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RESEARCH ON AND THROUGH GENERATIVE AI?
An inevitable entanglement

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Abstract

Since the release of ChatGPT to the public, generative artificial intelligence (GenAI) has become a primary concern for social researchers. Specifically, GenAI has been considered both an object of study and a potential tool for conducting social research, just as the Internet and digital platforms had been in past decades. Within this framework, this contribution focuses on these two interrelated realms, i.e., "research on GenAI" and "research through GenAI". Specifically, this paper discusses four areas of interest for the research on GenAI: a. Users' relationships with GenAI; b. Social narratives around GenAI; c. GenAI production; d. GenAI outputs. Then, how research through GenAI tools can be conducted at the qualitative and quantitative level is critically examined. In this regard, it emerges that GenAI systems are frequently framed as "assistants" and, therefore, research through GenAI emerges more as research "aided" by GenAI than "through" it. Given this scenario, we contend that research through GenAI is inevitably intertwined with research on GenAI and an understanding of GenAI itself.

Keywords

GenAI, social research, methodology, artificial intelligence

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1. INTRODUCTION

Over the past two decades, Internet research scholars have considered the Internet – and thereafter social media, streaming services and other types of algorithmic media/digital platforms – both as an object of research (research "on the Internet") and as a source of methodological tools for collecting data regarding users' behaviours (research "through the Internet", see Risi, 2021). Thus, on the one hand, scholars have considered networked technologies as an object of research and investigated how they are produced within corporate environments (Seaver, 2018; Pronzato, 2023), how individuals relate with them (Lomborg and Kapsch, 2020; Markham, 2021), as well as the social narratives around their implementation and functioning (Beer, 2018; Natale, 2021); on the other hand, methods "embedded" in online devices have been repurposed for the analysis of social and cultural change (Caliandro and Gandini, 2016; Venturini et al., 2018).

Similar scenarios emerged in relation to AI systems. While AI systems (machine and deep learning techniques) were analysed both as an object of research and also as methodological tools (e.g., Gefen et al., 2021), the diffusion of generative artificial intelligence (GenAI) models newly raises questions about how to investigate these human-machine interactions (Esposito, 2022), as well as whether and how the features and affordances of these technologies can be repurposed within sociological methodologies. GenAI tools (e.g., ChatGPT, Gemini, Midjourney, DALL-E, Gen-2, etc.) entails several opportunities and challenges for social research (Salah et al., 2023), such as the possibility to streamline data collection and analysis (Haluza and Jungwirth, 2023). Unlike algorithmic media, GenAI platform such as ChatGPT or Midjourney, based on large language models (LLMs) or deep learning techniques, offer not only content recommendation or distribution, but also real-time, interactive content generation, with the ability to adapt responses based on user inputs, i.e., prompts. This shift from the interfaces of digital platforms to dialogic interfaces with anthropomorphic qualities allows new forms of dynamic content creation and introduces various complexities in terms of the role of human input in shaping AI outputs and the relationships users develop with these systems.

Therefore, these technologies raise several epistemological, ethical and authorial concerns (Luccioni et al., 2023; Vincent, 2023). Indeed, beneath the superficial layer of the GenAI platforms' dialogic interface lie intricate socio-technical processes, such as the use of vast datasets, extensive algorithmic models, human labour and monopolised cloud

infrastructures (Crawford, 2021). In this scenario, it is vital to resist the temptation to give in to a celebratory of yet another 'Promethean moment' frequently associated with the initial hype for the diffusion of a certain technology, and consider the related media and remediation processes. Indeed, as argued by Bucher (2025: 1), what must be avoided is "jumping to the next umbrella term and technology hype cycle," not considering decades of social and technical analysis "that could help put the current AI craze into much- needed perspective".

Given this scenario, our contribution aims to critically analyse the relationship between social research and GenAI platforms, concentrating mainly on computational systems based on LLMs. Specifically, we focus on two interrelated realms, i.e., "research on generative AI" and "research through generative AI", and argue that the latter is inevitably intertwined with the former.

On the one hand, our paper examines four areas of interest for what it concerns the research on GenAI: a. Users' relationships with GenAI; b. Social narratives around GenAI; c. GenAI production; d. GenAI outputs. On the other hand, we analyse how research through GenAI tools can be conducted at the qualitative and quantitative level. Drawing on empirical examples, we show that GenAI systems based on LLMs are frequently framed as "assistants", resulting in a research more "aided" by GenAI than "through" it. Thus, each research endeavour through these technologies also emerges as an examination of GenAI itself. Indeed, the generative, socio-technical features of these systems, as well as their discursive-material characteristics, make the content generated inseparable from the artefact.

2. RESEARCH ON GENAI

On November 30, 2022, OpenAI launched ChatGPT, a chatbot, based on LLMs, designed for conversational interactions via *prompts* (a set of instructions or inputs fed to an AI tool to produce outputs). Its intuitive Graphical User Interface (GUI), enabled a collective dialogic engagement with the socio-technological advancements of AI in the linguistic field. What differentiates digital platforms based on natural language processing (NLP) or recommendation algorithms is that while social media or streaming services suggest paths and choices among existing digital content, GenAI platforms not only use powerful large language models (LLMs) or deep learning techniques, but also produce and propose new contents by synthesising and remixing existing material

from the web through an input-output interface.

The release of ChatGPT fostered a renewed scholarly interest in AI systems, given the specific features of interactive, conversational engagement, real-time content generation, and the chatbot's ability to provide context-aware responses designed to feel personalized. In this scenario, Baidoo-Anu and Ansah (2023) have highlighted the need for responsible integration of ChatGPT in education, while Bodria et al. (2023) emphasised research on explainability and effective benchmarking for complex GenAI models. Similarly, Beaudouin et al. (2020) advocated for flexible and context-specific approaches to explainability across different AI systems.

In general, critical algorithms studies emphasised the role of ranking algorithms and automated decision-making, while research on GenAI is primarily focusing on automated content creation. However, both fields share concerns about bias, transparency, copyright, culture shaping and social control (e.g., Noble, 2018; Ferrara, 2023; Fang et al, 2024). A crucial difference lies in their focus: algorithms do more than just "recommend" content, they shape how content is ranked, prioritized, and presented to users, influencing how knowledge is organised and users' creative activities and decision-making processes. On the other hand, GenAI platforms directly generate new content. In this sense, these systems impact such fields as art, education, research, marketing and communication, thereby influencing the production and reproduction of knowledge (Islam and Islam, 2024; Peres et al, 2023).

In this scenario, focusing on GenAI as an object of research at the sociological level implies identifying the different angles from which researchers can observe, describe and analyse it. GenAI platforms, based on LLMs, are networked objects, i.e., the result of a set of culturally-situated practices and relationships between different elements that contribute to the production of a complex socio-technical assemblage (Seaver, 2017; Wajcman, 2019). GenAI systems are not technological discoveries, but rather the culmination of a longstanding social process, marking the apex of work automation and societal quantification (Pasquinelli, 2023).

There are different disciplinary lenses that can be adopted to scrutinise these networked artefacts. How we [researchers] can look at them is related to what we are looking at. Thus, we identified four areas of interest for what it concerns the research on GenAI - *a.* Users' relationships with GenAI; *b.* Social narratives around GenAI; *c.* GenAI production; *d.* GenAI outputs, which will be discussed in the following section.

2.1 Users' relationships with GenAI

The ways in which users' relate with media products and technologies has been explored as a topic by different academic traditions. Several research areas, ranging from digital sociology (Lupton, 2015), audience research (Livingstone, 2019), communication studies (Senft, 2008; Markham, 2021) and human-machine interaction studies (Turkle, 2011) have investigated how individuals make sense of media content and the functioning of digital technologies, as well as how technological artefacts are employed in everyday life and professional activities. Specifically, it is now well-established that how technologies emerge within social life is not only the result of their design, but of the situated practices through which individuals *agentially* relate with them for their own purposes (Bonini and Trerè, 2024). In this context, it is interesting to examine how users interact with the "artificial sociality" (Natale and Depounti, 2024) and "banal deception" embedded and enabled by GenAI systems.

To comprehend the perception, employment and appropriation of GenAI platforms in mundane and professional practices, different approaches can be adopted. A media reception analysis lens may investigate how individuals "decode" GenAI. In the 1970s, as a reaction to mass communication research, Stuart Hall's (1973) conceptualised the Encoding/Decoding model to scrutinise how audiences interpreted broadcast media messages and if their interpretations aligned with the "preferred meaning" proposed by the dominant cultural order (see also Pronzato, 2024). Lomborg and Kapsch (2020: 746) extended this model to how individuals mobilise their "semiotic and socio-cultural knowledge" to interpret algorithms. Most users may not know how such GenAI systems as ChatGPT function, as in the case of the affordances of recommendation systems of algorithmic media. However, users construct sensemaking processes regarding the conversational interface of conversational agents, the words to use in prompts, the content they expect, and so forth. These sensemaking processes can be investigated to understand whether people adopt a dominant, negotiated or oppositional decoding of a certain GenAI system, i.e., whether they completely adhere to, negotiate or oppose the values underlying the functioning and type of outputs produced by these systems.

A related sociological perspective comes from Bonini and Trerè (2024), who adopt Scott's (1985) appropriation of the concept of "moral economy" to examine the constant struggle between users' values and the operations of digital platforms, such as social media or food delivery

apps. Within this framework, Bonini and Trerè (2024) introduced the terms "platform moral economies" and "user moral economies", as potentially competing entities, with users exercising "tactical" or "strategic" forms of agency that are not aligned with platforms' values. Specifically, "strategies" are implemented by more powerful actors , while "tactical" forms of agency "come from subaltern agents" (Ivi: 46). Regarding GenAI, researchers can explore how users' agential activities align with the moral economy embedded in a specific GenAI model. These tensions can be explored through the lens of agency (e.g., prompting and content generation), interface design (e.g., anthropomorphic qualities and interactive elements), and ethical concerns (e.g., bias), showing how users interact with and challenge the underlying values of these complex, multimodal systems.

To understand the diffusion and adoption of specific technological devices, 'folk theories' can be another valuable epistemological framework. Folk theories are implicit and practical beliefs that guide users' media activities and sensemaking processes. Recently, a folk theories framework was adopted by Ytre-Arne and colleagues to investigate beliefs about algorithms (Ytre Arne and Moe, 2021) and online services (Sakariassen and Ytre Arne, 2024) in Norway, as well as by Ignacio Siles and colleagues who, within the research area of human-machine interaction, analysed folk theories regarding Netflix (Siles et al., 2019) and Spotify (Siles et al., 2020) in Costa Rica. Examples of the application of this framework in relation to AI (not necessarily GenAI) are some initial studies situated in the US (Shelby et al., 2024), China (Xu et al., 2024) and Chile (López et al., 2024). Researchers could focus on the emerging folk theories in relation to GenAI platforms, such as the ones based on LLMs, considering how users understand and engage with the anthropomorphic qualities and interactive nature of these technologies. As users interact with chatbots like ChatGPT, they often form implicit beliefs about the systems' capacity, authorship and intentionality. Studies in this regard can inform researchers about how theories on GenAI platforms may shape users' prompting activities.

The concept of "folk theories" has also been related to Bucher's "algorithmic imaginary" (2017). This concept, grounded in a phenomenological approach, indicates "the way in which people imagine, perceive and experience algorithms and what these imaginations make possible" (Ivi: 31). For Bucher, imaginaries have thus a productive function, shaping users' behaviour and emotional states. Some early studies on users' imaginaries in relation to ChatGPT were conducted by Ciofalo et al. (2023) and Sūna and Hoffmann (2024), among others,

showing the potential of this heuristic lens in analysing the implications of GenAI.

In view of all that has been mentioned thus far, different heuristic lenses can be used to explore the culturally-situated practices and sensemaking activities through which individuals engage with GenAI technologies. Furthermore, studies are needed to scrutinise how social, cultural, ethnic, and gender inequalities potentially shape users' interactions with these systems.

2.2 Social narratives around GenAI

Not only the uses of AI-based systems are important in defining their implications, but also the broader social narratives around AI (Cave and Dihal, 2019; Natale, 2021), as they play a key role in framing expectations and fears surrounding technologies, as well as how people adopt them in their mundane practices. More specifically, social narratives have been linked to "socio-technical imaginaries" (Rahm and Rahm-Skågeby, 2023) that should not be understood in Bucher's phenomenological sense, but rather as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures" (Jasanoff 2015: 4) that informs and shapes choices of people and institutions.

As discussed by Flichy (2007) regarding the emergence of the Internet, collective visions reflect societal hopes, fears, and expectations about the role of certain technologies. More recently, adopting a Foucaldian perspective, Beer (2017: 9) focused on algorithmic systems and claimed that the social power of the algorithm "may then not just be in the code, but in that way that it becomes part of a discursive understanding of desirability and efficiency". Indeed, algorithms are "a notional presence in discourse" and the narratives around them may show how they contribute to "the production and maintenance of certain truths" (Ivi: 3) and some of the broader dynamics of which they are part at the cultural and political level. An example of this approach is Beer's (2018) analysis of public documents from data analytics companies, in which he shows how these actors envision the role of data and metrics and their seamless integration into social and organisational structures. Similarly, Sartori and Bocca (2023) argues that all actors involved in AI production contribute to the construction of narratives and their power onto the public debate.

Recently, several studies investigated narratives around AI, broadly intended, in different realms. For example, Bory and Bory (2015) examined the link between AI in science fiction films over five decades

and the emerging socio-technical imaginaries of intelligent systems, emphasizing a double dynamic, of wonder and fear. Cave and Dihal (2019) analysed 300 fiction and speculative non-fiction works about intelligent machines to identify the most prevalent fears and hopes regarding AI. Their examination shows that hopes around AI include the potential for longer lives, greater ease, and fulfilment, yet these are accompanied by fears of losing identity, obsolescence, and social isolation. In a study on Chinese and US military policies regarding autonomous weapon systems, Bächle and Bareis (2022) highlight how these countries politicise these technologies to serve their national interests, using ambiguous definitions. Focusing on the narratives about AI in nine newspapers from the UK, China, and India between 2011 and 2022, i.e., before the release of ChatGPT, Wang et al. (2023) revealed both dystopian and utopian themes associated with AI.

By contrast, focusing specifically on GenAI, Spillare and colleagues (2024) analysed how Italian newspapers discuss these systems after ChatGPT's launch, highlighting a strong tendency towards a "utopian-dystopian dichotomy" and, in particular, a positive attitude towards GenAI. Another interesting work is that of D'Alessandro and Ferzetti (2024) who attempt to demystify GenAI's potential for self-emancipation. By examining issues like the prediction paradox, the Inverse Turing Test, and algorithmic hallucinations, they argue that the human-chatbot interactions are characterised by a fundamental asymmetry: humans make sense of social life while GenAI systems are only content assemblers lacking true understanding.

These studies show the importance of investigating the narratives around different GenAI systems, their specific features and their cultural, social, political and economic foundations. Thus, further work is needed to comprehend how these technologies are imagined and discussed at the individual, collective, corporate and media level and to shed light on competing viewpoints regarding what technological change ought to look like (who and what it will be used for, whether it will replace humans in the workplace or will work alongside them, etc.).

2.3 GenAI production

Sociologists, anthropologists and STS scholars have long been interested in the processes underlying media content and technology production. In the 1970s, Gans (1979), Schlesinger (1978) and Tuchman (1978) conducted ethnographic work within journalist communities to investigate how their activities contributed to the social construction of

news. This tradition remains prominent in contemporary sociology (Cottle, 2007; Thomsen, 2018), alongside the development of production studies (Banks et al., 2015). Scholars working within this area explore the environments in which media products, such as films and tv series, are actually staged and produced, thus locating personal activities "within larger cultural studies of discrete production communities, their material cultures, and their historical contexts" (Banks et al., 2015: ix).

More recently, scholars have focused on algorithmic production to better understand what Airoldi (2021: 35) defines as "the culture in the code", that is, "the culturally informed choices and goals of those in charge of developing and programming algorithms", whose values and biases are then embedded into, and reproduced by technological artefacts. Key contributions in this realm include Seaver's (e.g., 2017; 2018) studies on music recommendation systems. Considering algorithms "as the manifold consequences of a variety of human practices" (Seaver, 2017: 4), Seaver argues for the merits of investigating through ethnographic methods their production, in order to scrutinise the culturally-situated environments in which algorithms take shape. Indeed, whereas

> discourses about algorithms sometimes describe them as "unsupervised," working without a human in the loop, in practice there are no unsupervised algorithms. If you cannot see a human in the loop, you just need to look for a bigger loop (Seaver, 2018: 378).

Seaver's pioneering work on algorithmic design (2017; 2018) has paved the way for further studies on the practices and values around the design of computational systems. For example, Bonini and Gandini (2019) analysed the dynamics surrounding music curation on streaming platforms, Sachs (2020) focused on the working activities of the people fine-tuning an art image classification system, while Aragona and Felaco (2018) examined the production of data infrastructures in European institutions. Other research includes Kotras' (2020) study on the production of machine-learning (ML) algorithms used in predictive marketing and Pronzato's (2023) analysis of tech workers' activities in a media company.

Although access to the corporate environments where platforms are produced has proved to be dramatically challenging for researchers (Bonini and Gandini, 2020), it is crucial to examine the people, contexts, and activities participating in technology design to gain a deeper understanding of the dynamics that shape these systems. This tenet remains particularly relevant for GenAI systems as well. Indeed,

researchers can investigate the practices involved in data curation and dataset creation, examining the human labour shaping processes of data collection and labelling. They can also explore the fine-tuning and algorithmic design of GenAI systems, exploring the work the people who adjust and evaluate the model parameters. Moreover, examining the workplace dynamics and organizational structures of companies developing GenAI can provide insights into how power hierarchies and internal tensions shape the design of these technologies. In this regard, it should be considered that, s discussed by several contributions (Gray and Suri, 2019; Crawford, 2021), AI production and maintenance is a process intertwined with a global labour chain that includes the "ghost work" of a myriad of outsourced data workers, frequently located in the Global South, not only in corporation offices in the Global North. In this context, the activities and experiences of these people are a key aspect to explore and are now the focus of studies conducted in Africa, Asia, and Latin America (Wood et al., 2019; Posada, 2022; Le Ludec et al., 2023; Casilli et al., 2024).

Thus, despite the practical limitations regarding access to the field, research focused on the production of GenAI systems is dramatically needed. Exploring these socio-technical assemblages can shed light on how GenAI systems take shape and emerge within corporate and institutional environments, alongside the transnational labour forces that sustain them.

2.4 GenAI outputs

The socio-technical nature of GenAI systems, alongside their discursive-material qualities, makes the content inseparable from the medium that creates it. By analysing GenAI outputs, researchers can uncover societal representations, implicit assumptions rooted in online discourse and understand how these platforms reinforce societal norms. In other words, they can scrutinise "the code in culture", that is, "how socialized machines shape our society by participating in it" (Airoldi, 2021: 70).

The impact of representational harms has grown significantly due to the public's widespread engagement with GenAI. This issue extends beyond the rapid adoption of ChatGPT to include visual generative models, such as Stable Diffusion, Midjourney, and Copilot (powered by DALL·E 3). Models like GPT-4, trained through unsupervised learning, do not require human-labelled data. Instead, they analyse statistical patterns across massive datasets. To enhance model accuracy, developers increase the model's parameters and training data size, with GPT-4

estimated to contain around 1.8 trillion parameters (Howarth, 2024). Although OpenAI does not disclose specific training materials, they state that GPT-4 sources from a broad mix of online content, including news, fiction, images, blogs, and social media (OpenAI, 2023).

DeepMind researchers (Wendinger et al., 2023) have identified six key risk areas related to LLM outputs: discrimination, hate speech and exclusion, information hazards, misinformation, malicious uses, human-computer interaction harms, and environmental and socioeconomic harms. These concerns are often framed under the term "bias," implying flaws due to incomplete or inaccurate data (Fang et al., 2024; Friedrich et al., 2023), which favour systematic misrepresentations or distortions, reinforcing stereotypes or assumptions (Ferrara, 2023).

Thus, GenAI outputs reflect and construct the social world and - more particularly - potentially reproduce forms of bias and discrimination within this process. While the term "bias" is helpful, a more useful term can be media "re-presentations'' for several reasons (Risi et al., 2025). First, "re-presentation" questions the notion of media as an immediate, transparent view of society: algorithmic media offer a refracted, situated perspective of social reality. Second, as theorised by Hall (1986), "representation" highlights the constructive power of media images in shaping social categories like age, gender, ethnicity and class. These images do not merely describe social markers but actively participate in their socialisation. Finally, 'representation' better reflects the complex and ambiguous politics of media portrayals, where negative effects are not ascribable to biases. If LLMs replicate social disparities, a straightforward 'unbiased' depiction would also perpetuate these inequalities. Paradoxically, a progressive approach to media could involve a conscious bias that counterbalances these disparities.

Argyle and colleagues (2023) suggest that 'algorithmic biases' in LLMs might be leveraged, not merely corrected, to create outputs that reflect expected representations across different social groups. GenAI algorithms can capture intricate societal details and nuances among various groups. Since their deployment, these AI-generated representations have attracted increasing scrutiny for their potential harm (Fang et al., 2024).

The risks associated with representational outputs in GenAI outputs stem from various factors, including human labour, corporate decisions, training data, labelling practices, model specifications, algorithmic priorities, design choices, and policy regulations aimed at mitigating harmful behaviours. Empirical observations and critical discourse on these outputs reveal their embeddedness in a particular social framework,

marked by discrimination and inequality. For example, Gillespie (2024) examined three GenAI systems based on LLMs (ChatGPT, Gemini, Microsoft Bing AI) with prompts designed to uncover their underlying normative assumptions. In their outputs, Gillespie reveals that GenAI systems tend to reproduce normative identities and narratives, rarely reflecting less common perspectives.

Some scholars categorise these representational issues as demographic and cultural (over- or underrepresentation of certain groups), linguistic (preference for English-language data), temporal (time-bound data limitations), and ideological (potential bias from labelling aligned with specific beliefs) (Ferrara, 2023). For researchers and developers involved in prompting, these images are central to the political and ethical challenges in AI. Studies are ongoing to mitigate these biases, although their persistence is likely, given the complexity of deploying these models across various domains.

The field of algorithmic fairness in GenAI continues to grow, seeking methods to reduce unjust portrayals and discrimination (Luccioni et al., 2023). However, a universal standard for fairness remains elusive, as researchers strive to formalise and find strategies to address these challenges in GenAI models (Friedrich et al., 2023).

3. RESEARCH THROUGH GENAI

Gefen et al. (2021: 191) argue that AI can be used "as a research method", "where massive data processing is made possible by techniques of machine and deep learning". Specifically, the authors highlight that such tools as topic modelling or sentiment analysis can be applied to the analysis of texts and language, allowing for the identification of recurrent discursive patterns. These socio-technical advancements have been particularly relevant in computational linguistics, quantitative history of ideas or quantitative formalism and can represent a new frontier in which the "mathematization of the demonstration" (Ivi: 195) can dramatically impact the production and organisation of cultural knowledge. Following a similar logic, AI systems could be employed "to identify visual similarities between images, diffusion of patterns or styles" (Ivi: 198), thus offering new methodological perspectives in art history. Then, focusing on social network analysis, these authors show how AI and network analysis can be combined for social analysis.

However, restricting the field to recent GenAI developments, there are some cases where these systems have been employed for social

research purposes (see Pilati et al., 2024). Following a positivistic and apologetic stance, Islam and Islam (2024) explored the opportunities and challenges of ChatGPT in academia, indicating that it can support research activities, providing additional resources, promoting creativity and innovation, and improving data analysis and interpretation. Other scholars have instead focused on how "AI research assistants" can help write scientific papers (Salvagno et al, 2023; Xames and Shefa, 2023; Dönmez et al. 2023), generating an initial draft, suggesting titles, summarizing the conclusions, highlighting areas of uncertainty.

Given this scenario, the following sections critically discuss the potential use of GenAI in empirical social research, at the qualitative and quantitative level.

3.1 The use of GenAI in qualitative research

The potential of GenAI systems based on LLMs in identifying recursive patterns within narrative material has attracted the attention of some researchers. Specifically, GenAI has been proposed as a research assistant "to streamline processes" (Perkins and Roe, 2024a: 391) for what concerns the qualitative analysis of discursive data.

Perkins and Roe (2024a), a management scholar and a digital pedagogy scholar, respectively, employed ChatGPT to conduct an inductive thematic analysis. By merging coding activities performed by human subjects and chatbots, they developed a final set of themes. Within a post-positivist approach to qualitative research, they claimed that ChatGPT allowed to obtain "increased objectivity, efficiency, and additional cognitive support for the researcher" (Ivi: 392), despite the issues encountered, including irreproducibility, biases and possible hallucinations in the GenAI outputs, even when using identical input data were used. Similar issues were experienced by Sinha et al. (2024) with GPT-4. Other researchers, such as Gao et al. (2023) and Gebreegziabher et al. (2023), developed their own applications to support qualitative data analysis. Even in these cases, although the machine has proven efficient in speeding up the coding phases, it was highlighted that there is the risk to reduce the quality and diversity of the coding process. Nonetheless, all these scholars working around the field of human-AI interaction continued arguing that the use of Gen AI will be fruitful in simplifying qualitative data analysis. Similarly, Davidson (2024: 5) argues for the merits of using GenAI models to analyse qualitative data and "to leverage advanced computational techniques to analyze data more efficiently and at a greater volume than previously possible, helping meet the demand

for increased rigor, transparency, and scale". The author claims that a key advantage of these systems is that "queries can be tailored to the data at hand" (Ivi: 3), thus the same model may be adapted to different tasks and at different stages of the process.

Overall, some scholars are experimenting with GenAI in qualitative research. Inductive qualitative methods are considered time-intensive, and recent advances in GenAI as promising for generating inductive coding results (Perkins and Roe, 2024b). According to Sinha and colleagues (2024), conducting research with GenAI can be useful (with caution and critical thinking) throughout all phases of grounded theory. This includes transcribing audio and video recordings, conducting the coding phases, analyzing notes and analytical memos, grouping codes and suggesting interpretations.

However, most contributions have also highlighted that GenAI systems "cannot yet replace human expertise" (Perkins and Roe, 2024b: 6) as the contextual understanding and interpretive capacities of researchers are still crucial for in-depth analyses of social phenomena. Furthermore, research revealed discrepancies in GenAI outputs (Chen et al, 2024), with hallucinations and irreproducibility of results that remain key problematic aspects that seem to be at odds with claims of objectivity and efficiency.

Additionally, GenAI models are always framed as "assistants" in the use of traditional techniques rather than native methodologies that can be repurposed for social and cultural analysis. In this sense, qualitative research through GenAI emerges more as research "aided" by the computational capabilities of GenAI than "through" it.

Finally, it should be noted that now AI features are implemented also in computer-assisted data analysis software programs, such as NVivo, TLab, and ATLAS.ti, integrating NLP and ML in these systems. Originally, GenAI platforms were different from these programs as they allowed contextual code generation in a probabilistic and adaptive approach. Moreover, GenAI's decision-making process was completely black-box, unlike in obfuscated but potentially verifiable proprietary software (Ferrara, 2023; Fang et al., 2024). Now LLMs and Generative Pre-trained Transformer technologies (on which GPT is based) are integrated into these software programs as well, to aid coding, data organization, and pattern recognition. In this scenario, the opacity of GenAI has spread, favouring a more complex situation in which proprietary packages and libraries in coding software become less transparent. Epistemologically, the non-transparent characteristics of LLMs contribute to the construction of meaning in qualitative data

analysis. This automation of analytical processes can lead to framings and interpretations of social phenomena over which researchers have limited control, or rather, an "illusion of control" (Markham et al, 2019).

3.2 The use of GenAI in quantitative and computational research

Perkins and Roe (2024b: 7) claimed that GenAI systems can have "the potential to revolutionise how researchers approach data analysis, interpretation, and visualisation" in the realm of quantitative methods. The first domain concerns visual analytics and pattern identification. These models can process large datasets, identify recurring similarities, and then, even generate data visualisations that researchers can use to interpret and present their work. Likewise, Davidson (2024) contends that GenAI can be used by computational sociologists to classify texts and images. For example, researchers can train a model so that it can automatically label large datasets such as news articles or social media posts. Such authors as Salah et al. (2023) even argue that GenAI tools can be provided with insights into cognitive processes underlying social behaviour.

The second area of intervention refers to the integration of GenAI with statistical software programs to conduct operations of data cleaning and pre-processing, as well as to "identify potential outliers or missing data patterns, and suggest appropriate statistical models based on the data characteristics" (Perkins and Roe, 2024b: 7).

The third domain addresses natural language interactions, that is, the possibility to give instructions on statistical procedures to be executed to the GenAI model through plain language queries. According to Perkins and Roe (2024b: 8), this adoption of GenAI can favour a "democratisation of advanced statistical techniques" as it may allow researchers with different backgrounds to conduct statistical analysis only by interacting with a GenAI system.

More generally, both Davidson (2024) and Perkins and Roe (2024b) notice that the aforementioned use of these technologies raise critical questions about the potential for misinterpretation also for quantitative research, highlighting the importance of maintaining statistical literacy and sociological expertise to contextualise GenAI outputs. These reflections show again how post-positivist researchers consider GenAI systems as "assistants" that can facilitate or streamline a research endeavour and even suggest or diminish the choices a researcher has to make.

The rise of various commercial and open-source GenAI platforms, based on LLMs, has also introduced new avenues for creating synthetic

textual and visual data. These data are generated to "mimic" content that individuals might produce on social media or in survey or interview contexts (Choenni et al., 2023). By lowering the barriers to synthetic data generation, LLMs are believed to hold significant promise for social research, where access to certain data types is limited. Synthetic data can serve various roles, from data augmentation and prototyping to direct analysis, where LLMs are assumed to act as proxies for real human participants.

In this sense, LLMs are also considered systems for data creation. Such authors as Grossman et al. (2023: 1108) suggest that LLMs' ability to "simulate human-like responses and behaviors" may present an opportunity to test theories and hypotheses about human behaviour at scale and with speed. In various contributions, LLMs have been used to generate human simulacra to serve as experimental participants and survey respondents, i.e., to potentially "replace" human responses in the research tools validation phases. An example is the use of GenAI to pre-test questionnaires and interview templates (Olivos and Liu, 2024; Kim et al, 2024) or attitude scales (Salah et al., 2024). However, who, what and how is created by GenAI remains a poignant and critical question (Gillespie, 2024). As noted in the previous paragraph, its potential depends critically on factors such as the fidelity and representativeness of training data, GenAI biases, and the tendency of these models to hallucinate or reproduce social stereotypes, all of which warrant careful consideration. In this regard, we concur with Jacobsen (2023: 10) that "the claims that synthetic data are ushering in a new era of generated inclusion and non-risk for machine learning algorithms is both misguided and dangerous" and that the frictions and issues embedded into ML cannot be neglected (Jacobsen, 2024).

4. CONCLUSIONS

This paper aimed to critically discuss the social research that can be conducted on GenAI and through it. In the first case, different theoretical perspective and heuristic tools were proposed to investigate users' relationships with GenAI systems, the social narratives that inform the socio-technical imaginaries around these technologies, how GenAI systems are produced in corporate environments, as well as the outputs that generate as a result. In this regard, it seems possible and potentially fruitful to adapt and adjust techniques and approaches that have already proved useful in investigating other complex socio-technical

assemblages, taking into account the specific characteristics of the models on which different GenAI systems are based, as well as their specific characteristics, such as their ability to engage interactively in conversations, generate content in real-time, integrate multimodal inputs, provide responses that are contextually aware and adaptable through learning.

Regarding the second realm of examination, research through GenAI emerged more as research "aided" by GenAI than "through" it. While digital methods could repurpose platform environments as contextual domains where situating users' activities (Caliandro and Gandini, 2016), GenAI systems emerge as "assistants", i.e., tools that can be used to streamline a research process rather than a context where individuals conduct activities. Within this framework, we noticed that several scholars argue for the merits of conducting research "aided" by the computational capabilities of GenAI systems, mostly based on LLMs. Interestingly, researchers frame GenAI as suggested by tech companies. Indeed, Google's GenAI platform NotebookLM describes itself on its homepage as "Your personalized AI assistant in research" while Microsoft's Copilot defines itself as "Your Everyday AI Companion", thus echoing interpretations also reiterated by social researchers.

Despite the potential usefulness of these systems, we emphasise that social research through GenAI poses different challenges given the opacity of these artefacts. Zhou and colleagues (2024) highlight several ethical concerns surrounding these research 'assistants,' including the automated reproduction of discriminatory narratives (bias) and risks related to the use and potential leakage of sensitive data (privacy and security). The lack of transparency of these systems and risks of plagiarism also emerge as crucial issues. Furthermore, the "culture in the code" of GenAI systems is not a neutral element and informs how these systems become "code in the culture" (Airoldi, 2021), i.e., part of one's research activity, hence, the roots of these systems and their following implications cannot be underestimated by researchers. More specifically, it is necessary to consider how and by whom GenAI systems are produced. As claimed by Tacheva and Ramasubramanian (2023: 1), the production and maintenance of these computational infrastructures is the result of "interlocking systems of oppression" and of social order "rooted in heteropatriarchy, racial capitalism, white supremacy, and coloniality", perpetuating "its influence through the mechanisms of extractivism, automation, essentialism, surveillance, and containment". Thus, the use of GenAI systems must be evaluated taking into account the violent contradictions underlying their perceived benefits.

At an epistemological level, GenAI also raises concerns, such as the generation of "algorithmic hallucinations" (D'Alessandro and Ferzetti, 2024) and the irreproducibility of its results, which challenges the foundational principles of scientific rigor, accountability and reliability.

As argued throughout the paper, GenAI are complex socio-technical assemblages that consist of several activities concerning both human and nonhuman elements. Their functioning is based on recursive patterns, each data point fed to the machine will contribute to craft its output (Airoldi and Rokka, 2022). What lies in between the input and the output — i.e., the strings of code that guide the process by which online algorithms ingest data and then produce an output — is not transparent and neutral, but rather the outcome of value-laden practices that contribute to the socialisation of artefact. In this sense, "machine learning systems encode a peculiar sort of habitus, a *machine habitus*" (Airoldi, 2021: 28). The activities of GenAI systems "result from the dynamic encounter between an adaptive computational model and a specific *data context*" (*ibidem*), therefore, their activities are always the outcome of social and cultural phenomena that sociologists have been studying for decades.

GenAI is different altogether to digital platforms, they are a different object of study, but not a context. Research through GenAI, therefore, is inevitably intertwined with research on GenAI as the results produced by GenAI are also the outcome of the practices and narratives underlying the design and adoption of these systems. In this scenario, the interaction between a GenAI system's functioning and the data researchers provide raises methodological challenges for qualitative and quantitative research.

In the Bourdesian terms used by Airoldi (2021), we may ask ourselves: what is the "habitus" of the assistant? How can social researchers keep track of the recursivity of GenAI systems in their research endeavours? These questions remain open for further investigations, but this article aimed to highlight an essential point: researching with GenAI implies an inevitable entanglement with its underlying principles and necessitates continual reflection on its socio-technical premises.

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