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Beyond the Network. A Critical Inquiry into the Limits of the Actor-Network Theory

This article critically examines the limitations and challenges of Actor-Network Theory (ANT) in contemporary social theory. Originally developed as a response to structuralist and constructivist paradigms, ANT offered a radical methodological alternative, emphasizing actor-relationality and emergent networks over predefined so-called social structures. While this approach has significantly shaped disciplines such as Science and Technology Studies (STS), political sociology, and environmental governance, it has also faced sustained criticism. Critics argue that ANT's refusal to engage with structural determinants, macro-political constraints, and historical asymmetries limits its explanatory power, particularly in relation to domination, hierarchy, and systemic inequalities. This article explores whether ANT can evolve beyond its descriptive commitments to address these concerns without compromising its core principles. Through an analysis of power asymmetries, digital governance, and ecological crises, the article interrogates whether ANT can reconcile empirical inquiry with critical engagement. Ultimately, it argues that ANT's future depends on its ability to navigate the tension between methodological openness and theoretical reflexivity, raising broader questions about the limits of a theory that seeks to expand beyond the very epistemological constraints that define it.

Key words: Actor-Network Theory (ANT), Power Asymmetries, Structural Inequality, Critical Sociology, Epistemological Constraints

Мислити изван мреже. Критичко преиспитивање граница теорије „актер-мрежа“

Овај чланак критички разматра ограничења и изазове теорије актера-мрежа (ANT) у савременој социолошкој мисли. Првобитно развијена као одговор на структуралистичке и конструктивистичке парадигме, ANT је понудила радикалну методолошку алтернативу, истичући релационалност актера и настајање мрежа уместо унапред датих тзв. друштвених структура. Овај приступ је значајно обликовао дисциплине као што су наука о технологији, политичка социологија и управљање животном средином, али је истовремено био предмет снажне критике. Критичари тврде да ANT-ово одбијање да се бави структурним одредницама, макрополитичким ограничењима и историјским асиметријама умањује његову објашњавачку снагу, нарочито у контексту доминације, хијерархије и системских неједнакости. Овај чланак истражује да ли ANT има потенцијал да се развија изван својих дескриптивних оквира како би одговорио на ове изазове без компромитовања својих основних принципа. Анализом асиметрија моћи, дигиталног управљања и еколошких криза, аутор преиспитује да ли ANT може да помири емпиријско истраживање са критичким ангажманом. На крају, тврди се да будућност ANT-а зависи од његове способности да балансира између методолошке отворености и теоријске рефлексивности, постављајући шира питања о границама теорије која тежи да превазиђе епистемолошка ограничења која је сама дефинисала.

Кључне речи: Теорија актера-мреже (ANT), асиметрије моћи, структурна неједнакост, критичка социологија, епистемолошка ограничења

INTRODUCTION

Actor-Network Theory (ANT) emerged in the late 20th century as a radical reconfiguration of social analysis, particularly in relation to science, technology, and power. Developed by Michel Callon (1986a; 1986b; 1998; 2005; 2006a; 2006b; 2008), Bruno Latour (1986; 1987; 1993; 1999; 2004; 2005; 2018), and John Law (1992a; 1992b; 1994; 1999; 2002; 2009) within the field of Science and Technology Studies (STS), ANT challenged foundational sociological binaries – nature versus society, structure versus agency, subject versus object – by proposing a relational ontology in which both human and non-human actors possess agency. This conceptual shift has

profoundly influenced disciplines beyond STS, including political theory, anthropology, and organizational studies. ANT's insistence on symmetry between human and non-human entities, its focus on network formations, and its methodological principle of tracing associations rather than assuming predefined – what conventional sociology defines as – social structures have rendered it a distinctive and widely debated approach in contemporary social theory.

However, despite its broad applicability and theoretical innovations, ANT has also been the subject of sustained criticism. Scholars have questioned its epistemological relativism, its methodological ambiguities, and its apparent neglect of power struggles and structural inequalities. Critics argue that by dissolving traditional sociological categories, ANT risks flattening the ontological distinctions between human intentionality and material affordances, making it difficult to differentiate between technological determinism and social agency (Collins & Yearley 1992). Others have pointed out that ANT's rejection of macro-structural determinants renders it insufficiently attuned to the enduring influence of what classical sociology describes as institutions, historical legacies, and systemic inequalities (Whittle & Spicer, 2008; Vandenberghe 2001). Feminist scholars have similarly argued that ANT's focus on network dynamics often obscures gendered power relations and fails to engage critically with patriarchal structures (Haraway 1991).

These critiques highlight a fundamental tension within ANT: while it provides a powerful framework for understanding how social order is assembled, contested, and reconfigured, its reluctance to engage with questions of normativity and power raises concerns about its explanatory scope. Some scholars suggest that ANT's radical empiricism – its insistence on following actors without imposing theoretical presuppositions – limits its ability to provide critical evaluations of inequality, exploitation, and domination (Amsterdamska, 1990; Shapin 1995). Others argue that ANT's analytical focus on local, contingent interactions risks neglecting the broader political and economic forces that shape actor-networks (Bloor 1999).

Despite these debates, ANT remains a foundational framework in contemporary social theory, continually evolving in response to emerging challenges. As Latour himself has acknowledged, ANT's early formulations may have overemphasized the constructed nature of scientific facts at the expense of recognizing their enduring material consequences (Latour 2005). More recently, in *Down to Earth* (2018), Latour has

suggested that ANT must now confront the realities of ecological devastation, planetary interdependence, and the political stakes of environmental governance. This raises important questions: Can ANT be reconciled with a more engaged, normative critique of power? Does its methodological openness hinder its ability to address pressing global crises such as climate change, technological authoritarianism, and economic inequality?

This article aims to critically reassess the legacy and limitations of ANT, addressing both its theoretical contributions and its unresolved challenges. By examining ANT's conceptual foundations, methodological principles, and epistemological assumptions, this article evaluates whether ANT remains a viable framework for understanding contemporary socio-technical transformations or whether its limitations necessitate new theoretical syntheses. The discussion unfolds in three key stages: First, the foundational principles of ANT are reconstructed, including its emphasis on translation, inscription, and black-boxing. Second, the primary critiques of ANT are examined, focusing on its treatment of power, knowledge, and agency. Finally, the article explores potential directions for rethinking ANT, considering how it might be expanded or reformulated to engage more directly with political, ethical, and normative concerns. Through this analysis, this article seeks to contribute to ongoing debates about ANT's theoretical relevance and methodological adaptability in an era of profound socio-technical upheaval.

To better grasp ANT's current relevance, it is important to recognize that what is often labeled as a single theoretical framework actually comprises a diverse and evolving set of intellectual trajectories. While early works by Latour, Callon, and Law shared a commitment to symmetry and radical empiricism, their later developments diverge in significant ways. Latour increasingly moved toward political ontology and ecological critique (Latour 2004; 2018), while John Law emphasized material semiotics and the multiplicity of realities (Law 2002; 2009). Michel Callon contributed to economic sociology and performativity debates, focusing on markets and valuation (Callon 1998). Furthermore, feminist scholars such as Susan Leigh Star and Annemarie Mol introduced crucial correctives by emphasizing care, embodiment, and partial perspective, pushing ANT beyond its original epistemic minimalism (Mol 2002). Noortje Marres, has stressed the role of technological infrastructures in shaping public participation and environmental politics (Marres 2012). Taken together, these strands suggest that ANT

should not be treated as a fixed theoretical system but as an epistemic toolset – one whose value depends on its capacity to adapt to new empirical and normative challenges.¹

FOUNDATIONS OF ACTOR-NETWORK THEORY AS A CHALLENGE TO CONVENTIONAL SOCIOLOGICAL PARADIGMS

ANT represents a profound shift in sociological thinking, offering a framework that challenges the ontological and epistemological foundations of classical sociology. ANT emerged as an alternative to prevailing structuralist and constructivist accounts of the social world, particularly within the sociology of science. Rather than presupposing a distinction between social and technical domains, ANT posits that reality is enacted through heterogeneous networks of human and non-human actors, thereby redefining the way agency, causality, and social order are understood. The implications of this shift extend far beyond STS, challenging the methodological commitments of mainstream sociology and raising fundamental questions about how social theory should conceptualize structure, agency, and power.

ANT originated at the *Centre de Sociologie de l'Innovation* (CSI) at the *École des Mines* in Paris, where Callon and Latour sought to rethink the sociology of scientific knowledge. Their laboratory ethnographies revealed that scientific discoveries and technological innovations are not solely the result of individual genius or institutional structures but emerge from networks of associations involving scientists, machines, funding agencies, and infrastructures (Latour & Woolgar 1979). This insight led them to question traditional sociological explanations that treat the social as a distinct, autonomous domain capable of explaining empirical phenomena. Instead, ANT directs researchers to trace associations, following the ways in which stability and change emerge from the continuous negotiation of heterogeneous elements (Latour 1987).

Bruno Latour's *Science in Action* (1987) and *We Have Never Been Modern* (1993) positioned ANT as a theoretical alternative to both positivist and constructivist paradigms. Modern thought, according to Latour, has

¹ While this article primarily focuses on the international trajectory of ANT, it is important to note that the theory has also received critical engagement within Serbian sociological and anthropological scholarship (Bošković 2015; Spasić 2007; Filipović 2012). These contributions offer locally grounded reflections on the applicability and limits of ANT, especially in relation to epistemological pluralism, disciplinary translation, and the legacy of realism.

wrongly separated nature and society, reducing reality to either objective natural laws or socially constructed meanings. ANT challenges this false dichotomy by tracing how associations between humans and non-humans produce hybrid realities that neither positivism nor constructivism fully account for: "Superpose all the signatures and you will have the shapes of what the moderns wrongly call, in order to summarize and purify, 'Nature' and 'Society'" (Latour 1993, 87). The very act of dividing nature and society into two distinct poles has enabled modernity to define who is constructing and who is not – if one constructed, they were dismissed as 'merely' a constructivist; if not, they were 'merely' a realist. By exposing this epistemological trap, ANT rejects both macro-structural determinism and individualist voluntarism, insisting that social order is not a pre-existing entity but rather an emergent effect of relational stabilizations across heterogeneous associations.

Traditional positivist sociology, influenced by Durkheim, explains social order through macro-structural forces, such as institutions, norms, and collective consciousness. Conversely, constructivist traditions, particularly those shaped by phenomenology and ethnomethodology, emphasize individual agency and meaning-making in the production of social reality. ANT disrupts this binary by showing that order emerges through interactions across heterogeneous networks – not solely from institutional structures nor from individual agency, but from the ongoing negotiations between human and non-human actors. By shifting attention from fixed social categories to dynamic assemblages, ANT opens a new way of understanding how realities are constructed and stabilized over time.

Latour's rejection of pre-given so-called social structures has profound implications for sociological analysis. In *Reassembling the Social* (2005), he argues that the social should not be treated as an explanatory variable but rather as the outcome of dynamic interactions between heterogeneous elements. This perspective challenges classical sociology's assumption that what it treats as stable institutions and power structures exist prior to and independent of the interactions that sustain them. ANT, by contrast, insists that institutions, technologies, and even scientific facts must be studied in terms of how they are stabilized, contested, and re-configured over time.

A central concept in ANT is 'translation', a process by which actors negotiate, redefine, and enroll others into a network. Michel Callon's study on scallop farming in Brittany (*Some Elements of a Sociology of Translation*, 1986) illustrates how scientific and technological networks coalesce through a four-stage process: problematization, interessement, enrolment,

and mobilization. This framework underscores the contingent and negotiated nature of social order, challenging deterministic accounts that reduce outcomes to pre-existing structures. Rather than viewing social relations as stable hierarchies, ANT focuses on the continuous work of assembling and maintaining networks that produce what sociologists typically describe as institutions, organizations, or collective behavior.

Another foundational principle of ANT is 'symmetry', which insists that human and non-human actors must be analyzed with the same conceptual tools. Unlike classical sociology, which attributes agency exclusively to human subjects, ANT asserts that agency is distributed across networks of human and material entities. Latour (1999, 176) provocatively argues that "we will never understand how humans act if we do not grant some level of agency to the objects that shape their actions". This perspective challenges the anthropocentrism of traditional sociological theories, which tend to treat objects, technologies, and infrastructures as passive instruments shaped by human action. Instead, ANT conceptualizes non-human actors as participants in the construction of reality, influencing outcomes in ways that cannot be reduced to human intention alone.

The concept of 'inscription' further illustrates this shift. In scientific and technological practices, knowledge is inscribed into artifacts, texts, and infrastructures, shaping how ideas circulate and gain authority (Latour 1987). The materiality of inscriptions means that once established, they can act independently of their creators, influencing future interactions. This perspective challenges the linguistic and symbolic focus of many sociological theories, particularly those influenced by discourse analysis and symbolic interactionism, by emphasizing how material objects actively mediate social relations.

Closely related to inscription is the notion of 'black-boxing', which describes how complex networks become taken for granted as stable entities. As Latour (1999, 304) explains, "when a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs, not on its internal complexity". Black-boxing reveals how institutions, scientific facts, and technological systems become naturalized over time, concealing the negotiations, alliances, and controversies that produced them. This insight is particularly significant for understanding bureaucratic and technological governance, where seemingly neutral systems often obscure deeply political and contested histories.

By challenging the foundational assumptions of dominant sociology, ANT reframes how scholars approach key sociological questions. Traditional sociology often assumes pre-existing categories such as socie-

ty, class, or institutions, using them to explain social phenomena. ANT, by contrast, insists that these categories must themselves be explained by tracing how they emerge and stabilize through actor-networks. This methodological shift aligns with broader poststructuralist critiques of essentialism, emphasizing the contingent and performative nature of social order.

However, this approach raises questions about the scope and applicability of ANT beyond STS. While ANT has proven highly effective in studies of science, technology, and innovation, its emphasis on localized network formations has led some sociologists to question its relevance for studying large-scale social phenomena such as capitalism, political institutions, and social movements. Unlike classical sociological theories that seek to identify underlying structures shaping social life, ANT focuses on the mechanics of assemblage, tracing how heterogeneous elements come together to produce stability or transformation. This methodological stance has been both its strength and its limitation, providing rich empirical descriptions but sometimes lacking the broader explanatory power associated with structuralist and critical theories.

Ultimately, ANT presents both a theoretical challenge and a methodological provocation to dominant sociology. By rejecting essentialist notions of society, dismantling human-centered agency, and emphasizing the fluidity of social formations, ANT has reshaped contemporary understandings of science, technology, and governance. Yet, this radical openness to contingency and relationality has led to questions about its explanatory power. While ANT has been instrumental in tracing how social order is assembled, contested, and reconfigured, critics argue that its avoidance of what are typically called structural determinants or macro-sociological categories, and normative frameworks leaves key aspects of social reality – such as domination, hierarchy, and systemic inequality – insufficiently theorized.

This raises an important dilemma: can ANT incorporate an analysis of power without compromising its methodological commitments? Or does its insistence on empirical description necessarily preclude broader critiques of social stratification, ideology, and historical asymmetries? Whether ANT represents a replacement for classical sociological paradigms or simply a complementary analytical tool remains an open question. What is clear, however, is that its emphasis on relationality, assemblage, and performativity continues to push the boundaries of sociological inquiry, challenging conventional assumptions while inviting critical reflection on its own limitations. These tensions become especially pro-

nounced when considering ANT's engagement – or lack thereof – with power, inequality, and domination, themes that will be examined in the next chapter.

CRITIQUES OF ANT AND THE QUESTION OF POWER

As mentioned, since its emergence, ANT has challenged the conventional boundaries of social analysis, offering an alternative framework that emphasizes relationality, materiality, and the contingent nature of stability. However, its radical rethinking of agency and structure has not been without controversy. Scholars from various traditions have raised concerns about its epistemological stance, its capacity to address structural inequalities, and its ability to account for domination, hierarchy, and ideology. While ANT provides a powerful analytical lens for studying how networks form and stabilize, critics argue that ANT – in its radical commitment to following actors without imposing theoretical presuppositions – risks explaining too much while saying too little about power, ideology, and domination. The question thus arises: can ANT engage meaningfully with these issues without sacrificing its methodological commitments?

One of the most significant critiques of ANT concerns its epistemological relativism – its tendency to dissolve traditional analytical categories in favor of empirical description. By insisting that all entities – scientific facts, technological artifacts, and actor-configurations – are the outcomes of contingent network formations, ANT challenges conventional notions of objective knowledge. While this approach has yielded valuable insights in STS, some argue that it leads to an overly expansive explanatory framework, in which everything is a network and every actor, whether human or non-human, plays an equally significant role. As Amsterdamska (1990) has pointed out, ANT's refusal to establish clear criteria for distinguishing between different kinds of entities makes it difficult to evaluate the relative significance of various actors and processes. This raises concerns about the limits of ANT as an explanatory framework – if everything is a network and all relations are constitutive, does ANT ultimately explain too much while leaving little room for analytical differentiation?

Related to this is the critique that ANT fails to adequately address structural inequalities. While ANT scholars have convincingly shown how scientific knowledge and technologies are socially constructed, critics argue that the theory remains curiously silent on issues of power structures and systemic domination (Whittle & Spicer 2008). By flattening hierarchies and refusing to privilege macro-level structures, ANT risks overlooking the historical and institutional dimensions of inequality. For instance, studies

of technological innovation that adopt an ANT perspective often emphasize the micro-processes of actor enrollment and negotiation but fail to engage with the broader socio-economic and political forces that condition these interactions. Vandenberghe (2001) critiques ANT for its methodological micro-focus, arguing that its reluctance to theorize durable associations makes it ill-equipped to account for how capitalism, patriarchy, and colonialism shape the networks it describes. Loïc Wacquant (2014, 9) offers an implicit yet firm critique of Latour's approach, emphasizing that ANT rests on problematic epistemological assumptions similar to those found in ethnomethodology, which he describes as a "hypersubjectivist paradigm." According to Wacquant, by strictly adhering to the methodological imperative to "follow the actors themselves," proponents of ANT tend to attribute a form of omniscience and omnipotence to social actors, as if they lived in entirely self-contained local worlds, detached from any broader structures. For Wacquant – a close disciple of Pierre Bourdieu – this stance effectively sidelines historically constituted relations of power (such as class structures, economic inequalities, and institutional forms of domination), rendering ANT unable to account for the reproduction of social order and the persistence of oppression over time.

The question of domination and ideology presents another major challenge for ANT. Traditional sociological and critical theories – ranging from Marxism to post-structuralism – have long emphasized that power is not simply an emergent property of networks but a structured force that operates through institutions, discourse, and economic systems. By contrast, ANT tends to conceptualize power in terms of stability and durability, rather than as a force that systematically benefits certain actors over others. Latour (1986) and Callon (1986) argued that power is not property or capability but rather an effect of network relationships. While this formulation challenges reductionist understandings of power as something possessed, it also risks obscuring the ways in which domination is reproduced through ideology and social structure. As Bloor (1999) points out, ANT's emphasis on relationism *in* over structure means that it is better at describing how power is exercised in specific situations than at explaining why certain groups consistently dominate others.

A related critique concerns ANT's ability to account for hierarchy and resistance. By treating power as something that circulates through networks rather than as something imposed from above, ANT has been accused of underestimating the role of coercion, exclusion, and systemic violence (Schinkel 2007). Critics argue that in many real-world institutions – states, corporations, and military regimes – whose authority is of-

ten sustained through force and economic control rather than negotiation and translation. While ANT's insights into the contingent nature of authority are valuable, its reluctance to engage with more coercive forms of domination has led some to question its applicability to studies of authoritarian governance, economic exploitation, and systemic oppression.

In response to these critiques, ANT scholars have sought to clarify and expand its approach to power. Latour himself acknowledged in *Reassembling the Social* (2005) that ANT, in its early formulations, may have underemphasized issues of inequality and asymmetry, focusing instead on how power is enacted through networks rather than addressing the structural conditions that shape those networks. Some scholars have argued that ANT can incorporate analyses of power without abandoning its methodological stance. Callon and Law (2005) propose that ANT's focus on actor-networks does not preclude analyses of inequality but requires that these analyses be conducted empirically, tracing how asymmetries emerge and are maintained through heterogeneous associations.

However, the question remains: can ANT be reconciled with more normative critiques of power and ideology, or does its commitment to empirical neutrality limit its ability to engage with such issues? This is where possible intersections between ANT and critical theory become particularly relevant. While classical ANT formulations have generally avoided grand theories of domination, some scholars have explored ways to synthesize ANT's empirical strengths with the normative critiques of power found in Marxist, feminist, and postcolonial theory (Blok & Jensen 2011). For example, Mol (2002) has proposed a 'political ontology' approach that retains ANT's relational sensibilities while incorporating questions of justice, exclusion, and resistance. Similarly, Marres (2007) has explored how ANT's insights into material participation can be integrated into studies of political activism and environmental governance.

The challenge for ANT, then, is whether it can evolve beyond its original formulations to engage more explicitly with power, domination, and ideology without compromising its foundational commitments. Some scholars argue that this requires a stronger normative orientation, shifting from description to critique (Guggenheim & Potthast 2011). Others maintain that ANT's methodological strength lies precisely in its refusal to impose external theoretical assumptions, insisting that power should be studied as an effect of networked enactments rather than as a pre-given structure. However, this methodological stance has drawn increasing criticism for its inability to account for structural inequalities that persist across historical and institutional contexts.

The debate over ANT's engagement with power reflects a broader tension within contemporary social theory: how to balance empirical openness with normative critique. While ANT has undoubtedly expanded understandings of agency, materiality, and sociotechnical systems, its reluctance to engage with broader structures of inequality and domination remains a persistent concern. Whether ANT can – or should – incorporate more explicit analyses of systemic power remains an unresolved question. As Guggenheim and Potthast (2011, 172) observe, “The problem of Latour’s career as the lost son of sociology is not so much his apostasy, since in his work he was always consequentially propelling some of the most convincing critiques of, and alternatives to, sociology. His recent attempts to return to and to improve sociology, however, are tainted by an ignorance of previous differentiationist theories and his failure to offer better alternatives.” This critique highlights the paradox of ANT’s development: despite its departure from traditional sociological frameworks, it now faces the challenge of returning to the very concerns it initially sought to escape – power, domination, and systemic asymmetries.

As ANT moves beyond its original context in Science and Technology Studies (STS) to influence sociology, political theory, and anthropology, the issue is no longer just about its analytical scope but about its ability to adapt to contemporary crises. This requires a reassessment of Latour’s intellectual trajectory, particularly in relation to his later attempts to reposition ANT within pressing political, ecological, and epistemological challenges. Can ANT be reformulated or expanded to address structural asymmetries, planetary entanglements, and new forms of governance? Can its emphasis on networked relations and material agency provide new ways of conceptualizing power in an era of global uncertainty? These are the questions that define the ongoing legacy of ANT and the need to reassess its relevance in light of Latour’s later contributions.

RETHINKING ANT IN THE WAKE OF LATOUR’S LEGACY

As we have seen, ANT was initially conceived as a radical challenge to dominant sociological paradigms, proposing an alternative to structuralist determinism and individualist voluntarism. By rejecting pre-existing structures and focusing on the contingent, negotiated formation of actor-networks, ANT positioned itself as a methodological tool rather than a normative social theory (Latour 1987). This approach, while offering interesting perspectives on the relational constitution of reality, has been the subject of criticism, the main premises of which we addressed in the

preceding section. As ANT has evolved, scholars have sought to expand its heuristic scope, raising the question: can ANT incorporate an analysis of power structures and systemic inequalities without reverting to the essentialisms it originally sought to avoid?

In its early formulations, ANT's commitment to radical empiricism led it to reject grand sociological categories, insisting instead that networks should be followed as they unfold, without imposing pre-existing explanatory frameworks (Callon 1986). This methodological stance disrupted traditional macro/micro dichotomies, offering a flat ontology where human and non-human actors were treated symmetrically (Latour 2005). "This is the reason why I am going to define the social not as a special domain, a specific realm, or a particular sort of thing, but only as a very peculiar movement of re-association and reassembling" (Latour 2005, 7). While this opened new analytical possibilities, it also led to criticisms that ANT lacked theoretical tools to address social inequalities, reducing power to an emergent effect of network formations rather than a structured force embedded in historical processes (Vandenberghe 2002). "The introduction of a metalevel of concrete determination does not mean that everything that happens locally is rigorously determined by global structures, but it allows us to analyze how and to what extent pre-existing structures of domination tend to exclude the emergence of an alternative ordering of social relations between humans and of the heterogeneous elements which they assemble as well." (ibid. 2002, 55).

This tension becomes particularly apparent when considering how ANT conceptualizes stability and change. While early ANT scholars emphasized network formation as an open-ended process, later work has acknowledged that some configurations endure, resist transformation, and reproduce inequalities. Latour (2005) recognized that certain actor-networks, once established, become so deeply embedded that they function as structural constraints. Yet, because ANT resists abstracting power from specific relational contexts, it struggles to account for how systemic domination is reproduced over time. This presents a paradox: ANT critiques grand theoretical models for their static conceptualizations of power, yet by treating power as contingent and relational, it risks under-theorizing the conditions that allow certain networks to maintain asymmetries across generations. As Whittle and Spicer (2008, 615) put it, "in addition to claiming to provide a radical equalization of agency, ANT also claims to provide a radical account of power. In place of a single dominant social group, ANT claims that power operates in and through a heterogeneous network of people and things."

Going beyond ANT thus requires more than simply extending the range of actors or applying the framework to new domains. It entails rethinking the ontological and epistemological assumptions that underpin ANT's original formulation. Latour's later work, especially *Down to Earth* (2018), marks a shift from radical empiricism toward an ecologically and politically engaged critique of modernity. Here, the problem is not simply how networks are formed, but how planetary conditions – environmental, geopolitical, and epistemic – require a fundamental reorientation of social thought. This includes what he calls the 'terrestrial' position: a mode of attachment to the Earth that demands new political and epistemological alliances. 'Beyond ANT' therefore signals a transition from neutral description to ontological intervention, where networks are not only traced but contested, and their normative stakes explicitly addressed.

In addition to sociological critiques, anthropological engagements with ANT have offered both pointed criticisms and productive appropriations. Scholars working in ontological and postcolonial anthropology have raised concerns that ANT's commitment to epistemological symmetry and its notion of flat ontology can inadvertently universalize Western conceptual frameworks, thus obscuring non-Western ontologies that operate with radically different understandings of agency, relationality, and materiality (Viveiros de Castro 2015; Holbraad & Pedersen 2017). For instance, animist or relational cosmologies, in which spirits, places, and ancestors are active agents, may not align easily with the actor-network model and risk being misrepresented if translated into its conceptual vocabulary without careful ontological mediation. At the same time, anthropologists have successfully mobilized ANT to analyze issues such as infrastructure, embodiment, and ecological entanglements, especially in the work of Mol (2002) and Marres (2012). These contributions suggest that ANT can be made more anthropologically sensitive by integrating attention to ontological pluralism and local meaning-making. As recently argued by Mladenović and Prodanović (2024), this synthesis opens a fruitful path for rethinking ANT's conceptual reach without abandoning its relational commitments.

One way forward is to rethink ANT's heuristic scope, moving beyond networks to focus on power-laden assemblages. The concept of 'assemblage', developed by Deleuze and Guattari (1987) and later adapted in political and sociological theory, offers a means of incorporating historical inequalities into ANT's relational framework. Unlike networks, which imply flexibility and reversibility, assemblages account for how heterogeneous elements become temporarily fixed into durable hierarchies (Nail 2017). This shift allows ANT to engage with structural inequalities without reverting to rigid structuralist

determinism. By integrating historical embeddedness into ANT's relational ontology, scholars can better analyze why certain configurations persist and why some actors consistently wield greater influence than others.

This shift also demands a reconsideration of ANT's relationship with normative social theory. Traditionally, ANT has avoided normative commitments, maintaining that social scientists should describe networks rather than impose external moral frameworks (Latour 2004). "We should not state that 'when faced with an object, ignore its content and look for the social aspects surrounding it'. Rather, one should say that 'when faced with an object, attend first to the associations out of which it's made and only later look at how it has renewed the repertoire of social ties'" (Latour 2005, 233). However, this stance has drawn criticism for failing to engage with questions of justice, exclusion, and exploitation (Guggenheim & Potthast 2011). If ANT is to remain relevant in an era of climate crises, digital surveillance, and rising authoritarianism, it must confront the ethical and political dimensions of networked power. There are no good or bad actors, only more or less durable networks. The absence of a normative orientation risks legitimizing existing social hierarchies, as ANT's descriptive neutrality may serve to reproduce the power relations it observes rather than challenge them (Bloor 1999).

A key area where this debate plays out is political agency. While classical ANT formulations often treated agency as an emergent effect of actor-networks, later work has recognized that some actors systematically shape networks more than others (Mol 2002). Economic elites, state institutions, and corporate infrastructures do not simply enroll actors into networks; they prestructure the conditions of possibility for certain forms of agency while foreclosing others (Marres 2007). The question, then, is whether ANT can be reconciled with critical perspectives on inequality and domination without abandoning its commitment to relational empiricism.

Marres (ibid.) has explored how material participation structures political engagement, demonstrating that objects, infrastructures, and technological systems mediate access to power. This aligns with calls for a more politically engaged ANT, one that retains its methodological strengths while expanding its capacity to analyze how power asymmetries shape the distribution of agency. Similarly, Mol (2002) has proposed a political ontology approach that incorporates questions of justice and exclusion while preserving ANT's relational sensibilities. These approaches signal a potential transformation within ANT, one that acknowledges the uneven distribution of agency and resources while remaining committed to empirical inquiry.

The legacy of ANT must be reassessed in light of Latour's later work, which takes a more explicitly political and ecological turn. In *Down to Earth* (2018), Latour offers a forceful diagnosis of the political and ecological condition of modernity, arguing that the failures of globalization, environmental degradation, and rising nationalism reflect the inability of dominant epistemologies to adequately represent the Earth as a political actor. In response, he calls for a 'terrestrial' politics grounded in material attachments and ecological interdependencies – a vision that demands a fundamental rethinking of the ontological foundations of politics. This shift marks a significant departure from ANT's earlier reluctance to engage with macro-political concerns and its methodological commitment to descriptive neutrality. Latour's turn toward ontological intervention foregrounds the need for ANT to evolve from tracing associations to articulating collective responsibilities. In doing so, he invites ANT to become not merely a mode of inquiry, but a normative project capable of confronting planetary crises without abandoning its foundational principles.

This evolution of ANT reflects a broader tension in contemporary social theory: how to balance empirical openness with normative critique. While ANT was initially suspicious of grand theories of power, later developments suggest that networks are shaped by histories of violence, exclusion, and struggle. The growing interest in political ontology, material participation, and assemblage theory signals a way forward, enabling ANT to retain its analytical strengths while broadening its scope. Whether this leads to a radical transformation of ANT or simply a refinement of its methodological approach remains an open question. This evolution of ANT reflects a broader tension in contemporary social theory: how to balance empirical openness with normative critique. Perhaps the problem with ANT is not so much that it ignores power, but that it disperses it so widely that it no longer makes sense. The growing interest in political ontology, material participation, and assemblage theory signals a way forward, enabling ANT to retain its analytical strengths while broadening its scope. Whether this leads to a radical transformation of ANT or simply a refinement of its methodological approach remains an open question.

CONCLUSION: ACTOR-NETWORK THEORY BETWEEN EMPIRICAL INQUIRY AND CRITICAL ENGAGEMENT

ANT has consistently positioned itself as a methodological and conceptual provocation, resisting the impulse to impose what conventional sociology defines as social structures or normative frameworks. From its in-

ception, ANT has challenged deterministic sociological models, replacing them with a radically empirical approach that follows actors and their associations as they build, stabilize, and contest networks. This methodological stance has allowed ANT to flourish across diverse fields, from science and technology studies (STS) to digital governance, environmental crises, and political sociology. However, the continued expansion of ANT has revealed critical tensions that remain unresolved. As the world faces mounting social, ecological, and technological disruptions, the question is no longer whether ANT can describe emergent relations, but whether it can critically engage with the broader structures that shape and constrain them.

The challenge lies in whether ANT's empirical inquiry can evolve beyond tracing associations to engage with questions of power, domination, and material inequality without betraying its foundational commitments. ANT's strength has always been its methodological adaptability, its ability to follow actors and uncover the distributed agencies that shape social and material life. However, its reluctance to interrogate the historical conditions that preconfigure networks before they emerge has led to persistent critiques. Scholars have argued that ANT's focus on emergent connections tends to obscure the structured asymmetries that shape who and what gains influence within a network (Whittle & Spicer 2008). By prioritizing movement and relationality, ANT risks overlooking the persistence of entrenched hierarchies. This raises a fundamental question: can ANT remain committed to empirical openness while also developing a more explicit engagement with the inequalities that shape social and technological landscapes?

A key issue in this debate is the question of reflexivity. ANT's rejection of pre-existing macro-structures was intended to break free from static sociological categories, yet in doing so, it has often failed to acknowledge how certain actors, institutions, and infrastructures systematically reproduce inequality (Blok & Jensen 2011). Power does not emerge equally across networks; it is conditioned by historical legacies of economic stratification, political exclusion, and epistemic dominance. This is particularly evident in the context of digital governance and algorithmic systems, where ANT has been instrumental in exposing how technological infrastructures mediate agency (Marres 2017). However, ANT has been less effective in analyzing how digital networks are shaped by corporate monopolies, regulatory asymmetries, and global financial architectures that pre-exist and precondition these technological formations (Couldry & Mejias 2019). A reflexive ANT would not merely describe these config-

urations but critically interrogate how and why certain forms of power persist while others remain contingent and unstable. This tension echoes broader philosophical debates about realism and ontological pluralism in anthropology (D'Andrade 1995; Kelly 2014), which remain crucial in assessing the epistemological stakes of ANT.

This challenge becomes especially pressing in the context of environmental crises and planetary governance. In his later work, Latour (2018) insists that phenomena such as climate change, biodiversity loss, and resource depletion are not external shocks to the social world, but fundamental reconfigurations of its political and economic foundations. For ANT to remain relevant in the Anthropocene, it must address not only the relational interplay between human and non-human actants, but also the structural asymmetries that shape access to resources, exposure to risk, and exclusion from decision-making processes. The agency of non-humans does not negate the persistent material inequalities embedded in global ecological governance.

Building on this, ANT has also offered valuable insights in anthropological research – particularly in settings where empirical description meets ontological plurality. Its relational ontology resonates with ethnographic approaches that emphasize the agency of infrastructures, landscapes, and non-human entities, as well as the multiplicity of culturally embedded cosmologies. By insisting on tracing associations rather than presupposing categorical hierarchies, ANT enables anthropologists to engage ontological difference without collapsing it into epistemological deviation. This makes it a powerful heuristic for investigating how realities are enacted and stabilized in specific cultural contexts. Still, anthropological critiques have cautioned that ANT must remain vigilant about its own conceptual assumptions, lest it impose a universal grammar of relationality. A more reflexive and politically aware ANT could, in this light, serve not only as a descriptive tool, but as a platform for negotiating epistemic justice within an ontologically plural world.

Embracing a more critically attuned ANT therefore requires neither abandoning its empirical commitments nor sacrificing its relational sensibilities. Recent theoretical work has sought to integrate ANT with frameworks centered on power-laden assemblages – concepts that allow for analyzing how certain socio-material configurations become stabilized into enduring hierarchies. Unlike the reversible and fluid imagery of networks, assemblages foreground the sedimentation of relations into durable asymmetries of influence and control. This conceptual refinement enables ANT to better address structural inequality, while pre-

serving its foundational critique of deterministic and essentialist social theory.

As pointed out earlier, Bruno Latour's intellectual trajectory suggests that even he recognized the necessity of ANT evolving beyond its original formulations. In *Down to Earth* (2018), he makes an explicit argument for the repoliticization of knowledge and governance, positioning ANT as a means to rethink political economy, environmental governance, and technological sovereignty. This marks a significant shift from early ANT's methodological neutrality, signaling a recognition that ANT must engage with systemic power relations if it is to remain relevant to contemporary crises. The challenge is whether this new political orientation can be meaningfully integrated into ANT without undermining its foundational principles.

At its core, the future of ANT depends on its capacity to navigate the tension between empirical inquiry and critical engagement. If ANT remains purely descriptive, it risks becoming an outdated methodological exercise, incapable of addressing the profound structural forces shaping the modern world. If it moves too far in the direction of normative critique, it risks losing the very empirical openness that made it such a revolutionary approach to social analysis. The question is not whether ANT should abandon its commitment to actor-relationality, but how it can integrate a more historically and politically attuned perspective on power.

As global crises intensify – whether through ecological collapse, algorithmic governance, or political instability – the demand for a conceptual framework that can reconcile contingency and constraint has never been more urgent. ANT has already expanded beyond its original disciplinary boundaries, challenging scholars to reconsider the nature of agency, structure, and power. Yet, if ANT is to remain a productive tool for contemporary analysis, the question is no longer simply where it should be applied but how it must transform. The key challenge lies in whether a theory so deeply rooted in radical empiricism and methodological openness can meaningfully integrate an account of systemic power, historical asymmetries, and structural constraints without negating its foundational principles. Can ANT move beyond tracing networks to engage with the forces that shape and limit them without undermining its core commitment to actor-relationality and emergent processes? Or does the very logic of ANT – its rejection of overarching explanatory frameworks – make such an evolution impossible? The tension between empirical inquiry and critical engagement remains unresolved, raising a more fundamental question: can a theory genuinely expand beyond its own limits if doing so requires

it to abandon the very assumptions that define it? The future of ANT will not be determined by where it is applied next but by whether it can navigate this internal contradiction – and in doing so, redefine what it means to study the relations that constitute the social world.

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