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Human Agency and the Problem of Replicability in the Dynamic Neo-Structured World

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Abstract

Social reality is undergoing rapid transformations, giving rise to new challenges for both social theory and practice. One of these much-discussed challenges is the so-called replicability crisis, a notion that describes the failure of the social sciences and humanities to verify established research findings with new empirical investigations. In the related debates, it is argued that this "crisis" can be interpreted as a sign of the growing disconnect between, on one side, traditional perspectives on human nature and social structures that still dominate academic mainstream and, on the other side, the reality of an emerging new phase of societal evolution—neo-structuration, which emphasizes individual agency as a driver of development—in contrast to the well-known "structuration" argument by Antony Giddens, whereby human agency is seen as ontologically fused with the social structure, procuring stability of the latter rather than its transformation. Bridging the gap requires an interdisciplinary paradigm shift. This shift would involve moving away from considering human beings as changeless or predictably evolving subjects whose intentions and actions are determined both internally and externally by structures that supposedly follow a linear trajectory of "progress," assuming the reproduction of the basic principles and forms of social interaction. Instead, in the context of intensifying neo-structuration, individual agency emerges as both an expression of the core of human nature and a catalyst for societal change, including the pressing social issues within the techno-material environment, which have radically changed in the first decades of the 21st century, especially after the COVID-19 outbreak in 2020. This presents a fundamentally new challenge for the social sciences and humanities: to develop methodological approaches and theoretical models capable of systematically analyzing the human capacity for creation and transformation—not just reproduction.

Under conditions of neo-structuration, individual agency causes transformations of both social structures and the agentic subjects themselves, which makes the crisis of replicability inevitable. The crisis itself is evidence of changes in social reality and human nature as the objects of research, not only the mere sign of the imperfection of measurements. Thus, the replicability crisis relates not only to the epistemology of science but also to the ontology of its subject matter.

Most important is to give an adequate theoretical and methodological account for the so-called strong agency, capable of a significant transformative impact on social environment. A *special challenge* refers to understanding the power of human agency in the context of technological advancement, including the opportunities related to artificial intelligence. Distinguishing between two types of such agency is necessary: on one hand, a conditionally "free" creative individual initiative, leveraging digital infrastructures as tools for forging new communities, transforming existing behavioral patterns, practices, and so on, and, on the other hand, a sphere of a "hybrid" strong agency, partially stimulated and augmented by targeted, customized systems of artificial intelligence's recommendations, suggestions, navigation services, consultancy, and advice. Within these intersecting realms, the foremost theoretical and practical challenges emerge—particularly regarding the reconceptualization of human agency as a pivotal driver of institutional change under the condition of neo-structuration, which puts the problem of replicability in a principally new light.

Keywords: replicability crisis, neo-structuration, agency, sociology, psychology, AI technologies

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Introduction

Science claims to reveal the objective truth about the world, which makes academia, as an institution, one of the foundational stones of what has been called "Modern Society."[1] Scholars' findings are usually respected by various publics and are often laid as the basis of practical policy because they have been verified, have been proved and, hence, have to be useful. But what if this is not the case in the new, changing reality? This article examines the ongoing discourse surrounding the "replicability crisis" (also referred to as the "reproducibility crisis"[2]), a topic that has gained significant attention in the social sciences and humanities since 2010.[3] The novelty of the crisis is not in the negative assessment of the state of the art in empirical research, per se, by a large number of the scholars or even in their dissatisfaction with the methodological toolbox for the social and humanitarian sciences.[4] What is new is the increasing empirical evidence pointing to the irrelevance of previously obtained results or, at least, raising doubts in the validity of the latter. The crisis has been especially widespread and obvious in psychology, capturing significant public interest.[5] Despite the active debates, perhaps the most important factor, leading to the crisis, has not explicated, that is, a fundamental change in principles and mechanisms of societal development captured by the concept of "neo-structuration"[6] and the related idea of a transformative human agency as a core driver of societal changes.

Through a critical review of international literature, two primary areas of concern driving existing debates are identified, and certain steps forward are proposed. The first dominant concern is that in early 21st century, discussions are focused on the relationship between academia and external stakeholders, such as policymakers, the public, clients of applied research, and state institutions funding academic science. The second concern relates to the internal academic practices, particularly to methodologies of data collection and analysis, with a strong emphasis on statistical techniques.

While these concerns are valid, a deeper analysis reveals a serious limitation: Despite the cross-disciplinary nature of the replicability crisis, existing literature predominantly addresses discipline-specific epistemological issues while neglecting the broader implications for cross-disciplinary fundamental theoretical assumptions on the ontology of human nature and social environment that dominate contemporary academic thought. In other words, the "grand theoretical visions" of personality and society developed in academia through the second half of the 20th century remain largely unchallenged in these debates, even though they may hold the key to understanding and resolving the crisis.

Two strands of research have not yet been integrated into the "replicability crisis" debate, but they are highly relevant for understanding the essence of the latter.

On one hand, research in the general social theory could provide valuable insights into the ontological and epistemological dimensions of the replicability crisis. However, sociologists have thus far played a limited role in these discussions, including the efforts to bridge psychological and sociological perspectives.[7] Furthermore, as this analysis demonstrates, sociological contributions rarely attempt to develop a theoretical interpretation of the crisis.

On the other hand, it is discussions of digital technologies'[8] evolution and their possible role in socioeconomic transformations in the literature on management, education, and entrepreneurship, among others. Especially important for comprehending the crisis are rapidly developing digital contexts and related tools, including generative artificial intelligence (AI), that simultaneously enhance the capacities for creative and transformative individual agency and ensure a strong, regulative impact of the institutional environment on the individual based on the power of algorithms. These issues remain beyond the scope of "replicability crisis" debates, although they are crucial for understanding why the very idea of replication becomes increasingly problematic.

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This article addresses the gaps in the replicability crises discourse by drawing on cutting-edge debates in social theory of the 2010s and 2020s and connecting them with key arguments from psychology, as well as with research on transformations brought about by digital technologies. Together, these perspectives offer a novel interpretation of the replicability crisis. Specifically, the concept of "neo-structuration," which entails an emphasis on human agency, is elaborated.[9] Also included is a special focus on the specifics of agency manifestation and formation in the digital environments.

More concretely, it can be argued that personality, when understood as agentic toward its social context, cannot be adequately captured and assessed within the dominant methodological frameworks of mainstream psychology and sociology or through its conventional statistical tools. Neo-structuration implies not only social fluidity (a long-acknowledged phenomenon in social theory, including structuration theory by Anthony Giddens[10] and elaborations within the actor–network theory (ANT)),[11] but also a crucial shift: In the 21st century, the trajectories and manifestations of structural change in various social contexts are increasingly often shaped by individual agency. *Human agency* reflects the dynamic and holistic essence of human nature but receives a strong additional impetus from the newly emerged digital environment and AI tools.

This article focuses mostly on the phenomena and processes related to what can be called a "strong" agency, that is, action capable of generating substantial transformations within the social environments. A distinction is offered between, on one hand, "conditionally" autonomous, creative individual behavior, utilizing digital ecosystems as an instrumental means for establishing novel communities or reshaping existing behavioral patterns and practices, among others, and, on the other, a "hybrid" strong agency, partially induced and augmented by targeted, customized systems of AI support.

In light of this, the replicability crisis is not an isolated methodological predicament but a symptomatic manifestation of broader and more profound societal transformations driven by the dynamics of human agency, enhanced by digital technologies.

The "Reproducibility/Replicability Crisis": Key Concerns in Early 21st-Century Debates

The terms *reproducibility crisis* and *replicability crisis* are often used interchangeably.[12] However, in this article, *replicability crisis*[13] should be understood as part of the broader "reproducibility crisis," which encompasses difficulties in reproducing findings of empirical research, including challenges in directly replicating prior studies, methodologies, and samples.[14]

In 2022, Moody and colleagues mapped the global landscape of replication studies using citation-based analysis, identifying twenty-eight distinct clusters of publications spanning disciplines such as economics, management, education, criminology, health studies, and sociology—where psychology appears to be central.[15] An analysis of the most frequent descriptive terms for each cluster (available in the supplementary materials of Moody et al.[16]) allows drawing two conclusions.

First, these discussions predominantly focus on statistical techniques or domain-specific empirical challenges, with virtually no engagement with theoretical questions. Even psychology, the discipline most actively involved in these debates, lacks a dedicated cluster of papers addressing the broader theoretical and methodological foundations and/or implications of the replicability crisis.[17]

Second, although focused mainly on technical issues, somewhat paradoxically, the debates on the replicability crisis largely ignore the technological advancements and related new tools that both support individual and group activities and are used to measure the latter. The words related to "technologies," "platforms," or "digital" do not appear in any of the 250 common keywords or the twenty-eight clusters of publications. Indeed, the

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discourse on replicability is preoccupied with attempting to replicate previously conducted research rather than using novel tools and methods to test the hypotheses and findings from the past. These tools and methods primarily imply so-called digital traces analysis. Digital traces analysis is discussed in the literature as a very promising path for social research, opening unprecedented possibilities for getting information about individual and group behavior;[18] however, these debates evolve parallel to replicability discussions.

Elaborating further on Moody et al.[19] and other scholars and summarizing existing debates on the replicability/reproducibility crisis, two major strands of concern recurring throughout the literature can be identified:

- "Political" Concerns: "replication obsession" and academia's internal and external relations
- "Technical" Concerns: methods and statistical practices

"Political" Concerns: "Replication Obsession" and Academia's Internal and External Relations

These revolve around tensions within academic institutions and between the academia and external stakeholders—policymakers, the public, applied research clients, and state entities shaping conditions of academic labor. The crisis undermines the perceived utility of scholarly work, particularly when applied interventions fail.[20] Beyond practical shortcomings, there is growing unease about academia's public image and the reputational risks for individual researchers and the academic institution as a whole.[21] For instance, Billheimer[22] critiques the overreliance on presumed universal laws in applied science, which often lack relevance to real-world problems.

Proposed solutions often target systemic issues in scholarly practice. Some advocate for greater transparency, such as open access to data, statistical models, and analysis codes, to enhance research credibility.[23] Others critique the exploitative nature of academic labor—linked to post-2008 financial austerity—and call for reforms in funding, employment conditions, and institutional structures.[24]

The journal *Nature Human Behaviour* published a "Manifesto for Reproducible Science," advocating for precision in research—even at the cost of novelty—and urging changes in hiring and promotion criteria.[25] Importantly, the replication "obsession" manifests itself not only in direct discussions about measurement initiatives but also in the broader stream of academic activities that, somewhat paradoxically, puts in question the very idea of the "progress" of science. The commitment to the search for universally valid knowledge preoccupied scholars and scientists with proving existing theories or making marginal improvements rather than searching for novelty. In a sense, Thomas Kuhn's "scientific revolution" logic does not seem to work that well anymore: If researchers are focused on searching for replication, expecting findings that lead to a new paradigm becomes difficult.

As Park and colleagues[26] demonstrated in 2023, since the 1940s, scientific products have become less disruptive over time: papers and patents are increasingly less likely to push science in new directions. Authors link this decline in disruptiveness to the increasing use of previous knowledge, the so-called shoulders-of-giants approach. When published, this paper drew the attention of more than 250 news outlets.[27] According to David Matthews, the finding even made its way into a US congressional hearing.[28] Therefore, the institutional logic of Academy development pushes researchers in the direction of dangerous path dependency of "replication obsession."

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“Technical” Concerns: Methods and Statistical Practices

Another strand of discussions deals more with technical concerns: Approximately 45 percent of papers on the crisis focus on data processing methods, particularly statistics.[29] A central critique targets the misuse of significance testing and “*p*”-values, where subjective effect size interpretations are often replaced by rigid thresholds (e.g., $p < .05$), incentivizing questionable research practices. For example, Kühberger et al.[30] identified an inverse correlation between effect sizes and sample sizes in psychology: Larger studies tend to report weaker effects. This suggests that small-scale studies may produce statistically significant but unreliable results that are prone to replication failure.

Discrepancies across studies are frequently interpreted as signs of poor scientific quality, prompting extensive debate over statistical remedies.[31] Yet the crisis ultimately stems from the erosion of trust in empirical findings —the bedrock of modern science. Surveys indicate widespread concern, with 52 percent of scholars across disciplines perceiving a “significant” replicability crisis and 38 percent, a “slight” one.[32]

Despite the breadth of discussions, most remain narrowly focused. Some exceptions, such as Billheimer,[33] challenge foundational assumptions, arguing that the social sciences should prioritize context-specific predictions over universal generalizations. Also, there are attempts—although less engaged with the crisis—to explore Big Data as a potential solution. Nelson[34] emphasizes transparency and replicability in complex methodologies, while others examine digital traces as tools for validation.[35] Yet the potential of digital data to generate “new” insights (rather than merely confirm old ones) remains underexplored. The major problem, as Frade argues, is that the rapid advancement of “computational social sciences,” as a supposed flagship in the development of methodological approaches aimed at working with digital data among the social sciences (including sociology), has led to a deficit of critical understanding of the digital environment from a specifically sociological perspective, separate from the “digitalization discourse” mainstream.[36]

What remains overlooked in existing debates on the “replicability crisis” is the ontological shift behind it.

Ontological Shift Behind Replicability Crisis

The discussions outlined earlier reveal a paradox: While the crisis has spurred calls for institutional reforms and methodological innovation in academic practice, the theoretical aspects of the related issues remain largely unexamined. Replication failures are not discussed as a possible signal of shifts in the ontology, which requires not just better statistics but also better theories, implying a reconceptualization of the actual reality, including both human agency and the contexts of its operation. The prevailing assumption remains unproblematized across social sciences, humanities, and, particularly, psychology, which are suffering from the replicability crisis—that the social world and human nature are relatively stable, the same as they were in the second half of the 20th century, when the “grand theories” of the mainstream in social sciences formed. It diverts attention from the possibility that increasing fluidity in social contexts may render traditional replicability expectations fundamentally unrealistic.

Mainstream scholarship in social sciences and (to a lesser extent) humanities have not attempted to provide theoretical interpretations of the replicability crisis. The next sections trace the roots of the crisis through two lenses. The first is through psychology’s vision and mission through the lens of sociocultural determinants of the scholarship development.[37] The second is a critical review of the dominant accounts of human nature and agency in social theory.

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The Roots of the Replicability Crisis in Psychology

Since the mid-20th century, mainstream psychology has largely developed within what is often termed the "American tradition," characterized by an aggressive standardization of both theoretical frameworks and methodological approaches. This standardization has permeated all levels of psychological science—from overarching (and often implicit) models of personality and society to specific empirical research techniques. As Jaan Valsiner observed, when the global center of psychological thought shifted from Europe to the United States, the discipline's international dissemination took the form of exporting standardized teaching materials and practices.[38]

This emphasis on standardization reached its peak in the latter half of the 20th century, coinciding with the global dominance of US psychology. Wiggins and Christopherson[39] describe this period as a "scientific revolution" in which methodological uniformity replaced theoretical diversity, providing the field with a semblance of cohesion it had never achieved conceptually. As they note, "[v]arious methodological and statistical practices became canonized as algorithms that could provide justification for research claims inasmuch as they presumably systematized the scientific logic that might impartially indicate the strength and likelihood of a finding."[40]

This methodological orthodoxy came at a cost. The relentless pursuit of standardized, quantifiable approaches led to a mechanistic reconceptualization of the human psyche. Valsiner critiques this trend:

> Psychology as science has been afraid of the complex realities of human lives—at the risk of seeming non-science . . . avoidance of complex psychological phenomena has continued over the last hundred years. It has been fortified by the reductionist imperatives that came with the dominance of the "empire of chance."[41]

The consequence, as Valsiner[42] argues, is a distorted view of human nature—one that portrays individuals as passive, reactive entities rather than dynamic, meaning-making agents. This reductionist perspective aligned seamlessly with the behaviorist and cognitivist paradigms that dominated 20th-century psychology, both of which relied on a static vision of a human. Underlying these approaches was an implicit assumption of universal human nature—the belief that all "normal" individuals share fundamental psychological characteristics (or belong to a limited set of immutable types, such as temperament categories).

These theoretical foundations rested on two implicit problematic premises: first, that Western liberal democracy (as crystallized in the 1960s–1970s) represented the "natural" and optimal social environment for human development and, second, that the specific cultural prototype (white Anglo-Saxon Protestant) serving as psychology's default research subject could stand in for humanity as a whole.

As psychological research became increasingly technologized throughout the 20th century, the field placed an ever-greater emphasis on methodological standardization and sophisticated statistical analysis. Ironically, the very methodological rigor that mainstream psychology considered its greatest strength became problematic. In the early 21st century, the replicability crisis suggests that the field's technological sophistication—with its inherent institutional inertia—may, in the early 21st century, hinder scientific progress rather than advance it.

Remarkably, mainstream responses to the crisis have focused not on reconsidering psychology's fundamental assumptions but on intensifying methodological controls. Proposals include expanding "open science" practices, pre-registering experimental designs and hypotheses, creating centralized databases for research protocols, implementing stricter peer-review verification processes, and conducting mass replication efforts.[43]

While these steps may improve technical reliability, they fail to address the deeper issue: psychology's inability to account for the dynamic, context-dependent nature of the human experience.

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Psychological mainstream sees human psyche as, first, subject to reduction (for instance, the famous "Big Five" or offered in 2021 "Big Six" and other alternative approaches);[44] second, subject to classification (i.e., two, three, four, or more limited number of types can be outlined adequately reflecting all the existing diversity of human qualities); and, third, subject to "objective" mechanisms and laws, regulating behavior (although not strictly deterministic but rather probabilistic in nature). Hence, not surprisingly, in general social theory, the psychological aspects of human behavior are interpreted as generated by an interplay of inner and outer structures rather than a result or manifestation of human free will (or the related power of human agency).

The Problem of Replicability in Social Theory

The preceding view, however, was never openly and consistently presented in sociology, because it obviously contradicted general cultural narratives and dominating political ideas, according to which humans should be treated as possessing individual freedom and independence. As van den Berg and Amasyalı[45] summarize in their review of agency-related discussions in sociological literature, "all reject a model of causal explanation that takes action to be the fully determined by actors' environments and their psychological predispositions. Beyond these, they insist on an element of choice, of free will."[46]

Thus, according to the sociological tradition, *agency* refers to the individual's free will, and this implies a sort of voluntarism. Such a view is declared in the theory of social action by Parsons, the theory of structuration by Giddens, approaches developed by Blumer and Alexander, and, continuing with the late 20th- and early 21st-centuries, the theoretical models of agency by Emirbayer and Mische[47], and, further, N. Fligstein and D. McAdam.[48]

Notedly, in social theory in the 21st century, there is resistance to the "free will" ideas and related attempts to move from brief theoretical (and ethical) declarations that humans are capable of a free will to concrete accounts of "agency" as "voluntaristic" components in societal dynamics: Fligstein and McAdam "find that none of these provide a satisfactory justification for incorporating such a voluntaristic notion of agency into sociological explanations."[49] The argument goes that the concept of agency is not really needed because "we naturally return to causal explanations involving, say, the different social back-grounds, cultural commitments, perceived interests, beliefs, etc., of the members of different social groups."[50]

What van den Berg and Amasyalı do not notice is that the authors they criticize for over-emphasizing the role of agency in fact under-emphasize it. Most importantly, they conflate agency with structure by arguing for the analytical, yet not ontological, value of this notion.[51]

To sum up, mainstream psychological approach to seeing a human being as operated and determined by inner traits-presumably relatively stable throughout the lifespan and situations,[52] naturally supplemented sociological approach, which looked at "external" structural determinants of behavior,[53] emphasizing how social structures shape individual behavior (the "structure/agency debate"). Hence, while not openly arguing against the vision of a human being as being free and capable of agentic transformative action upon themselves and social reality, and while even declaring free will to be accounted for in general theories,[54] in reality, mainstream sociology and psychology, each from its side, promoted methodological approaches that diminish transformative human agency. They see both contexts and individuals as relatively stable, basically uniform, and subject to universal laws, thus promoting the idea that every finding concerning human behavior is to be subjected to replication with an expectation of a mechanistic (and often deterministic) way of relation between analyzed parameters—otherwise, the finding cannot be called scientific.

Thus, transformative human agency as a distinct element of social reality historically did not have a real place in the logics of analysis promoted by mainstream psychology and sociology—and it still has not.

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Alternative Traditions of Comprehending Human and Society

Throughout the 20th century and further in the 21st century, dissenting voices challenged mainstream assumptions. These voices may be structured in three different lines: first, alternative psychological approaches; second, non-mainstream sociological elaborations; and, third, concepts and ideas coming from interdisciplinary studies (integrating research in management, education, entrepreneurship, etc.), including those emphasizing the impact of technological advancement on both human and society.

Alternative Theories in Psychology

The late 20th century saw growing challenges to psychology's dominant paradigm. The decolonization movement in social sciences, emerging in the 1980s, problematized the universalist claims of Western psychology and the global triumph of liberal democracy, which Francis Fukuyama (1992)[55] proclaimed the "end of history." The rise of global psychology[56] exposed fundamental tensions in psychology's basic ontological assumptions about human nature. While decolonization debates targeted psychology's theoretical foundations, the replicability/reproducibility crisis struck at its methodological core.

Approaches grounded in Marxist theory (e.g., Vygotsky's cultural-historical theory, Alexei Leontiev's activity theory) and cultural psychology have long emphasized the dynamic, context-merging nature of the human psyche. Activity theory posits that psychological development occurs through interactions with the social environment.[57] From this perspective, in the early 21st century, understanding personality requires analyzing transformations in social structures and the broader cultural material and symbolic surroundings—a task necessitating, first, a closer collaboration of psychology with sociology, to the extent sociologists themselves a capable of grasping the changing reality,[58] and, second, collaborations with more applied disciplines staying closer to the frontiers of practice (for instance, transition studies, management, and education).

The replicability crisis, therefore, is not merely a challenge for psychological methodology but a symptom of psychology's outdated theoretical foundations. Addressing it will require more than better statistics—it demands a fundamental rethinking of what it means to be human in a rapidly changing world increasingly infused with technologies.

Social Theory and the Replicability Problem

As outlined earlier, the central theoretical dilemma in sociology—the "structure/agency problem"—concerns the relationship between individual actions and social structures, particularly regarding how societal changes originate and what role initiative and individual actions play in these transformations. As shown earlier, traditionally, sociological inquiry has emphasized how social structures shape individual behavior, examining the mechanisms and consequences of this determination.

However, long-standing critiques in sociological literature highlight the discipline's limited capacity to explain social change when operating within frameworks that view individual action as merely reproductive of the logic of existing structures rather than generative of innovation.[59] Recent years (especially since Covid outbreak in 2020) have witnessed accelerated and often unexpected societal shifts, such as those triggered by the COVID-19 pandemic,[60] exposing the inadequacy of conventional models. While contemporary theorizing increasingly acknowledges fluidity and unpredictability in social dynamics, the sources of this flexibility remain poorly understood, with explanations typically privileging structural logics over human agency.[61]

Prominent efforts to integrate human agency into theories of structural change include Margaret Archer's[62] morphogenetic approach and Fligstein and McAdam's[63] theory of strategic action fields. Archer posits agency as an ontologically independent force, not merely an analytical construct, criticizing mainstream approaches

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for their "conflation" of human agency with structural determinants. This framework conceptualizes agency as a spatiotemporal process wherein present actions become future structural conditions. Fligstein and McAdam introduce the notion of "social skill," which describes individuals' capacity to transform social structures ("fields"). While both theories advance beyond structural determinism by recognizing agency's transformative potential, they assume the structure–agency relationship has remained essentially stable—either throughout history[64] or during modernity ("some may rightly wish to point out that morphogenesis has been with the social order forever").[65] They also do not distinguish the specific role of human agency in social transformations—agency (despite given more attention than in previous scholarship) always remains pre-directed by structure (and, for Archer, also by culture). These limitations become particularly significant when analyzing the replicability/reproducibility crisis, as these frameworks fail to account for after-2020 shifts in how agency proactively interacts with structures, including the role of technologies.

Multiple other sociological elaborations deal with the problem of agency; however, among the most well-known and influential alternative approaches is ACT by Bruno Latour[66] and others.

Bruno Latour disqualifies the very structure/agency problem formulation. In short, for Latour, as well as other ANT advocates (Michel Callon, Madeleine Akrich, John Law, and others), in contrast to Giddens and other more "traditional" sociologists (beginning with Émile Durkheim through to institutionalism in the early 21st century),[67] no social structure is an entity of a specific "social" quality, and humans are not the only bearers of agency. Instead of social classes, institutions, and other forms of social organization with related types of social (i.e., exclusively human-to-human) interrelations typical for them, Latour focuses on networks seen as a dynamically shifting web of interactions between heterogeneous actors, including not only humans but also non-humans (for instance, material objects like technological devices). These networks (and their interrelations) are what ultimately determine the way people behave and the meanings they negotiate. Individual human being (with their inner strategic planning or reflexivity, so important for Giddens or Archer) is not the major actor in humans' associations; every network is fundamentally local and subject to its own dynamics, empirically, physically, and materially determined by simultaneous contacts between human and non-human entities, not by any kind of general social laws: "networks have no inside, only radiating connectors. They are all edges. They provide connections but no structure. One does not reside in a network, but rather moves to other points through the edges."[68] Latour would probably not see a problem with the "replicability crisis" because it would simply reflect the diversity of networks in which human behavior and psyche is located and by which it is primarily determined. John Law[69] would probably add that the very idea of searching for replicability is inherently wrong because to study the "fluid," constantly changing realities, a flexible method is needed, one not regulated by normative means and claiming the limited number of types of data and tools of analysis as scientific.

Neo-Structuration Theory: A Paradigm Shift

Neo-structuration theory is not an attempt to develop or argue against specifically and exclusively Anthony Giddens's structuration theory; its target is much broader: to offer a novel solution to the structure/agency problem, discussed earlier, by overcoming the inherent underestimation of the importance of human agency as a structuring/creative power in societal reality in the 21st century. However, semiotically, it purposefully refers to Giddens's[70] structuration theory to make visible the differences between not only the two theories but also the traditional views in social theory and the proposed novel approach to comprehend the "structure," its re/production, and its transformation.

Giddens defines "structure" as "[r]ules and resources, or sets of transformation relations, organized as properties of social systems,"[71] while "structuration" is understood as "[c]onditions governing the continuity or transmutation of structures, and therefore the reproduction of social systems."[72] Hence, it is not humans but,

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rather, “natural” structural dynamics that defines societal changes. Indeed, for Giddens, humans do not invent but rather recreate pre-given activities (which are supposed to be the manifestation of their agency rooted in reflexive monitoring of daily social activity): “Human social activities, like some self-reproducing items in nature, are recursive. That is to say, they are not brought into being by social actors but continually recreated by them via the very means whereby they express themselves as actors”.[73] The core idea of Giddens’s structuration is that human agency reproduces social structures or supports their development in a structurally determined (by these very structures) way: “when I go about my daily affairs my activities incorporate and reproduce, say, the overall institutions of modern capitalism”.[74] “It is always the case that the day-to-day activity of social actors draws upon and reproduces structural features of wider social systems”.[75] Therefore, Giddens’s structuration theory explains well the mechanisms of reproducing the social order, but does it explain how it changes? References by Giddens to the unintended consequences of action and its unacknowledged conditions do not help much in understanding the large systemic shifts, including those standing behind the “replicability crisis.” Most importantly, Giddens denies ontological status of individual agency as distinct from structure, therefore “solving” the structure/agency problem by viewing the latter as a logically, epistemologically, and ontologically subordinate entity. Obviously, structuration theory by Giddens has little to offer as an analytical tool for understanding the “reproducibility/replicability crisis” because, according to this theory, reproducibility and replicability should be expected but not problematized.

The proposed neo-structuration theory[76] aims to overcome these limitations to mainstream sociological thought (not limited to Giddens’s theory as demonstrated previously) by building on and significantly extending the ideas of Archer and Fligstein and McAdam. While affirming agency’s ontological autonomy (following Archer) and its capacity to generate new social forms (following Fligstein and McAdam), neo-structuration theory identifies a fundamental transformation in the logic of societal evolution. Empirical evidence across diverse domains—labor markets,[77] cultural production,[78] education,[79] and beyond—demonstrates that social structures’ viability increasingly depends on individual transformative agency.[80] This represents more than human agency’s capacity to modify structures; it reveals situations in which individual activity operates independently of (and often contrary to) structural logics—resisting, for instance, market dynamics[81] or World Society expansion.[82]

Institutions’ sustainability increasingly often requires harnessing individual agency for adaptation—a stark contrast to Weberian bureaucratic models predicated on rationalized stability. For instance, management scholarship documents the emergence of “hyper-management” paradigms that abandon universal “best practices.”[83] Methodologically, this manifests as growing “unexplained variance” in social phenomena—what Marshall[84] likened to the residual variance in statistical models that reflects structurally non-deterministic behavior. Crucially, while such variance has always existed, its magnitude remained relatively stable in earlier periods when structural changes were more gradual and predictable (e.g., the USSR’s collapse, which aligned with World Society Theory predictions[85]). The contemporary replicability/reproducibility crisis emerges precisely as this variance escalates due to neo-structuration.

Neo-structuration theory reinterprets numerous contemporary phenomena—increasing dynamics of corporate innovation (including so-called digital scaling[86]), proliferation of non-standard employment (especially platform-based work), rising impact of influencers in media ecosystems, and alternative education pathways—as manifestations of agency’s growing transformative (rather than reproductive) role. This framework also offers fresh perspectives on rising inequality, suggesting that disparities may reflect differential individual effectiveness within increasingly agency-dependent contexts.[87]

Through the lens of neo-structuration theory, the replicability/reproducibility crisis stems from an untenable core assumption: that measurements always take place in the same “system of coordinates.” When contexts diverge due to transformations, driven by individual agency, changing structures in a non-deterministic manner, identical measurement tools cannot yield consistent results—hence the observed inverse relationship between effect sizes and sample sizes.[88] Larger samples may artificially stabilize results by aggregating diverse

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agency-marked contexts into a presumed universal framework, but this technical solution does not respond to the underlying theoretical challenge. As contexts become more fluid and agency-driven, the very expectation of replicability requires reexamination, not merely methodological refinement but also paradigmatic reconsideration of what constitutes valid knowledge in the neo-structurated social world.

Thus, neo-structuration theory provides a novel framework for understanding the reproducibility/replicability crisis. Rather than representing a crisis of measurement tools and procedures, this phenomenon reflects the growing inadequacy of replication as a core methodological practice in social sciences, because it ignores that social contexts, driven by individual agency, are rapidly evolving. While building on cultural psychology's critique of static models of human nature, neo-structuration theory advances this perspective by demonstrating how agency—conceptualized not merely as an enduring human characteristic but also as an increasingly important force shaping institutional development and individual well-being—has become central to contemporary social dynamics.

The digital environment offers unprecedented opportunities to observe and analyze these agentic processes. The digital sphere exemplifies neo-structuration through its capacity to foster novel, boundary-transcending social formations. Identifying patterns in such agentic behavior requires moving beyond early 21st-century replicability debates' narrow technical focus (e.g., fraud prevention, data transparency, statistical innovations).

The Digital Environment as a Space for Transformative Human Agency

Digitalization has emerged as one of the most widely debated trends in the Academy and practice since 2000. Yet its perception has undergone significant evolution. In 1990s and 2000s, discussions about the societal effects of digitalization primarily emphasized shifts in human experience, framed as a transition into a more "liquid" yet ostensibly freer environment. Digitalization was then conceptualized as an extension of earlier post-industrial economic trends and the "dematerialization" of society. However, since 2020, increasing attention has been paid to two groups of phenomena.

On one hand, new social structures emerge within the digital environment context, imposing not merely a comparable but also radically heightened determinacy on actors' behavior compared to traditional "non-digital" contexts. Processes of "algorithmic governance" require the development of measurement tools capable of capturing related patterns of behavior, including not only human behavior but also that of the algorithms.[89] Scholarship demonstrates how these AI-enhanced systems reconfigure social ties or fabricate "pseudo-communities" through social media,[90] or how they enable the total subjugation of labor processes to algorithmic control.[91] The digital environment as a "super-structure" has become a dominant trope in contemporary sociological literature, as evidenced by Carlos Frade's discourse analysis of "digital sociology."[92] Consequently, explanatory models have to explicitly account for the new unprecedentedly customized influence of institutions (state, corporations, advertising, social platforms, etc.) on individual behavior. The primary analytical challenge lies in the dual nature of these processes: While partly repetitive (and indeed automated), their concrete mechanisms of influence are inherently dynamic, evolving in "real time" (e.g., e-commerce recommendation systems or algorithmically driven notification feeds, workplace surveillance tools, etc.). Thus, "replicability" in studies employing such models—including those leveraging Large Language Models (LLMs)—becomes inherently relative and conditional.

On the other hand, scholars have increasingly scrutinized digitalization's effects on real, "objectified"[93] institutional transformations and their measurement. This includes the rise of novel social formations, modes of interaction, production and consumption.[94] This body of work begins with a pragmatic imperative: the need not merely to "improve" existing systems but to also transition corporations, industries, society, and economy toward organizational principles prioritizing dynamic, hyper-adaptive configurations over traditional stability, structures capable of navigating "chaos" and rapidly evolving to serve human needs.[95] Exemplary debates

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include discussions of “open systems,”[96] “transformational transitions,”[97] and “digital scaling”[98]—phenomena explicitly theorized as antithetical to “reproduction.”

Against this backdrop, it is unsurprising that despite exponential growth in digital data-collection capabilities, empirical findings increasingly resist replication through subsequent “analogous” measurements. Human behavior, as reflected in such data, appears ever less predictable.[99]

Thus, the digital environment has a dual impact on the problem of replicability: on one hand, as a space of intensified regulatory influence exerted by structural forces upon humans and, on the other, as a domain of human agency-driven transformation (rather than reproduction) of existing social structures. Going deeper, in what follows, two interrelated dimensions are examined in greater detail: first, the digital environment as a tool for human transformative agency and, second, the digital environment as an arena for fundamentally new modes of structural influence on human actors—what is termed algorithmic “quasi-agency” enabled by digital technologies.

Digital Environment as a Tool for Human Transformative Agency

One specific research direction dealing with what is called “strong agency”—the study of corporate entrepreneurial behavior in digital environments—deserves special attention. Other domains undergoing active digital transformation that exhibit forms of “strong” agency enabled by digital technologies include social activism, culture and arts, education, and others.[100]

The radical impact of digitalization on the economic sphere—including labor and employment—is widely recognized. However, the key practical and theoretical problem lies in the so-called productivity paradox: Despite rapid technological advancement, adequate progress in economic outcomes—whether measured through labor productivity, total factor productivity, or the well-being of workers and their families—remains elusive. This phenomenon has been documented since the 1990s.[101]

Literature discusses AI and digital platforms, as so-called general-purpose technologies, which enable not merely incremental efficiency improvements or optimization of existing processes but rather facilitate radical structural transformations throughout the economy and society, leading to a significant increase in economic growth. Unfortunately, such transformations have not seemed to have happened yet.[102]

Why is this so? While various perspectives exist, a synthesis of contemporary review studies in the field of technological transitions across industries,[103] corporate management,[104] and education[105] reveals that at least some researchers believe that human agency constitutes a crucial component of the answer.

One of the key characteristics of research examining “strong” forms of agency in the corporate sector is the recognition that attempts to explain organizational development and fluctuations in corporate economic performance through traditional structural factors prove inadequate. As Brown and colleagues demonstrate,[106] the so-called life cycle theory of organizations remains influential despite its overestimation of both the necessity of progressing through each theoretically prescribed stage of the cycle and their sequential order.

As an alternative, scholars propose the concept of “entrepreneurial leaps”[107] as a crucial factor in organizational development. These interventions are in organizational structure by the individual agency of executives that occur during “transitional phases” of its dynamics. These phases are associated with specific, hardly predictable “trigger moments”[108] and are characterized by powerful transformational effects.

These studies share a common recognition of the increasing complexity and heightened uncertainty of socioeconomic reality,[109] where human agency becomes crucial for seizing opportunities and navigating crises.

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Within digital environments, new trends emerge—companies deeply embedded in digital ecosystems demonstrate significantly faster growth rates than market averages.[110] Their success is interpreted not as a consequence of environmental determinism but rather as the outcome of leaders' structure-transcending individual agency.[111]

However, characterizing digital environments as "autonomous enclaves" disconnected from the "real" (i.e., offline) world would be erroneous. On the contrary, they serve as catalysts for structural social development, enabling traditionally non-digital institutions to unlock new growth potential through full or partial digital integration. This transformation, however, necessitates an enhanced role of humans. Consequently, digital environments evolve into unique spaces for neo-structuration processes, marked by the growing significance of human agency as a driver of change.

This dynamic may hold one of the keys to resolving the "productivity paradox" and facilitating successful "transformational transitions" in both economic and social spheres—ultimately serving individual and collective well-being.

Human Agency and Structural Constraints in the Digital Environment

As Dominic Pettman metaphorically observes in his book *Infinite Distraction* when describing social media operations, "[t]he spider tunes its web to the fly's particularities."[112] This interpretation of digital environments does not originate from sociological thought per se; rather, it stems from popular culture (one need only recall The Matrix franchise) and broader transdisciplinary expert discourse.

Yet this perspective reflects more than just intellectual "fashion"—it responds to objective transformations in the world that necessitate reexamining conventional notions of structure and its capacities within digital contexts. As Schwarz[113] demonstrates, new sociotechnical phenomena have emerged: "social network sites," "digital material infrastructure," "connectivity," "algorithmic power," "generative governors," and others. These elements establish a fundamentally new framework for regulating human behavior across both leisure and labor domains.

For example, scholars note "the end of situations" in their traditional symbolic interactionist understanding. Interaction in the digital environment is no longer a spatially and temporally bounded co-construction of mutual actions (i.e., Goffman's "situations") but, rather, objectively existing digital environments allowing for unlimited scope and depth of external observation and storing "digital traces." This makes them objects for automated analysis and sources of data for future regulatory influence from both immediately involved "participants" and external actors, the latter being not only other users but also bearers of "algorithmic power," namely, software codes.[114]

Summarizing both discussions in sociological literature and research on information systems,[115] two fundamental characteristics of the digital environment can be identified as structure. First, in the early 21st century, users generate not just "messages" (although their nature changes due to dramatically expanded spatial and temporal accessibility to potentially unlimited audiences) but also "data," including tracks of digital traces that are left naturally and "involuntary" yet provide significant amounts of information that can be used for much deeper understanding of behavior (as well as its prediction). Second, alongside individual and organizational actors that previously served as the sole subjects generating personalized content, non-human quasi-actors emerge that are capable of creating and instantly delivering to users practically unlimited volumes of content in the form of messages personalized in both essence and form. As a result, this creates both large-scale risks and equally impressive windows of opportunity.

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Thus, the digital environment dramatically changes the context for replicability/reproducibility problem. In terms of strong individual agency manifestation, no replicability is possible. In terms of algorithm-driven behavior, the problem is that algorithms are themselves changeable (especially those enhanced by LLMs). Perhaps one of the most exiting frontiers in studies on human agency's intersection with digital technologies is what can be called a "hybrid" agency, that is, agency partially stimulated and augmented by targeted, customized systems of AI recommendations, suggestions, navigation services, consultancy, and advice.

What Next? Toward New Approach for Scientific Evaluation in Neo-Structuration Era

Replicability is no longer a reliable criterion for distinguishing robust theories (and related hypotheses for empirical testing) from weaker ones due to the fluidity of the social world. However, in contrast to what Latour and other ANT scholars might claim, the forces of this fluidity are not less—but significantly more—dependent on purposeful human agency (compared with the claims by mainstream sociology and psychology still believing in various types of structuralisms). The neo-structuration era requires a different approach to scientific evaluation rather than simple seeking for reiteration: The systemic internal and external coherence of social phenomena of every scale (from individual to a large groups, organizations, and their constellations) in their dynamic non-linear evolution toward new levels of structural organization (or destruction), driven by human agency (often enhanced by technologies), is what empirical studies should look at with more precision. It means, first, paying attention simultaneously to the interactions within the system and to the relations between the system and its environment, understanding that the drivers of transformation may be internal, external, or both at the same time (see illustrations for the corporate sector in Sorokin).[116] Second, it requires a focus on dynamics: The task is not only to "catch a moment" when a system demonstrates coherence understood as sustainability in its internal and external aspects, given the concrete temporal and spatial environment. Hypotheses should also be made and tested concerning the future transformations of a system, with an account to its past—seen not as a determinant for future development but, rather, as a recourse for creative interpretations by multiple agents capable of possessing the "narrative agency" as a truly transformative power. Third, given negative trends in societal development, the increase in well-being of actual participants and broader stakeholders of the particular social configurations (with its measurement being a particular issue that needs to be discussed elsewhere)—might be another important aspect to monitor and, if possible, support. Fourth, the digital environment should be seen simultaneously as an expanding set of tools for human agency's performance (including those utilizing AI[117]) and as a space for its reflection.

To sum up, the next step "after replicability crisis" might involve an evolution of a theoretical and methodological toolbox for the social and humanitarian sciences to respond to the evolution of societal reality. Implying the necessity of dealing with the unprecedented complexity of the dynamic world of the human psyche and social institutions is not an easy task. The chance to succeed is high, especially given the opportunities brought by digital tools that empower the multidimensional analysis of an individual and their agentic engagement in various environments. However, a distinction is needed, between, on one hand, a conditionally "free" creative individual initiative, leveraging digital infrastructures as tools for forging new communities, transforming existing behavioral patterns and practices, and, on the other hand, a "hybrid" strong agency, partially stimulated and augmented by targeted, customized systems of AI's recommendations, suggestions, navigation services, consultancy, and advice. Within these intersecting realms, the foremost theoretical and practical challenges emerge, particularly regarding the reconceptualization of human agency as a pivotal driver of institutional change under the neo-structuration condition.

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Conclusion

This article presents an interdisciplinary reinterpretation of the replicability crisis, synthesizing three perspectives: sociological, psychological, and digital studies. It has been argued that the crisis signals a growing disconnect between academia's dominant theoretical models and assumptions, which presume relatively stable individuals operating within predictable social structures, and the realities of neo-structuration, where undetermined by external structural forces individual agency drives societal transformations, increasingly embedded in digital space where the "rules of the game" change dramatically. On one hand, there are new actors at play: quasi-agentic algorithmic agents operating based on unprecedented, deeply informed knowledge of human behavior. Importantly, these algorithms communicate in a very personal, customized, and most human-like manner. It allows not only supporting the reproduction of this behavior but possibly its transformation as well. On the other hand, digital tools become available for humans to transform existing reality and create new communities, practices, and institutions (e.g., "digital scaling" in business).

This analysis points toward an impending paradigm shift across the social sciences and humanities. The central task will no longer involve studying fixed individuals within rigid structures presumed to follow linear developmental trajectories. Instead, scholars must develop methodologies and theories capable of systematically analyzing humans' context-dependent capacities for creation and transformation, not merely reproduction. While behavioral regularities may persist, identifying them requires fundamentally rethinking research priorities beyond 21st-century crisis management approaches.

Particularly promising in this regard are studies on digital-mediated agency. In the digital environment, the human capacity to transform increasingly determines both individual flourishing and institutional survival and is supported by a rich toolbox of technical instruments, including those based on AI. The reproducibility crisis, therefore, represents not merely a methodological challenge related to the epistemology of science but also points to changes in the ontology of the subject of research, demanding reconsideration of basic assumptions on human nature and social reality.

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