Before or beyond narrative? Towards a complex systems theory of contemporary films

Poulaki, M.

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6. Causality and emergence through complex systems and narratives

In complex systems, causality is entangled with internal complexity and self-organization. As we saw in Part 1, Luhmann described how systems acquire their causality through self-organization. This is an emergent approach to causality, as it describes a system that becomes causal as soon as it constitutes itself. In the latest years, a nonlinear conception of causality also gains ground, complementing—and not contradicting—the emergent causality of the system. This nonlinear causality is involved in the constitution of the system by its units. Rejecting proportional cause and effect sequences, this conception accounts for the ability of units and their complex interactions to make way for the system’s emergence. It acknowledges the agency and causal power of elements, which work in synergetic networks rather than linear sequences. Causality in complex systems offers a model for thinking causality in complex films as having a similar nonlinear constitution and self-organizing function. Especially network films attract the attention to the nonlinear workings of causality in the process of their textual and cognitive organization.

Emergent causality

Emergence is a concept that in the last years has been taken up by the study of complex systems, and refers to the self-organization achieved through complexity. The two terms—emergence and complexity—are often used interchangeably in the relevant literature, although complexity is a more ‘technical’ term compared to the philosophical background of emergence. Even though the study of emergence in complex systems still remains in many respects an obscure process that has not yet been explained in a systematic way (see Sengupta 2006: 324 and 350), the common assumption of those who study complexity is that emergence is opposed to fixed structures that determine their components, but also to the simple reduction of a system to the number of its constituents.

In order to explain my claim that causality in complex films can be thought in terms of emergence, it is necessary to introduce in more detail the concept of emergence, as it has been developed first in philosophy in the beginning of the last century, and later in (complex) systems theory. The philosophical sense of emergence dates back to 1875, when George Henry Lewes used it in his work Problems of Life and Mind. In the late 19th and early 20th century, emergence was a central concern for the cycle of British Emergentists, who participated in the debate between mechanists and vitalists about the genealogy of sciences. Emergentists occupied a moderate position, resisting the reduction of biology, and secondarily of chemistry, to physics. Life, according to them, is not just an outcome of mechanical laws,
neither is it a substance itself; some of its qualities continue to be irreducible to mere mechanical processes. Among the most important figures of British Emergentism have been John Stuart Mill and Charlie Dunbar Broad. While Mill retained the attribute of causality in emergence, Broad initiated (in *The Mind and its Place in Nature*, 1925) a “synchronic, noncausal, covariational account of the relationship of emergent features to the conditions that gave rise to them” (O’Connor and Wong 2009); his account has certain affinities with the contemporary revived interest in emergence. The ‘noncausal’ character that British Emergentists ascribed to emergence is due to the fact that emergent laws are “trans-ordinal”, as Broad called them, that is, they refer to the connection of one order (or level) with another, and do not apply in the case of elements situated within the same order. Trans-ordinal laws can only be found *a posteriori* and at the higher level, and cannot be predicted by any existent law about the composition of lower-level elements: “[…] we must wait till we meet with an actual instance of an object of the higher order before we can discover such a law; and […] we cannot possibly deduce it beforehand from any combination of laws which we have discovered by observing aggregates of a lower order” (Broad 1925: 79, as cited by O’Connor and Wong 2009). Trans-ordinal or emergent laws “describe a synchronic noncausal covariation of an emergent property and its lower-level emergent base” (O’Connor and Wong 2009). “Noncausal” here means that no single law of the lower level can account for the property that emerges at the higher level, thus direct cause-and-effect chains between different levels cannot be established. According to Broad’s approach to emergence, “high-level causal patterns” are additional to those at the lower level, and they can exert influence upon the lower levels, in a manner that has more recently been characterized as “downward causation” (see Campbell 1974).

Other British Emergentists, and especially Samuel Alexander, have been more influential than Broad in contemporary science. Alexander’s view of causality is summarized by Philip Clayton as follows:

> evolution produces new structures and organizational patterns. We may speak of these structures as things in their own right; they may serve as irreducible components of our best explanations; and they may seem to function as causal agents. But the real or ultimate causal work is done at a lower level, presumably that of microphysics. Our inability to recognize in these emerging patterns new manifestations of the same fundamental processes is due primarily to our ignorance and should not be taken as a guide to ontology. (2006: 21)

Alexander, contradicting Mill and Broad, dismissed autonomous higher-level causality, and even though he emphasized the novelty of emergent qualities, he thought of emergence as an
epistemological rather than an ontological category. According to the criticism, however, the “weak” emergence of Alexander cannot account for the causal properties of the whole constituted by the parts (Clayton 2006: 25-26); such properties are indispensable in order for the whole to be considered as an autonomous entity.

Although the degree of connection between different orders was a point of dispute for Emergentists, what is certainly defeated by all emergentist accounts is causal determinism. The unpredictability of a system is considered a central property of emergence: “Emergent properties are systemic features of complex systems which could not be predicted [...] from the standpoint of a pre-emergent stage, despite a thorough knowledge of the features of, and laws governing, their parts” (O’Connor and Wong 2009; emphasis mine). Moreover, despite their differences, all theorists of the British movement shared a common view of nature as “layered”. The world for them is arranged in levels “of increasing organizational complexity of matter” (ibid). As organisms move to higher levels of complexity, reducibility to lower levels becomes impossible. Thus, emergence counteracts reductionism. Preoccupied with wholes that are not reducible to their parts, the concept of emergence found fertile ground in systems theory, which revived the interest in emergence (ibid). Since Ludwig von Bertalanffy’s General Systems Theory (GST), systems theory “was put forward as a counter to what was perceived as excessive reductionism dominating scientific discourse during much of the 20th century” (EMIL 2007).

Different degrees of emergence, from strong (absolute irreducibility and completely ‘new’ properties) to weak (practical but not analytical irreducibility), have been identified in the philosophy of emergence, and causality plays a crucial role in the difference between the two—strong and weak—versions. Contempory accounts of emergence in the context of complex systems study seem to favor a ‘weaker’, or “intermediate”, version of it. The weak emergent approach is materialistic, according to systems scholar Mark Bedau, as it steps on the existence of microdynamics between material components of the microlevel that result in the emergence of operationally autonomous macrophenomena (1997: 395). The recent complex systems theories favor these weaker versions of emergence, as the material substrate of autonomous units and their interrelations are considered to be involved in an active way in emergent self-organization.

Complex systems are nonlinear and irreducible, in the sense that “a single high level property may be realized by more than one set of micro-states which have no lawful relationship between them” (EMIL 2007). However, as a case of weak emergence, the irreducibility of a complex system does not preclude (nonlinear) deducibility from the initial conditions, although these conditions are impossible to be clearly defined in open (and not isolated) systems. Therefore the methods that are usually employed in the study of emergence
in complex systems are simulation or statistical modeling (see Byrne 1998: 62). Thus, the study of emergent causality demands a synthetic rather than an analytical approach, because synthetic approaches ‘follow’ the bottom-up constitution of systems. According to Bedau, “the macrostate’s behavior” could be derived “from the system’s microdynamic” only by means of simulation (1997: 378), or “modeling all the interactions of the realizing microstates leading up to it from its initial conditions” (O’Connor and Wong 2009).

Nonlinear causality and emergence from cybernetics to complex systems theory

Nonlinear causality has been associated with cybernetic feedback. In cybernetics, self-organization was initially associated with negative feedback and homeostasis, but with the second wave of cybernetics (the one that Hayles calls phase of reflexivity, as mentioned in Chapter 3, and lasting from 1960 to 1980), a shift in the thinking of self-organization took place, and the “deviation-amplifying” positive feedback processes gradually gained ground. Philosopher Manuel de Landa credits Norman Wiener, the ‘father’ of cybernetics, with a nonlinear idea of causality, which broke with a tradition of “linear (nonreciprocal) causality” (De Landa 2009: 67). Magoroh Maruyama’s study of positive and negative feedback, as well as Maturana’s and Varela’s “autocatalytic loops”, further established a nonlinear conception of causality. This conception countered the dominant conception of causality in Western thought, according to which “similar conditions produce similar effects” (Maruyama 1963: 4).

The nonlinear approach to causality questions the value of negative feedback and stability, and highlights the role of non-equilibrium in self-organization. According to Bertuglia and Vaio, this shift to positive feedback and non-equilibrium also marked the ‘overtaking’ of cybernetics by complexity theory:

Cybernetics, in reality, can be considered a science that anticipated complexity in the investigation of dynamical systems, precisely because it was the first to make use of concepts such as isolated or closed systems that regulate themselves by means of internal feedback cycles. […] complexity has overtaken cybernetics because it makes use of new concepts such as, in particular, self-organization and emergence; in other words, because it considers systems that evolve towards new states that do not have negative feedback cycles. (2005: 264)

When causality is conceived in nonlinear systems, it becomes the emergent product of the aggregation and “synergy” of a system’s elements. Causal synergy and emergence is what differentiates nonlinear from linear systems. As complexity scientist Grégoire Nicolis explains,
In a linear system the ultimate effect of the combined action of two different
causes is merely the superposition of the effects of each cause taken individually.
But in a nonlinear system adding two elementary actions to one another can induce
dramatic new effects reflecting the onset of cooperativity between the constituent
elements. (1995: 1)

The combination of different agents in a complex system has causal influence that again
exceeds that of the sum of the combined causes taken individually. Nonlinearity in the
mathematical sense of the word refers exactly to this disproportionality between starting
conditions and results. ‘Weaker’ versions of emergence suggest that there is a connection
between properties at the micro-level and those at the macro-level, but this connection is
nonlinear. This, however, does not preclude some kind of causality to exist between the
different levels. Later in this chapter, I will connect this synergetic and weak conception of
causality with the one that operates between the different diegetic and narrational levels of
complex films.

In complex systems accounts, emergence is not acausal. It rather pertains to a different,
“pattern-based” as it has been called, form of causality. Jeffrey Goldstein (1996: 178),
following Ben Goertzel’s mathematical model of “pattern dynamics”, rejects the view
according to which complex chaotic processes are acausal—he refers specifically to the
philosopher of science Stephen Kellert who expresses such as view in his book *In the Wake of
Chaos*. Suggesting “a revision of causal explanation in the light of emergence” (163), instead
of an abolishment of causality altogether, Goldstein distinguishes pattern-based causality
(revolving around questions such as “how do the new patterns shown in emergent phenomena
relate to previous patterns in the system?”) from the traditional, “substantialist” causality
(implied by questions such as “what is it made of?” and “how much of it is there?”) (165).
Emergence is caused when already existing systemic patterns become more complex, creating
“a plurality of folds” (169). Thus, either through “Boolean networks” (as Stuart Kauffman
claims) or the “Baker transformation” (as does Ilya Prigogine), “emergent phenomena have
[within the system] complex precursors” (170), and they do not just ‘pop up’ out of the initial
simplicity of a system. By characterizing a property as emergent, one does not imply that there
is no way to explain or understand its occurrence. Causation is still an issue in emergence, but
it does not happen horizontally, following the model of bowling balls hitting each other, as a
classical mechanical approach to causality would imply, but vertically, between different
scales and levels. Emergent events are ‘wholes’, the causal effects of which “cannot be
correctly represented in terms of the separate causal effects of [the] constituents” (O’Connor
and Wong 2009).
It is complexity itself that demands some notion of causality to be preserved for emergent phenomena. There is a causal link, Goldstein argues, between increased complexity and emergence (1996: 174). The insistence upon the coupling of emergence with causality is a stance that rejects both ‘hard’ scientific reductionism and the absolute detachment of the emergent phenomenon from its functional substrates (as a “strong emergence” thesis would have it). Rather, it is compatible with the combination of the “local” with the “global” level (175). As Prigogine, together with philosopher Isabelle Stengers, mention in their book *The End of Certainty*, there is “a narrow path between two conceptions that both lead to alienation: a world ruled by deterministic laws, which leaves no place for novelty, and a world ruled by a dice-playing God, where everything is absurd, acausal, and incomprehensible” (1997: 188; emphasis mine).

Emergence seems to require a bridge between the microlevel and the macrolevel, which allows a view over the patterns developed by aggregates of separate micro-elements. As O’Connor and Wong note: “Of central importance is to recognize that the relationship of micro-level structures and macro-level emergent properties is dynamic and causal, not static and formal (in a quasi-logical sense)” (2005).

**Emergent causality and narrative**

Complex films, as many different theorists, from Bordwell to Cameron, have pointed out, stand somehow between determinism and contingency: on the one hand, they negate linear and deterministic causality; on the other hand, they demonstrate the causal effects of contingency. Before going on, certain clarifications need to be made: narrative causality is not the mechanical and ‘linear’ (in the strict sense) causality of Newtonian laws. It is not physical or mathematical but anthropomorphic, less precise and less tight than causality at the level of natural elements, to which complexity in sciences refers. In one sense, causality in most narratives and narrative films is already ‘loose’. According to organizational theorists Haridimos Tsoukas and Mary Jo Hatch, narrative can be a model for all modes of thinking in which causality does not operate through strict and reductive logical sequences, but “through associations that are not causal in the logico-scientific sense” (2001: 1006). As they point out, narrative causality operates through patterns of “co-occurrence, spatial proximity, formal similarity or metaphor” (*ibid*), features that “may help us to understand […] the non-linearity, indeterminacy, unpredictability, and emergence of complex systems” (1007).

However, this conception of narrative is already made from a post-narrative perspective, and particularly from one of complex systems theory that re-interprets narrative as a complex system. In film theory, narrative has been clearly differentiated from other non-narrative formal systems that are possible in film, such as the rhetorical, categorical,
associational and abstract forms that Bordwell and Thompson distinguish (2008). Certain among these non-narrative forms, and especially the associational one, which creates patterns of images related according to motifs, have similar characteristics with those that Tsoukas and Hatch mention. But this form, prominent in “experimental” films, according to Bordwell and Thompson (2008: 356), is downplayed in narrative films. The definition of narrative in film theory but also in narratology, as shown in Chapter 5, sticks to the notion of causality as an organizing principle that arranges events in causal-logical sequences. This narrative organizing principle, no matter how less deterministic from the one presupposed by natural Newtonian laws, is still diegetically but also formally challenged by the “chance encounters” and the “intersections of strangers” proliferating in complex films. Causality in complex films is not just loose but nonlinear, and organizes the film in an emergent way. Nonlinearity does not only characterize the interactions of characters/actors at the representational level, and the way their actions lead to “storms of consequences”, as it happens in *Burn After Reading*, but also the ‘causal logic’ of the narration and the one involved in the cognitive construction of the diegesis by the viewer.

Narrative conceived as a cognitive system of interpretation retrospectively determines the sequence of events so that they can be placed in a causal-logical chain. But a complex systemic approach requires a careful examination of how any form of cognitive organization emerges from the level of the *syuzhet*, and how does the text and its construction complicate and even withhold this top-down establishment of causality towards which narrative tends. The complex systems framework favors approaches that take as their starting point the level of the *syuzhet* and put in a secondary position that of the *fabula*.

In the field of organizational studies, narrative causality has been contested as inadequate to capture the complexity of organization. From this perspective, David Boje contests causality (in the form of cause and effect chains) as anthropomorphic, and suggests a complex systems approach that he calls antenarrative. The Latin prefix ‘ante’ indicates his pointing at the stage before narrative. Drawing from Nietzsche’s disavowal of “universalized causality”, Boje suggest that the establishment of logical causal connections between events often underestimates the role of contingency upon human action and neglects “all kinds of affects” that are at play between two thoughts. Thus, Boje contends,

The narrative acts of retrospective causality destroy the antenarrative experience of multi-causality and non-linear causality, and situations where the only cause is a fictive one. […] Physics is moving beyond mechanistic interpretation to more non-linear models, and organization studies follows along. We in organization studies are giving more sensitivity to initial conditions, self-organization and emergent dynamics in chaos and complexity theory. In the postmodern world of storytelling
organizations linear causality is a convenient fiction, an over-simplified narrative of complex antenarrative dynamics in which non-linearity (and that too is a fiction) reigns. Organization studies are beginning to wrestle with an antenarrative understanding of causality. As Langley says, “Researchers are also increasingly recognizing that the presence of multilayered and changing contexts, multidirectional causalities, and feedback loops often disturb steady progression toward “equilibrium” (1999: 692). (Boje 2001: 93-94).104

In film studies too, an antenarrative approach would be one focusing on and starting from the complexity of filmic texts, without presupposing the whole that narrative stands for, one that—even retrospectively and in an emergent way—imposes a causal-logical structure to the multiplicity of affects involved in the process of communication between a recipient and a film.

Since complex films can be conceived as complex systems, as I argue in this dissertation, they may still form organizations, communicate and produce meaning without putting their elements into any kind of steady linear arrangement. As long as meaning making processes in complex films are concerned, and provided that these are emergent processes, both textually and cognitively in the different systems of the film and the viewer, I would opt for a weak rather than a strong conception of their emergence. This implies that the textual form of the syuzhet matters in the emergence of meaning. Adopting a weak emergent approach to the causality involved in complex films would mean to direct our attention to the actual causal role that the multiple constitution and the non-linear ordering of the syuzhet and the relations between its elements have in the emergence of a whole. In the opposite case, a strong emergent approach that would consider this whole to be completely independent of its units, an ‘order’ or schema that emerges in all cases of reading and viewing being independent of the specific characteristics of each text, would tell us nothing, to paraphrase Jaegwon Kim (2006: 200), about the processes through which the cognitive and filmic organization is constituted in complex films.

**Structure and emergence in networks, from social theory to narrative**

In the previous chapter I argued that the number of characters in complex films, and mostly the number and entanglement of their interactions, disrupts the classical schemata of causality in narrative cinema. Here I will explain in more detail how the number of components of a system (which can also be a filmic system) and their relations plays a fundamental role in the system’s complexity.
Complex systems scientist Stuart Kauffman has shown that complexity is built in multi-agent and densely interconnected systems (see 1993: 243). These two factors, the number of agents and the density of connections, are interdependent, as the big number of individual units increases the possible interactions and therefore, the complexity of the resulting system.105 As the anthropologist and neuroscientist Terrence Deacon notes,

With every iterated interaction, relational properties are multiplied with respect to each other, so an increase in numbers of elements and chances for interactions increases the relative importance of interaction parameters and related contextual variables. (2006: 121-122)

Films with network narratives follow this logic; by increasing the number of agents they also increase the relational range and the complexity of the network that these relations form.

In graph theory, networks are graphic representations used in order to depict relations between a number of units. It has become a common practice in many different disciplines to use network theory and graphs to analyze complex data, but the word ‘complex’ here equals to ‘connected’—with a varying degree of entanglement, which sometimes makes network graphs incomprehensible. Network is the graphic form of interconnectivity, as it provides a means to elaborate systems with many interconnected parts. There are variations of complexity in networks, depending on the degree of their distribution, the clustering coefficient (the degree to which nodes cluster with each other) and other dimensions.

However, the network structure, pictured as the complicated connections between a multiplicity of nodes, is not a sufficient condition for complexity to develop, in the sense that complex systems theory gives to the term. Complexity theory does not stop at the representation of systems as networks but also seeks to explore how these networks are dynamic, and how they form themselves through reciprocal connections between the ‘nodes’ that compose them. Complexity theory, as Russ Marion points out, “envisions adaptive systems (species, animals, plants, viruses, etc.) as neural-like interactive networks of agents and seeks to understand the dynamics of network behaviors” (2006: 274). Emergence happens only through such dynamic interrelations. As Marion notes, “events emerge from complex interactive dynamics involving neural-like networks of adaptive agents. That is, emergent events are products of unpredictable combinations and recombinations among interdependent agents” (259).106 The “networked, interdependent interactions” are characteristic of every complex system. Interactions between a large number of agents/elements create increasing complexity, but these interactions between the nodes need to be dynamical and reciprocal, in order for them to transform into an emergent organization. That is why network theory is not synonymous with systems theory, or, why not all networks can be characterized as complex
Network theory has historically been a structure-oriented approach, but complex network theory as a strand of systems theory moves beyond structures, focusing on the emergent dynamics that the interrelations between units release. A similar complex approach to network films would also be differentiated from structuralist approaches, emphasizing the emergent dynamics at the ‘meso-level’ of unit interactions.

An example of the ‘structuralism’ inherent in network theory may be given through Emirbayer’s and Goodwin’s discussion of the particular use of network analysis in sociology. They distinguish between different versions of ‘structuralism’ (prioritization of structures) therein: the “structuralist deterministic” model prioritizes the potency of structures over that of the individual actors, while that of “structuralist instrumentalism” prioritizes actors. The former tends to work with “static ‘map configurations’ or relational ‘snapshots’ of network patterns” (Emirbayer and Goodwin 1994: 1426), ending up in reifying relations and considering them overarching structures that determine the units; the latter takes the theory of “homo economicus” as its starting point, attributing to individual nodes a rationalistic and utility-maximizing logic, which, even in a bottom-up direction, still pre-determines the conduct of the network’s actors/nodes. Such a double ‘structuration’ became apparent through the analysis of causality in narrative in the previous chapter; the ‘characterological’ construction of causality based on—anthropomorphic—motives, such as those of the actors in *Burn After Reading*—reduces (and structures) the actors to instantiations of cultural and social ideals (the vein, obsessed with external appearance woman, the man who wants to feel important…), while a structuralist—in the narratological sense—analysis of causality again succumbs the dynamics of the plot’s form to overarching symmetries that preexist them. A change of theoretical context though would allow, as it did in sociology, for different properties of networks to come to the fore. Complex systems theory in sociology aims at revealing the dynamical nature of social networks and highlighting the complex links and interrelationships between the micro-level of individuals and the network macro-level. Between these two levels, a multiplicity of nested systems with their own interrelationships weaves the patterns of social complexity (Byrne 1998: 10).

In sociology too, as in cybernetics, systems theory initially adopted a very different approach from the one that the ‘new’, complex systems theory, takes. Even today, systems theory in sociology often refers back to the work of Talcott Parsons, who, influenced by cybernetics, developed a model of society—known as “functionalism”—as a hierarchy of nested systems always beginning from—and tending towards—equilibrium. This model can be seen as analogous to the equilibrium model of narrative in Todorov’s narratology, since Todorov defined equilibrium in a similar way, as “the existence of a stable but not static relation between the members of a society” (Kafalenos 2006: 4); and this conception of
equilibrium, similar to that of Parsons, influenced his adaptation of structural equilibrium into his narrative theory. However, as Kenneth Bailey argues, the emphasis that functionalism placed on equilibrium gradually became incompatible with the development of the (new) systems theory in sociology. The latter saw entropy (the amount of ‘redundant’ energy that increases during a thermodynamic process) as well as nonequilibrium, as the bases for both biological and social organization. Along with the development of complex systems theory, social systems theory differentiated from functionalism, departing from the “age of equilibrium” to enter the “age of entropy” (Bailey 1994: 5). A combination of autopoietic self-organization with complexity emphasizes evolutionary dynamics that can be observed from the macrolevel: “macro-level social order is a complex product of micro-level intentionality and the wider non-linear operation of the system” (ibid). The nonlinear process of self-organization is described by Peter Coveney as “the spontaneous emergence of non-equilibrium structural reorganizations on a macroscopic level, due to the collective interactions between a large number of (usually simple) microscopic objects” (2003: 1058).

As long as social theory kept oscillating between reduction and reification of social phenomena, the occurrence of macro phenomena as the ones of broader social changes and transitions could not be properly grasped. Particularly, not enough attention had been paid to the complex interactions that make such phenomena emerge; this is a gap that (complex) systems theory tries to fill. The recent rise of complex and emergent approaches to the study of social and other kinds of networks as complex systems provides new methods to bridge the micro-macro divide.

Narrative has been used as a counter-example of emergent organization in this respect. Patrick Doreian, in a similar line of thinking with that of Boje cited above, comments on how sociologists have tried to describe the formation of networks using narrative. However, the limitations of this approach, which emphasizes causality, soon became manifest, since networks cannot be represented in causal-temporal chains of events.

A narrative as a straightforward description of a sequence of events has considerable appeal. Most network analysts who study empirical phenomena use narrative. In part, it is window dressing, but it has more than surface interest. The risk is that the narrative becomes yet another just-so story with events following each other in time under convenient stage management. Once it is recognized that the only real connection between the described events is merely temporal, the causal enterprise is shaken. If a different event could follow a given event—which happens—the coupling of the events in a narrative is loosened. And, if there could be other outcomes between two hitherto sequential events that appear in a set of narratives, the tight coupling between events is lost again. […] The most hard-
nosed assessment is that truly establishing causality in network analysis is impossible—just as it is in the realm of statistical causality. [...] There needs to be a very tight coupling of theory, mechanisms, and credible empirical information before we can delineate the actual operation of causes in the empirical world before we can tell causal stories. (Doreian 2001: 110-111)

Here the term narrative refers to the particular type of presentation of research findings in the field of social networks, a description that the writer objects. Even though in a very different context from that of film and literary theory, the function of narrative here is reminiscent of the way narrative as a cognitive process is conceived by narrative theorists, namely as a mode of data organization that constructs a causal story—and ‘meaning’—even from the most baffled and ‘anti-narrative’ texts, in which causality is loosened or even broken. Our ability to construct causal stories, in the sense of tight coupling of events, is challenged by contemporary complex films, and together a need is created to account for the organizing potential lying in a different, pattern-based causality. The multiplicity of agents that complex network films involve is a means through which linear causality is undermined and other types of organization become prominent. Thus, complex films seem to call for an analogous development in film and narrative theory with the one in sociology or organizational theory. The use of emergent and bottom-up approaches to textual organization is needed when the lines of causality as traditionally conceived in narrative theory are broken, and when structuralist models of symmetry do not prove helpful. These approaches help us see how diegetic wholes emerge when narrative, along with both Aristotelian and structuralist conceptions of causality, is placed in the background.

**Dynamics of transformation and narrative**

As already broached, an important aspect that differentiates the complex systemic approach from older cybernetic approaches to systems has to do with a passage from the “age of equilibrium” to that of entropy, according to Bailey’s expression. This passage also has to do with a shift to an “ensemble” perspective. Moreover, it is a factor that differentiates complex systemic approaches to causality from narrative approaches.

Nonequilibrium and change are the basic features of self-organizing systems, according to Prigogine, the founder of nonequilibrium thermodynamics, which is considered one of the strands of complex systems theory. Unlike Newtonian dynamics, nonequilibrium thermodynamics prioritizes evolution and entropy instead of time-reversibility or equilibrium. The behavior of systems cannot be described in terms of trajectories of individuals (in the case of thermodynamics, these ‘individuals’ are molecules) but in terms of populations or
“ensembles”, whose movement in time (or succession of states they are found in) is probabilistic and irreversible, leading to new, emerging properties.

In stable systems, there is no difference between the level of the individual trajectories and the one of ensembles; the ensemble can be easily understood as an additive collection of the individual trajectories. However, in unstable dynamical systems, as Prigogine and Stengers mention, “the equivalence between the individual point of view and the statistical point of view […] is broken” (1997: 83), and asymmetry is established between individuals and aggregates. What according to a Newtonian—and linear—trajectory description would appear as divergence, according to a statistical—“ensemble” and complex—description appears as “resonance”, “a coupling of events loosely analogous to the coupling of sounds by resonance” (ibid: 42).

It is of course not easy to draw an analogy between the behavior of particles in physics and that of agents in narratives. However, based on the principle of isomorphism that characterizes complex systems theory as a transdisciplinary field, we could argue for a similar ‘ensemble approach’ in film analysis. If agents/actors in a narrative are conceived as individuals in single trajectories from one event to the next, then an ensemble approach introduces an asymmetry that changes this picture. The single trajectory perspective makes events appear as the causes and effects of other events, triggered most of the time by human (or anthropomorphic) action. Complex/network films, as already mentioned, are structured around events that are disconnected from their causes, contingent and divergent from the causal-logical sequence. Thus, the single trajectory perspective, or that of ‘lines of causality’ is not particularly helpful, as it tends to reduce the contemporary complex and ‘ensemble’ films to the classical Aristotelian definition of complex plot, as discussed in Chapter 5. The ensemble perspective, however, makes events appear as emergent products of resonance between multiple threads of action, initiated by different each time initial conditions. Single trajectories of actions and events can only make sense as long as they are placed in an ensemble, resonating with other parallel (actual in the case of multi-character films or virtual in the case of forking-path films) trajectories. Complex films can organize themselves by means of resonance, and produce complex textual organizations, and the viewer may follow them by similar cognitive resonances. Because of the multiplicity reflected in their plots, these films favor non-anthropomorphic—‘ensemble’, in the statistical sense—descriptions, that highlight the patterns of agency emerging from the micro-level of unit interactions.

Are these statistical ensemble descriptions narrative? One of the basic problems with narrative is that it holds onto the notion of the observer. This anthropomorphic observer always judges events as probable or improbable and establishes causality between them. From the perspective of complex systems, causality can be conceived as “the outcome of a
stochastic, *probabilistic* process” (Prigogine and Stengers 1997: 37; emphasis mine), the same process that drives self-organization. However, this statistical sense of probability is different from the one based on a human observer. Prigogine and Stengers explain how probabilities are now built into the fundamental laws of the universe, which behaves probabilistically independent of an observer (see 1997: 5, 54, 131). The complex interactions that take place before even narrative becomes possible, require, in the context of complex films, *syuzhet*-focused approaches that do not take narrative as their starting or ending point, approaches that would thus focus before or beyond narrative. As I already argued, diegetic agent-based models may be one of the ways to take into account interacting agents that produce the diegetic world by means of ‘ensemble’ (here not only in the statistical sense but also according to the use of the word in film theory, as in ‘ensemble films’ that contain aggregation of agents) rather than of individual trajectories.

Irreversible processes create an order that is different from the one of systems in equilibrium. This ordering through nonequilibrium is produced by the self-organization of a system in a “state of increased complexity” (Prigogine and Stengers 1997: 64; emphasis in the original). Here what Todorov called narrative transformation becomes relevant. It is not causality in the traditional sense of the word, but transformation that generates the causality of a system. Transformation may be observed when the state of a system is compared in two different points in time, but the dynamics of transformation cannot be captured in retrospective observation. Narrative as a form of representation cannot address the process of transformation itself. It is the gradual development of the *syuzhet* that reveals the dynamics resulting in transformation. Transformation is an emergent process determined by contingency and impossible to attribute to a single cause or causal line.

In his article “Narrative and Emergent Behavior”, literary theorist Porter Abbott argues that emergent action does not follow anthropomorphic laws of causal continuity and direct consequences of actions, laws that are indispensible in narrative (237). Emergence happens in-between the micro and the macro level, and narrative according to the same writer cannot approach this area (234). Thus, Abbott concludes that emergent behavior, with its nonlinear causality, is “by definition unnarratable” (233). The multiplicity of agents is for him one of the most characteristic obstacles that narrative faces when it comes to complex behavior:

[...] the principal reason for the incompatibility of emergent behavior with narrative understanding is its massive distribution of causal agents—a complexity of causation so acute that it disallows any perceptible chain of causation that could serve as a narrative thread. Narrative can and does play a limited role in our understanding of emergent behavior but does so only at the micro level of individual agents [...] and the macro level of the whole [...]. (Abbott 2008: 227)
Even though the distribution of agents in the complex films of contemporary cinema is not massive, as it is, for example, at the level of particles in physics, or of biological organisms such as ants, it still confronts the narrative understanding with an alternative and less anthropomorphic way of understanding. As researchers or viewers we can see emergent processes retrospectively, and then narrate them, from a macro viewpoint. However, at the time when these processes take place, they are unnarratable, and the only way to follow them is to participate in the textual and cognitive resonances that transgress narrative reasoning. With an emancipation of the syuzhet from the fabula, narrative can give way to other forms of organization, which, according to my opinion, in the films of the complex narrative tendency withhold and ultimately overtake narrative.