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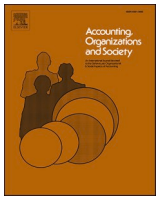

Memories lost: A history of accounting records as forms of projection

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ABSTRACT

This paper develops a theoretical history of the intricate relationship between accounting as a recording technology and memory, arguing that accounting's influence extends beyond mere financial documentation to shape human memory and projections into the past and the future. Drawing on Stiegler's theory of transindividuation, understood as the *trans*-formation of individuals, groups and technologies, and his emphasis on technology-mediated memory, we propose that varying types of accounting records cultivate different memory forms by fostering spatiotemporal projections which reshape the societal perception and comprehension of accounting. Our analysis relies on a comparison between two decentralized transaction recording systems similar in their operations, but which emerged in two different eras: blockchain and early double-entry bookkeeping. Our approach draws from Haydu (1998) to identify similarities and contrasts between different periods which can emphasize the uniqueness of each, while conceptualizing long-term trends. By juxtaposing DEB and BC as instances of decentralized records, the study postulates a critical shift in accounting's transindividuation over time. We argue that while DEB's norms of recording aided in the formation of collective memory and long-term projections, turning records into objects of social investment, BC's recording, propelled by automation and an economic emphasis, manifests as an isolated numerical sequence hindering the scope of human projections. We posit that compared to early DEB, BC recording, although it holds the potential for democratization, may lead to divisions between users, among themselves, and with their records. We discuss the potential implications of this *trans*-dividuation process for notions of accountability, transparency, regulation, and the broader political role of accounting in society.

1. Introduction

The connection between accounting and memory may seem obvious to many, as accounting is widely recognized for generating records that enhance decision-making and optimize profits. This perception, however, has not always been prevalent. In medieval times, accounting records held a far-reaching significance that extended beyond financial facts. They played a central role in preserving collective memory and fostering social relations (Puyou & Quattrone, 2018; Quattrone, 2015). Even today, accounting records remain a repository of memories beyond monetary information, nurturing a feeling of belonging and community (Yu et al., 2018). Grasping these insights is crucial to understanding the wider implications of accounting within society, notably the sway of "cultural-cognitive processes" (Robson and Ezzamel, 2023) that steer the evolution of accounting and are manifest in its outcomes. Nonetheless, studies on the relationship between accounting and human memory are dominated by approaches that narrow the question of memory to its role as a storage capacity and its potential for improvement in optimal performance, as illustrated by a long tradition of Judgement and Decision-Making research (Birnberg & Shields, 1984; Libby & Trotman, 1993; Peecher et al., 2013; Yip-Ow & Tan, 2000).

This paper seeks to unravel the trajectory of what we term "memory forms" or mental representations of the past, which materialize through accounting records and contribute to the shaping of both individual and collective self-formation. Ours is essentially a project of "theoretical history", which takes as its point of departure the recognition that "various types of historical systems have their own logic, that is, their own active laws of development" (Rozov, 1997, p. 340). Yet we are not aiming for a mythical all-encompassing narrative; instead, we focus on theorizing the complex structural frameworks within these systems, their implications in specific contexts, and the dynamics of their trajectories. At the core of this project lies our engagement with Stiegler's concept of transindividuation, understood as the mutual *trans*-formation of individuals and groups within a given techno-semiotic milieu, which

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trans-forms through the same process (Stiegler, 2012). In contrast to other sociomaterial research that adopts an "onto-epistemological" stance (Barad, 2007), Stiegler's distinct focus on memory sets his perspective apart. This emphasis allows him to highlight the distinct qualities of technologies that actively contribute to the creation of meaning and the formation of entities. Stiegler sees technology as the "externalization" of human memory, challenging the notion of a linear process where memory comes before its integration with technical tools. Instead, the interiority of our memory takes shape through its manifestation in these external tools (Stiegler, 2009, p. 54; 2011, p. 28). This prosthetic memory shapes and influences all cognitive and cultural processes, while also being their product. Transindividuation processes draw upon shared representations of the past which give rise to a common horizon of expectations through technological means (Stiegler, 2011, p. 89). Thus, the historical development of transindividuation parallels that of technologies, such as accounting, which shape the ways in which human projections unfold (Stiegler, 2012).[1]

Critical accounting studies have previously emphasized the existence of dynamic relationships between human memory and accounting norms and practices. Notably, the visual aspects of accounting, imprinted in memory, have been identified as influential in shaping perceptions of reality and guiding individuals' thoughts and actions (Thompson, 1991; Quattrone, 2009; Pollock & D'Adderio, 2012). Additionally, accounting records have been associated with the intergenerational transmission of shared knowledges (Ezzamel, 2012; Quattrone, 2015). Despite these pioneering insights, the cognitive and cultural fields of accounting research remain relatively unexplored compared to the predominant focus on governance and control (Miller & O'Leary, 1987; Carmona et al., 2002; Martinez, 2011; Walker, 2016). Yet the complementarity between these approaches has been previously illustrated, as seen in ANT studies, where the integration of governance and the sociocultural dimensions of accounting is emphasized (Chua, 1995; Corvellec et al., 2018; Ezzamel & Hoskin, 2002). Nevertheless, accounting's involvement in the very emergence of human societies, bringing people together around a common understanding of their temporal trajectories, calls for greater scrutiny. The implications of this foundational role are vast, as accounting's memory forms shape the different epochs of its evolution and ascertain how it influences the management of organizational life.

In this paper we seek to highlight the mutations of accounting's transindividuation over time. To achieve this, we explore how accounting as a recording technology relates to memory formation in two distinct time periods. While the standardization of accounting records occurred during the early modern era with the widespread adoption of double-entry bookkeeping (henceforth referred to as DEB) across Europe, establishing itself as a universal trade language (McWatters & Lemarchand, 2010), digitalization has brought about novel ways in which records assimilate with their surroundings. This paper uses the case of blockchain (referred to as BC) to represent the digital automation of accounting records. We juxtapose this with the historical precursor of early DEB, which similarly relied on decentralized consensus to generate records but emerged prior to any form of computerized automation. By contrasting these two historical instances of decentralized recording, we gain a dual perspective on accounting's evolution, uncovering insights obscured by a purely historical or contemporary focus. Our approach follows Haydu's assertion that comparing different time blocks can illuminate each era's uniqueness and the long-term trajectory of a given issue (Haydu, 1998). In our two cases, their singularity allows us to see the changing character and trajectory of accounting's transindividuation.

Focusing primarily on the technological dimensions of transindividuation, our particular emphasis lies on contrasting recording norms rather than practical adherence. While usages may entail reappropriation dynamics, these operate within systems that set the rules, asserting their subtle yet pervasive influence. Put simply, technological standards shape the complex interactions each individual maintains with their surrounding artifacts. Given our emphasis, we touch on implementation only when it clarifies the fundamental intent of the law. Similarly, as we strive to navigate the complex issue of technological determinism and embed our two technologies in their socio-cultural contexts, the core objective of this study remains the evaluation of accounting records' changing role in transindividuation processes. While acknowledging the influence of human agency in record production, our analysis aims to comprehend how the resulting records shape human memory and projections, which in turn determines the technology's distinct significance in different eras.

By delving into the connection between particular recording norms and evolving memory forms, we uncover insights into cognitive and cultural frameworks influencing economic action and social relations. We emphasize similarities between DEB and BC recording norms across four main aspects: the use of codified languages, system referentiality, ledger infrastructure, and validation procedures for entries. Subsequently, we scrutinize the discrepancies found within these shared aspects, serving as the foundation for our conjectures about shifts in transindividuation and their implications for the meaning of accounting in the digital era. We find that early DEB's recording was intimately tied to the construction and re-actualization of collective memory, forming the basis for both short and long-term projections that bridge distant history with unpredictable current and future times. In comparison, BC's recording narrows the scope of human projections for two main reasons. Firstly, BC's narrow focus on short-term economic gains restricts the possibility for multidimensional and long-term projections. This is reinforced by BC's real-time operations, which prioritize the ever-present, encompassing the immediate past and the calculable, near future. Overall, while DEB's recording norms nurture transindividuation, where records underpin projections shaping merchants' collective identity, BC's recording norms align with Stiegler's concept of transdividuation, where individual actions fragment into algorithmic operations, becoming functions of machines rather than expressions of collective individuals. We further elucidate Stiegler's characterization by proposing a threefold movement of separation induced by automated recording. Firstly, records gain interiority, leading to a division from their users. Secondly, a divide emerges among users, who are no longer collectively engaged in making sense of the technology. Lastly, within each user, a division arises between perception and analytical faculties. We argue that accounting's transdividuation, defined in this manner, has profound implications for notions of transparency, accountability, and, on a more tangible level, for accounting's regulation and its role in shaping power structures within society.

The main contribution of our study is to rework the relationship between accounting, time and space. Through our comparison, we show how norms for recording are involved in the emergence of specific memory forms and the associated spatiotemporal projections, which in turn determine how individuals relate to themselves and to one another through accounting records. While prior research on time and space has primarily focused on matters of governance, coordination, and control (Miller & Rose, 1990; Ezzamel & Robson, 1995; Mouritsen & Bekke, 1999), other studies suggest the presence of a reciprocally influential connection among accounting, memory, and self-formation. Yet these aspects have not systematically been studied together. Memory work in accounting has tended to focus on its visual properties (Quattrone,

[1] For Stiegler, 'projections' refer to the movements of the mind as it creates mental representations of spacetimes that exist beyond itself (Stiegler, 2012). Projections therefore can be understood as "displacements" of the mind towards absent spaces located in the past or future, forming the very foundation of thought.

2009), while works suggesting a relationship between accounting and collective memory (Ezzamel, 2012; Quattrone, 2015) or between accounting and the temporal ordering of society (Ezzamel & Hoskin, 2002; Hoskin & Macve, 1986) do not specifically delve into the cognitive issue of projections and memory formation.

We further enrich the literature on accounting's digitization by revealing its often-overlooked connections to time and space. Recent accounting digitization studies have mostly focused on organizational structure shifts (Agostino & Sidorova, 2017; Bhimani & Willcocks, 2014; Grenier et al., 2015), market changes (Poon, 2009; Williams, 2013), and valuation mechanisms (Kornberger et al., 2017; Lee et al., 2015). While the issue of human-machine interaction has been examined from the perspective of shifting professional boundaries (Arnaboldi et al., 2017; Suddaby et al., 2015), changes in valuation processes also internally affect humans, generating new responsibilities (Scott & Orlikowski, 2012). Such insights prompt an exploration of the formative properties of the digital, an area explored in cultural theory, media and STS studies (Andrejevic, 2013; Lupton, 2016, pp. 1–5; Thrift, 2014; Väliaho, 2014) but nascent in accounting (McDaid et al., 2023). Our contribution advances this area by emphasizing the effect of real-time accounting on memory forms.

2. Accounting and the structuring of spacetime. From management control to memory formation

Critical accounting research has long revealed that the role of accounting in the spaciotemporal structuring of organizations extends beyond its conventional function of aiding memory for optimizing profit-seeking activities. Time and space have primarily been studied as elements of governance and management control, where accounting is used to create temporal and spatial enclosures designed to enhance coordination and overall performance within the organization.

Numerous studies have delved into the ways in which formalizing, quantifying, and documenting temporal aspects within accounting records creates a temporal grid to locate and manage events, aiming at eliminating inefficiencies through the creation of timeframes, schedules, and deadlines (Ezzamel & Robson, 1995; Hopwood, 1989; Quattrone & Hopper, 2005). Time-based management practices are not just seen as technical tools; they are deeply intertwined with the social fabric of an organization, serving as instruments for disciplining employees and legitimizing managerial authority (Anderson-Gough et al., 2001; Mouritsen & Bekke, 1999). Consequently, the setting temporal performance standards is a complex and inherently politicized process, involving struggles and compromises, reflecting different values and notions of organization priorities (Ezzamel & Robson, 1995; Nandhakumar & Jones, 2001). Similarly, the implementation of spatial boundaries has been regarded as a critical element of management control. Governmentality studies in particular have expanded on the concept of calculable spaces and the processes of territorialization (Miller & Power, 2013) to show how accounting numbers are harnessed to exercise control across spatial dimensions. Such role encompasses the recursive relationship between accounting and other bodies of knowledge through which different entities are simultaneously constituted and made amendable to government, ranging from individuals (Ogden, 1997) and profit centres (Kirk & Mouritsen, 1996) to factories (Carmona et al., 2002), hospitals (Arnold & Oakes, 1995), industrial assembly lines (Miller & O'leary, 1994), even entire populations (Miller & Rose, 1990) as well as the most "fluid" spaces at the micro level within organizations (Vaivio, 2006). This research stream highlights the significance of shaping time and space as a mechanism of control, which may vary depending on the organizational context and the informational tools employed.[2]

Other studies drawing on ANT, have more broadly shown how accounting practices and ideas enable individuals to engage with and influence other people and events in different locations and times, through processes of framing and translation (Robson, 1992). Ethnographic investigations into ANT have delved into the utilization of accounting inscriptions, techniques, and devices by various actors engaged in shaping organizational representations. Such representations are found to exercise far-reaching influence and control over organizations, individuals, and interactions beyond their boundaries, shaping decision-making processes and accountability structures (Chua, 1995; Edwards et al., 1999; Skærbæk & Tryggestad, 2010). ANT research brings into focus the importance of adopting a broader and multidimensional perspective on control to apprehend strategies that involve complex webs of interactions among actors, instruments, ideas and activities. As a result, our understanding of the nuanced power interplays inherent in accounting's transformative effect on time and space has deepened considerably.

Complementing the predominant focus on governance and strategy in the previous discussions, the link between accounting, time, and space has also been explored from a cognitive perspective for users of accounting information. While focusing on issues of organizational power and conflict, Ezzamel and Robson highlight how ingrained patterns of cyclical time in organizations shape individuals' perception of time and their inclination to project future actions (Ezzamel & Robson, 1995, pp. 158–160). Takatera and Sawabe (2000) have examined how accrual accounting creates an internal concept of time that is separate from external time dynamics, which serves as a shared cognitive foundation for communication both inside and outside organizational boundaries. Expanding on the notion that distance is socially constructed (Quattrone & Hopper, 2005), Corvellec et al. (2018) demonstrate how accounting devices such as invoices may be used to create new patterns of visibility that reduce the cognitive gap between the economy and the environment. Anderson-Gough et al. (2001) argue that the socialization of audit trainees plays a crucial role in developing a time-conscious mindset and temporal outlook. Although these studies do not explicitly mention the connection between accounting and memory, only this relationship can elucidate how accounting norms and practices effectively shape human perceptions of time and space.

Critical accounting studies have only occasionally explored this relationship explicitly. When this has been the case, memory is not seen merely as a separate and potentially flawed human storage capacity for accounting information (Kennedy, 1995; Ricchiute, 1999; Wilks, 2002). Instead, memory has been described as a partial product of the accounting technology itself. Quattrone has discussed how the visual properties of accounting create and reinforce social memory and shape perceptions of reality (Quattrone, 2009). Without explicitly mentioning memory, Thompson makes a similar argument when suggesting that the "printerly" character of DEB helped it become a "way of thinking" (Thompson, 1991, pp. 592, 595, 598). Quattrone has also highlighted that accounting practices can play a key role in managing and preserving institutional knowledges over time (Quattrone, 2015), while Ezzamel identifies accounting records as part of a broader textual cultural

[2] The relationship between specific accounting techniques and control mechanisms exhibits patterns that are both unpredictable and heterogeneous. For instance, modern digital technologies effectively reduce distances through the acceleration of information flows (Bhimani & Willcocks, 2014), theoretically enhancing control in a principal-agent, centre-periphery models. Yet in practice, the collapse of distances made possible by real-time information can impede the scope of managerial control by facilitating the emergence of multiple centres with varying interests and intents (Quattrone & Hopper, 2005).

heritage that is transmitted through generations, contributing to create a collective narrative about the past (Ezzamel, 2012, pp. 76–77).

As research by Quattrone and Ezzamel suggests, the transmission of memory through accounting can indeed be related to individual and collective self-formation. Thus, token accounting is said to have facilitated the shift from nomadic to settled agricultural communities in Mesopotamia by instituting a regular work structure and consolidating socio-economic relations through concrete records of past transactions and indications of future commitments (Ezzamel & Hoskin, 2002). In Ancient Egypt, accounting numbers and inscriptions embodied notions of clarity and harmony which aligned with the cosmic order, while promoting collective accomplishment and personal accountability (Ezzamel, 2012). A few centuries later, the adoption of Arabic numerals brought about a novel perception of social order and control, manifesting in the emergence of clocks and enclosed spaces such as monasteries (Hoskin & Macve, 1986). From an interpersonal perspective, Renaissance record-keeping facilitated merchants in understanding their societal roles, fostering an awareness of interconnectedness within the community (Quattrone & Puyou, 2018). Closer to the present, Anderson-Gough et al. (2001) have discussed how time-consciousness and temporal visioning among ICAEW trainees influence the development of their professional identity. Finally, Yu (2021) explores how accounting for Covid-19 deaths was able to foster memory as collective grieving and a sense of unity among the deceased, the dying, and the living.

The insights presented above highlight a mutually formative connection between accounting, memory, and the development of social relations, which has yet to be systematically investigated. Our goal is to delve into this uncharted territory by scrutinizing the influence of different recording forms on the scope of human projections and the nature of the transmitted past, as well as the resulting societal implications of accounting across diverse contexts. This onto-epistemological approach aligns with Robson and Ezzamel's plea for studies into the cultural cognitive fields of accounting. It not only complements but also stands on par with the predominant research trajectory that centres on issues of power and control within strategic frameworks. This is because control processes are inherently tied to specific types of accounting records, making governance reliant on immediate recollection and therefore short-term memory. Similarly, transgenerational memory shapes the understanding of current and emerging accounting tools, thereby determining their role as instruments of control. Therefore, organizational control cannot be fully understood outside of both the immediate and historical dimensions of accounting memory. Conversely, what appears to be a mere control tool might influence broader facets of human memory.

3. Stiegler's theory of transindividuation and its relevance for the study of accounting records and memory forms

To explore the relationship between accounting, memory, and self-formation, we draw on Bernard Stielger's concept of transindividuation (Stiegler, 2012), understood as the mutual *trans*-formation of individuals and groups within a given techno-semiotic milieu, like accounting, which itself *trans*-forms or emerges concomitantly. For Stiegler, transindividuation is a movement from an initially metastable system towards an undefined future, in which technologies appear and crystallise as the condition for time and space. While echoing socio-material studies of technologies which insist on the co-constitution of people and technology (Barad, 2007; Orlikowski, 2007), Stiegler goes beyond them by providing a historical characterization of the original connection between individuals and technology. In particular, he examines how technologies are an inherent part of memory (Stiegler, 2009, p. 54).

Expanding on Husserl's phenomenology of consciousness (Husserl, 1991), Stiegler introduces the notion of tertiary retentions to explain how memory emerges through technological objects. Primary retention in Husserl's phenomenology is the process by which a momentary experience leaves a trace in consciousness, slightly altered as it passes into the immediate past, enabling the perception of time as a flowing and continuous phenomenon.[3] On the other hand, secondary retention involves recalling past experiences, like a melody heard the day before. Stiegler contends that tertiary retentions, such as sound recording technology, shape secondary retentions (individual recollections of the melody), and subsequently influence the primary retentions that constitute the lived experience of the melody (Stiegler, 2011, p. 21). Tertiary retentions therefore play a constitutive role in both primary and secondary retention, demonstrating that memory is inherently social and intergenerational from its inception (Stiegler, 2010, p. 9, p. 67).

Together with our technologically shaped retentions, "protentions" are formed, as retentions *trans*-form into expectations through their encounter with perception (Stiegler, 2009, p. 329). Retentions therefore serve as reflective screens upon which all projections, whether pertaining to the past or the future, are formed. Thus, they facilitate the "spacing out of time" and the "temporalization of space" (Stiegler, 2011, p. 158), becoming the fundamental condition for the Derridean concept of "différance", understood as the processes of (spatial) differentiation and (temporal) deferral by which individuals apprehend their position in time as finite beings.[4] Tertiary retentions however can only play their role of projection screen "on the condition that they are practised" (Stiegler, 2015, p. 107) through apprenticeships, rituals, pedagogies, etc. Stiegler introduces the notion of "epiphylogenetic" memory to describe the process of transmitting acquired individual memory to future generations. Unlike genetic and epigenetic memory,[5] which are not interactive, epiphylogenesis through tertiary retentions ensures the preservation and passing down of experiences and lessons. This enables the continuity of scientific, philosophical, or literary projects and the establishment of traditions. Epiphylogenetic memory grants individuals access to a shared past, shaping their collective history and horizon of expectations.

Thus, for Stiegler, transindividuation is a fundamentally temporal process which enables humans to apprehend their space in time through technologies that both shape their short-term/cognitive memory and pass down their long-term/cultural memory, with the two dimensions constantly co-constituting one another and determining how we anticipate the future. By shaping memory and the correlated spatiotemporal projections, technologies play a pivotal role in the emergence of particular meanings within a sociotechnical arrangement.

Stiegler's approach to sociomateriality therefore introduces a distinct aspect of causality within a relationship that is typically regarded as dynamic, but often lacks specification. The concept of socio-material assemblages has been scrutinized in the history, sociology, and philosophy of science and technology. These studies have focused on the local impact of technologies on human practices in specific fields. Scholars like Pickering (1995), Bijker (1995), Law (2004), or Beunza et al. (2006) have explored the interplay between theories, practices, and materiality in shaping research, technological and market development. Although they emphasize the influence of materiality on human action and understanding, they do not delve into the mediating role of

[3] for example, in experiencing a melody, each note leaves a trace in consciousness that lingers and influences the perception of subsequent notes, contributing to the sense of a continuous musical flow rather than fragmented sounds.

[4] Stiegler contrasts with Derrida by asserting that *différance* extends beyond linguistics and requires technological mediation, involving the distinction between what is already there, and what is there to come, or the transformation of continuous temporal experiences into discrete spatial elements (e.g., letters, numbers, notes) through technical supports (Stiegler, 2009, p. 143).

[5] Epigenetic memory pertains to individual experiences and changes that occur within a person's lifetime but are not inherited by future generations upon their death.

memory in this process. On the other hand, studies focusing on the theory of sociomateriality tend to discuss the expressions and implications of its diverse forms, rather than identifying, like Stiegler, a historical, foundational and universal connection between humans and technology. For instance, Law and Mol (1995) introduced semiotics, strategy, and patchwork as concepts to reveal the symbolic and cultural importance of objects and the intentions of individuals interacting with them. Similarly, Orlikowsky (2007) used examples of search engines and mobile communication to demonstrate the fluid and unstable influence of technology on social interactions and organizational practices. Barad, who shares a conceptual affinity with Stiegler, directs her attention more specifically towards defining the nature of the relationship between the social and the material. Her primary focus lies in theorizing the dynamic flow of agency, wherein different elements of the world interact, influencing the formation and disruption of causal structures and properties. She introduces the concept of "agential cuts" (Barad, 2007, p. 140) to illustrate how specific scientific and cultural practices reconfigure the world by establishing boundaries.[6] Like Stiegler, she emphasizes that the fabric of spacetime emerges from this onto-epistemological process (ibid, pp. 140–142). She does not however extensively explore the specific role of technologies in this emergence, which is what is at stake in Stiegler's concept of tertiary retention.

Stielger's theory of transindividuation therefore seems particularly relevant to study calculative sociomaterialities like accounting, which shape and regulate the organization of time through their recording imperatives. Stiegler's perspective on the prosthetic nature of memory offers valuable insights into understanding the performative effects of accounting's visual properties (Quattrone, 2009; Pollock & D'Adderio, 2012). More broadly, Stiegler's onto-epistemological approach complements more action-focused ANT and governmentality approaches, providing deeper investigation into the culturo-cognitive characteristics of accounting that dictate its practical applications. To fully harness the potential of Stiegler's theory in accounting research, and shed light on the mutations of accounting's transindividuation over time, we use a comparative methodology.

4. A comparative methodology

Our comparative approach is motivated by the prima facie resemblances between early DEB and BC, which both rely on decentralized consensus to generate transaction records, and which represent two critical junctures in the long run history of accounting. While early DEB spread throughout Europe in the 16th century, becoming a universal grammar of trade, blockchain epitomises the digital transformation of accounting records and the potential "replacement" of accountants by machines and programmers (Casey & Vigna, 2018; Peters & Panayi, 2016; Yermack, 2017). Historically, accounting software like QuickBooks, Capium, Sage, or Auto Entry partially automated recording, with some aspects, particularly expense allocation, requiring human intervention. In contrast, the blockchain paradigm, alongside real-world blockchain applications, is intricately designed to collaborate with artificial intelligence (e.g., via smart contracts) to accomplish complete automation of recording processes, encompassing even cost allocation (EY Americas, 2019; Han, 2021; Gusc et al., 2022). Thus, we regard blockchain as a pertinent representation of automated recording, while DEB expanded prior to the emergence of any form of computer automation and is therefore a good proxy for the previous epoch of accounting's transindividuation. Notwithstanding that the blockchain technology has an ever-growing variety of uses (appendix, 7), and that DEB could be used to record events such as gifts (Yamey, 1959) or agricultural crops and yields (Montrone & Chirieleison, 2009), we focus our inquiry on the recording and execution of payment transactions, which are both core and common features of the two technologies.

Our investigation involves juxtaposing these cases through a theoretical historical lens, which focuses on the underlying mechanisms that drive historical developments, shedding light on the intricate relationships between various factors and processes. Our approach begins by emphasizing the contrasting features of historically distinct norms of recording and validating transactions. These norms encompass specific actions, ideas, and document types that describe and prescribe what is considered standard in the production and interpretation of records. Subsequently, we present conjectures regarding the interplay between such norms and the associated projections and memory forms – in essence, the spacetime conditions of transindividuation, which transcend its local unfolding. The underlying premise is that although we harness technologies in innovative ways, these actions are bounded by established norms or "frameworks of feasibility" (Rozov, 1997, p. 349) that wield significant influence and merit equal attention. These norms act as a set of expectations that extend beyond mere adherence, influencing how people define themselves in relation to accounting records. Yet they are not rigid or static but respond to the ever-evolving sociotechnical context. To examine these norms in both periods, we primarily draw from historical and technical literature that elucidates the protocol-related attributes of early DEB and BC, rather than relying on sources that reflect user-generated content signifying observance, rejection, or readaptation of these norms.

Such comparative analysis builds on the historical tradition of dividing the seamless continuum of time into blocks. While temporal blocks are usually organized around key events and predominant assemblages of social forces, we consider them from the perspective of the constantly mutating phenomenon of transindividuation. Such an approach is inspired by Haydu's claim that continuities and contrasts between different blocks of time can highlight each period's singularity and outline the long-term trajectory of a given issue (Haydu, 1998), thus avoiding the shortcomings of both generalising approaches, which search for causal regularities across periods,[7] and individualising approaches, which focus on the specificity of each historical case.[8] Haydu introduces the "reiterated problem-solving model" as an alternative to narrative and path-dependency approaches in historical sociology (Haydu, 1998). According to Haydu, while narrative methods connect events across time, considering common patterns (Skocpol, 1979) or larger narratives (Gordon, 1980), they often overlook the interconnections and influences between different periods. On the other hand, path dependency focuses on self-reinforcing sequences that shape outcomes over time (Roy, 1997) but fails to capture broader historical trajectories and the roots of critical junctures. The reiterated problem-solving model seeks to overcome these limitations by providing a temporal and explanatory order to events, accounting for both historical contingencies and causal relations. Haydu's concept involves

[6] These cuts encompass both conceptual and material dimensions, influencing how matter is perceived and mobilised in the world. They are not fixed or predetermined but contingent and continuously evolving through ongoing "intra-actions" between the material and the discursive.

[7] With generalising statistical or qualitative comparison can be used to generalize across time and space to uncover causal regularities among a set of carefully chosen cases, and to establish a theory's scope conditions. For example, Tilly et al. (1975) use four different time-series to analyse the impact of industrialization and urbanisation on working-class protests and their outcomes. Statistical patterns are detected for each space-time unit (France, 1830–1960, Germany 1815–1939, and Italy c.1830–1930). The comparativist ambition is to find the most valid theoretical model to account for social struggle and violence.

[8] An example of individualising is Bendix's work on authority in industry (Bendix, 1974), which shows how national variations in workplace ideologies relate to differences in the social structures of various space-time units (pre-1917 Russia, post-World War II East Germany, and England and United States during epochs of intense industrialization). Here the cross-case comparison highlights their irreducible singularities, rather than their commonalities, with regards to the problems of authority relations and legitimacy.

constructing a narrative that integrates critical junctures initiating lasting social regimes, by observing how recurring problems are solved. Continuities and contrasts between periods need not be sequential to become "part of the same intellectual enterprise" (Haydu, 1998, p. 356) to comprehend why humans choose specific solutions for similar issues at different points in time.[9]

We use Haydu's method as an exemplar of theoretical history and as a source of inspiration to shed light on the transformations of accounting through time. While DEB and BC were presented by their promoters as solutions to other specific organisational problems, such as the necessity to maintain one's business in good order in the case of early DEB (Dean et al., 2016; Ganim, 1996, p. 297; Miller, 1990), or the desire to break free from centralizing institutions in the case of blockchain (Nakamoto, 2008), the crux of our inquiry relates primarily to comparing the emergence of different sociomaterial arrangements, rather than the problem-solving properties of a technology in isolation. Our comparative approach draws on Haydu in that it separates similar historical cases of transaction recording to problematize their respective transindividuation processes. Diverging from methods that hinge on predefined variables and preconceived hypotheses regarding initial conditions or expected outcomes, our approach affords us the latitude to craft inductive conjectures rooted in our analysis of the two recording systems.

Differing from narrative and path-dependency methodologies, we refrain from regarding transindividuation as a sequence of chronological events or sequences directed by concepts of necessary or sufficient causes. Instead, in accordance with Stiegler's onto-epistemological perspective, we perceive it as an ongoing process marked by unpredictable patterns. We therefore examine and compare two snapshots of accounting's transindividuation without any initial assumption regarding the influence of specific configurations, like digitalization, or the extent of integrations between the "social" and the "technological". Through the juxtaposition of these snapshots, we identify shared features that encompass internal divergences, serving as the bedrock for delving into the evolutionary character of accounting's transindividuation. In particular, we establish a link between the uniqueness of each process and its distinct historical context.

5. BC and early DEB constrasted

Upon our initial examination, DEB appeared to be an early demonstration of decentralized production of transaction records. Subsequently, we have identified three additional areas of resemblance between our two recording technologies. Firstly, both early DEB and BC utilize a codified and repetitive language for recording transactions. Secondly, an equivalence exists between the act of transacting and recording in both systems. Within the BC framework, transaction validation allows for simultaneous recording and execution (appendix, §3). Similarly, in late medieval times, book entries served as a form of currency akin to physical cash, effectively constituting a transaction.[10] Thirdly, both technologies share a similar ledger infrastructure, comprising a network of interconnected and interdependent nodes. These nodes collectively support the creation of permanent and immutable records of transactions, arranged chronologically. Fourthly, the most notable commonality lies in the reliance on decentralized consensus for validating transactions. In this section we further explore these areas of resemblance and outline the ways in which their contours and content may differ, thereby highlighting the specificities of our two cases. Table 1 summarises our comparison.

5.1. Codified languages

The most fundamental dimension of BC and early DEB's distinct normativities resides in their common use of a codified language to produce records – "code" and DEB, respectively. These languages however vary in their degree of homogeneity, completeness, and the methods they employed to conceal identities.

Early DEB rules were not fully deterministic and were localised. Trading manuals offered models of bookkeeping based on the author's own experience (Bottin, 2001; McWatters & Lemarchand, 2010). Recording habits partly depended on the local context, each merchant's own preferences, and his judgement regarding the relative importance of different transactions (Matringe, 2016, pp. 37–40).[11] By contrast, while there may be much creativity and variety involved at the level of BC code development (Alam et al., 2021), once set up, a given code (for instance, C++ on the bitcoin blockchain) continuously repeats itself throughout the recording process. It provides simple and deterministic technical rules to generate a particular set of affordances and constraints (Narayanan et al., 2016, pp. 55–60; Berg et al., 2019, pp. 22–23). Thus, unlike the varying length and level of detail found in DEB entries, BC entries maintain a consistent and uniform structure. While DEB accounts could refer to specific people, places, and/or stages of an operation, BC blocks are all similar in their format (appendix, §3). Finally, while DEB allowed for corrections, such as striking out and additions, to integrate uncertainty (Yamey, 2012, pp. 10, 14n.; Goldthwaite, 2015, pp. 616, 623), BC code cannot be reversed.[12]

Second, DEB entries were drawn up in reference to the interpretative discourse of commercial correspondence, which sometimes became embedded in the entries themselves when elements of contextualisation were provided. This was because merchants involved in international

[9] Haydu's temporal approach to the comparative method departs from traditional spatial comparisons in historical scholarship, which focused on cross-national, cross-cultural, and centre-periphery analyses dealing with domination, backwardness, and exceptionalism (Levine, 2014). It has influenced numerous works in sociology, political sciences and public policy, social movement, and organization studies. Researchers have used reiterated problem-solving to explore the precedence and endurance of social structures and processes (Kaup, 2015), as well as to explain variations in the meanings and purposes of similar concepts and objects across different time periods (Berbrier, 2013; Gong, 2017; Saito, 2006). Additionally, this approach has helped connect the past to the future by establishing general patterns of policy dynamics and uncovering links between past decisions and future choices (Howlett & Rayner, 2006; Lainer-Vos, 2013; Lin, 2015; Rayner, 2009)..

[10] Book credit was not a right to claim a payment in cash or an obligation to pay in cash for a debtor, but a form of 'scriptocurrency' which counted as money just as much as hard cash (De Roover, 1948, p. 321; Mueller, 1997, p. 22; Goldthwaite, 2009, pp. 408–409). Whether one or the other form of payment was sought after depended on the general conjuncture and the particular circumstances surrounding a given transaction.

[11] Even in accounting manuals, where transactions were supposed to be recorded in a concise style, some transactions could be recorded at length with an abundance of details and comments, if they were deemed to deserve special attention (see for example Savonne, 1588, p. 12; Boyer, 1627, p. 34; Van Damme, 1606, p. 196).

[12] Only on rare occasions, such as the Decentralized Autonomous Organization (DAO) successful attack in 2016 (Mehar et al., 2019), does code need to be amended. As a rule, the code runs automatically without needing to be checked..

Table 1
Comparison of DEB and BC recording norms.

Normative properties	Early double-entry-bookkeeping	Blockchain
Language codes	Diverse: partially deterministic (DEB) + interpretative (Perfect Merchant rhetoric)	Singular: Deterministic, universal, univocal (code)
	Amendable	Irreversible
	Context-dependent, interconnected	Self-sufficient, autonomous
	Self-governed identity concealment	Centrally managed identity concealment
Traces & referentiality	One transaction = multiple traces Transaction seen from different angles	One transaction = one trace Transactions seen from one perspective
	Traces reference credit relationships between merchants	Traces reference other traces
	Traces' "quality" reflects morals of merchants	Asocial history of punctual coin transfers
Ledger infrastructure	Interconnected books	Interconnected computers
	Symbolic anchorage: Secret ledgers connected to city and family history and to afterlife	Symbolic anchorage: distributed ledger as symbol of contestation against present hierarchical power structures
	Information partially shared between books	Single digital storage space fully and infinitely reproducible in any digital device
	Institutionalised gossip provides additional information	Light nodes restrict the circulation of information
Consensus procedure	Positively defined, knowledge-driven consensus: accuracy and righteousness	Negatively defined, action-driven consensus: avoid double-spending
	Alethurgy to establish truth of law	Algorithm as truth of fact
	Unpredictable outcome (diversity of recording possibilities)	Predictable outcome: Yes/No. Only one recording solution
	Supposedly disinterested and "free"	For profit competition between miners
	Decentralized consensus as compromise between participants	Decentralized consensus as competition Centralization around "winner node"

trade could not fill their ledgers without the information provided by their correspondents abroad. Copies of *nostro/vostro* accounts[13] occupied a central position in business letters and were accompanied by comments explanations which also regularly made their way into DEB ledgers. This secondary language necessary to make sense of and complete DEB was itself highly codified. It belonged to a broader 'perfect merchant' rhetoric which involved a standardised way of writing, talking, and behaving with others that had been elaborated in trading networks since medieval times and were later codified in mercantile treatises (Jeannin, 2002, p. 299; Hoock, 2008; Puttevils, 2016, pp. 11, 102; Trivellato, 2019, pp. 60, 124).[14] This impersonal code of conduct enabled merchants who often did not know or meet one another to carry out discontinuous trade with a variety of trading partners (Goldthwaite, 2009, p. 107; Matringe, 2016, pp. 139-44; Court, 2018). In comparison with DEB's code, which references and combines elements of the perfect merchant rhetoric, BC code is more self-sufficient and self-referential.

Lastly, early DEB and BC languages offered distinct approaches to concealing identities. In early modern times, the perfect merchant rhetoric acted as a mask, requiring all network members to adopt the same discourse and behaviour. Additional protection could be achieved by using cryptic titles for accounts, where fake initials or symbols concealed the identity of high-risk and high-flying clients (Matringe, 2016, pp. 227, 370). In both cases, transactors actively participated in hiding their identities, either by learning and adhering to a prescribed behaviour or by negotiating extra protection measures with clients. In contrast, BC's cryptographic method, while not infallible (Andola et al., 2021), allows transactors to maintain their claimed identities while conducting transactions, as the cryptographic process automatically provides them with a mask (appendix, §2).

5.2. Traces and referentiality

Both BC cryptopayments and early DEB scriptopayments are simultaneously point-in-time transactions and the durable signifiers of such transactions. Yet the representation and interpretation of transactions within these two systems of traces exhibit variation.

DEB transactions were typically recorded multiple times, providing unique perspectives on each transaction. While memoranda listed transactions chronologically based on their supposed moment of occurrence, journal and ledger entries referring to debits and credits delved into the transaction's impact on the business's wealth, outlining its boundaries. The correlation between transaction numbers in the ledger, representing the transaction amounts, and the numbers in the balance sheet, indicating the business's debt or creditor status, further enhanced this perspective. Early DEB transactions were structured to emphasize credit relationships, recorded in personalized current accounts that chronicled the history of these credit ties between an entity and its partners. *Vostro/nostro* accounts circulating between firms contained identical transaction traces from the perspectives of the different parties involved in the transaction. On a symbolic level, the symmetry of accounts formed an aesthetic code that united members of a mercantile society, particularly notable in places like Florence where kinship, personal relations, friendships, economic ties, and political connections intertwined constantly (Padgett & Ansell, 1993; Puyou & Quattrone, 2018). The arithmetical qualities of DEB traces also played a role in publicly and divinely legitimizing merchants, creating an impression of just profits (Aho, 2005; Carruthers & Espeland, 1991; Poovey, 1998, pp. 54–55). The early DEB system of transaction traces therefore mapped the trajectory of each transaction from diverse viewpoints. These interconnected perspectives were integrated in a broader semantic framework maintained by continuous numerical and narrative references to a shared history and belief system.

On the other hand, BC traces offer a singular version of factual truth

[13] While *nostro* accounts recorded the activity carried out by a correspondent on behalf of a given merchant and were thus proprietary accounts, *vostro* accounts were commission accounts recording the activity a merchant carried out on behalf of his correspondents. Transactions recorded in an agent's *nostro* account were recorded in an inverted fashion in the *vostro* account open in his name in the ledger of his principal, with each debit recorded in the first one becoming a debit in the second one. For example, if A purchased a bill of exchange on behalf of B, A would debit its value from B's *vostro* account, while B would credit the same value in A's *nostro* account. (see De Roover, 1944; Yamey, 2011).

[14] Trading manuals were often written by experienced or retired merchants, who offered standards for best practice – rather than prescriptive rules (De Ruysscher, 2018) – based on the economic environment and the mercantile practices they had witnessed their whole lives (Bottin, 2001; McWatters & Lemarchand, 2010). Although they were sometimes mentioned in general trading manuals, business letters were also the object of specific separate treatises (Meurier, 1558; De Vivre, 1576; Bourlier, 1576). Such letters were typically written in a courteous style which highlighted reciprocity (Court, 2018; Matringe, 2016; Trivellato, 2009, p. 169, p. 161), in a context where expressions of mutual obligation increasingly acquired a contractual meaning (Fortunati, 1996; Petit, 1997). Like notarized documents, business letters had a codified structure and together with ledgers, were valid as proofs in a court of justice (Goldthwaite, 2015; Trivellato, 2009, p. 168; Yamey, 2012, p. 633).

(appendix, §5), leaving no room for deviations from this unequivocal historical record. The process involves consolidating transaction numbers into chronologically ordered blocks, generating numerical traces that only depict punctuated exchanges between anonymous parties. This emphasis on the horizontal circulation of tokens results in a purely visual geometry of exchanges, devoid of any of the contextual information which in early DEB enriched the human interpretation of transactional significance. By prioritizing chronological order and anonymity, BC's records appear to disregard the potential economic and social implications of transactions for various parties within and beyond the network. Such self-referential system of transaction traces indeed restricts the visibility of their broader implications and meaning, which can only be reconstituted ex-post by willing and capable actors, such analysts and researchers engaged on platforms like Glassnode.

5.3. Ledger infrastructure

Both BC and early DEB rely on a network of interconnected storage devices that facilitate the production of a permanent and immutable record of transactions. However, these respective infrastructures differ in terms of their physical and symbolic components, and in the way they organize the circulation of information.

The most evident contrast in ledger infrastructure lies in its materiality, distinguishing nodes in BC from books of accounts in early DEB. These two forms of record-keeping not only differ physically but also in the significance attributed to them. In the context of early DEB, ledgers gained meaning within a broader network of objects, such as merchants' counters, other ledgers, and letters, as well as through various symbols like signatures, hallmarks, and dedications. The symbolic essence of DEB ledgers emerged from the localized nature of the information they contained, owned exclusively by a particular merchant, and shrouded in secrecy, reflecting the principle of business confidentiality (Richard, 1991, p. 382–383; Safley, 2021). These private ledgers, accessible only to the merchant, were also linked vertically to the family lineage and extended into the afterlife. A given merchant family's ledgers proudly displayed their coats of arms, signifying their status within the long-standing Florentine aristocracy. Ledgers were organized chronologically and marked with alphabetical letters, capturing the history of partnerships, sometimes spanning generations (Goldthwaite, 2009, p. 76). Such ordering linked each ledger to the family's heritage, illustrating the longevity of the merchant house. Additionally, the opening dedication to God and saints (Aho, 2005, p. 67) connected the ledger's contents to the afterlife. Thus, the physical space of recording was intricately tied to broader human, historical, and ethereal realms, making each ledger unique and more than just a recording medium. It served as a space where the public identity of merchants and their faith were negotiated.

In the case of BC, the symbolic dimension is still present, but focuses on the present. The development of peer-to-peer networks in the 1990s not only aimed for efficiency but also represented a political countercultural movement seeking an idealized world of social justice and equality (De Filippi & Wright, 2018, pp. 18–19). Although some of these mobilizing ideals may have waned in force, they continue to motivate the adoption of BC among companies and individuals (Newsfile, 2022). From this perspective, BC is not merely seen as a platform for reliable and fast transactional execution and recording, but it is also symbolically perceived as an immediate "space of protestation". However, unlike DEB ledgers, the BC distributed ledger is not intertwined with imaginary social spaces and temporalities characterized by remoteness and longevity.

The second significant distinction between early DEB and BC ledger infrastructure pertains to the circulation of information across the network. At first sight, the distribution of information appears more homogenous in BC infrastructure. This is because all transactions performed on the network are directly accessible to any node, allowing for the potential reproduction of the entire transaction history (appendix, §3). In contrast, each individual DEB ledger contained all transactions specific to a particular merchant and was horizontally connected to the ledgers of their trading partners through mirror *nostro/vostro* accounts. Consequently, the bulk of transactions in an international business network was reflected in a vast web of interconnected DEB ledgers, which were complementary rather than identical in terms of the information they contained.[15]

This apparent contrast between the distribution of information in the two systems may be nuanced for two reasons. First, the existence of light nodes in the blockchain ecology (appendix, §1) enables users to rely on a wallet service that only displays their own transactions, effectively acting as a centralizing agent (Abramova et al., 2021).[16] Only users interested in the complete set of nodes and their activities may choose to download the full version of the distributed ledger.[17] In contrast, the interconnection of ledgers in the DEB network was facilitated by commercial correspondence, which was intended to circulate information regarding transactions in which the sender/recipient did not directly partake. Thus, each "node" in the DEB network accessed more information than disclosed in *nostro/vostro* accounts. This was further reinforced by customary word-of-mouth contacts between merchants, creating a continuous form of "gossip" (Fan et al., 2021) that facilitated the circulation of confidential information throughout the network.

5.4. Consensus procedure

The most striking similarity between early DEB and BC is their common reliance on a decentralized consensus procedure to validate entries and therefore make payments. Yet such procedures also fundamentally differ in their purpose, motivations, and approach to decentralization.

The purpose of early DEB was knowledge, in a context where book entries were up for debate between merchants. In business letters, copies of accounts were usually followed by a standard formula inviting the correspondent to verify the account and notify the sender in case he had detected any error or disagreed with the entries for any reason.[18] Only the consensus on the exactitude of accounting entries would lead to their final validation embodied by the crossing of accounts. The verification concerned both the context of the transaction (its motivation and the existence of a provision), how it was calculated (exchange rates, level of fees, etc.), and how it should be recorded (which accounts to debit and credit). The purpose of DEB consensus thus was to explain and to justify transactions which could be incorrectly priced and/or inaccurately recorded in the accounts.[19] Reaching such knowledge partly relied on the perfect merchant rhetoric, which ensured that merchants

[15] By contrast, the interdependency of ledgers in the BC infrastructure arises from the decentralized consensus mechanism and the employment of redundancy for protection against potential system failures or attacks (appendix, §1).

[16] In practice, even decentralized or non-custodial wallets have been shown to present "privacy holes" (Dilmegani, 2022; Lyons & Dapp, 2021).

[17] In practice, this could be hedge funds (PwC, 2022, p. 18), governments (Allessie et al., 2019), analysts (The Block Research, 2022) or researchers (Makarov & Schoar, 2021) willing to track cryptocurrencies movements and do market analysis.

[18] See for example Vázquez de Prada, 1960, v. 2, p. 60; Ruiz Martín, 1965, p. 103; Da Silva, 1956, p. 198; Roseveare, 1991, pp. 323, 356.

[19] See for example Da Silva, 1956, pp. 249, 262; Roseveare, 1991, pp. 361, 411; Archivio Salviati, I, 565, f. 3v.

communicated on equal grounds, using a common language and with shared objectives in mind.[20] When an agreement could not be reached, external 'experts' were asked to examine the problem (Yamey, 2012).[21] Therefore, DEB consensus on book entries resulted from an "alethurgy" or the "procedures by which one brings to light what is laid down as true as opposed to false" (Foucault, 2014, p. 7). What we define here as DEB "truth of law" encompassed both accuracy, indicating a degree of correspondence between an entry's description and an event occurrent outside of the ledger, and righteousness, referring to the moral integrity of the accountant.

In contrast, the purpose of BC consensus procedure is practical, and tends to be negatively defined, i.e., to prevent double spending (appendix, §3). While the formatting of a given language code may involve debates between actors who create them with certain objectives in mind (Pflueger et al., 2022), and although the choices of these actors subtly shape the framework of economic action, these decisions typically do not undergo broader deliberations involving all users of the technology. Once established, code acts as law, and BC's factual truth relies on the automatic verification of a provision's existence. When faced with a double-spending scenario, the consensus does not aim to determine which transaction occurred in the presence of a provision, but to eliminate a correct amount of non-fundable transactions or one of the two competing transactions within a block. While the DEB consensus was grounded in a foundation of skepticism and the significance of verification for discerning truth, the BC consensus leans more towards a trust in technology, potentially diminishing the emphasis on knowledge. For many users unfamiliar with the intricacies of BC, confidence in the technology's reliability becomes paramount..[22] In the context of early DEB, the utilization of technology did not serve as a safeguard against errors and fraudulent activities, and human intervention was necessary to establish truth, whereas in a BC regime, humans define technology as truth and numbers speak for themselves. Consequently, while DEB negotiations could lead to a variety of solutions/recording possibilities, BC's elimination-based consensus leads to a yes/no outcome.

These contrasting purposes of consensus imply different perceptions of participants' motivations within the two recording models. Pursuing truth of law primarily stems from the need to ensure the network's viability, promoting the consolidation of social relations and the long-term profitability of operations. Conversely, the quest for factual truth is solely driven by the prospect of immediate financial gains. Miners receive block rewards and transaction fees (see appendix, §4), which can be increased to accelerate the validation process for specific transactions (Lantz & Cawrey, 2020, p. 31). Furthermore, their financial capacity can influence the miners' eligibility under various proof mechanisms.[23] The boundless opportunities for financial gain that this for-profit-recording approach offers are evident in the recent financialization of mining (Hayes, 2023).

These unique perspectives on truth and anticipated participant motivations stem from two contrasting notions of decentralization. In early DEB, all transactors were obligated to engage in "truth discovery". This could occur in reciprocal contexts, such as agency trades, or in multilateral settings like clearing sessions (Börner & Hatfield, 2017). In contrast, BC mining is voluntary (appendix, §3), and in practice, it has been noted for its concentration among a few major players (Hayes, 2023; Leonardos et al., 2020). The financially driven consensus in BC fosters competition among independent nodes, with each striving to individually solve the algorithmic puzzle before broadcasting the result. On the other hand, DEB consensus was achieved through collective efforts, leading to commonly agreed-upon outcomes among partners. Consequently, DEB consensus inherently promotes decentralization and democratization among participants to a greater extent than BC, and these two consensus mechanisms embody different understandings and practices of de/non-centralization. While BC's decentralization means that anyone can make money, DEB's non-centralization meant that the truth could only be found in common.[24]

6. Discussion: the mutations of accounting's individuation

In this section, our comparative study is extended by drawing on Stiegler's insights on the influence of digitalization on transindividuation, enabling us to develop conjectures about the relationship between recording norms and different modes of transindividuation. Specifically, we explicate the nature of memory conveyed by our two cases of transaction records, the types of projections enabled or prevented by such memory forms, and how these projections subsequently shape the specific significance of each recording technology for humans. Finally, drawing from our comparison, we make educated guesses about the broader accounting implications of transindividuation in the digital era.

6.1. *Unraveling the effect of digitalization on transindividuation: Stiegler's insights*

Stiegler's approach to the relationship between digital automation and transindividuation (Stiegler, 2015) echoes other critical theory works on the development of modern subjectivity, which emphasize the relationship between new forms of power, the condensation of time and space, and the scattering of the self (Flaherty, 2011; Hassan, 2003; Rosa, 2010; Tomlinson, 2007). Stiegler shares Rosa and Hassan's apprehensive observations on modern forms of alienation and speed-related pathologies but goes deeper in analysing the noetic implications of this transformation. According to him, the digital compression of time and space profoundly transforms the circuits of transindividuation to the extent that "*trans*-dividuation" emerges (Stiegler, 2015, p. 33). This notion describes an interactive process where individual actions are fragmented and assimilated into algorithmic operations that predict and manipulate them to align with a behavioural norm, effectively turning humans into "dividuals" (Deleuze, 1992).

[20] Merchants adopted a trust facade, viewing peers as 'perfect merchants' characterized by honesty, diligence, prudence, and discretion (Cotrugli, 1573/1990, pp. 64–92; Peri, 1662, p. 4, 9, 27, 32, 50, 59; Savary, 1675, p. 52, 62, 148, 161, 222, 227, 311). The 'perfect merchant' approach to entries verification involved assessing mutual observations and concerns with courteous openness, balanced by inherent scepticism, which was central to the rhetoric (Dahl, 1998, pp. 245–246; Sabatino Lopez & Raymond, 1967, p. 24, 422; Savary, 1675, p. 72).

[21] Experts were renowned merchants on a particular market. Their opinions, called *parere* (literally 'to seem', from the standard expression used by experts: "it seems to me") became a literary genre which completed the perfect merchant's maxims of behaviour Savary, for example, published a separate collection of *Parere* in 1588, twelve years after his best-seller *Le parfait négociant*.

[22] For "knowing" users, belief in decentralization as a political project may play a role in that it might prevent them from engaging in actions that could harm the system (Roberts, 2022).

[23] This is because, in a PoW blockchain, the mining process requires significant computational power and energy consumption, while in a PoS blockchain, validators are chosen to create new blocks based on the number of coins or tokens they hold and are willing to "stake" as collateral, and so the probability of being chosen as a validator and earning rewards is proportional to the stake a participant holds.

[24] This conclusion resonates with recent discussions on the multifaceted nature of decentralization and its varied, often paradoxical outcomes in modern societies (Schneider, 2019).

This happens because, with their considerably higher computing speeds compared to human synaptic connections, automatic retentions generate a transient, generic, and reversible form of synaptogenesis instead of more enduring, singular connections. Hence, long circuits of individualization (involving for instance mastering a skill, critical thinking, appreciating art …) are prone to being bypassed by practices and techniques that prioritize speed, impulsive instant gratification and superficial effectiveness. In other words, automatic retentions stimulate and amplify individuals' drives rather than fostering their ability for projections, essential for their personal and collective development (Stiegler, 2015, pp. 44, 140).

As digitalization gains momentum, the knowledge activated through reason is replaced by automatic understanding that functions without any reason (Stiegler, 2019, p. 239).[25] Digitalization therefore poses a threat to the human ability to conceptualize, theorize, and experience genuine individuation, which thrives on intergenerational and transindividual connections (Stiegler, 2015, pp. 12–13) rather than fragmented engagements with technologies. Memory, once a repository of shared experiences preserving knowledges and know-hows across generations, is overshadowed by instantaneous algorithmic processing, leading to a diminishing connection between individuals and their past and the erosion of the space and time of *différance* (Stiegler, 2018, p. 209; 2019, p. 54, 180).

6.2. Early DEB recording as a case of transindividuation

In many ways, early DEB records correspond to the role of tertiary retentions in Stiegler's theory of transindividuation. The production and interpretation of DEB records involved the mobilisation of intergenerational knowledges and how-knows which bound people together around a common past and a collective horizon of expectation. DEB memory was a complex amalgamation, interweaving the recollections of socially embedded transacting experiences, the preservation of heritages and traditions, and the acknowledgment of human finitude. These interconnected memories formed the bedrock for a continuous process of past and future projecting which contributed to the understanding of records, while revitalizing and perpetuating the significance of collective memory.

The first type of DEB-based projecting was of a short-term nature, centring on the merchant network which remained ever-present in the merchants' minds as an intangible construct. When writing book entries merchants integrated information conveyed by the network through the commercial correspondence. The design and operation of ledgers and accounts also underscored the merchants' understanding of their position within the network. Describing the same transaction from multiple perspectives across registers implied envisioning each transaction within a system of books, which in turn connected to other merchants' bookkeeping systems through mirror accounts. The adaptability exercised in recording entries laid the groundwork for debates among merchants and projections into the minds of others when copies of mirror accounts were received. Irregularities and gaps in the recording process were addressed through speculative efforts, taking the form of diagnostics and prognostics regarding the motivations and intentions of other individuals involved.[26] Projections into the minds and actions of others were also encouraged by the ledger infrastructure, which offered only a partial visibly of each merchant's business. Gossip therefore served to circumvent the secrecy of ledgers and its prevalence in DEB governance caused merchant networks to resemble the "courtly continuum, in which the conversation unfolded continuously from one day to the next, involving many pairs of eyes and ears" (Snyder, 2009, p. 93). The merchant's psychological insight was nourished and developed via the perfect merchant rhetoric, which not only served as a means of communication, but also as a means of deciphering other people's behaviours and silences.[27] In essence, the production and interpretation of DEB records were intrinsically tied to the constant references to and projections within the merchant network.

The second type of projecting fostered by DEB records was towards the distant past and future and deeply connected to the symbolic anchoring of ledgers, which served not only as records of financial transactions but also as repositories of cultural and spiritual significance. As above-mentioned, these ledgers captured ancestral heritage and religious commitments reinforcing both familial prominence and piety. Precise transaction records showcased the integrity of esteemed Florentine merchants and devout Christians. Along with deeds of benevolence, like building churches, ledgers were key to shaping the merchants' public persona.[28] They melded individual merchant pursuits with broader ideals, blending profit ambitions with ancestral respect and spiritual contemplation. These interwoven long-term projections highlight the interplay between the material, the social and the metaphysical, merging the practical aspects of accounting with the noetic dimensions of life.

Early DEB-based short and long-term projections were made possible by the incorporation within the recording process of temporal spaces with diverse durations, characterized by randomness and non-uniformity. Constructing the accounts with continuous references to the commercial and social network, collaboratively agreeing on the validity of entries, and upholding meticulous accuracy all implied the devoted attention of merchants over extended periods of time. Each merchant infused their own distinctive "inner rhythm" into this process. Moreover, the consensus procedure introduced indefinite obligatory pauses, emphasizing the careful deliberation within the recording approach. This procedure could, in theory, and frequently did in practice, extend over a prolonged and indeterminate duration.[29] While merchants had long acknowledged the equivalence of time and money (Epstein, 1988), the pursuit of truth transcended fixed temporal boundaries.

These fluctuations and intervals in the timing of recording occurred in a society that was characterized by a deep awareness of uncertainty, recognizing the unpredictability of human actions and the

[25] Following Kant, Stiegler defines reason as the "theoretical and practical capacity to *make* the difference between fact and law" (Stiegler, 2015, p. 46). He opposes this faculty to "automatized understanding" (ibid., p. 106), which refers to a-normative calculus operating based on patterns and correlations in data.

[26] Such situations could arise when merchants deemed a report or copy of a commission account unreliable due to inconsistencies with information provided by other agents operating in the same market, or when they had not received reports from a specific agent for an extended, prompting the need for guess work. Instances of such disputes accompanied by their speculative activities are plentiful in the commercial Correspondence of that era (see for example Neal & Quinn, 2003; Lamikiz, 2010, p. 179). For a general discussion on the relationship between information and speculation among early modern merchants, see Da Silva, 1956, pp. 16–17.

[27] Manuals overflowed with advice on how to read others and how to narrate oneself (Savary, 1675, p. 226).

[28] The significance placed on family, citizenship, and devotion to God is also evident from their personal memoirs and diaries, where the emphasis on a collective identity stands in stark contrast to today's prevalent focus on celebrating individual traits (Hoock, 2008; Safley, 1999).

[29] For example, between January and March 1595, Simon Ruiz consults several friends and experts regarding a disagreement he has with Andres Ximenes regarding who should bear the losses of a particular exchange transaction (Da Silva, 1956, pp. 131–136).

uncontrollable influence of providence. While the desire to comprehend and mitigate chance, often represented as "Fortuna" (Baker, 2021), shaped the development of DEB and the adoption of perfect merchant rhetoric, the pursuit of excessive control was absent from the DEB ecology. Instead, DEB merchants collectively embraced each other's deviations (Matringe, 2017, pp. 227–229; Kadens, 2019) and did not seek complete standardization of their accounting practices. Varied formats for recording entries were not deemed as "human errors" but rather as the norm. At its core, DEB was not designed to support permanent organizations. Merchants applied their prognostics to the short and middle term (Da Silva, 1956, pp. 16–17), leaving matters of the long term to providence. Given the realities of the time, with treacherous seas and rampant banditry making the circulation of men, goods, and money highly perilous, and market conditions that could vary drastically during the transmission of instructions, the idea of absolute control was not conceivable. Risk as uncertainty permeated every aspect and was beyond suppression (Baker, 2021; Ceccarelli, 2020). In this context, the anchoring of ledgers into the family and Florentine history can be seen as a mechanism through which merchants carried forward a stable legacy from the past into an unpredictable future.

The dynamic and unpredictable environment in which records emerged, combined with their deep connections to transgenerational knowledge and beliefs, created a conducive atmosphere for the ongoing process of transindividuation. Through this collective sense-making process, merchants consistently renegotiated and reaffirmed shared meanings of themselves and accounting by engaging with and interacting through records. The presence of irregularities and gaps within this process, along with the constant integration of diverse perspectives, contributed to its efficacy as a well-functioning system of meaning, as it remained metastable, continuously open to new individuations.

6.3. *BC recording as a case of transdividuation*

Comparing BC and early DEB in terms of transindividuation processes involves probing the influence of automated memory in BC on human projections. In a sense, projecting is foundational to the blockchain infrastructure and flows from its originating political project of allowing a community of "free" users to transact securely and potentially partake in governance. Nevertheless, compared to early DEB, BC's recording norms and the resulting memory structure may constrain the scope of projecting and the potentials for transindividuation processes.

The memory conveyed through blockchain records is an ever-growing list of payment transactions which reflect only themselves and do not refer to distant spacetimes, but only to the creation of immediate profits. In contrast to DEB entries that begin with a promise and evolve into collectively agreed-upon solutions through diverse pathways, BC entries simply exist as factual truth without maturing or undergoing growth through human projections. Unlike early DEB's ledger infrastructure, BC's provides "full" visibility of the transaction chain, rendering the knowledge of human motivations irrelevant due to the protocol's control over their outcomes. BC's devices are interchangeable computers, which do not carry individual or symbolic meaning. Unlike merchants who projected into the minds of others to make sense of entries, BC nodes perform a "blind" test and trial competition in isolation. This approach does not entail an algorithmic equivalent to projecting such as computers generating a representation of a potential solution based on previous input. The competition is followed by "communication" between nodes in the form of silent copy past. Furthermore, mining-based financial speculation on the part of humans merely extends the for-profit recording principle with some variation, creating a considerably impoverished version compared to the DEB-based sociocultural projections, which imbued the circulation of money with broader meanings beyond enrichment.[30]

Closer in scope to DEB projections might be those conducted by human analysts who combine algorithmic calculations with external information sources like discussion forums and blogs to interpret BC records (Bohannon, 2016; Roberts, 2022). However, never-ending BC records generate patterns hard to decipher for the human mind. This absolute, infinite and contextless memory of facts necessitates further algorithmic involvement for interpretation, whether it is to improve transaction data visualisation (Di Battista et al., 2015; McGinn et al., 2016; Ranshous et al., 2017), or to highlight the human factor, for instance when discovering identities (Nagata et al., 2018; Shao et al., 2018; Liang, Li, Chen, & Zeng, 2019), or detecting illegal behaviour (Kanemura et al., 2019). Deciphering BC memory therefore involves a growing dependence on artificial intelligence, which operates on short-term feedback loops rather than being guided by century-old traditions and beliefs, thus reinforcing the dominance of a permanent present. As the inner workings of algorithms become increasingly obscure (Borch & Hee Min, 2022), accountants of the future, regardless of their proficiency with technology, may ironically assume roles akin to recording devices. Bound to the observation of machine interactions and their outcomes, they might end up contemplating the dissolution of their own individuation.

As opposed to early DEB's multilayered temporalities, real-time inductive mode of remembering all facts tend to reject all projections. Conventionally defined as a specific level of computer reactivity triggered by external inputs (Shin & Ramanathan, 1994), real-time is designed to provide nearly instant feedback measured in micro or nanoseconds, enabling seamless and immediate interaction between users and components. Real-time records provide seemingly immediate, systematic and continuous documentation of coin transfers, distinct from way DEB records bridged gaps and linked fragmented information to construct a coherent narrative. While the irregular rhythm and silences of DEB language were filled by speculation and hope, BC's chain of data which grows at a constant rhythm is not stitched together by any form of projecting activity. Unlike DEB records which derive their meaning from the consecration and stabilization of specific entities (the company, the family, and God), BC records embody a philosophy that embraces the dynamic and fluctuating essence of the world, intertwining analytical rationality with an acknowledgment of impermanence (Sadin, 2015). Distinctions between "before" and "now" tend to dissolve, yielding to an uninterrupted scroll of information that governs with short, predicted pauses, the framework of transacting, while transactions in turn generate fresh gains and new sequences of code. Thus, real-time records predominantly engage short-term memory, beckoning transactors to trail the movements of a permanent present which extends both ways into a concrete recent past and a probable and calculable near future. The real-time observation of conclusive events erodes the cultivation of hesitation and longing, which build over time and spring from uncertainty. Instead, BC records sustain an ongoing pursuit of the next impulse, preventing the attainment of a fully settled state, akin to a closed account or ledger.

The prevalence of real-time in BC reflects a broader model of algorithmic governmentality (Rouvroy et al., 2013) which today operates universally. This model leverages immediate knowledge of phenomena

[30] See Hayes, 2023, for the institutionalised side of BC's speculative mining activity. In some cases, financial projections to maximize profits are illegal, for instance in the case of selfish mining (Davidson & Diamond, 2020), block withholding (Bag et al., 2016), timestamp manipulations (Yaish et al., 2022), and sybil attacks (Zhang & Lee, 2019). However, such projections are not promoted by but run counter to BC's recording principles and BC networks implement various security measures and incentives to discourage and prevent such manipulations.

to make optimal, algorithm-based decisions, aiming to gain full control over the flow of events and to erase uncertainty. This new form of governmentality satisfies the key demands for optimization, streamlining, and securing modern societies (Sadin, 2015). By steadfastly avoiding deviations and disagreements, algorithmic governance perpetually maintains harmonious adequacy, eliminating friction and ensuring seamless articulation among various processes. Its objective is to continuously lubricate the joints and achieve optimal efficiency, drawing inspiration from industries and logistics sectors that prioritize minimizing delays between different phases (Sadin, 2015). In the context of BC, the indefinite sequence of recording and transacting ensures consumption maximization. The concept of a 'perfect participant,' akin to the 'perfect merchant,' is not a coder or analyst; it is a blind, invisible transacting force who makes the record, hence the profits, grow. Unlike the perfect merchant its drives are not repressed through education but nudged by blockchain's protocol and its binary outcome.

Thus, seen through the prism of early DEB, BC real-time records appear to operate outside the long-term circuits of transindividuation, which involve collective sense-making of people and objects based on shared projections or temporal leaps. We do not contend that thoughts about the past, and even more so, the future, are absent from the digital economy to which blockchain belongs.[31] However, we have tried to show that the presence of automated records poses challenges for human projective capacities and alters the circuits of transindividuation. Participants in BC do not identify themselves in relation to the records as bearers of transindividual memory. Rather, they are individually linked to an external memory storage whose opaque "gestural face" (Knorr Cetina & Bruegger, 2002) is not intended for scrutiny and which, rather than *trans*-forming with humans, shapes its own interior. By eliminating fixed temporal delineations which enable the actualization of a shared past, BC's real-time prevents the acts of transacting, recording, and sense-making to be linked together within a process of collective self-formation. The onto-epistemological separation we postulate here builds upon Stiegler's concept of transdividuation, showcasing its existence in three distinct modalities. First, the non-requirement to comprehend one's transactional memory creates a division among users between knowers and others. Second, the speed of real-time encourages a split within individual participants, between their perception and analytical abilities. Sense-making is not a prerequisite for memory formation. Third, as a result, BC records may not become objects of social investment, generating a split between humans and technology. BC's delayered chain of facts promotes the emergence of an internal, expandable memory storage on one hand, and on the other hand, that of dividuals as functional correlates (transactors, programmers) of the technology, rather than collective individuals *trans*-forming through shared projections.

6.4. Accounting implications of transdividuation

The conceptual leap from early DEB to BC, as established through our comparison, can serve to depict the mutations of accounting's transindividuation and more specifically, a shift from a record-based collective sense-making process to an algorithmic-driven procedure that delineates boundaries among individuals, as well as between humans and technology. But what are the accounting implications of transdividuation?

Our preceding discussion implicates the potential transformation of transparency. It is well-established that accounting constructs reality by employing a representation system that highlights certain aspects while concealing others, influenced by local politics and unforeseeable events (Hood, 2010; Roberts, 2009). When compared to early DEB transindividuated records, BC's transdividuated records achieve an abstraction of transactions from human language. While the concept of an "economy" as a distinct domain did not exist in medieval times, BC records portray an abstract marketplace where humans are seen as isolated transactional power units interacting without communication. The community visible through BC records is one of interconnected computers, while the "human" aspects of this community are captured and influenced in other digital spaces like social media. BC's memory of transactions is devoid of their potential societal impact, creating the picture of a socially sterilized platform where money is the sole determinant of transactions.

This particular form of transparency naturally affects accountability mechanisms pertaining to the responsibilities and duties an entity is obligated to meet (Messner, 2009; Mulgan, 2000; Ribstein, 2006; Roberts, 2009), which encompass the necessity to provide explanations and justifications for decisions (Lerner & Tetlock, 1999; Messner, 2009; Roberts, 1991), creating a "relationship of responsibilities" (Mulgan, 2000, p. 87) among interacting actors. While early DEB records continually reminded merchants of their obligations to the social and familial networks they were part of, as well as their duty towards God, BC records solely keep track of transactions and remaining balances. This picture of "social forgetting" typical of contemporary finance (Ailon, 2014, p. 613), peaks here, leaving no room for accountability mechanisms that operate within the long circuits of transindividuation.

It has been pointed out that an individual's ability to understand themselves and convey that understanding sets tangible boundaries to accountability (Messner, 2009). In line with Stiegler's concept of transindividuation, this personal self-understanding ability is intrinsically tied to the construction of a collective identity based on shared memory. Early DEB-based, perfect-merchant-shaped memory, provides merchants with a standard to adhere to or defy, thereby guiding their ongoing identity construction process. Conversely, BC records, devoid of any mirror like features, base their operation on the notion of absolute freedom for individuals to be whoever they want, while detaching them from others. Uninvolved in generating their own memory and only represented by their cryptographic address, transactors might feel indifference as to whether it is them or another interchangeable entity conducting a specific transaction. In addition, while poor bookkeeping skills were regarded as marks of low virtue in the early DEB era, BC's dividuated records imply that programmers are not held accountable for defective or vulnerable algorithms (Tyma et al., 2022). Expressions of the self, potentially forming the foundation of accountability, are delegated to alternate platforms like social media, where they unfold unimpeded, but within a framework that codifies, stimulates, and directs these expressions subtly, often beyond immediate awareness (Brubaker, 2020). BC therefore participates in a larger "economy of traces" (Power, 2022) that tends to compartmentalize and shield different facets of human life, reducing the capacity to establish mechanisms of accountability.

This narrowed space for accountability in dividuated records presents a challenge in regulating their production and use. As previously highlighted, both BC and early DEB depend on decentralized self-regulation to deter fraud. While the perfect merchant rhetoric taught merchants to exercise caution and honesty in maintaining records, BC's dividuated record enforcement strategies focus primarily on preventing double-spending, leaning heavily on financial deterrents like the significant costs associated with fraud or initiating a fork. Accountability notions tied to transindividuated forms of memory, where the risk of fraud being recognized damages reputations, are absent from BC's enforcement approach. This absence, along with the stimulation of short-term impulses through real-time operations, potentially encourage transactors to act amorally. Moreover, the preventative measures against double-spending and the preservation of factual truth do not address the potential legal truth issue raised by the fraudulent use of BC

[31] In particular, the concept of a fully democratized society of transactors aligns with the grand visions of digital moguls who see technological innovation as catalyst for an inevitably improved and brighter future, where diseases and poverty are eradicated, the climate crisis is resolved, and humans rejuvenate (Prater, 2023; Rose, 2023).

records, such as for money laundering purposes. The early DEB case suggests that only a reappropriation of fact by law and of collective memory records by all transactors can rectify such issues, a notion supported by recent attempts to regulate blockchain (Sotiropoulou & Guégan, 2017; Nabilou, 2019).

The multifaceted implications of dividuated records hint at the possibility of a broader transformation in the role of accounting within society. Early DEB records, in conjunction with the perfect merchant rhetoric, functioned as tools to discipline transactors, facilitating seamless market functioning and strengthening social bonds. In contrast, BC records, combined with other digital technologies, tend to lead participants toward disengagement, fostering mindless transactions while shielding them from thoughtful deliberation. This transition results in monad-like dividuals whose consumption patterns are exploited by technology to facilitate wealth extraction for the new "memory merchants" (Le Goff, 1988, p. 170). Indeed, the real-time aggregation of economic traces in BC operates within a comprehensive information framework, encompassing diverse platforms, data centres, communication channels, and satellite networks, all geared toward industrializing memory for commercial purposes (Stiegler in (Université de Caen Normandie · UNICAEN, 2017)). Consequently, BC's data-driven transdividuation potentially amplifies hierarchical power dynamics compared to early DEB's network-centric transindividuation. Although BC promises democratization, which was absent in early DEB, where DEB records were confined to a merchant-banking elite, realizing this potential necessitates adopting early DEB's self-enablement practices, built on shared knowledge and common projections. Such integration calls for the cultivation of contradictory or divergent temporalities that do not conform to the axiom of real-time. This stance reflects a yearning to live out of sync, embracing the Nietzschean notion of the 'untimely' as a means to distance oneself from the diktat of code as law (Sadin, 2015). Failure to embrace these divergent temporalities might lead BC-based accounting to reduce transactors to mere traces and accountants to dispensable records, eliminating even the dreams of democratization and accountability in the ever-expanding landscape of digital records.

7. Conclusion

In the preceding arguments we have developed a theoretical history of accounting and its implications for collective self-formation (transindividuation). This project should not be understood as aiming for a grand theory of history in the shadow of, say, Hegelian idealism. Rather, we are more modestly focused on contrasting two settings for accounting, early DEB and BC, in order to explore and conjecture about the possible trajectories of memory formation and projections in accounting. This history of accounting, memory and projection draws on elements of Haydu's comparative methodology and places the dynamics of Steigler's theory of transindividuation, and his insights into the effect of automation on this process, at its centre. Our comparison of two recording systems, similar in their operations and decentralized structure, extends the pioneering works of Quattrone, Ezzamel, and others, whose works have highlighted the existence of an intricate relationship between accounting, memory, and collective self-formation. In a context where mechanisms of control still occupy a central position in the qualitative accounting field, our investigation answers recent calls to devote to the cultural and cognitive dimensions of accounting the attention they deserve (Robson and Ezzamel, 2023).

After examining the commonalities and differences between early DEB and BC norms of recording, particularly in their use of a standardized language, referentiality systems, ledger infrastructure, and consensus procedures, we have sought to identify the nature of memory and associated projections promoted by these norms during their respective periods. Our analysis has shown that early DEB norms of recording facilitated the construction and preservation of collective memory, fostering the emergence of a distinct merchant culture, which influenced the intentions and aspirations of individual merchants. Emphasis lay on truth of law. The hermeneutical foundations underpinning the production and interpretation of records were inextricably woven with the honouring of collective memory and the invocation of propitious auguries. Consequently, DEB records exemplified a case of transindividuated records, evolving and acquiring meaning through human projections, which simultaneously contributed to the formation of merchants as collective individuals. In sharp contrast, BC's approach to real-time, profit-driven production of factual truth tends to confine human projecting to the pursuit of immediate profits, while artificial intelligence increasingly takes charge of long-term analysis of the chain's movements. We conjecture that this transition might introduce interiorized dividuated records, alienated from human memory, and dividuated transactors, confined to mere transactional impulses nudged by the consensus algorithm. In line with Stiegler's analysis, we associate transdividuation with the sway of real-time, representing a one-dimensional cadence that tends to short-circuit human reason and replace it with automated understanding. Otherness, whether it takes the form of a present uncertainty, an unknown future, or simply variety as an essential feature of biological life and systems, was accepted and integrated in DEB, while it is combatted with a view to being eliminated in BC. While DEB's metastable records opened the space for *différance*, BC tends to promote *afférance* in the form of a constant adherence of action and thoughts to an ongoing algorithmic generation of profit which actively rejects the unknown.

Based on our comparative analysis, we have also formulated conjectures regarding the implication for accounting of transdividuation. Although DEB's recording model was designed to ensure the endurance of a privileged international merchant network, it suggests that BC's goals of transparency and fairness require revisiting a more traditional temporality, which would facilitate the reappropriation of memory by reason and of fact by law. In light of this continuing evolution of accounting, which our theoretico-historical comparison has helped to highlight, we end with a question and provocation. Does the increasing internalization and automation of accounting records, as exemplified by blockchain, suggest that accounting should no longer be primarily studied as a "social" practice? Or must we look in new places for its sociality? This would suggest an inversion of a classic formulation and invite us to study the "roles of organizations and society in accounting".

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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