

Harrison White, the Pioneer of Network Analysis

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The American sociologist Harrison White made a vital contribution to the development of social network analysis. Besides his work in this field, his theoretical synthesis and his understanding of social formations have influenced a variety of fields such as the sociology of art and economic sociology.

To mark Harrison White's death in May 2024, *The New York Times* paid tribute to a "groundbreaking (and inscrutable) sociologist," seeking to link his life story to his often iconoclastic ideas¹.

Harrison Colyar White (1930-2024) was a giant of contemporary North American sociology. His students teach at the most prestigious universities (Mark Granovetter at Stanford, Scott Boorman at Yale, Peter Bearman at Columbia, among others). More generally, his work has inspired many authors in one way or another. White made a major contribution to social network analysis, which now brings together thousands of researchers around the world at dedicated conferences, including the Sunbelt conference organized annually by INSNA (International Network for Social Network Analysis), and enriches contemporary social sciences as a whole by building bridges with other disciplines such as physics and biology. His contributions have been incorporated into the corpus of reference works of economic sociology and the sociology of art in particular.

¹ *The New York Times*, June 12, 2024.

In France, he has long been recognized for his input in the study of social networks—which, outside this specific field, are cited, for example, by Luc Boltanski and Ève Chiapello in *The New Spirit of Capitalism* ([1999] 2007)—and for his work on markets in economic sociology (cited, among others, by Pierre Bourdieu in his later work on the social structures of the economy) and in the sociology of art (cited by specialists such as Raymonde Moulin, Pierre-Michel Menger and Nathalie Heinich). When two of us translated his most theory-intensive book (*Identity and Control*) into French, it aroused some interest among the more theoretically minded researchers. And yet, his body of work has not yet caught on in the social science research community to the same extent as the work of foreign authors of his generation, which is regularly cited and integrated into social science teaching in France, such as Howard Becker, Erving Goffman, Niklas Luhmann, Anthony Giddens—and even, in the following generation, Mark Granovetter, who was his doctoral student.

Harrison White's work has a reputation for being inaccessible, but it is easier to tackle if we place it in the context of his career as a physicist and mathematician, moving progressively from methods for analyzing social structures to more general theory. For this reason, we will briefly review certain stages of his career path, before focusing on his most theoretical work.

From physics to sociology

The sociological career of this trained physicist probably began in 1956-57, while he was at the Center for Advanced Study in the Behavioral Sciences (CASBS) at Stanford University. This interdisciplinary research laboratory—established a few years earlier in 1954—hosts scientists working in one of the "five core social and behavioral disciplines of anthropology, economics, political science, psychology and sociology."² Over the years, it has welcomed renowned researchers such as economists Kenneth Arrow and Frank Knight, anthropologist Edward E. Evans-Pritchard and political scientist Karl Deutsch. Deutsch was teaching at MIT when he singled out Harrison White from among his students. White was a young physics prodigy (who had joined MIT at the age of 15) with an interest in the social sciences. Deutsch convinced him to spend a year (1956-1957) at the CASBS.

² https://web.archive.org/web/20140808235002/http:/www.casbs.org/history

White had just defended his physics thesis the previous year, and then embarked on a sociology thesis under the supervision of Marion Levy, who had studied under the sociologist Talcott Parsons. Defended in 1960, this thesis was the culmination of White's transition to a new field of study, which had already begun in earnest following his year at Stanford. After his time at the CASBS, White spent a year studying at Johns Hopkins University before being recruited by Carnegie Mellon University. He was then invited to join the University of Chicago in 1959 as an associate professor, which finally gave him the opportunity to work in a sociology department. It was there that he met, among others, the sociologist Everett Hughes. In 1963, he moved from Chicago to Harvard, where he spent much of his career, before joining Columbia University after a brief two-year stint at the University of Arizona.

White's academic career was therefore typical of the American academic elite, particularly at certain Ivy League universities such as Harvard and Columbia. His scientific career was less conventional, marked by a wide variety of subject areas, but also by methodological consistency and a theoretical evolution that gradually incorporated discursive and symbolic aspects into a conception of the social world that had initially been characterized by a fairly strict structuralism and formalism.

From kinship models to social network analysis

Harrison White's very technical first book was a modeling of kinship networks (White, 1963), considered as a set of links between people characterized by their respective positions. White drew inspiration from the work of the French mathematician André Weil, who collaborated with Claude Lévi-Strauss on *The Elementary Structures of Kinship* and wrote an appendix to the anthropologist's renowned book. Kinship networks are closed societies, structured into clans with highly codified relationships. In his book, White outlines the idea of structural equivalence, i.e., similarity of position in the structure that makes the elements more or less substitutable (for example in the very limited choice of spouses, as described in Lévi-Strauss's observations). If kinship is described as a set of relationships between positions defined by membership of family groups and by relationships of descent, two positions are structurally equivalent if they have similar places within the structure. For example, for a given person, two aunts on the mother's side are in a situation of structural equivalence.

At the beginning of his sociological career White emphasized methods, seeking mathematical models for social phenomena. Thus, his first publications did not set out a theoretical position, as is usual in the texts of authors with a background in philosophy or social sciences. However, his determination to model structures aligned him with a form of structuralism. There were, of course, numerous variations on this line of research. In France, it was often linked to the works of Claude Lévi-Strauss, or in sociology, those of Pierre Bourdieu. In the French tradition, the "mentalist" dimension, that of cognitive structures, was extremely important. In English-speaking traditions, particularly British anthropology, from which White drew some of his inspiration, this aspect was much less prominent. The structure was seen more as a set of relationships between individuals or groups. For example, as early as 1940 the anthropologist Alfred Radcliffe-Brown wrote, "direct observation does reveal to us that these human beings are connected by a complex network of social relations. I use the term 'social structure' to denote this network of actually existing relations" (Radcliffe-Brown, 1940, p. 2). This notion was also explored by British anthropologists in the 1950s, notably John Barnes and Elisabeth Bott, who presented definitions of the concept of a social network that inspired White some time later. These researchers saw a social network as a set of relationships (or routine forms of interaction) between individuals or groups, where the links between individuals could cross the boundaries of more or less institutionalized groups or communities.

However, rather than the concrete relationships between people, White was primarily interested in the links between positions in the structure, those positions in which people find themselves at one time or another. Accordingly, he set out to model the cascading job changes triggered by a person's move within a given job system (White, 1970). Each job is considered a single position within a structure, and the transfer of a person from one position to another frees up the original position, which then becomes accessible to another person, who in turn frees up another job, and so on.

When White was hired as an assistant professor at Harvard in 1963, he became fascinated with British anthropologist Elizabeth Bott's book *Family and Social Network*, which described networks as a structure that he felt could be modeled, in particular by developing the notion of structural equivalence, a concept for which he had already laid the foundations in his work on kinship. Structural equivalence denotes a similarity of position in a network. White's idea was that if a network could be described in sufficient detail, showing its various links, then certain actors of the network would be related to the same third-party actors (see Godart, 2011). This similarity corresponds

to positions. A purely structural analysis of the network should then make it possible to reveal these positions, without necessarily having any other information. For example, if the interactions in a secondary school are analyzed without knowing who the people are to begin with, the analysis of structural equivalences will reveal groups of teachers (who have the same pupils) and pupils (who have the same teachers).

Yet mathematical algorithms still had to be developed to measure equivalences (which are never perfect) and determine the blocks. White developed methods for identifying actors of the network that are most similar with regard to their positions, and named the resulting groupings "blockmodels" (Lorrain and White, 1970; Breiger, Boorman and White, 1976), thus opening up a major new field of research (Doreian, 2009).

At Harvard, he trained young sociology researchers including Mark Granovetter, Barry Wellman, and John Padgett, ushering in what has sometimes been called the "Harvard Revolution." Drawing on concepts from British anthropology and adding to them new quantitative methods enabled by the development of computer tools, these authors—along with others working on closely related topics (James Coleman, Ronald Burt and Nan Lin in Chicago, Claude Fischer and Linton Freeman in California)—laid the foundations for "social network analysis" (SNA) which, in the early 1970s, formed the basis of a scientific community that would grow considerably.

At that point in time, White was not a theorist expressing his personal conception of the social world. He was first and foremost a researcher specializing in mathematics applied to the social sciences, and his work during that period cannot really be considered separately from that of the young researchers he advised, some of whom have become more famous than White himself (for example Mark Granovetter, who was included in the <u>2014 list of Nobel Prize contenders</u>). We must therefore take another look at social network analysis, in which White and his students made a key contribution to shaping the analytical and methodological frameworks.

Social network analysis centers on the more or less lasting relationships between individuals or groups. Researchers can use different strategies to detect and analyze these networks. They can delimit groups of entities based on a criterion of resource sharing (for example, belonging to the same small business or the same sports club, and having relationships stemming from a shared activity) and document the relationships between these entities as fully as possible. These are generally referred to as complete networks. Blockmodel analysis as developed by White and his colleagues (Lorrain, Boorman, Breiger, see above) is particularly well-suited to this type of data, but network analysts can also explore the relationships around each person in a conventional sample (with no links between interviewees), reconstructing what are usually referred to as personal networks. This approach was developed in particular by Barry Wellman, a doctoral student under White (1979), and another young researcher with whom he was also in contact, Claude Fischer (1982). In addition, researchers in this field may also seek to determine the relational channels through which resources are accessed (for example, finding employment through relationships that either generate jobs directly or put people in touch with recruiters). This approach was used by Nancy Howell Lee in her research on young women seeking abortions (1969) and by Mark Granovetter on access to employment (1974), under the guidance of White, who was their thesis supervisor.

Social network analysis has evolved considerably because, once one has the means to detect them, networks are ubiquitous in the social world. This allows network analysts to address all areas of the social sciences from the unique angle of "dyadic" relationships (between two entities) and the networks they form. On a language note, it is worth mentioning here that the social networks referred to in these studies differ from the social media networks that emerged in the 2000s and are also often referred to as "social networks" (*réseaux sociaux*) in French. This causes recurring problems of terminology in French-language research, but also raises the question of how the development of these social media affects interpersonal relationships (Grossetti, 2014), and how network analysis research has influenced the development of Internet giants such as Google and its PageRank algorithm (Brin and Page, 1998).

Economic sociology is one of the fields that White studied in depth and which revealed the potential of social network analysis. It also played a part in the development of his ideas, which is why we will now look at it briefly.

Rethinking economic sociology based on networks

White had always been interested in economic activity. He had centered his sociology thesis on the relationships between different departments within the same firm, seeking to identify its structure based on interviews and questionnaires with department managers (he defended his thesis in 1960 under the title *Research and Development as a Pattern in Industrial Management: A Case Study in Institutionalization and Uncertainty*). His interest in economic activity and markets was also rooted in

research carried out with his wife Cynthia White, an art historian, on the impressionists and art markets (White and White, 1965). The two authors analyzed the emergence and organization of dealer-critic art markets. In France, the book (published in French in 1991) had a profound influence on sociologist Raymonde Moulin and, subsequently, on many areas of the sociology of art, both in France and in the United States. Artistic activities would remain one of White's research topics throughout his career, providing him with examples of emerging social structures and inspiring him to develop the concept of style as a harmony of practices (White, 1993).

Taking a more general approach to markets, he quickly moved away from the dominant economic theories, which he knew very well, as well as from some of the authors who had propounded them, basing his thinking on the concept of structural equivalence as detailed above. His market model considers the network of producers, along with their suppliers and customers, and identifies situations of equivalence between competing companies. By observing each other and continually adjusting quantities and prices, companies eventually stabilize within a provisionally balanced whole that White calls a market. The first version of this model appears in the 1981 article "Where Do Markets Come From?" By tackling a key subject for economists (markets), White made a significant contribution to establishing what would later be called the "new economic sociology." This current addressed economic activity as a whole without necessarily refraining-as was previously the case for sociologistsfrom reconsidering the subjects of study and the central concepts of economics, such as markets or price formation. White later revised his model, incorporating new developments (White, 2002; White, Godart and Corona, 2008) and opening a dialogue with researchers in the economics of conventions (Favereau, Biencourt and Eymard-Duvernay, 2002). Committed to structural analyses, he did not subscribe to the individualistic theories of mainstream economics, whose foundations he deemed too fragile, but this did not deter him from defending a mathematized (or formalized) approach to the analysis of economic activities.

Alongside his work on networks and economics, White accumulated notes on more theoretical work, which he set about summarizing in a book during the 1990s. This work is often considered to represent an important evolution in his thinking, with the initial structuralism becoming much more complex through the integration of a dimension linked to language and meanings, and through his exploration of social formations of varying scope that went well beyond networks.

Social formations

In 1992, his book *Identity and Control. A Structural Theory of Social Action* was published by Princeton University Press. The book was reworked with various contributors (including one of us, Frédéric) and republished in 2008 with a new subtitle, "How Social Formations Emerge." ³ The change in subtitle signaled an evolution, not in the book's core content, but in White and his co-authors' perception of the book's overall perspective: from a structure made up of an arrangement of positions, to a social organization in which social positions interact with discursive forms to constitute increasingly complex social formations.

Drawing on a considerable number of case studies—many of which derived from research by the network analyst community—White undertook to construct a general theoretical framework by developing his own concepts, choosing everyday terms and giving them new meaning or creating his own neologisms. His book was not a social theory in the traditional sense, but rather an ontology, an inventory of the social formations that constitute social organization, an organization that he regarded as a "polymer gel" or "a mineral before it hardens" rather than as a clearly ordered crystal, as would be suggested by more rigid structural approaches. In other words, social formations are never entirely stable; they fluctuate and are likely to evolve somewhat abruptly or more gradually.

The structure of these social formations can be perceived through the types of uncertainty that permeate activities. White distinguishes three of these, which correspond to as many dimensions of social organization. Contingency relates to what he calls biophysics, i.e., the natural environment over which social activity has only limited control. "Is a storm approaching the coastline?" is an example of this type of uncertainty. Another—ambiguity—relates to meanings: "Is that really what he meant?" Meanings lie at the heart of Harrison White's ontology (White, Godart and Thiemann, 2008) and are always linked to social positions. To denote uncertainty about these positions, he chose the archaic, seldom-used term "ambage" (the same word was used in the French translation of the book). "Will I get a promotion?" is a question that can illustrate ambage. This highly original deconstruction of forms of

³ Two of us (Michel and Frédéric) translated this second version into French (White, 2011). Incidentally, the translation project preceded the second English-language version. Harrison White spent many months in Toulouse working on the translation with Michel, while working simultaneously on the new English version.

uncertainty suggests that the fabric of social organization is made up of three closely intertwined dimensions: the biophysical, meanings and the social. The three dimensions constantly interact with one another, particularly the last two. White thus shows that maintaining ambage at an acceptable level often means increasing ambiguity, as when a politician seeks to remain allied with partners who are otherwise in disagreement by avoiding any public statement that would make him/her appear to belong to one side or the other.

The two most fundamental concepts, which give the book its title, are identity and control.

White rejected not only approaches centered on a structure or system that would be considered stable, but also individualistic theories based on actors whose logic of action could be clearly identified and modeled. He set aside the standard concepts of sociology (actors, groups, etc.) and defined "identities" as any source of action to which observers can attribute meaning⁴. For White, there are no individuals who can be attributed rationality, a logic of action or dispositions: people are specific cases of identities, and the same person can generate multiple identities (for example, as a mother, a professional, an activist, etc.). These identities can also be collectives, or sometimes even processes. Essentially, they are the subjects of the verbs that appear in the stories. White defines five senses of identity: as an emerging entity seeking support through interactions; as a source of innovation; as a "face" perceived by others; as an a posteriori self-description; and finally, as a person in the more traditional sense when these various aspects are combined. When faced with uncertainty, identities use the activities in which they are involved to build support in order to establish a position, and this support is referred to by the concept of "control." Control is therefore not systematically associated here with a coercive power, but with the possibility for identities to maintain a degree of continuity.

These two fundamental concepts set the book's approach apart from any "mentalist" aspect that would include hypotheses about what goes on in the human mind. Meanings are key, but they appear in discourse or activities without necessarily being linked to intentions, strategies, representations or dispositions. This is what distinguishes White from an author such as Pierre Bourdieu, who was also greatly influenced by structuralism and also deconstructed the notion of the individual, but who based his theory on hypotheses relating to the way in which the social structure influences infra-conscious dispositions. The emphasis on meanings brings White

⁴ On these points see, among others, Grossetti and Godart, 2007.

closer to approaches labeled as "pragmatic" in France, but he distanced himself from them through a very specific conceptualization of social structures.

Indeed, if the contingent and fluctuating nature of identities and their more or less discordant attempts at control are reminiscent of the world described by quantum mechanics, the produced and observable meanings make it possible to detect regularities that evoke the more stable world of gravitation—if we can be forgiven this somewhat crude analogy for the thinking of a physicist turned sociologist.

The first type of social formation White discerns is that of dyadic links between identities-links that are exposed by the narratives and which aggregate into networks. He then revisits the entire field of social network analysis, mentioned earlier, which he had helped to organize. Yet, while many practitioners of network analysis see networks as the fundamental structure of the social world, White only devotes a chapter to them, and quickly moves on to discuss forms of social order that become autonomous from networks, that "decouple" from them, to use his term. These orders, which he calls "disciplines," are a generalized version of what he had observed in markets, when companies with similar customers or suppliers aligned themselves with each other. His term for this type of order produced by similar links with external entities is "interface." However, order can also emerge from adjustments within a given set of identities, as harmony between them, which White calls an "arena." Finally, order can be constructed through more formal deliberations, which he calls a "council." These three types of discipline characterize the collective forms that appear in the social melting pot. At any given time, the same collective form may be structured by one discipline or another. For example, an artists' collective can become an interface when relations with the outside world (the public, critics, dealers) become polarized and place them in a situation of equivalence; it is an arena when the artists determine the "essence" of their art through their interactions; and it becomes a council when those artists collectively agree on actions to organize internally or to defend their art against external threats. Furthermore, White defines a more generalized form of regularity, which he calls "style." Style is a kind of harmony that can refer to a temporary social environment as well as highly reflective artistic constructions.

For White, social organization does not end there; it is also made up of institutions, a type of social formation based on rules, which he refers to as "rhetorics." Institutions (and rhetorics) are not only formal but often tacit, such as the institution that can be perceived in queues, for example. This perspective goes beyond the usual

definitions of the concept of institution, while remaining compatible with them. Working towards increasingly large aggregates, he then defines "regimes," which are large-scale and long-lasting balances between various activities. This allows him to address phenomena such as patriarchy and capitalism.

Although it fluctuates, social organization is nevertheless very restrictive, and attempts at action—i.e., local modification of this organization—are endlessly confronted with logics of obstruction, which he describes as a "Sargasso Sea" of social activity. However, social organization also supports identities and, as it fluctuates, it opens up possibilities for action.

This intellectual construction lends itself to very diverse interpretations. It is more ontological than theoretical, sometimes appearing more as an assemblage of profound intuitions than a very regular architecture, and is moreover written in a complex and sometimes very allusive language. When it was first published, the book baffled most sociologists, with the notable exception of Andrew Abbott. In his review of the book (Abbott, 1994), he stressed its marked originality and the openings it offered, suggesting that readers should read it in full without trying to understand everything, and then revisit the parts that resonated most with their own concerns, in the certainty of gaining entirely new perspectives. And this is exactly how social scientists everywhere have gradually learned to use it. This is not a "ready-to-use" theory that can simply be applied to a research problem. Rather, it is a concentration of ideas and insights that is enormously inspiring when one selects some of them to reinterpret and incorporate into one's own thinking. In this respect, White can to some extent be described as a sociologist for sociologists, just as there are "musicians for musicians" who inspire their peers but remain inaccessible to a wider audience.

White's intellectual journey is reminiscent of that of a philosopher, also trained in mathematics and engineering, such as Ludwig Wittgenstein. Beginning with a quest to rationalize the analysis of social activity by developing precise mathematical models—just as Wittgenstein had initially sought to free philosophy from metaphysics—White progressively gave greater importance to meanings and language (he had planned to devote a book to this subject, but was never able to complete it), in the same way that the philosopher focused on language games. This analogy is clearly very limited, particularly as White never stopped producing mathematical models, notably of economic activity, collaborating with more empirically oriented researchers, and describing social structures. But it can be helpful for understanding this very unique figure in the field of sociology.

A rich legacy

As the tributes poured in after his death in May 2024, many of his collaborators and readers began to encounter the full scope of his work, having only previously perceived fragments through techniques, research themes or particular theoretical interests. Likewise, members of White's close academic circle have begun to realize the considerable range of his influence in many areas of the social sciences. Some of those who were more interested in methods than theory, and who had often been disconcerted by *Identity and Control*, have begun to appreciate the book's importance. Others who are more involved in theoretical debates have become increasingly aware of the extent to which White's proposals, although expressed in very abstract terms, are rooted in methodological reflections and in-depth knowledge of several fields of research.

The social sciences are now taking stock of the full legacy of this "groundbreaking" and "inscrutable" author, in the words of *The New York Times* article quoted in the introduction to this review. It will surely have an impact on many fields. In the community of network analysts, whose main organization, INSNA, was founded by one of White's former students (Barry Wellman, also deceased in 2024), the fundamental questions addressed by White are coming back to the fore, despite the development of techniques and the diversification of the topics covered, which have accompanied a sustained rise in the number of practitioners. In economic sociology, his contribution-combined with that of his former students, including Mark Granovetter and John Padgett-provides important insights for discussing mainstream economic theories. The sociology of art and cultural practices has long incorporated his theory of markets, but in recent years it has also discovered the relevance of notions such as style, applied in particular to cultural industries such as fashion (Godart, 2016). And we could continue to list the thematic areas in which his ideas offer new insights. Finally, in terms of theory, White has become a key reference, and continues to be a source of commentary and developments.

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Translated by Susannah Dale with the support of CASBS, Stanford University and published in <u>booksandideas.net</u>, 18 March, 2025