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Thinking Complexity with Harrison White: Towards Social Emergence via Indexical Language

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Abstract

Harrison C. White, a founding giant of the relational turn in Sociology, has left us a monumental model of social emergence based on the interplay of three primitives (identity, control, switching) and two principles (self-similarity, dispersion) of social organization. In this essay honoring his extraordinary legacy, I reflect on the significance of White's theoretical model for future thinking on complexity in the social sciences. After the relational and cultural turns, I propose that Sociology take a complexity turn, in light of recent developments across the sciences. In this respect, White's model provides sharp insights consistent with complex systems ontologies far from equilibrium, exhibiting path dependence and nonlinear phase transitions. His model radically breaks with cybernetic or autopoietic systems models, and recognizes the ambiguity of network ties not as measurement error, but as integral to social systems. Moreover, White's later turn to sociolinguistics to theorize context-making and meaning in networks is pathbreaking. His incorporation of linguistic indexicality and reflexive metapragmatics to explain shifting network configurations refines our understanding of complexity specific to human life, where systems boundaries are seldom physical but primarily semiotic. My goal is to stimulate complexity thinking in Sociology by foregrounding White's innovative analytical tools, including polymer netdoms, scale-invariance and nonlinearities, phenomenologies of ties and stories, boundaries enabling multiple contingencies, resilient footings sustaining ambiguity, meaning and context-making via indexical switching, and speech registers indexing subsystems differentiation but also interpenetration, among others. I conclude by positioning White's model in complexity debates on restricted versus general emergence, and claim his model contains a theory of general emergence based on irreducible path dependence and historical contingency.

Keywords: Complexity; Emergence; Indexicality; Social systems; Social networks; Language semiotics.

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> I claim that all scopes and scales of social process induce themselves in some fashion as the following: Identities trigger out of events — that is to say, out of switches in surroundings — seeking control over uncertainty and thus over fellow identities. Identities build and articulate ties to other identities in network-domains, *netdoms* for short [...] In their search for control, identities switch from netdom to netdom, and each switching is at once a decoupling *from* somewhere and an embedding *into* somewhere (White, 2008a, p. 2).

Harrison C. White, a founding giant of the relational turn in sociology, has produced some of the most influential tools to date in social network analysis, including vacancy chains, structural equivalence, blockmodels, and producer markets modeling (Boorman & White, 1976; Lorrain & White, 1971; White, 1963, 1970, 1981, & 2002; White et al., 1976; White & Breiger, 1975; Heil & White, 1976). Moreover, he left us a monumental theoretical model to explain the emergence of social formations. His model provides key insights to think about complexity in social systems. It radically breaks with equilibrium or autopoietic systems models, recognizes ambiguity of network ties not as measurement error but as integral to social systems, and postulates complex emergence out of historical contingency.

White's model (1992a & 2008a) begins analytically with identities triggered by stochastic processes at any scale, from individuals to empires. Once decoupled from their environments, identities seek footings vis-à-vis other identities in control efforts to reduce uncertainty. In the process, they self-organize in disciplined molecules to accomplish tasks and secure perduration. Signaling and comparability are key. Specialization ensues. Increased complexity triggers further control efforts, and hence identities polymerize ever more intricate social networks and domains (netdoms) that merge in social ties delivering reflexive stories and temporalities. Identities switch across these shifting netdom shapes seeking further footings and changing contexts that spark new meanings. The entire process is scale-free and recursive.

I have explained elsewhere (Fontdevila, 2018) White's relational foundations in depth and conducted an exegesis of his model of social emergence — a model built on creative interplay of three axiomatic primitives (identity, control, switching) and two principles (self-similarity, dispersion) of social organization. In another publication (Fontdevila, 2025), I have written about his intellectual impact on my sociobehavioral research. In this essay honoring his extraordinary legacy, I focus on White's theoretical model in terms of its significance for future thinking and research on complexity in the social sciences. In particular, I contend that White's sociolinguistic theoretical contributions and turn to Peircean indexicalities and metapragmatics provide original insights to think deeply about complexity in social systems.

My goal is to reignite sophisticated systems thinking back into sociology by integrating complexity theory. By this, I mean deep thinking about social emergence and organization that is consistent with complex systems ontologies far from equilibrium exhibiting path dependence and nonlinear phase transitions. Needless to say, this entails rejecting deficient systems models based on cybernetic equilibrium or autopoietic closure. Instead, White's sociolinguistic turn centering indexical switches in networks is uniquely positioned to refine our knowledge of complexity specific to human life, where systems boundaries are seldom physical but primarily semiotic.

Moreover, complex systems research provides interdisciplinary frameworks and insights that can bridge our current fragmentation of sociology. Following Page (2015, p. 37), I also believe that "sociology might benefit from a deeper engagement with research on complexity". After the relational and cultural turns, sociology could take a complexity turn and get back to systems thinking in light of new developments in complexity across the sciences. Given that

central to complexity is the phenomenon of emergence, and emergence of social formations is arguably sociology's quintessential object of knowledge, engagement with complexity research could expand sociology's explanatory power (Sawyer, 2005).

After this brief introduction, I discuss relational and cultural turns as backdrop to foreground White's foundational concepts in connection to complexity thinking, including polymerizing networks, phenomenologies of ties, and stories and boundaries. I claim that relational and cultural turns were attempts to supersede value-driven and cybernetic systems theory, but that they did not go far enough in embracing complexity. I then introduce White's sociolinguistic turn. I claim that by adopting Peircean indexical semiotics and metapragmatics, his model provides critical tools to refine complexity thinking of meaning and context-making, including switching and subsystems interpenetration. I conclude with the question of social emergence and discuss White's model in the context of restricted versus general emergence.

1 Polymerizing Networks in Phase Transitions

Philosophers of science have argued that if indeed we have access to the world, epistemological access may be just to relations among things and not to the things themselves (Kuhlmann, 2010). Reflecting on quantum "weird" phenomena (e.g., entanglement, quantum vacuum), many claim we may never know the real nature of fundamental things (e.g., particles, fields), but only how things change and structurally relate to each other. This epistemic relationalism has a stronger ontological version called ontic structural realism. The latter denies the existence of relata altogether, claiming that relations are all there is. In this light, the metaphysical question as to whether relations or relata are more fundamental in nature is perhaps unknowable. However, the historical record shows that scientific theories positing formal relations among things, without claiming strong assumptions about their nature tend to be more parsimonious and successful (Cruickshank, 2013; Ladyman, 2023; Votsis, 2000).

In the context of these epistemic debates on the primacy of relations versus relata, White pioneered a relational turn in the social sciences of the 1960s and 1970s that has produced some of the most influential formal tools to date in social network analysis. As mentioned earlier, I have explained these tools elsewhere (Fontdevila, 2018). Here, I highlight a few ideas as they relate to complexity thinking. I claim that this relational "epistemic break" was White's first step towards complexity thinking of social systems understood as nonlinear and far from equilibrium, and away from 20th century models based on cybernetic or atomistic equilibrium (Sawyer, 2005; Page, 2015).[1] Thus, White (1992a, pp. xii & 9) aimed at an "epistemology of middling level, in between individualism and cultural wholism [sic]", and recommended we "abandon both the Talcott Parsons attempt to derive social order from values guiding individual persons, and the view common in economic theory of social order emerging from preexisting individuals' efforts to achieve their idiosyncratic wants and interests".

1.1 Networks as Polymerizing Gels

Against holism and atomism, White proposed a relational ontology that recognizes that in social life "there is no tidy atom and no embracing world, only complex striations, long strings

1. By "far from equilibrium" I mean that complex social systems are not only far from "thermal equilibrium" or heat death in the trivial sense (systems by definition are negentropic), but most significantly, that social systems are open and dissipative systems that are far from "cybernetic equilibrium", in a repudiation of structural functionalism or autopoietic models of system closure (Cilliers, 2001; Reed & Harvey, 1992).

reptating as in a polymer goo, or in a mineral before it hardens" (1992a, p. 4). Thus, social organization is "messy and refractory, a shambles rather than a crystal" (2008a, p. 18), captured by imageries of polymerizing gels in phase transitions (polymer gel metaphors replacing that of rigid structure). In his words:

> We are creatures living within social goos, shards, and rubbery gels made up by and of ourselves. We, like gels, may dissolve into a different order under some heat. Even the frozen shards exhibit only limited orderliness, and even then an orderliness lacking in homogeneity [...] (1992a, pp. 337–338).

Moreover, in theorizing social networks as polymer gels, White insisted that often chains of "ties and their stories are generated in an endogenous process without need for the analyst to call on attributes or ideology" (White, 2008a, p. 22; see also Baldassarri & Bearman, 2007; Bearman, 1993; Padgett & Ansell, 1993). In this view, topologies of networks emerging from multiple relational bonds are more significant to social life than any single dyadic bond, much like DNA's complex temporal-spatial switchings are key to gene transregulation, or proteins' 3D molecular shapes are more relevant to cells' metabolic communications than single covalent bonds (White, 1992b, p. 211, on the significance of spatial models for vacancies and blockmodels).

In this connection, emergent topologies of network ties configure reflexive arrangements that are highly consequential for action in that, as Crossley puts it, "different patterns of connection generate different opportunities, constraints and dynamics for those connected in them" (2010, p. 14). Some of these relational patterns partly congeal into positive and negative feedback loops, resulting in control systems, including path dependence, technological or arms races, poverty traps, and social dilemmas or coordination problems, among others. White (2008a, p. 63) explores control orders within network turbulence through concepts such as social molecules and disciplines (Fontdevila, 2018, p. 241). His goal is to uncover underlying network mechanisms to "seek principles of social process which account for chaos and normality together" (White, 1992a, p. 4).

1.2 Scale-invariance and Nonlinearities

From complexity science, White incorporates to his model two principles of self-organization: self-similarity and dispersion (Fontdevila, 2018, p. 239). Self-similarity or scale-invariance is the principle "according to which the same dynamic processes apply over and over again across different sizes and scopes" (White, 1992a, p. 5). Complementing self-similarity is the principle of dispersion. This principle captures White's view of social life as characteristically nonlinear with phase transitions. Thus, social process cannot be reduced to linear normal curves in that "it is not averages which are crucial, but rather spreads across locale and degrees of social connections" (White, 1992a, p. 5). White's notion of comparability among structurally equivalent actors derives from this dispersion principle and is further developed in his theory of market profiles (White, 1981 & 2002).

In complexity thinking, self-similarity and dispersion are two sides of the same process of self-organization that exists at the "edge of chaos", where systems thrive and adapt in the phase space between chaotic and congealed states (Kauffman, 1995; Langton, 1990; Lansing, 2003). At the edge of chaos is where power-law and other long-tailed distributions predominate, including many small, few medium size, and occasional large frequencies. In fact, long-tailed

distributions signal that a complex system is self-organizing through nonlinear sensitivity to initial conditions.

Often small initial conditions create path dependencies that rapidly produce long-tailed distributions. For example, a few online songs can quickly go viral, disproportionately increasing their frequency as more and more people see their growing popularity and stream them. In this case, a self-organizing positive feedback loop sets in that started by small initial, often random, conditions rather than by the songs' intrinsic qualities. Similarly, "an academic paper with 500 citations may owe its success as much to positive feedback as to quality" (Page, 2015, p. 29). Moreover, Fontdevila and White (2013) contend that in struggles for domination among rapidly polymerizing netdoms, identities manage ambiguity through reflexive and indexical language dimensions (metapragmatics, heteroglossia, poetics). They argue that "poetic control" of speech styles for esthetic and persuasive purposes transform identities into power-law constellations with robust footing that then decouple to preserve quality.

In self-organizing systems, both positive and negative feedback loops increase dispersion. Positive feedbacks create long tails because "more begets more" (e.g., multiplicative effects, power laws, Matthew effects, preferential attachment), but negative feedbacks also skew normal variance because they disproportionately reduce fluctuations (Page, 2015, p. 34). Most importantly, self-organizing runaway loops that accumulate continuous change may cross a threshold entering a phase transition (bifurcation) where a new emergent organization is born. Phase transitions are like a "dialectical transformation" in Hegelian parlance, where "changes of quantity become changes of quality" and new forms emerge (Byrne, 2005, p. 105; Mackenzie, 2005). In short, self-organizing complex systems have the capacity to produce the emergence of new properties and functions at a larger scale. For example, a city region can phase transition from industrial to post-industrial, reaching a threshold after which new emergent social properties arise, like unexpected health disparities and residential inequalities (Byrne, 2005, p. 105; Page, 2015).

Finally, self-organizing feedback loops and path dependencies occur at very different scales of the system. In fact, it is scale-invariance that is the hallmark of complexity, providing complex systems with flexible yet resilient hierarchical structures (Cilliers, 2001, p. 4). In this sense, complex systems are not chaotic but fractal systems. To adapt to their environments, all systems differentiate into hierarchies of parts that reduce the amount of information that any single part needs to keep track of and control. But in contrast to hierarchical models of nested systems in equilibrium, complex systems self-organize into hierarchies that interpenetrate at various scales to provide redundancies and resilience (more on this later).

The relational turn of social network analysis pioneered by White and collaborators was a radical breakthrough that helped move sociology away from the cybernetic model of structural functionalism — which was a poor model of the reality of social systems far from equilibrium (Byrne & Callaghan, 2023; Sawyer, 2005; Urry, 2005 & 2006). The relational turn developed innovative mathematical tools to explain network forms and emergent effects that work behind social actors' backs. However, the network turn often remained at a meso-level of analysis with limited theoretical insight on complexity and emergence at broader historical scales. Although network mechanisms (scale-invariance and nonlinearity) dissolved many distinctions between physical and social systems, new theoretical frameworks were needed to explain emergence in what is specifically human, that is, the phenomenology of meaning.

2 Phenomenologies of Network Ties

Swept by the tides of the postmodern and cultural turns of the 1990s, relational scholars began theorizing network relations as more complex phenomena than simple conduits of informational flows. Social networks and ties became increasingly conceptualized as constituted in "time" by interpretive processes of meaning-making and second-order observations (Erikson, 2013; Fuchs, 2001; Kirchner & Mohr, 2010; Mohr, 1998; Mische, 2011; Pachucki & Breiger, 2010; Podolny, 2001). Instead of pipes or conduits, network configurations were increasingly seen as lenses or prisms, "splitting out and inducing differentiation among actors", and by which action was interpretively refracted (Podolny, 2001, p. 35). In short, the intractable problem of meaning (*verstehen*) in explanatory models of action, in this case network action, was not going away.

In these epistemic contexts, White (1992a, p. 3) had grown critical of the social sciences, which "appeared to be in the doldrums", including reductionist approaches to network analysis, and as a corrective published his magnum opus *Identity and Control* (1992a; 2008 edition for the definitive rewrite). In an impressive labor of synthesis, White produced a pathbreaking sociology including three axiomatic primitives (identity, control, switching) and two principles of social organization (self-similarity, dispersion). *Identity and Control* is, simply put, a masterpiece of intellectual genius that never ceases to stretch our reimaginings of social life.

2.1 Stories and System Boundaries

In *Identity and Control*, White develops "story" as phenomenological accomplishment of network tie. He draws on the paradigm shift from representational to ontological understandings of narrativity that had taken place in the social sciences and humanities of the 1980s (Somers, 1994 & 1996). In his words:

> An apparently simple pair-tie can be seen to be a considerable social accomplishment [...] There also must be ambivalence and complexity built into a tie, since it is a dynamic structure of interaction in control attempts. It is this structure which is being summed up as a "tie", and interpreted in stories, both by its members and by onlookers (White, 1992a, pp. 68–69; 2008a, p. 25).

A story consists of a series of periodic reports, accounts, and updates variably linked through emplotment that provide a characteristic sense of temporality to a social tie — it provides a history. Through stories, network ties are reinterpreted by actors in ongoing interactions and control efforts. As discussed later, sets of stories are told and retold in speech registers and sublanguages appropriate for a particular type of tie. Stories deliver a characteristic sense of continuity to social ties, which otherwise would switch on and off in everyday disjointed snapshots. In this sense, narrative is the site where subjective experience of phenomenological "shock" — new times, new contexts, new trajectories — triggered by netdom switchings is "edited out" from the weavings of the social in order to preserve identities' ontological continuity.

It is worth noting that already in the 1960s White was well aware of the significance of the phenomenology of network ties, expressing concerns about the co-constitution of objective structures and actors' perceptions and experiences of them. White's concept of category-network or *catnet* — sets of individuals interconnected and "alike in some respect, from someone's point of view" — is an early exercise on the need to include cultural dimensions to network structure (2008b, p. 4 [1965]). As he put it in early lectures,

> a net continues indefinitely [...] Yet there must be a common culture to define a type of relation sharply and clearly, if there is to be a net defined by the presence or absence of that relation between pairs of persons (2008b, p. 2 [1965]).

Similarly, in his conceptualization of *frame* as folk theories used by people to categorize their indirect relations (e.g., a kinship group with names for indirect relations), White states that "people develop culture in part to meet their needs to visualize, operate in and modify the social structure to which they belong" (2008b, p. 11 [1965]). Moreover, White's modeling of market profiles based on phenomenologies of mutual perception and signaling is a special case of his broader concept of comparability of ties (White, 1981 & 2002). Actors reduce uncertainty in social life by assessing courses of action taken by other actors with structurally equivalent standpoints and valuations.

White's conceptualizations of the phenomenology of ties through stories, from catnets to netdoms, are important considering that one of the most intractable epistemological challenges in complexity thinking of the social sciences is the question of boundary formation (Cilliers, 2001; Sawyer, 2005). Human social systems are not physically bounded in the same localized way as biological systems. This is because interconnections between component parts in social systems are rarely physically visible but mostly constructed through intersubjectivities and semiotic practices. Hence, the same "parts of the [social] system may exist in totally different spatial locations [and] non-contiguous sub-systems could be part of many different systems simultaneously. This would mean that different systems interpenetrate each other" (Cilliers, 2001, p. 6).

In this light, White's model enables us to think deeply about systems interpenetration and boundaries through mechanisms beyond isolated dyads attempting to stabilize the indeterminacy of their double contingency. Beyond dyadic reductionism, his model incorporates the complexity of multiple contingency, including identities' second-order observations of shifting network shapes and expectations, taking into account changing positions and expectations of several nodes removed from their direct ties and located in different subsystems. As discussed later, multiple contingency is key to indexicalities of context-making (i.e., boundary formation) across netdoms since speakers perform reflexively not just to co-present ties but via them to absent and indirect ties as well — for example, indexing deferential demeanor in addressing a direct superordinate with the intent to indirectly target the latter's higher-ups who are not present (Fontdevila & White, 2010 & 2013).

2.2 Control and Ambiguity

Moreover, White's primitive of control also enables us to think about processes of open-ended boundary formation in complex systems. Identities, as sources of action triggered by stochastic processes in social life, seek control to reduce uncertainty by relentlessly switching netdoms.[2] In the process they produce phenomenological contrasts among ties that become interpreted through emplotment in stories. For White, these stories result from control efforts by identities

2. For White, identities — individual or collective (groups, institutions, nations) — are sources of meaningful action with a "point of view" that emerge out of historical contingency and turbulence at different scales. He distinguishes four complex levels that build on each other: (1) securing footing, (2) social face in task-oriented groups, (3) integration across social settings, and (4) ex-post biographical account or narrative identity (1992a, p. 312; 1993, p. 48; 2008a, p. 10). Of these, the third and fourth levels are distinctively human in that they involve network phenomenology. A fifth meta-level identity of modern personhood as "style" is proposed in his later work (2008a, pp. 18 & 112).

to reduce uncertainty. But "control" is not just "domination over other identities. Before anything else, control is about finding footings among other identities. Such footing is a position that entails a stance, which brings orientation in relation to other identities" (White, 2008a, p. 1). He claims that footings must be reflexive with future anticipation as well as present response efforts (Fontdevila & White, 2013; White, 2008a, p. 2). Thus, there "must be ambivalence and complexity built into a tie, since it is a dynamic structure of interaction in control attempts" (White, 1992a, p. 69).

Moreover, White asserts that reaching through network ties to get robust action entails "keeping the state of interaction hard to assess through making very many possible evolutions continue to seem possible [...] which prevents anyone from seeing clearly an outcome that would end the social tie" (White, 2008a, p. 288). He draws on Leifer's (1991) characterization of expert chess players sustaining ambiguity, where a player's ability to make sense of the game is often not determined by the capacity to see many moves ahead, but by the ability to sustain uncertainty in the relationship itself.

In short, "ties are stable only through being ambivalent and ambiguous at any particular instant and in any tangible action" (White, 1992a, p. 86). This strongly resonates with complexity thinking, since, as Cilliers indicates, the "boundary of a complex [social] system is not clearly defined once it has emerged [...] and therefore the closure of the system is not something that can be described objectively" (2001, p. 5). In complex systems parlance, the boundaries of social ties constituted by their stories must remain open-ended to endure.

To close this section, in White's model both ambiguity (i.e., sustaining ambivalence within a tie) and ambage (i.e., using direct ties to influence indirect ties) pervade network ties' phenomenologies. These are also mechanisms that can unblock and get fresh action (White, 1992a, pp. 57 & 106). Hence, I argue these mechanisms produce resilience and flexibility to complex systems because open-ended boundaries of network ties enable hierarchies to interpenetrate different subsystems (contra the "operational closure" of autopoietic models à la Luhmann, more on this later). Note that if footing among identities is about keeping boundaries of stories open, then boundaries by their nature are objectively difficult to define. Thus, it goes without saying that the methodological challenges of operationalizing boundaries in complex social systems are formidable (see McLean & Song, 2023, for the operationalizing challenges of "side-directed behavior" in network configuration).[3]

3 Indexical Switchings Across Netdoms

The cultural turn in network thinking produced new frameworks to explore the constructed nature of ties and their dynamics. It recognized that networks of humans are ontologically more complex than formalized graphs, in that they contain active phenomenologies of meaning and context-making. In these arenas, White and other relational scholars of the period

3. White proposes emergent levels of control that show increasing complexity. The most basic building blocks are "disciplines" in social molecules to accomplish the tasks of the social which exist side by side flexible "networks" (Fontdevila, 2018, for details). Beyond this basic level, control at larger scales include institutions, rhetorics, and control regimes. These provide frameworks for mobilization and coordination of identities across wider domains of action than disciplines, including path-dependent histories of the *longue durée* (White, 1992a, p. 116; 2008a, pp. 171 & 220; White, Godart et al., 2007; White, Fuhse et al., 2007; Mohr & White, 2008). Rhetorics are to institutions what stories are to ties. Rhetorics are folk commonsense understandings jointly held by identities in connected netdoms as institutions. Stories draw on background rhetorics to express and constitute their relational ties. In turn, rhetorics "play out through stories" (Godart & White, 2010, p. 580; for rhetorics through heteroglossia, see Fontdevila & White, 2013, p. 168).

embraced the view that "networks and culture are mutually constitutive and so deserve deeper analytical consideration in light of one another" (Pachucki & Breiger, 2010, p. 209). Yet White realized that to fully grasp culture, it was imperative to first explore the semiotics of language pragmatics in context. The cultural turn alone — often turning to cognition, practice repertoires, or performance rituals — was not sufficient. It lacked fine-grained analytical tools to investigate speakers' subtle switches in meaning that produced new contexts and shaped networks. So, to explain mechanisms of network emergence, White turned to the constitutive and reflexive capacities of language to produce sociality. More specifically, he turned to Peircean linguistic indexicality and metapragmatics to explain context and meaning in networks.

Sociocultural and biological systems are highly informational systems with stochastic and path-dependent histories. Both require complex communications among their component parts to self-organize. But sociocultural systems are not just a more elaborate version of biological systems and cannot be reduced to them. Whereas biological systems accumulate information through genomes across generations, sociocultural systems accumulate information through the semiotics of language. Thus, a natural language — with its open-ended meaning capabilities and reflexive context-making mechanisms — is our species' *differentia specifica* that unleashes the next emergent leap in systems complexity. As White put it, "polymer molecules don't tell stories about their encounters or strategize in those encounters. Human [social] molecules do, but in ways shaped by their social gel" (1992b, p. 211).

In this light, I contend that a sophisticated theory of human communication must be at the center of our understanding of social complexity (Cossu & Fontdevila, 2023; Fontdevila, 2010; Sawyer, 2005). As White stated about his model, "communication remains central" (2008a, p. 3). Moreover, such theory must draw on deep knowledge of semiotics and sociolinguistics given that human communication depends on linguistic signification at multiple metapragmatic levels. Following Duranti's (2003, p. 343) remarks on the future of anthropology, I believe that a sociology without a sophisticated grasp of language semiotics and pragmatics is bound to produce "a naïve understanding of communication". A naïve understanding that takes language for granted and identifies it — and culture by extension — with crude notions of "discourse" or "binary codes".

Early influences on White's turn to sociolinguistics came from Halliday (1985) on choice grammar and speech registers, Gumperz (1982) on contextualization cues, Labov (1972) on sublanguage varieties, and Gal (1979) on code-switching and networks. However, Silverstein (1976 & 1993) on linguistic indexicality takes center stage in shaping White's views on language. Silverstein pioneered the application of Peirce's semiotics of indexes to the pragmatic analysis of language and culture, proclaiming that the indexical "analysis of speech behavior — in the tradition extending from Peirce to Jakobson — allows us to describe the real linkage of language to culture, and perhaps the most important aspect of the 'meaning' of speech" (1976, p. 11).

Drawing on this rich field of sociolinguistic influences, by the mid-1990s White was reflecting on language and networks in a series of unpublished manuscripts (White, 1994, 1995b & 1995c) that culminated in a seminal paper (White, 1995a). In an early statement, White declared that his perspective on language and networks had been "reopened by sociolinguistic results of the past 15 years" and that the "pragmatics of socio-cultural action replaces the semantics of referential as central [...] grammaticalization replaces grammar [...] [and] multilingualism describes a socio-cultural battlefield in a political economy rather than merely an objective mapping of ingrained habits" (White, 1994, pp. 1–2). Moreover, he asserted that "events of language use mediate human sociality" and that language through its indexical and reflexive capacities is mostly about "keeping relationships going" rather than predication about

the world.

3.1 Indexical Language and Metapragmatics

Indexes are more or less grammaticalized elements that point to features of the social or physical world, and that speakers use reflexively to create and lay out the contextual parameters of their social interactions. Unlike referential symbols, indexes are signs that signify by spatio-temporal contiguity.[4] From shifters (e.g., *here*, *now*), pronouns (e.g., *I*, *she*), verb tenses, to code-switching, registers, deference markers, prosodic tones, silences, and so on, indexes anchor the linguistic code in practical contexts of use. Many linguistic indexical strategies can be used reflexively (i.e., metapragmatically) to constitute the social contexts in which they are uttered. For instance, two individuals "switching" to a first-name basis index a new context of status proximity, or coworkers "switching" from formal to casual speech index a more relaxed professional context. Indexes enable speakers to reflexively negotiate their footings and ties, rendering more complex semiotic processes (e.g., metaphor, myth, narrative) fully operational in communicative practice. In short, indexes are the primitives of meaning that bridge semiosis and communication in social life (Fontdevila, 2010 & 2025).

White recognized this constitutive capacity of language to shape context and the meaning of speakers' interactions through switches in indexicalities. Switching is, thus, his model's third primitive and a fundamental mechanism of context-making that embeds or decouples networks into different shapes and temporalities. For White, "[...] meaning emerges for humans only with switching, as from one netdom to another. Switching is central to this theory and will appear again and again at different scopes and levels" (2008a, p. 12). In short, language matters to networks because speakers via reflexive switches of indexical markers reshape their network topologies (e.g., switching forms of address, ironic tone, vernacular versus standard registers). Moreover, these switches are never performed in dyadic isolation. In White's view (1995b, p. 4), Silverstein's "heroics of indexicality" produced with phenomenological effort in face-to-face interaction need not be in "myopic messiness of dyads", but channeled by broader patterns of network switchings.

In this light, White claims that switches of speech registers and specialized sublanguages across netdoms are fundamental "vehicles of meaning for identity and control" (2008a, p. 17). His reflections on the origins of speech registers as indexical devices of network tie are worth noting here. Thus, packs of vertebrates (e.g., wolves, primates) avoid constant injuries from competitive fights by being naturally selected for transitive dominance of pecking order across every domain of activity — "sex, food, resting site, first to the alpha male, then [...] no talk needed" (1995a, p. 1037). However, in evolutionary or historical scale even greater fitness or subsistence, respectively, was attained by establishing subsystem boundaries along specializations of "task and caste and locale and breeding". This is the strategy pursued by ant societies for millions of years, with pheromone chemical "signaling" as the key mechanism that demarcates caste and task boundaries.

Eventually, "over thousands of years, one vertebrate species (two, if you include *Neanderthal*) worked out specialization with talking, not pheromones. Like the ants, early human

4. For Peirce (1931), semiotic mediation — counter to Saussure's dyadic signifier/signified — is triadic in essence, including a sign-vehicle (representamen), an object for which the sign stands, and a cognitive or feeling relation (interpretant) created by the sign-vehicle in its standing relationship to the object. A sign can relate to an object by similarity or analogy (icon), arbitrary rule or convention (symbol), or spatio-temporal contiguity (index). This latter capacity — indexicality — constitutes the basis for the contextual function of language in sociocultural practice (Duranti, 2003; Fontdevila, 2010; Mertz, 2007).

talkers may have switched only rarely, perhaps in the earliest mass ceremonials. At some point came frequent switching, perhaps situated around sleep patterns, and no longer necessarily in lockstep" (White, 1995a, p. 1037). White claims that "sociocultural reality was constructed only when there was switching back and forth between at least two domains, everyday and ceremonial, with their continuing networks" (1995a, p. 1035). In his own words:

> Humans, unlike ants, switch back and forth between specialized domains of joint activity, and talk develops along with and sustains this differentiation. Talk and its languages are shaped primarily by this switching. Switches in talk between one and another domain are at the same time switches in which particular social ties of different sorts are being activated and deactivated (White, 1995b, p. 1).

In other words, complex communication by task and rank in human social organization is sustained through specialized speech registers and sublanguages. Now, all communication is metacommunication as we know since Bateson (1985[1955]), and thus any message provides context-markers to the addressee on how to decode it (e.g., tone to decode the opposite meaning of a remark in irony). Through its indexical devices, a speech register "metacommunicates" the type of network tie and its associated story, including its purpose, tasks and ranks. What is significant about human complex organization is that very different tasks can be performed by the same individual switching across different netdoms. Hence, it is critical to switch speech registers to signal and contextualize boundaries of netdom switches — a "switch" of speech register signals (indexes) the activation or deactivation of a particular type of tie within a relationship, for example, from coworker to friend. Speech registers are metacommunicative devices (equivalent to pheromones in ants) that enable the emergence of specialized subsystem boundaries among human beings when they perform multiple tasks and ranks across different domains — unlike ants, which are selected genetically for task and caste. Among humans, complexity only emerges after there is potential to switch registers and thus "social process even thousands of years ago could develop only in co-constitution with full-fledged language" (White, 2008a, p. xxi).

For complexity thinking, the aforementioned underscores that the indexical and reflexive functions of language constitute critical mechanisms of emergence in human systems of complex organization. In particular, the metapragmatic function of language (i.e., reflexive awareness of the pragmatic rules of linguistic interaction) is essential to speakers' deployment of indexical devices and contextualization cues that accomplish types of netdom ties.[5] As Sawyer notes, "speakers use the metapragmatic function of language to reflexively communicate about the emergent process and flow of the encounter or about the ground rules and the communication language itself" (2005, p. 182). Moreover, metapragmatic processes of context-making occur in real time and thus "the mechanisms by which relational information is signaled are inherently ambiguous, i.e., subject to multiple interpretations [...] In conversation, such ambiguities are negotiated in the course of interaction" (Gumperz, 1982, p. 208).

5. Language is unique in its reflexive capacity. Based on Jakobson's insights on the metalingual function of language (language about language), Silverstein (1976 & 1993) claims that language's reflexive capacities are essentially metapragmatic. Most metalinguistic activities are not about semantic understanding (e.g., glossing) but primarily about the pragmatic use of language. So, in examples such as "Don't you dare use those words with me!" or "Oh, don't call me Sir, call me by my first name", note that language is used to talk about language but mainly to redefine the relative interactional footings of speakers in their interactions. With variable levels of awareness we always use language metapragmatically (i.e., reflexively) to negotiate our social ties.

3.2 Subsystems Interpenetration through Indexical Language

In light of the above, I argue that the capacity for indexical and reflexive switching that enables specialized differentiation across netdoms is also the key mechanism that undergirds subsystems interpenetration in complex social systems. Reflexive switches of transposable metapragmatic devices can reshape boundaries and enable subsystems interpenetration — for example, switching from standard to vernacular speech at the workplace signals solidarities and exclusions anchored in separate but interpenetrating subsystems of race and corporation. Against nested hierarchies of cybernetic models, complex social "systems can be overlapping, non-nested and not saturating of their space, and have different temporal and spatial reach" (Walby, 2021, p. 326). Because they are open to polysemic interpretation, indexical devices also create indeterminacies and redundancies that enable cross-communications between shifting systems hierarchies. As Cilliers has remarked, in complex systems, "hierarchies are not that well-structured. They interpenetrate each other, i.e., there are relationships which cut across different hierarchies" (2001, p. 7). In his words:

> The cross-communications between hierarchies are not accidental, but part of the adaptability of the system. Alternative routes of communication are vital in order to subvert hierarchies that may have become too dominant or obsolete. Cross connections may appear to be dormant for long, but in the right context may suddenly play a vital role (Cilliers, 2001, p. 7).

Similarly, White has indicated that "any social formation whatever, complex or not, tends to settle into blocking action over time" (1992a, p. 255), but decoupling by netdom switchings "provides the lubrication that permits self-similarity of social organization across scopes and levels" (2008a, p. 280). In this connection, Fontdevila et al. (2011) have analyzed subsystems interpenetration via indexical switching. They agree with Luhmann that meaning is central to social life but challenge his claim that modern society is based on communicative self-closure of separate, functional subsystems (e.g., economy, science, law, arts). They contend that there is refuting evidence from sociolinguistics and argue that language's indexical and reflexive devices are transported across institutional contexts with significant netdom consequences.

Thus, Fontdevila et al. (2011) claim that identities, in their struggle to secure footing, switch among different institutional rhetorics often producing "hybrid" rhetorics (see also Fontdevila & White, 2010, p. 339). These hybrid rhetorics enable identities to reflexively frame ambiguity and avoid "indexically" closing systemic meaning (e.g., gay marriage legalization reframing established institutional rhetoric). This proves crucial to boundary maintenance of rapidly differentiating subsystems, since it keeps boundaries permeable and porous to new meanings, avoiding systemic collapse. Similar to "story" discussed earlier, identities seeking reflexive footings across institutional rhetorics embrace ambiguity to keep their ties flexible in anticipation of change. Thus ambiguity should not be removed methodologically as measurement error but should instead become fully integrated into the analytical model.

In short, identities switching across subsystems bring new contextualizing and reflexive devices that change the communicative rules of specific subsystems, which are not impermeable to indexicalities from elsewhere. In contrast, Luhmann's theory of communication is based on binary codes governed quasi-algorithmically within autopoietic subsystems to reduce uncertainty (e.g., legality/illegality in law, legitimacy/illegitimacy in politics). By establishing an ontological distinction between action and communication to justify systems operational closure, Luhmann falls back into structuralist and nonindexical understandings of meaning. But only

actors seeking footing contextualize systems' self-referential meanings to reach understanding. Institutional logics may constrain action but ultimately it is reframed and enabled by identities struggling for control. Fontdevila et al. (2011) contend that humans are not merely the system's environment but the cornerstone of the system's meaning generation. In other words, systems closure does not solve the problem of meaning and uncertainty in social life. In fact, lack of uncertainty is itself a problem. Order is necessary, but order at the edge of chaos.

In closing this section, I would like to highlight the relevance of systems interpenetration for current theories of power. In particular, this is relevant for theorizing intersectional mechanisms of power across global and postcolonial societies. In this respect, Walby (2007 & 2021) is unique in providing an analytical framework that incorporates intersectionality into complexity thinking. Contra nested models of cybernetic differentiation, Walby remarks that, in complex systems analysis,

> there can be multiple systems having effects in the same space [...] [allowing] for the analytic separation of institutional domains and regimes of inequality [...] [and] the theorisation of multiple intersecting regimes of inequalities without identifying or reducing each one to a separate institution (2021, p. 320).

She further states that,

> [...] for example, multiple regimes of inequality of class, gender and ethnicity can all structure the same institution of employment. This theoretical capacity to distinguish between institutional domains and regimes of inequality is only possible with this new way of thinking about systems [...] There is no longer a difficult choice between a theory of society based on institutional differentiation and one based on regimes of inequality: sociology can have both (2021, p. 320).

Space limits prevent full elaboration of White's understanding of power and systems interpenetration. Suffice it to say, like Bourdieu's (1977) political economy of linguistic capitals, White sees domination as "the root process in what is specifically social" (1995b, p. 10). Any language is always a discourse of interpenetrating sublanguages, styles, and registers, laden at all scales with struggles for domination and identity. Thus, grammars may result from routinization, but by domination rather than innocent habituation, over historical choices of switchings in unequal networks and domains (Fontdevila & White, 2013). White provides a framework to theorize overlapping systems of domination via indexical language. He looks to insights from the sociolinguistics of pidgins and creoles as models for localized grammaticalization processes embedded in domination, and transposes them to any situation where actors fluent in different sublanguages and indexical systems must interact in a common lingua franca — so not only trade posts and plantations but multiethnic corporations traversed by global networks of transactions and peoples. Thus, reflecting on the grammaticalization choices of deictics and other indexical devices of business talk of the modern corporation, White & Godart (2010) remark,

> Within your part of a firm, say a big New York bank, one has come to speak in the style which is at home there. Speaking with another firm, by contrast, could instead be analogous to using a different, coarser and more formal idiom, much as in the Djirbal tribe of Australian Aborigenes a man switches to a special mother-in-law language when speaking to affines (2010, p. 273).

4 Conclusion

In this essay honoring Harrison White's legacy, I have reflected on complexity in dialogue with his theoretical model to shed light on social dimensions of complex systems. My goal has been to stimulate sophisticated systems thinking back into sociology by means of complexity theory. We live in complex social systems far from equilibrium that experience path-dependent histories and unpredictable phase transitions, and that now more than ever, exist in strained relations with our planet. In this connection, I argue that White's model is extremely significant for future research on complexity in the social sciences. More specifically, I consider White's integration of indexical semiotics and metapragmatics into networks a turning point in complex social systems theorizing.

In addition to vacancy chains, structural equivalence and blockmodels, White left us an extraordinary toolkit of sharp analytical tools that can be used in complexity thinking. I have attempted to relate a few to complexity processes, including polymerizing networks undergoing phase transitions, self-similarity and nonlinearity as indicators of self-organization, stories as phenomenologies of ties, open-ended boundaries as enabling multiple contingencies, catnets and netdoms as demarcating domains, resilient footings sustaining ambiguity, context-making via indexical switchings and metapragmatics, and speech registers indexing differentiation but also systems interpenetration, among others.

I will conclude with the question of social emergence and where White's model falls in the debates. Emergence is the quintessential attribute of complexity by which aggregation of a system's components and their relations "produce patterns, functionalities, and properties that do not or cannot exist at the micro level" (Page, 2015, p. 32; see also, Human, 2016). In complex social systems, as discussed earlier, social actors are not just interacting face-to-face with one another following "local" rules (e.g., impression management, direct strategies) but are also interacting with their mutually perceived networks and indirect ties in multiple contingencies such that "one man's tie to another is always contingent on the ties each has to still others, and thence to the latter's ties to others at a further remove [...]" (White, 1968, p. 15). In this light, when social actors interact with each other they typically construct interpretations of their respective and others' social networks, which, unlike complex physical systems, will "contain [partial] representations of the emergent macropatterns" (Sawyer, 2005, p. 26).

These "representations" of emergent macropatterns and interpretations that actors hold in complex social systems get to the core of a crucial distinction in complexity theory between restricted versus general complexity (Morin, 2007 & 2008). On one hand, restricted complexity models often draw on agent-based modeling where agents in computer simulations are made to follow simple "local" rules that produce emergence. Although helpful to explain simple emergent phenomena, restricted complexity is still a reductionist project based on weak emergence and methodological individualism. On the other, general complexity models are based on irreducible emergence that involves social agents with complex representations of their social worlds, including second-order observations, meta-rules, and historical path dependence. Moreover, general complexity makes the stronger ontological claim that emergence can become a "reality" of the social itself that exerts downward causation on its supervenient base of agents (Byrne & Callaghan, 2023, p. 28; Durkheim, 1915 [1912]; Sawyer, 2005). As Morin put it, in general complexity "the principle of reduction is substituted by a principle that conceives the relation of the whole-part mutual implication" (2007, p. 6).

Sawyer (2005), following Fodor's theories of complex emergence, distinguishes between "tokens" and "types" to explain that when a higher level emergent type (e.g., structural stigma,

health disparities) can be realized by multiple "wildly disjunctive" tokens — through different instantiations or mechanisms — then the higher level type can be theorized in effect as exhibiting causal powers. Undoubtedly, in any one instance, the higher level type is realized by a particular "supervenient" token base of interacting agents, which act as the type's productive mechanism. But the higher level emergent type has been so ubiquitously "institutionalized" throughout the social formation that it is "irreducible" to one single mechanism. Multiple different interactional mechanisms or "token instantiations" may realize its "emergence". In turn, the higher level type can also exert a sort of "downward causation" in shaping supervenient bases of lower level token units (e.g., emergent health disparities cause further conditions for new micro-level mechanisms of stigma) (see Fontdevila, 2020 & 2023, for emergent stigma and HIV disparities affecting gay and bisexual migrant men realized via indexical semiotic mechanisms at the micro-level).

So where does White's model lie in the restricted versus general emergence distinction? As quoted earlier, White intended an "epistemology of middling level, in between individualism and cultural wholism [sic]" (1992a, p. xii). His middle-range approach to networks was clearly a departure from both cybernetic and atomistic equilibrium. But many network forms that work behind social actors' backs can be explained through methodologies and simulations of restricted emergence that do not involve history and irreversible path dependence. However, considering the significance of phenomenology and historical contingency in White's model — illustrated by a wealth of historical examples in his writings — I would strongly argue that his model contains a theory of general emergence.

Perhaps his more recent concept of *control regime* is the one that exhibits stronger signs of general emergence. It seems to incorporate key attributes of general emergence, such as irreducible path dependent histories and downward causation. Control regimes are social forms (e.g., patriarchy, corporatism, clientelism) that emerge out of conflict and provide broader channeling frameworks for identities to mobilize across wider domains of action than disciplines or institutions (White et al., 2007). Interestingly, White considers Foucault's seminal concept of "regime of truth" to be a "cognate" of his control regime approach but complains that "there seems little place for mobilizing by identities within [Foucault's] anonymous discursive practices that account for order within the regime" (2008a, p. 224). This arguably shows that White's control regimes include more agency and upward causal change from their supervenient base of agents than Foucault's regimes. Ultimately, whether an emergent phenomenon or property of a complex social system can be explained by restricted or general emergence is an empirical question.

I will end with a final question: Did Harrison White solve Nadel's Paradox? In relational sociology Nadel's paradox refers to the intractable difficulties of formalizing network structures in isolation from the subjective and cultural meanings that shape and change them in real time (DiMaggio, 1992). I have expressed elsewhere (Fontdevila, 2018 & 2025) that I strongly believe White got closer than anyone else to solving it. That was his genius! Many attempts are made to solve the paradox but either "context" or "mathematics" gets lost in the process. White kept them both in focus. So, for instance, in a rigorous attempt to formalize discourse and market networks, White recognized that "actual modeling of reflexive indexing will prove the most demanding mathematically" (2000a, p. 130). Thus, the challenge for a developed social science will always be parameterization and measurement without bleaching meaning (White, 1997 & 2000b).

Harrison White will be missed but his extraordinary social scientific and intellectual legacy lives on through all of us, many generations of disciples and students. In my view, it is because

of Harrison White's genius and monumental ideas that we can still in the 21st century believe in the scientific project of Sociology!

References

Baldassarri, D., & Bearman, P. (2007). Dynamics of Political Polarization. *American Sociological Review*, *72*(5), 784–811. https://doi.org/10.1177/000312240707200 5

Bateson, G. (1985). A Theory of Play and Fantasy. In R. Ignis (Ed.), *Semiotics: An Introductory Anthology* (pp. 129–144). Bloomington, IN: Indiana University Press. (Original work published 1955).

Bearman, P. (1993). *Relations into Rhetorics: Local Elite Social Structure in Norfolk, England 1540–1640*. New Brunswick, NJ: Rutgers University Press.

Boorman, S., & White, H.C. (1976). Social Structure from Multiple Networks. II. Role Structures. *American Journal of Sociology*, *81*(6), 1384–1446. https://doi.org/10.1086/226228

Bourdieu, P. (1977). The Economics of Linguistic Exchanges. *Social Science Information*, *16*(6), 645–667. https://doi.org/10.1177/053901847701600 60

Byrne, D. (2005). Complexity, Configurations and Cases. *Theory, Culture & Society*, *22*(5), 95–111. https://doi.org/10.1177/0263276405057194

Byrne, D., & Callaghan, G. (2023). *Complexity Theory and the Social Sciences: The State of the Art*. New York, NY: Routledge.

Cilliers, P. (2001). Boundaries, Hierarchies and Networks in Complex Systems. *International Journal of Innovation Management*, *5*(2), 135–147. https://doi.org/10.1142/S1363919601000312

Cossu, A., & Fontdevila, J. (2023). Introduction: Interpretive Sociology and the Semiotic Imagination. In A. Cossu & J. Fontdevila (Eds.), *Interpretive Sociology and the Semiotic Imagination* (pp. 1–30). Bristol, UK: Bristol University Press.

Crossley, N. (2010). *Towards Relational Sociology*. New York, NY: Routledge.

Cruickshank, J. (2013). Anti-Authority: Comparing Popper and Rorty on the Dialogical Development of Beliefs and Practices. *Social Epistemology*, *29*(1), 73–94. https://doi.org/10.1080/02691728.2013.782589

DiMaggio, P.J. (1992). Nadel's Paradox Revisited: Relational and Cultural Aspects of Organizational Structure. In N. Nohria & R.G. Eccles (Eds.), *Networks and Organizations: Structure, Form, and Action* (pp. 118–142). Boston, MA: Harvard Business School Press.

Duranti, A. (2003). Language as Culture in U.S. Anthropology: Three Paradigms. *Current Anthropology*, *44*(3), 323–347. https://doi.org/10.1086/368118

Durkheim, E. (1915). *The Elementary Forms of the Religious Life*. New York, NY: The Free Press. (Original work published 1912)

Erikson, E. (2013). Formalist and Relationalist Theory in Social Network Analysis. *Sociological Theory*, *31*(3), 219–242. https://doi.org/10.1177/0735275113501998

Fontdevila, J. (2010). Indexes, Power, and Netdoms: A Multidimensional Model of Language in Social Action. *Poetics*, *38*(6), 587–609. https://doi.org/10.1016/j.poetic.2010.09.004

Fontdevila, J. (2018). Switchings among Netdoms: The Relational Sociology of Harrison C. White. In F. Dépelteau (Ed.), *The Palgrave Handbook of Relational Sociology* (pp. 231–269). New York, NY: Palgrave MacMillan.

Fontdevila, J. (2020). Epidemics as Complex Systems: Sexual Meanings and HIV among Latino Gay and Bisexual Men. In A. Patterson & I. Read (Eds.), *The SHAPES of Epidemics and Global Disease* (pp. 132–167). Newcastle: Cambridge Scholars Publishing.

Fontdevila, J. (2023). Stigma-embedded Semiotics: Indexical Dilemmas of HIV across Local and Migrant Networks. In A. Cossu & J. Fontdevila (Eds.), *Interpretive Sociology and the Semiotic Imagination* (pp. 158–180). Bristol, UK: Bristol University Press.

Fontdevila, J. (2025). Harrison White's Sociolinguistic Investigations: From Polymer Physics to Netdom Emergence via Indexical Language. *Connections*, *45*(1), 59–65. https://doi.org/10.21307/connections-2019.051

Fontdevila, J., Opazo, M.P., & White, H.C. (2011). Order at the Edge of Chaos: Meanings from Netdom Switchings across Functional Systems. *Sociological Theory*, *29*(3), 179–198. https://doi.org/10.1111/j.1467-9558.2011.01393.x

Fontdevila, J., & White, H.C. (2010). Power from Switching across Netdoms through Reflexive and Indexical Language. *REDES*, *18*(1), 326–350. https://doi.org/10.5565/rev/redes.398

Fontdevila, J., & White, H.C. (2013). Relational Power from Switching across Netdoms through Reflexive and Indexical Language. In F. Dépelteau & C. Powell (Eds.), *Applying Relational Sociology: Relations, Networks, & Society* (pp. 155–179). New York, NY: Palgrave Macmillan.

Fuchs, S. (2001). *Against Essentialism: A Theory of Culture and Society*. Cambridge, MS: Harvard University Press.

Gal, S. (1979). *Language Shift: Social Determinants of Linguistic Change in Bilingual Austria*. New York, NY: Academic Press.

Godart, F.C., & White, H.C. (2010). Switching under Uncertainty: The Coming and Becoming of Meanings. *Poetics*, *38*(6), 567–586. https://doi.org/10.1016/j.poetic.2010.09.003

Gumperz, J.J. (1982). *Discourse Strategies*. Cambridge, UK: Cambridge University Press.

Halliday, M.A.K. (1985). *An Introduction to Functional Grammar*. London, UK: Edward Arnold Publishers.

Heil, G., & White, H.C. (1976). An Algorithm for Finding Simultaneous Homomorphic Correspondences between Graphs and Their Image Graphs. *Behavioral Science*, *21*(1), 26–35. https://doi.org/10.1002/bs.3830210105

Human, O. (2016). Complexity: E-Special Introduction. *Theory, Culture & Society*, *33*(7–8), 421–440. https://doi.org/10.1177/0263276415600105

Kauffman, S.A. (1995). *At Home in the Universe: The Search for Laws of Self-Organization and Complexity*. Oxford, UK: Oxford University Press.

Kirchner, C., & Mohr, J.W. (2010). Meanings and Relations: An Introduction to the Study of Language, Discourse, and Networks. *Poetics*, *38*(6), 555–566. https://doi.org/10.1016/j.poetic.2010.09.006

Kuhlmann, M. (2010). *The Ultimate Constituents of the Material World: In Search of an Ontology for Fundamental Physics*. New Brunswick, NJ: Ontos Verlag.

Labov, W. (1972). *Sociolinguistic Patterns*. Philadelphia, PA: University of Pennsylvania Press.

Ladyman, J. (2023). Structural Realism. In E.N. Zalta & U. Nodelman (Eds.), *Stanford Encyclopedia of Philosophy*. Stanford University. https://plato.stanford.edu/entries/structural-realism/

Langton, C.G. (1990). Computation at the Edge of Chaos: Phase Transitions and Emergent Computation. *Physica D*, *42*(1–3), 12–37. https://doi.org/10.1016/0167-2789(90)90064-V

Lansing, J.S. (2003). Complex Adaptive Systems. *Annual Review of Anthropology*, *32*, 183–204. https://doi.org/10.1146/annurev.anthro.32.061002.093440

Leifer, E.M. (1991). *Actors as Observers: A Theory of Skill in Social Relationships*. New York, NY: Garland.

Lorrain, F., & White, H.C. (1971). Structural Equivalence of Individuals in Social Networks. *Journal of Mathematical Sociology*, *1*(1), 49–80. https://doi.org/10.1080/0022250X.1971.9989788

Mackenzie, A. (2005). The Problem of the Attractor: A Singular Generality between Sciences and Social Theory. *Theory, Culture & Society*, *22*(5), 45–65. https://doi.org/10.1177/0263276405057190

McLean, P., & Song, E. (2023). Theorizing Side-directed Behavior. In A. Cossu & J. Fontdevila (Eds.), *Interpretive Sociology and the Semiotic Imagination* (pp. 96–117). Bristol, UK: Bristol University Press.

Mertz, E. (2007). Semiotic Anthropology. *Annual Review of Anthropology*, *36*, 337–353. https://doi.org/10.1146/annurev.anthro.36.081406.094417

Mische, A. (2011). Relational Sociology, Culture, and Agency. In J. Scott and P. Carrington (Eds.), *The Sage Handbook of Social Network Analysis* (pp. 80–97). Thousand Oaks, CA: Sage.

Mohr, J. (1998). Measuring Meaning Structures. *Annual Review of Sociology*, *24*, 345–370. https://doi.org/10.1146/annurev.soc.24.1.345

Mohr, J., & White, H.C. (2008). How to Model an Institution. *Theory and Society*, *37*(5), 485–512. https://doi.org/10.1007/s11186-008-9066-0

Morin, E. (2007). Restricted Complexity, General Complexity. In C. Gershenson, D. Aerts & B. Edmonds (Eds.), *Worldviews, Science and Us* (pp. 5–29). Singapore: World Scientific. https://doi.org/10.1142/9789812707420_0002

Morin, E. (2008). *On Complexity*. Cresskill, NJ: Hampton Press.

Pachucki, M.A., & Breiger, R.L. (2010). Cultural Holes: Beyond Relationality in Social Networks and Culture. *Annual Review of Sociology*, *36*, 205–224. https://doi.org/10.1146/annurev.soc.012809.102615

Padgett, J.F., & Ansell, C.K. (1993). Robust Action and the Rise of the Medici, 1400–1434. *American Journal of Sociology*, *98*(6), 1259–1319. https://www.jstor.org/stable/2781822

Page, S.E. (2015). What Sociologists Should Know about Complexity. *Annual Review of Sociology*, *41*, 21–41. https://doi.org/10.1146/annurev-soc-073014-112230

Peirce, C.S. (1931). *Collected Papers* (Hartshirne, C., & Weiss, P., Eds.). Cambridge, MA: Harvard University Press.

Podolny, J.M. (2001). Networks as Pipes and Prisms of the Market. *American Journal of Sociology*, *107*(1), 33–60. https://doi.org/10.1086/323038

Reed, M., & Harvey, D.L. (1992). The New Science and the Old: Complexity and Realism in the Social Sciences. *Journal for the Theory of Social Behavior*, *22*(4), 353–380. https://doi.org/10.1111/j.1468-5914.1992.tb00224.x

Sawyer, K.R. (2005). *Social Emergence: Societies as Complex Systems*. Cambridge, UK: Cambridge University Press.

Silverstein, M. (1976). Shifters, Linguistic Categories and Cultural Description. In K. Basso & H. Selby (Eds.), *Meaning in Anthropology* (pp. 11–55). Albuquerque, NM: University of New Mexico Press.

Silverstein, M. (1993). Metapragmatic Discourse and Metapragmatic Function. In J.A. Lucy (Ed.), *Reflexive Language: Reported Speech and Metapragmatics* (pp. 33–58). Cambridge, UK: Cambridge University Press.

Somers, M.R. (1994). The Narrative Constitution of Identity: A Relational and Network Approach. *Theory and Society*, *23*(5), 605–649. https://doi.org/10.1007/BF00992905

Somers, M.R. (1996). Where is Sociology after the Historic Turn? Knowledge Cultures, Narrativity, and Historical Epistemologies. In T. McDonald (Ed.), *The Historic Turn in the Human Sciences* (pp. 53–89). Ann Arbor, MI: University of Michigan Press.

Urry, J. (2005). The Complexity Turn. *Theory, Culture & Society*, *22*(5), 1–14. https://doi.org/10.1177/0263276405057188

Urry, J. (2006). Complexity. *Theory, Culture & Society*, *23*(2–3), 111–117. https://doi.org/10.1177/0263276406062818

Votsis, I. (2000). Structural Realism: Continuity and its Limits. In A. Bokulich & P. Bokulich (Eds.), *Scientific Structuralism* (pp. 105–117). New York, NY: Springer.

Walby, S. (2007). Complexity Theory, Systems Theory, and Multiple Intersecting Social Inequalities. *Philosophy of the Social Sciences*, *37*(4), 449–470. https://doi.org/10.1177/0048393107307663

Walby, S. (2021). Developing the Concept of Society: Institutional Domains, Regimes of Inequalities and Complex Systems in a Global Era. *Current Sociology*, *69*(3), 315–332. https://doi.org/10.1177/0011392120932940

White, H.C. (1963). *An Anatomy of Kinship: Mathematical Models for Structures of Cumulated Roles*. Englewood Cliffs, NJ: Prentice-Hall.

White, H.C. (1968). *Lectures in Sociology* [Unpublished lecture notes]. Department of Social Relations, Harvard University.

White, H.C. (1970). *Chains of Opportunity: System Models of Mobility in Organizations*. Cambridge, MA: Harvard University Press.

White, H.C. (1981). Where Do Markets Come From? *American Journal of Sociology*, *87*(3), 517–547. https://doi.org/10.1086/227495

White, H.C. (1992a). *Identity and Control: A Structural Theory of Social Action*. Princeton, NJ: Princeton University Press.

White, H.C. (1992b). Social Grammar for Culture: Reply to Steven Brint. *Sociological Theory*, *10*(2), 209–213. https://doi.org/10.2307/201959

White, H.C. (1993). *Careers and Creativity: Social Forces in the Arts*. Boulder, CO: Westview Press.

White, H.C. (1994, April 16). *Language Networks and Social Change* [Presentation]. Columbia College Dean's Day, New York, NY.

White, H.C. (1995a). Network Switchings and Bayesian Forks: Reconstructing the Social and Behavioral Sciences. *Social Research*, *62*(4), 1035–1063.

White, H.C. (1995b). *Where Do Languages Come From? Part I. Talk from Switches*. [Unpublished manuscript]. Paul F. Lazarsfeld Center for the Social Sciences, Columbia University.

White, H.C., (1995c). *Where Do Languages Come From? Part II. Times from Reflexive Talk*. [Unpublished manuscript]. Paul F. Lazarsfeld Center for the Social Sciences, Columbia University.

White, H.C. (1997). Can Mathematics be Social? Flexible Representations for Interaction Process and its Sociocultural Constructions. *Sociological Forum*, *12*, 53–71. https://doi.org/10.1023/A:1024604606367

White, H.C. (2000a). Modeling Discourse in and around Markets. *Poetics*, *27*(2–3), 117–133. https://doi.org/10.1016/S0304-422X(99)00027-3

White, H.C. (2000b). Parameterize!: Notes on Mathematical Modeling for Sociology. *Sociological Theory*, *18*(3), 505–509. https://doi.org/10.1111/0735-2751.00116

White, H.C. (2002). *Markets from Networks: Socioeconomic Models of Production*. Princeton, NJ: Princeton University Press.

White, H.C. (2008a). *Identity and Control: How Social Formations Emerge* (2nd ed.). Princeton, NJ: Princeton University Press.

White, H.C. (2008b). Notes on the Constituents of Social Structure. *Sociologica*, *2*(1), 1–15. (Original work published 1965). https://doi.org/10.2383/26576

White, H.C., Boorman, S., & Breiger, R.L. (1976). Social Structure from Multiple Networks. I. Blockmodels of Roles and Positions. *American Journal of Sociology*, *81*(4), 730–780. https://doi.org/10.1086/226141

White, H.C., & Breiger, R.L. (1975). Pattern across Networks. *Society*, *12*, 68–73. https://doi.org/10.1007/BF02699922

White, H.C., Fuhse, J., Thiemann, M., & Buchholz, L. (2007). Networks and Meaning: Styles and Switchings. *Soziale Systeme*, *13*(1–2), 543–555. https://doi.org/10.1515/sosys-2007-1-246

White, H.C., & Godart, F.C. (2010). Relational Language: The Example of Changes in Business Talk. In J. Fuhse & S. Mützel (Eds.), *Relationale Soziologie* (pp. 273–289). Wiesbaden: VS Verlag.

White, H.C., Godart, F.C., & Corona, V.P. (2007). Mobilizing Identities: Uncertainty and Control in Strategy. *Theory, Culture & Society*, *24*(7–8), 181–202. https://doi.org/10.1177/0263276407084470

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