi and Esposito, 2021, p. 244) and in communicating in a variety of languages, for what is recommended further cross-disciplinary study involving consciousness-based theories. Despite the locus of control over consciousness, the impact of Luhmann’s reflexive analysis on researcher’s social defence system (Sher and Lawlor, 2022) has been highly noticed, which contributed to researcher’s stress and anxiety to a great extent, being recommendable to carefully balance self-reflection with conversation, activities, and resting. Conflict of interest also could have limited the outcomes of this analysis by selecting codes from consciousness’s interaction that would protect researcher’s privacy and reputation above the scope of this research.

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