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The Behavior of Cultural Networks

Zusammenfassung: Bis vor kurzem hat sich die Netzwerkforschung kaum um die kulturelle Dimension von Netzwerken gekümmert, und die Systemtheorie sieht Kultur lediglich als semantisches Korrelat und Echo sozialer Strukturen. Demgegenüber wird hier vorgeschlagen, Kulturen als Netzwerke eigener Art zu verstehen und deren Verhalten netzwerktheoretisch zu analysieren. So differenzieren sich kulturelle Netzwerke beispielsweise in Kernbereiche und Peripherien mit unterschiedlicher charakteristischer Phänomenologie aus. Im Kern kultureller Netzwerke findet sich ein robuster und dogmatischer Realismus, zumal dann, wenn das Netzwerk Monopolstellung einnimmt und eine hierarchische Ordnung von oben beherrscht.

Up to now, sociological network analysis has chosen two different paths to approach the dimension of »culture« and »meaning« (Fuhse 2009). Traditional network sociology, committed to a purely structural and formal conceptualization of networks, has paid scant attention to culture and symbolic meanings, or ignored the cultural dimension of social structure altogether. In fact, the anti-categorical thrust of this line of work has been to reveal the latent causal efficacy of a »deep« level of relations underneath the surface of everyday and common sense understandings of actors' social ties and connections. In this formal approach, pioneered and exemplified by blockmodeling and graphtheoretical mappings of networks, the matrix of social relations typically results from presence or absence of ties across a population of natural or corporate actors. In this way, it is possible to represent the formal structure of a network in a sociogram of relational patterns and transactions among actors positioned at different or equivalent locations in the overall structure. Depending on their position and location in the network, actors and clusters of actors can then be shown to have differential access to such resources as status, information, jobs, promotions, or technological innovations, precisely as a result of their embeddedness in a patterned configuration of ties. Actors need not have an accurate sense or understanding of the structural parameters of their positions in the network for these parameters, conceptualized and operationalized in purely formal terms, to yield important social outcomes.

This purely formal understanding of networks pays little or no attention to the meanings of the relations and transactions structured in and by networks. Observing the presence or absence of ties, for example, says little or nothing about the symbolic contents of such ties, nor about the cultural identities of

the actors involved, or about the contextual history of ties and actors. It is likely that ties have meanings that vary across time and social situations, and that actors have identities that are not stable and constant.

These perceived deficits of purely formal network modeling have given rise to a more »phenomenological« interpretation of networks as saturated and infused with symbolic meaning and cultural understandings of ties between actors, so much so that the emergence of a distinct cluster of network researchers concerned with relational phenomenology has been observed (Fuhse 2008). In the center of this newer network phenomenology is placed Harrison Whites (2008) revised »Identity and Control,« in which he pursues the interplay of culture and structure, after having discovered Luhmann and system theory's core concepts of »meaning« and »communication.« The relationship between structure and culture is called »netdom«: »The meaning horizon usually sees network locality, configuration of expectations, as neighborhood star (sic). Correlatively, communication also characterizes and is characterized by immediate context in domain of *theme* in that horizon. Since this correlates with network interlock, a suitable labeling is *netdom*. While *net* refers to pattern of ties, *dom* for domain comprises stories, symbols, and expectations, and together they co-constitute a ›net-dom‹« (White et al 2007; all original emphases).

In this approach, two important issues remain open and uncertain. First, it is unclear how the terms »phenomenology« and »phenomenon« are used. Both seem to refer to »meaning« and »culture,« and are sometimes used interchangeably with these two latter terms, which remain unspecified as well. Meaning, for example, might be subjective or objective, possibly even »intersubjective.« It might reside in a mind, a text, or an institution. Some meaning may be specific to a certain kind of relationship, such as intimacy, while other meaning might be more public, or even »shared.« Likewise, »culture« is a most ambiguous term as well, and has received as little clarification in phenomenological network analysis as »meaning.« What is obvious and lamentable, though, is that network-sociological understandings of »phenomenon« and »phenomenology« have little or nothing to do with how these terms are used in the philosophical phenomenology of a Hegel, Husserl, Heidegger, or even Schutz.[1] The second question pertains to the relationship between the structure of ties and the culture of social relationships. Is it possible to have one without the other, or do both always co-exist? And if they do, what kind of relationship can be observed between structure and culture? Is one dependent on the other, or do both follow from a third, unspecified, source? Which kind of structure »correlates« with which kind of culture? How is it possible to analyze variations within and between different cultures, and how do such variations correspond to variations in social structure?

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1 See Glendinning (2007) for a recent overview.

In what follows, I will not address, let alone solve, these difficulties, but rather suggest a »third way« for the network analysis of culture. While the first strand of network analysis, as we have seen, ignores culture altogether, and the second, »phenomenological« network approach sees culture as somehow entangled and interwoven with the structure of social relations (»netdoms«), I shall analyze »culture« as a structure and network in its own right. Since this attempt is driven by an intention to show the cross-disciplinary force of network models, the examples I will be using come from a variety of fields and specialties, in addition to »culture« proper, such as semantic holism, the sociology of science and technology, and neuroscience. In each of these cases, the basic forces of networks seem to operate in similar ways.

Networks of Culture

A cultural network is a more or less bounded, recursive and holistic pattern of interrelated symbolic meanings.[2] Cultural networks are similar to Cassirer's (1955) »symbolic forms,« such as science, art, myth, and religion. Extending Kants critique of reason toward a critique of culture, Cassirer sees symbolic forms as »media« or »frames« within which objects and their meanings are constituted. Since there are various such forms, media, or frames, the meaning of an object placed within such a form varies accordingly, so that not even within one larger symbolic form, such as science, are physical objects the same as biological or chemical objects. It is not possible to isolate an object of knowledge, since it »can be defined only through a medium of a particular logical and conceptual structure« (Cassirer 1955, 76). Symbolic forms are not simply the sum of their objects and concepts, but rather express the »law governing their structure« (81).

In the same NeoKantian fashion, Foucault's (1973) »archaeology« of knowledge investigates those »historical a prioris« (XXII) that constitute the cultural codes of various »epistemes.« It is these epistemic codes and configurations that constitute an historical observer, above and beyond any persons or authors. Cultural codes of relational similarity and difference structure the meanings which the objects of discourse acquire, and discontinuous ruptures in the history of such codes change the ways in which the world is perceived and observed: »The fundamental codes of a culture – … – establish for every man, from the very first, the empirical orders with which he will be dealing and within which he will be at home« (Foucault 1973, XX).

Still another notion similar to cultural networks is the idea of »memeplexes« in memetics, where »meme« is a unit of cultural meaning and practice: »Memeplexes are groups of memes that come together for mutual advantage. The

2   »Kultur ist … die Sinnform der Rekursivität sozialer Kommunikation« (Luhmann 1995, 47).

memes inside a memeplex survive better as part of the group than they would on their own. Once they have got together they form a self-organising, self-protecting structure that welcomes and protects other memes that are compatible with the group, and repels memes that are not« (Blackmore 1999, 231).

I take this convergence among very different approaches as a sign that a theory of cultural networks can connect observations from a variety of sources and approaches. But what do these approaches have in common? As all networks, cultural networks have two basic components – nodes and relations. It is not possible, from the location of an outside observer, to specify or define these components exhaustively in advance since, depending on their level of professional and reputational closure, networks themselves decide which nodes to admit into the network, how these will be formatted, and how the nodes will be related to each other. In this consists precisely the work of a network; it can and will relate to itself and its environment, but how this happens depends on a network's own mode of operation. Since cultural, and all, networks change over time, their nodes and relations will also vary over the history of the network, and so will their meanings: »Mendel sagte die Wahrheit, aber er war nicht ›im Wahren‹ des biologischen Diskurses seiner Epoche: biologische Gegenstände und Begriffe wurden nach ganz anderen Regeln gebildet« (Foucault 1974, 24). Expect changes also in the overall pattern or configuration of a network; as it ages and becomes more consolidated and institutionalized, for example, the meanings of some nodes harden, to the point of becoming deeply embedded in the core of the network, where it houses and protects its »ultimate« building blocks and foundational anchors. In cultural networks, one finds here the »classics« of a cultural tradition or school, themselves related to other such classics, and also to the less central works at the margins of the overall structure.

The nodes in a network of art, for example, are works of art, related to each other in various ways, such as the family resemblances between the artworks that constitute a distinctive and recognizable artistic or literary style, as in »impressionism« or »Russian formalism.« But works of art are not the only possible nodes in an artistic network; another set of nodes may be academic commentaries on art, which are related to each other through citation networks, which display a characteristic structure or pattern as well. Yet another network belonging to an art world is that among museums, galleries, and other modes of display, which can be mapped according to the paths along which works of art travel from site to site. Still another, much more extensively studied, dimension of the network that is an art are the master-apprentice ties among artists and their generations, in which case the nodes are formatted not as works or display venues, but »persons,« and the relationships between them are those of mutual affiliation, training, and interaction.

Cultural networks, then, reveal multiple dimensions, depending on the different possible levels at which nodes of various kinds are linked, and on the kinds

of relations between them (Bourdieu 1993). To take a different example, in a science or scientific specialty one possible set of nodes is the concepts within the semantic web that constitutes a theory as a network of related concepts. But, on another level, an entire theory might be a node, linked to other theories in a family of theories which constitute a distinctive school or theoretical tradition, such as »conflict sociology« or »rational choice« in sociology. On yet another level we find, in a science, that organizations, such as laboratories, are linked as nodes in an overall organizational set which constitutes a demarcated academic field of intellectual labor migration and exchange.

It is not possible, in this article, to explore the complexity of cultural networks on all these different levels. Therefore, my understanding of cultural networks will, for the most part, be more narrowly oriented toward those semantic webs called »theories.« This understanding resonates with Luhmann's use of the term, »network,« as recursive coupling of communication (see Bommes / Tacke 2007, 11). The semiotic and structuralist analysis of language and discourse moves along similar lines as well (Shweder 1991, 196-202), as do Bourdieu's (1984, 262, 340) analyses of »correspondences« between preferences of taste and style in class cultures. The nodes in theoretical networks are communications of some kind, or elements thereof, such as concepts, propositions, hypotheses, examples, measures, or indicators. The relations among the nodes are »logical« relations in the broad sense, such as similarity and difference between the terms and concepts in a particular order of classification, or relations of conceptual implication and empirical consequence that connect various terms to each other. Typically, theories display a »hierarchical« structure in that central terms, those indispensable to a theory, are those upon which less central terms are based and grounded. The *locus classicus* in the social sciences is Marxism, with its distinction between »basis« and »superstructure.« On this ground, we can move beyond the rather simple assertion that theories are recursive couplings of meaningful communications and their components, to a mapping of the precise ways and forms in which such coupling occurs. As all networks, a theory will display an overall architecture or Gestalt, a characteristic signature of nodes and relations which evolve over time, as a theory does its work, relates and distinguishes itself from rival theories, and responds in characteristic ways to what it considers and accepts as relevant evidence. The overall movement of this structure, the ways and modes in which it arranges and rearranges its nodes and relations, is the »behavior« of a cultural network, coming about through the mutual adjustments among various network components and sectors in a »quasi-orchestral practice« (Fleck 1935, 97).

Semantic Holism

The idea to view cultures, such as scientific theories, as semantic networks comes from an approach in the philosophy of science, semantic holism, endorsed by writers as diverse as Wittgenstein (1953), Quine (1964), Kuhn (1962), Fleck (1935), Hesse (1980), Latour (1987; 1988), and Rorty (1979). Semantic holism opposes logical positivism and verificationism when it comes to two major epistemological puzzles: meaning and falsification. According to verificationism, the meaning of a term or statement is the method of grounding it in fact and confirming it, which can be done separately and in isolation for each of a theory's components. According to holists, in contrast, the meaning of a term in a theoretical or cultural structure cannot be decided or fixed in isolation; for example, by relating that term to an isolated empirical or observational datum. No such observational datum makes any sense by itself and in isolation, but only in the terms of an account located within the semantic web: »There are no brute, self-contained matters of fact, capable of being understood apart from interpretation as an element in a system« (Whitehead 1929, 14). The meaning of a term comes from its position and role in the network of related terms that make up the overall structure. The structure is a pattern of relations with a characteristic signature or *Gestalt*. The *Gestalt*, the overall configuration or physiognomy of a network, outlasts changes in both nodes and relations. The relations are not simply »logical;« a cultural network is held together by more or less local practice and mental habits, not abstract reason (Margolis 1993, Chapter 1).

It is the network that »knows,« not the Subject, mind, or consciousness. To be sure, networks »need« minds, but only as a means to continue themselves. One might say that a network »formats« minds in the ways it needs them to maintain its own structure and operations. Systems theory is not the invention of Luhmann or anyone else; rather »Luhmann« is what systems theory uses, among many other things, such as this journal, to continue itself: »Cognition modifies the knower so as to adapt him harmoniously to his acquired knowledge« (Fleck 1935, 86).

Cultural and semantic networks do not contain just theorems or propositions, but a variety of assorted and associated resources and supports. Kuhn (1962, 182ff.) calls such networks »disciplinary matrices.« They constitute the identity and solidarity of a – in Kuhns case: scientific – community. Such matrices do contain formal and explicit propositions, definitions, and laws, but much of the »knowledge« embedded in them remains tacit, and is acquired not by formal training and instruction, but rather by informal and practical socialization into a community's form of life, practice, and ways of doing its work. Besides formal symbolic generalizations, or laws, a disciplinary matrix also includes »metaphysical paradigms,« the fundamental ontological models of a science's niche, »values« as the normative principles underlying theory choices, and »exem-

plars,« or typical problem solutions which allow practitioners to perceive the family resemblances among the various puzzles of a normal science.

All of these heterogeneous components are called here »terms.« They are the nodes of the network.[3] Strictly speaking, networks do not consist of nodes, but relations between nodes. The nodes are outcomes, not sources or origins, of the network. Whatever stability and coherence a network might achieve does not rest on the invariability of its nodes, but on the comparative endurance of its structural *Gestalt*. The nodes are what they are within the network, and they are defined and held in place by embedding in a relational pattern. Outside of the network within which they become what they are, the nodes lose their identity and get nothing done. They are unlikely to survive, or get lost and look out of place: »There is no meaning outside of those systems that use and reproduce meaning as medium,« Luhmann (1997, 45) observes for the case of systems using meaning.

The working of brains is likewise coupled and contained. The nodes in neural networks cannot be transplanted outside of the brain, to a different organ, and the longer a node has been in its relational place, the less is it able to migrate elsewhere and do something else in a different network. Flexibility is much higher for stem cells, precisely because they have not yet been formatted and fixed within stable relational embeddings. The longer the tenure of a node within a particular structural location, the more rigid and caged it becomes, and the less is it able to move to a different place and change the way it works. Take a scientific finding outside of the network of related findings, and it loses its sense and significance. Place such a finding into the networks of a different, yet connected, science, and it will acquire a meaning it did not have before, or may change its meaning altogether. Translation works in much the same way; as a text is being translated into another language and culture, it is being reformatted by that language or culture, according to what and how it matters there, which is why »literal« translation is a contradiction in terms.

The meaning of a term, therefore, varies according to changes in the configuration or signature of the network within which connected terms are embedded. As the position and role a term plays in the network changes, so does its meaning. The standard (Saussurian and structuralist) case in point is language, which »stands as the supreme example of a self-contained ›relational‹ structure whose constituent parts have no significance unless and until they are integrated within its bounds« (Hawkes 1977, 26). The meaning of a term in a semantic network is just the difference this term makes within the entire relational structure, a difference that becomes most visible when that term is removed from the network. When this happens, the network adjusts by rearranging itself to maintain its overall integrity and cultural identity. Depending on how critical a term is for the viability of the network as a whole, its removal will trigger

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3   For some concrete examples of cultural networks consult Thagard (1992).

repercussions of varying scale and significance throughout the entire structure. Upon their removal, terms that are deeply embedded in the central regions of the network make more of a difference to the network than marginal terms in its periphery. The more a term is connected to the connections of other terms, the more dramatic and widespread the effects its change or removal will generate in the network as a whole.

The same dynamic appears to apply to technical networks, adding to the force of the basic network model. Perrow (1984) shows how disturbances and accidents in a technosystem affect the performance and behavior of that system in different ways and degrees, depending on how that system is structured and, particularly, how the relations among its components are coupled. In closely coupled systems with uncertain parameters and complex interactions, disturbances are difficult to localize and isolate, and so tend to spread quickly and unpredictably to other parts and areas of the system, possibly cumulating into massive disasters that destroy the network itself. Such network failures are likely to occur when unexpected changes change the very ways in which many more unexpected changes occur in coupled parts of the structure. This might be how scientific revolutions occur – as dramatic collapses of paradigms on multiple fronts (Fuchs 1993; Fuchs / Spear 1999). In network terms, revolutions are sudden and drastic meltdowns of a network core. Such changes might be announced by a prolonged »crisis« in the network's basic concepts and methods. More orderly and cumulative changes require the rest of the network to remain more or less as it was, much like moving a limb requires not moving certain other parts of the body at the same time.

Accordingly, semantic holism maintains that no statement of a theory can ever be tested or falsified on its own, in isolation. There seems to be no strict distinction between a theory and its empirical basis. The empirical basis of a theory is not exempt from falsification itself. The »protocol statements« which constitute this basis are subject to revisions just as any other parts of the overall theoretical structure. Falsifications are not contradictions between words and the world, but between two different, yet related and mutually dependent, sets of words: »Clashes between theories and factual propositions are not ›falsifications‹ but merely inconsistencies« (Lakatos 1970, 99).

If, and when, a semantic network responds to challenges or attacks from other such networks, the entire network is at stake and on trial. Falsifications concern not isolated statements but entire networks, and so have different consequences depending on where in the network they occur, and how that locale is related to its other parts and segments. Falsification of theory, therefore, is decided by theory, not falsification. No theory disappears just because of anomalies or refutations. Since theory is not simply theoretical, but includes a variety of heterogeneous elements such as measures, indicators, and operational rules, falsification is never straightforward, but mobilizes adjustments from very different sources and corners of the network. As networks tend to

defend their overall integrity and, especially, those nodes and relations upon which they are founded and grounded, they will protect these critical and central areas »at all costs« and »come what may.« Falsifications are thus much more likely to affect marginal and peripheral terms and sectors of a network, which are being adjusted to save its center and core.

Network Consolidation

Networks take time to assemble and organize themselves. Very young networks are unstructured and unstable, and thus very likely to fail early on, succumbing to the »liability of newness« (Hannan/Freeman 1989). The nodes have as yet no precise locations and definitions; they float and drift around in turbulence and raw complexity. There are no clear and solid boundaries that demarcated the network from the other networks in its niche. The »identity« of the network is ill-defined, controversial, and fragile, subject to attacks by those already established networks occupying the same niche, and laying claim to the same ontological region. Neither nodes nor relations are »in their place« yet – the place they acquire once the network matures into an established and recognized system. Young networks have yet to settle into the routines prevalent in older ones, and they cannot yet point to an impressive history of successes and accomplishments. The most likely scenario is the network falling apart and disintegrating before it is ever able to normalize itself and institutionalize its operations. Liability of newness endangers systems across a wide variety of niches, from biological species to business start-ups and social movements. The failure rate among novel networks is thus much higher than for established ones.

If it does survive its liability of newness, a network gradually settles into its routines, de-fines the position and role of its constitutive nodes, and holds them in their place by an emerging regular pattern of relations. In this way, degrees of freedom in nodes are being curtailed, and stable objects emerge that behave more or less orderly and as expected. The boundary around the network hardens, and might even become a »wall« (Krieger 1992, 7-14). Such walls create two sides and shield the inside from the outside. Inside, the world is simpler and less complex than outside. Walls cage complexity by limiting and controlling the parameters affecting the behavior of the network. Very thick and impenetrable walls create invariances and conservation laws. The network turns toward itself, inward, and in doing so becomes more bounded and closed. At this point, not anything goes anymore, and the network acquires a recognizably distinct identity that distinguishes it from other such identities.[4] Those operations that yield stable outcomes are condensed into routines, as in »nor-

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4 See Harrison Whites (2008, 17ff.) struggle to separate the notion of »identity« from that of »person.« The »five senses« of identity he proposes gradually move onto levels higher and above »person.«

mal science,« that decide what is, and is not, competent and standard practice. They gradually become part of the network's core. Firm rules of method and textbooks appear there, together with standard applications and model problem solutions. Latour (1987, 4) calls this »ready-made« science, as opposed to »science-in-the-making,« which is the prevailing mode of cultural work in the peripheral areas. Change within the network core becomes very orderly, systematic and cumulative. It takes the form of gradual extensions of that which is already known in advance, minor surprises and revisions notwithstanding. As the network builds itself up by building upon the results and outcomes of its own previous operations, it acquires tradition and history, which it tends to read as an imperfect and incomplete approximation to its more advanced present and still more advanced future. The network reproduces itself through generational ties and organizational anchors which provide its material conditions. Mullins (1973, 23) calls this the »cluster stage« in the development of a cultural network (in his case: scientific specialties), with strong in-group ties and a high degree of concentration in the means of intellectual production. Towards the »winter« of a culture (Spengler 1918), its core institutions have become fossilized, frozen and inert in their inability to consider the possibility that the world might be otherwise, after all.

Once established and consolidated, a cultural network becomes, to an extent, internally closed. It can still react and respond to its environment, mostly that of rival networks in the same niche, but only in and on its own terms. The network itself decides what it will attend to, and how it does so. It goes to work on the outcomes of its own previous operations (Berg 1997, 409). It cannot represent the world at large or as such. It decides for and by itself what it considers as possible falsifiers and exceptions, and how it will deal with them, if at all. The reality it builds up is and remains its own. It can expand and make its reality more universal, but anything that happens happens, at first, locally, at a particular time and place. Nothing universal starts out that way, and I cannot think of any universal that is truly so. No »world« religion has ever been the religion of »the« world. »Universals« are usually exaggerations and stretches. More universalism and consensus are claimed than can actually be cashed in, leading to ideological inflations. The distinction between local and universal is one of degree, not kind, and what is, indeed, more universal may eventually shrink back into a more local reality. This happens when empires fall apart, for example. Their universalism disappears together with their centers.

A closed network cannot digest anything »raw,« as it were, but only that which it has »cooked« to some extent. One might liken this to metabolism and immune systems in organisms; an organism dissembles and rearranges that which it feeds on, and expels or neutralizes threats to its self-preservation. An organism that cannot »cook« what it ingests dies. By analogy, how networks react and respond to that which occupies their attention and becomes their work is decided by their own blueprints. The networks in the same niche

share certain »codes« that allow them to communicate and relate to each other. Scientific theories react to other scientific theories in the same niche, which excludes not only most or all theories and ideologies outside of science, but all theories in separate niches or scientific specialties. The networks and observers in a niche observe and »monitor« each other, as White (1988) has shown for closely coupled market sectors. For the case of philosophy, Collins (1998) provides evidence for the number of competitors and rival schools being quite limited, hovering around three to five distinct clusters which dominate the intellectual attention space. The extreme cases – monopoly and anarchic competition with very large numbers of rival players – appear rarely and prove unstable.

Network Expansion

A network cannot do the work of other networks, and it cannot extend its work into other networks, with the exception of dramatic episodes of network expansions. A good example comes from Latours (1988) analysis of the »Pasteurization of France.« Latour follows Pasteur in a series of moves and displacements, from the inside of his laboratory to the outside of the French countryside and back again, through various »translations« and »enrolments«. Latour answers one of the most persistent objections to relativism by traditional philosophy of science: if science is relative, how come it works? In the case of Pasteur, his science eventually »worked« because he managed to transform the French countryside into an extension of his lab, so that what worked in the lab also worked outside.

Another example for network expansion is the reduction of one specialty to another. Such reductions do not happen in, or as a result of, logic, but when a network actually invades and takes over another network completely or partially, as in the »reduction« of, say, sociology to biology in sociobiology or evolutionary psychology. Reductions move along the lines of stratification in scientific fields and disciplines, with high-status fields expanding into low-status ones (Ben-David / Collins 1966). Reduction is similar to the expansion of an empire subsuming and absorbing a conquered territory. But even then, the colonizers will have to reckon with that which is already there, and will likely end up creating some sort of hybrid or creole culture, leaving parts of the conquered culture intact under an imperial umbrella administration.

Short of colonization and conquest, a network cannot see what it cannot see, and cannot do what it cannot do: »The domain of discourse is a closed domain, and it is not possible to step outside of it through discourse« (Maturana / Varela 1980, 39). Such a network does not respond to the »world at large,« but only to that very limited and rather narrow slice of it which constitutes its ecological niche. A contribution to an art, for example, must somehow be recognized as

art by and within the network that constitutes an art. Depending on its level of professionalization and closure, the network of art scrutinizes potential art-to-be, and relates potential candidates to its various institutions, such as criticism, commentary, and modes of exhibition. The same applies to literature, and its various sub-fields and genres. On the face of it, art and literature seem rather unlikely, since most objects never acquire any particular or pronounced aesthetic significance. A recognized work of art can also lose that status over time and revert back into an »ordinary« object, just as a scientific fact may at some point turn into an artifact, and vice versa: »A sentence may be made more of a fact or more of an artifact depending on how it is inserted into other sentences. By itself, a given sentence is neither a fact nor a fiction; it is made so by others, later on« (Latour 1987, 25).

This is why art and science have histories. If there are multiple and pluralistic networks of art, what is considered art will be contested and controversial. Controversy also surrounds the experimental avant-garde sectors of a culture. What is considered art in one network may not be so considered in another, much as one social movement's charismatic leader is another's ordinary person. Some rare artworks become entrenched in the core of the network, where their status as art becomes more and more secure, to the point at which such works are being consecrated and canonized as exemplars for what art *is* in its very nature and essence. Such works turn into classics and models or exemplars for all art to come.

Cores and Peripheries

An important result of network consolidation is the distinction between core and periphery in the network as a »field of force« (Quine 1964, 42). The core houses, maintains, and protects those network components which turn out to be fundamental and foundational for the entire structure. Hampe (2007, 50) has shown this for the modern concept of »laws of nature,« which is part of a semantic field of related concepts, and which belongs to the core of that field as a concept that is both necessary and elementary for the entire philosophical understanding of modern science. The entire semantic web rests on the core as its center of gravity and receives its robustness and stability from there. In the core, the nodes are closely connected and tightly coupled to each other. Strong and direct ties prevail here, linking the same nodes to each other in many different ways, over and over again. The pattern of relationships is very redundant, with few or no »structural holes« (Burt 1992) around the nodes. The relations are very strong and resistant to disturbances. The network considers its core elements and relations as inevitable and unassailable necessities. They become its »essences« and »substances.« The prevailing mode of core operation is effortless and automatic necessity, not uncertain and tentative contingency.

Core meanings have become »technical«: »Meaning becomes *technical* to the extent that the process of experience is freed from its accompanying meaningful references – relieved, so to speak, from having to include the entire world – and can then go through an abstractly specified sequence of selection steps (e.g., a mathematical calculation, or the step-by-step composition of a work of art, or a sequence of choices of means appropriate to a particular goal) without thereby being irritated or jeopardized by that neglected horizon of other possibilities« (Luhmann 1990, 46-47, original emphasis).

As one moves within the core, one is always at home and cannot really get lost, since all the relations and paths are well-known in advance and familiar to all those trained, equipped and accustomed to travel within the network. The circularity in the core leads one safely back to where one started: »A rule is amended if it yields an inference we are unwilling to accept; an inference is rejected if it violates a rule that we are unwilling to amend« (Goodman 1983, 64). The paths along the core relations are brightly lit, well-paved, and clearly indicated by maps, markers, and directions. One never encounters strange and controversial territory while traveling inside the core. There are no unmarked spaces and uncharted wilderness. In the core one finds the network's obvious truths and undisputed facts and standard black boxes, such as routinized pieces of equipment or computerized statistical analysis packages. Such devices are fairly immune to changes in observer, time or location; unlike novel instruments and devices, they travel well from site to site and so can be »replicated« elsewhere, increasing faith and trust in the network's replicability: »Institutions of all kinds can be formalized to a high degree; they become ›transportable‹, much like the formalism of political democracy has migrated to much of the world, though with highly variable concrete manifestations« (Gehlen 1956, 40).

In Rorty's (1979, 315f.) words, the core is »epistemological«, not »hermeneutic«, about itself – it satisfies a desire for order, certainty, and firm foundations. For Rorty, the distinction between epistemology and hermeneutics has nothing to do with the difference between »hard« science dealing with solid physical things and »soft« humanities dealing with ambiguous texts. Rather, this distinction cuts across the difference between subject matter or regional ontology. »Hermeneutics« emerges together with uncertainty; epistemology responds to closure and consolidation: »We will be epistemological where we understand perfectly well what is happening but want to codify it in order to extend, strengthen, or teach, or ›ground‹ it. We must be hermeneutical where we do not understand what is happening but are honest enough to admit it« (Rorty 1979, 321). In the »epistemological« core reigns a reality that cannot be imagined any different from what it actually and naturally is and must be. The core is reinforced by a high degree of tacit and institutional consensus around that which »everyone knows« and no one with any minimum level of cultural competence could possibly deny. In fact, any results obtained which contradict the core, as in inept high school science demonstrations, simply document that

someone has made a mistake and has not learned or mastered the basics. The consensus in the core is not rational but institutional, not achieved but assumed, not explicit but implicit. For institutions are latencies. They are not essentially beliefs, but may turn into beliefs when they are weakening and forced to render themselves explicit in attempts at defending and justifying themselves. Strong institutions remain in the invisible background of a form of life and form its blind spots. Institutions rule out other possibilities and options without rendering them explicit: »For most of what he calls solid fact, sound interpretation, suitable presentations, every man is increasingly dependent upon the observation posts, the interpretation centers, the presentation depots, which in contemporary society are established by … the cultural apparatus« (Mills 1963, 406).

The core is the network's common sense, the way it works when operating in the routine or default mode of »normal« science and culture. Although science, as a whole, is usually opposed to common sense in textbooks on epistemology and methodology, a science has its own common sense, a *habitus* acquired through long practice, training, and discipline. It is impossible to »refute« common sense, although it can collapse together with the community to whose common practices it provides its sense. Common sense is slow to learn, resistant to change, and unwilling or unable to make any genuine discoveries. Common sense has much faith in itself and its ability to handle come what may. What has worked before will work again and in different situations or times. In the end, the natural attitude always turns out to be right, precisely because it is »natural.« Of course, what is considered »natural« does not stem from nature, but from long and undisturbed practice and habit, sedimented into the network's core, and rendered invisible there (Douglas 1986, 48). Common sense reacts with irritation, indignation, and consternation to being questioned and asked to observe and account for itself. If it does encounter some phenomenon which it cannot assimilate and integrate into itself, it shrugs this off and moves on with business as usual. Common sense is not and never a »theory« or a system of »propositional attitudes.«[5] It is more like the home where one lives.

Common sense is hostile to second-order observing (Luhmann 1992, Chapter 2). For, to observe an observer is to render contingent and improbable what that first-order observer itself takes for granted as obvious, self-evident, and universal. Observing common sense therefore requires special efforts and precautions, such as the »breaching experiments« of Garfinkel (1967) or the »bracketing« of Husserl (1913, 61ff.). Common sense observations are being attributed to the way the world simply is and must always be, not to the observer to whom common sense is common. In the common-sensical mode, one

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5   That common sense is »folk psychology« as a system of »propositional attitudes« is probably
    one of the most glaring mistakes of computational cognitive science (see Lycan 1990).

does what comes »naturally« and needs no justification because no alternatives are visible or available to begin with. Those who don't have (our) common sense simply have no (common) sense altogether and cannot be trusted. They cannot be or become part of »our« community and world. Common sense thinks of itself as universal, though historical comparisons can reveal variations in common sense. The common sense of a 21st century investment banker will be very uncommon to that of a 12th century monk, and there will be no place in one for the other's world (Hannerz 1992, 128).

The stronger a network or community cohere, the more inviolable and robust its common sense, and the more suspicious it will be towards strangers, outsiders, and anomalies. Building upon Mary Douglas's (1986) »grid / group« model, Bloor (1983, 142) shows how reaction to anomaly varies with the social density of the network. In very dense networks or network areas, such as their cores, anomalies are seen as dangerous and immoral offenses to common sense. They must be eradicated and neutralized at all costs. In some cases, such as fundamentalist religions or culturally isolated sects, the core houses the sacred objects and totems of a group, protecting them by rituals and taboos from challenges and dissent. Since the core houses the basic necessities deemed indispensable to a form of life, it is safeguarded by a protective belt which separates core from periphery. For the case of organizations, Thompson (1967) shows how they employ a variety of strategies and safeguards to entrench and buffer their operational cores from disturbances and interruptions. If and when core realities come under attack, the protective belt assures that the entire network reacts so as to minimize impacts on the core. In theories, a common way to do this is *ceteris paribus* clauses. Or, an exception or anomaly is being explained away as not being covered by theory and therefore out of its range and jurisdiction. Alternatively, the solution and dis-solution of anomaly is promised in the future, when more is known. Much effort is invested in showing that an anomaly is not really that anomalous. Attacks will be staged against the rival network which pushes an anomaly as a source of embarrassment for the focal network.

In any case, adjustments are made in the periphery to save the core. The core is that area of the network farthest removed from the network's margins, where it deals with conflicting data, contrary observations, and tests or falsifications. If and when falsifications occur, they are much more likely to affect the peripheral zones than the core. The core is largely exempt from revisions and very slow to change. One might say the core expects »normatively« rather than »cognitively« (Luhmann 1984, 440-441). While Luhmann assigns these modes of expecting to the different function systems of law and science, network theory holds that normative expecting resides in *any* core of *any* network, regardless of differences in function. In case core expectations are disappointed, the core insists on its own reality, and marginalizes or trivializes the exceptions and contradictions to itself. That which cannot be reconciled with the core cannot

therefore be. Nothing can be that contradicts the laws of logic. When it comes to persistent anomalies, cores adopt a »monster-barring« strategy (Bloor 1983). Cores are very dogmatic about themselves, tolerating very little or no irony and skeptical distance from themselves.

In contrast, the more peripheral zones of the network are more loosely coupled and ill-defined, with many structural holes, weaker and inconclusive ties, and more uncertainty. Peripheries accommodate more controversy and contingency; their mood is more playful and their mentality more open to change, alternative interpretations, and innovations. It is here that we find the »frontiers« and »avant-gardes« of a culture, its high-status cultural workers with a lot of reputational capital. In the periphery, the location and role of the nodes are less defined and settled. The relations among them stretch out into unfamiliar space and uncertain territory. The pattern of ties is loosely coupled and not very redundant; structural holes abound, and the paths along the relations are in the process of being forged amid controversy: »The less interconnected the system of knowledge … the less stable and more miracle-prone is its reality« (Fleck 1935, 102). Anomalies are the rule in peripheries, not the exception. They are not perceived as threats to common sense and firmly established truths, but seized upon as welcome opportunities for innovation and discovery.

The peripheral zones are different from the core in their cultural phenomenology. For example, they cultivate a different relation toward time. Cores are presentist; they view the past as an incomplete and immature step toward the present, and the future as a gradual extension and stabilization of the present. Peripheries, in contrast, celebrate the openness of possible futures as exhilarating opportunities for innovation and paradigmatic shifts.

The distinction between core and periphery is a variable accomplishment of the behavior of (cultural) networks. Expect that, as a network consolidates its core, some of its components migrate across the border separating the two zones. The border will display varying degrees of openness and closure. For example, in young networks this border tends to be ill-defined and controversial, with the network components crossing the border with little inspection and regimentation. At this point, the entire network is in perpetual flux, with low structural stability and differentiation. As the network ages, its core becomes more entrenched, and the border between core and periphery more guarded and watchful. An example comes from isolated and involuted sects or cults, which police their borders very rigidly, prohibiting most outsiders from entering, and keeping the surrounding world at a large distance. Since cults that do not generate their own offspring, however, must recruit new members from outside, they will subject these novices to rigorous inspections and treatments. They will disassemble and deconstruct old identities forged on the outside, prior to membership in the cult, and reassemble and -construct those identities according to their own and internal specifications and requirements. By controlling, reducing, or even severing the ties that link their new mem-

bers to the outside, they reduce or eliminate the drift on their nodes stemming from such previous ties. The result is a large and robust core inside a total and greedy institution.

The core / periphery distinction seems to apply also to that network of relations called a »self.« The relational self goes back to Hegel and the »Subject« of the German Idealists. The Subject relates to the Object, to itself, and to other Subjects. The becoming of the Subject, its »phenomenology,« is the unfolding of this relational structure and dynamic. The self is a self-accomplished network of relations. It relates to itself, to the world or niche within it that it calls and makes home, and to other selves in various degrees of vicinity and intimacy. As selves consolidate and find what works for them over time, they acquire a core self with a robust «master« identity that defines who they really and essentially are, »deep down« in the inner recesses of personhood. In the core of self, strong relations link closely coupled clusters of various roles, or »Mes«, into a tight and well-defined unity, observed as more or less reliable and predictable »character.« In contrast, selves with weak cores are much more difficult to pin down, define, and hold in place. These opaque and open selves are what Sartre (1943, 165) calls a »decompression« of being, in the sense that such selves do not coincide with themselves, and so are usually at odds and out of step with who they are. These »postmodern« identities have a fragmented, fleeting, and ambiguous sense of self, unsure of who they were, are, or might be. In Meadian terminology, such selves have a prominent »I« but a weak »Me.« Selves without strong cores are »men without qualities,« chameleons difficult to tame, constrain, and domesticate. Selves with strong cores, in contrast, can be counted upon more reliably to remain who they are and stay »true« to themselves. Over time, core identity hardens and becomes ever slower and unwilling or -able to adapt and adjust to changes in relational patterns. At this point, any changes to core self are likely catastrophic, triggering failures and collapse of identity, experienced as an ability not just to handle this or that difficulty, but as a loss of handle on the world altogether.

Another illustration, on a macro-scale, comes from Elias's (1979) theory of civilization. Elias shows how absolutist courts during the early modern period centralized the systems of coercion, taxation, and administration in a court society of increasingly dense and interdependent social relations. In the core of that society Elias finds tightly coupled clusters of royal officials, servants, and retainers, while the more peripheral sectors of society are much more isolated, localist, and less connected to each other. This core / periphery distinction generates corresponding divisions in cultural style and *habitus*, with sophisticated and refined mannerisms and modes of intercourse defining the core, and rawer passions and sociocultural relations ruling the countryside.

Sociological Philosophy

For cultural networks, an important result of core entrenchment and stable core / periphery differentiation is the distinction between analytic and synthetic statements. The theory of cultural networks sociologizes this distinction, and treats it not as an essential difference between different natural kinds of statements, but as a variable and dependent outcome of network operations and behavior. Kant's (1781, 57) philosophy is based on a fundamental distinction between empirical knowledge of objects and transcendental knowledge of knowledge of objects. Transcendental knowledge itself is divided into two kinds, a priori and a posteriori. Transcendental knowledge a posteriori is concerned with the possibility of experience, grounded in the senses. Within the transcendental a posteriori, the distinction between a priori and a posteriori recurs or re-enters: The a priori within the a posteriori denotes the »form« of experience, that is, time and space as the themes of transcendental aesthetics, while the a posteriori within the a posteriori concerns not the »form« but »matter« of experience, raw sense data of unstructured complexity.

In the same »fractal« fashion, transcendental knowledge a priori is logic, not aesthetics, concerned not with experience but thought, and divided into analytical and synthetic judgments or propositions. There are two criteria analytical statements must satisfy. They must be true by necessity, in all possible worlds, regardless of experience, and no exceptions are possible because they are unthinkable. An example is, »all bodies are extended,« since »being extended« resides within »body.« The way to arrive at analytical truths is to strip away from knowledge all that which comes from experience, to the point where reason becomes pure and approaches the »thing in itself.« Since, ultimately, the thing-in-itself can only be known by the force that created it, God, it is not accessible to a finite intelligence, and so Kant is mostly concerned not with analytical, but synthetic propositions a priori, such as causality. In network terms, synthetic propositions a priori fall in between core and periphery, corresponding to Kants efforts at mediating between rationalism (core) and empiricism (periphery).

While, for Kant and philosophy, the difference between analytical and synthetic statements is a difference in kind, for network theory it is a difference in *degree*. The closer one moves toward the core of a cultural network, the more analytic its cognitive mode, and the more its relations become »purely logical.« But becoming entrenched in the core does not happen by itself or for reasons intrinsic to its fundamental building blocks. Rather, entrenchment is the temporary and local result of net-work, that is, of a long process of sedimentation and institutionalization. The truths in the core are not really necessary or universal; they are so only *within* the network whose foundations they provide. Outside of the network, or in different networks, different necessities and certainties rule: »In science, just as in art and life, only that which is true to culture is true to nature« (Fleck 1935, 35).

Another axis of variation is the proportion of core and peripheral zones in a cultural network. Much has been made of the differences between science and religion, for example. Often, science is seen as based on reason and evidence, while religion is based on faith and revelation. But one must have faith in reason and evidence as well, and trust plays a much larger role in science than the contrast between science and religion would allow (Shapin 1994). In network terms, the difference is that, by and large and variations between religions notwithstanding, religions have larger and stronger cores than sciences. In a religion, the truth is already known. It was established at the founding of a religion, with its constitutive revelations and prophesies. No major discoveries can be expected; in fact, such discoveries would only corrupt the original word and message. Since all the truths are already known, not much is left to do but preserve and protect them from forgetfulness and compromise. Much work is expended on generating ever more comprehensive syntheses and synopses of all that is known and certain (»summae«). The result is an impressively coherent and consistent architecture of knowledge, an *ordo* in which everything has its place, the place where it naturally belongs and longs to be (*analogia entis*). Dissent is discouraged or outlawed as sacrilege or heresy. The work of the network consists, for the most part, in the dogmatic consolidation and fortification of established doctrine, laid down in the sacred scriptures and authoritative pronouncements. Religions tend to look backwards, not forward, as a science will. If it does look forward to the future, a religion will see it as a restoration or rebirth of the past. Religious practices sacralize the core into totem, and erect forceful ritual prohibitions sanctioning offenses against the taboo.

A science has its core as well, in its normal and routine modes of operation, but the core tends to be smaller and less durable than in religion. A science that looks backward is a dead science. It leaves its history to the historians. It cannot limit itself to worship and commentary of and on its founding fathers and classical texts. The past of a science is seen as that which it has to overcome to prepare itself for future innovation and discovery. High status in science goes not to those who preserve its traditions, but to those exploring areas of high uncertainty and novelty. A science's glory lies in its future, not past.

However, there are variations also within religions and sciences when it comes to the structural division between core and periphery. An important variable in this regard is the distribution in the means of intellectual and cultural production. At one extreme, there is monopoly, with one organization controlling all or most opportunities for culture. Examples include the medieval Church, centralized state socialism, and the Chinese scholar-officials or *literati*. Under these conditions, there are few or no resources for cultural work outside of the dominant organization. The intellectual workers are likely employees of the state or church, and have little discretion over their work (Burke 2000). They are not organized into independent and self-governing professions. Under these conditions, intellectual work becomes the ideological expression and for-

mal rationalization of the hegemonic organization. Culture is confined to the elaboration and celebration of that organization's mission, status, and agenda. The intellectuals become official spokespersons for the organization and systematize its foundational and fundamental principles. They reside in temples, courts, or state-run academies.

The official principles become those in the core of the corresponding cultural network. Since there is only one such network, with rival networks either nonexistent or forced underground, its principles and doctrines are sacrosanct, with deviance and dissent subject to serious sanctions and exclusions. High status in such intellectual communities goes to those closely connected to the ruling elites and inner circle of the party or church. Advancements through the ranks follow strict bureaucratic protocol, and high status comes to those with seniority and long tenure inside the organization. All culture is concentrated at the top, and those below or outside the hierarchy have no or a very inferior culture. Such a culture is very scholastic and realist about itself. It expects normatively, not cognitively, and becomes unwilling or –able to learn.

In contrast, there are decentralized and pluralistic »markets« for intellectual and cultural production which make it difficult or impossible for a privileged observer to emerge or sustain its privileged status. This is the case when intellectual and cultural work becomes organized into independent professions of experts and specialists. Under such conditions, no network is strong enough to dictate its terms to all the others. Control over intellectual production is not administered by centralized hierarchies, but occurs within highly specialized and differentiated professional communities. Such are the structural conditions for »creativity,« as Peterson (1994, 175), has shown for popular music, where periods of rapid aesthetic innovation coincide with competitive and decentralized markets. To be sure, there are still differences in ranks among such professions and their speciality subcultures, but there is no overarching and all-consuming hierarchy. The opportunities for intellectual work are not administered by a central monopoly, but by decentral and competitive academic labor markets. Such are the conditions for cultural work that regulates itself and gives the highest status and rewards to innovators and discoverers. As a result, there is not one culture but many, and competition between them prevents large and solid dogmatic cores from forming or enduring. Such cultures will not be realist but constructivist, to the point of outspoken multicultural relativism.

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