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# Complex thinking, complex practice: The case for a narrative approach to organizational complexity

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**ABSTRACT**

Complexity is not only a feature of the systems we study, it is also a matter of the way in which we organize our thinking about those systems. This second-order complexity invites consideration of the modes of thinking we use to theorize about complexity, and in this article we develop the idea of second-order complexity using Jerome Bruner's contrast between logico-scientific and narrative modes of thinking. Using Bruner's framework, we examine and critique dominant forms of thinking about organizational complexity that are rooted in the logico-scientific mode, and suggest alternatives based in the narrative mode. Our evidence for the value of doing this comes from the logic of complexity theory itself, which we claim indicates and supports the use of the narrative mode. The potential contribution of the narrative approach to developing second-order thinking about organizational complexity is demonstrated by taking a narrative approach to the matter of recursiveness. By extension, similar insights are indicated for other features that logico-scientific thinkers commonly attribute to complex systems, including, non-linearity, indeterminacy, unpredictability and emergence.

**KEYWORDS**

complexity theory ■ narrative ■ organizational complexity

## Introduction

A central assumption in organization science has been that organization is an intrinsic feature of the social world. Social systems in general, and business organizations in particular, are thought to be organized in one way or another, and it is the task of organization scientists to find out how and why. To this end, two schools of thought can be broadly distinguished. One is sociological–historical–anthropological in orientation; it seeks to produce accounts explaining the specific features of organization(s), either employing what Mohr (1982) called ‘the variance model’ of explanation, or through tracing back the lineage of organizational features to historical-cum-institutional or cultural factors (e.g. Geertz, 1973; Granovetter, 1992). There is a great deal of methodological and theoretical diversity within this school, but there is also a common theme: the *social* sciences can offer an account of *social* organization.

The second school is the cybernetic–systemic one. Here organization is conceived much more broadly: it is thought to be a feature of the cosmos at large, not just of social collectivities (Capra, 1996). Both living forms and non-living matter are taken as being organized, and the suggestion is that there is a great deal to be learned about social organization by looking at the organization of the non-social world. Indeed, organizational cybernetics and systems theory have been built upon this premise (Beer, 1981; Miller, 1978). The recent surge of interest in exploring social organization(s) through the science of complexity falls firmly within this category. Proponents of this school argue that we can enhance our understanding of social organization(s), in particular of business organizations operating within a market economy, through modeling them on, that is, by finding analogies with, natural and biological systems (Holland, 1995; Stacey, 1996).

Both schools of thought have been heuristically useful; they have helped generate a great deal of research and have significantly advanced our understanding of organization(s). However, less often has the question been asked whether organization might be not only a feature of the world (social and/or natural), but also of our thinking about the world. In other words, in order for cognitive beings to be able to act effectively in the world we must organize our thinking. As Piaget so aptly remarked, ‘intelligence organizes the world by organizing itself’ (quoted in von Glaserfeld, 1984: 24). Following this reasoning, one way of viewing organizations as complex systems is to explore complex ways of thinking about organizations-as-complex systems; in this article we explicate this view, which we call second-order complexity. We further note that entering the domain of second-order complexity – the domain of the thinker thinking about complexity – raises

issues of interpretation (and, we argue, narration) that have heretofore been ignored by complexity theorists.

In shifting the focus from first- to second-order complexity, we expose epistemological and methodological issues that have important implications for how we position ourselves and our approach to organizational complexity. Put most simply, is it better to explore complex thought processes (second-order complexity) in relation to an assumed objective world (first-order complexity), in which case the variance model-based methods of natural science appear to be indicated? Or should we, instead, explore along the lines of sociological–historical–anthropological approaches that employ interpretive methods and are more likely to view the objectivity of the world as a social construction? Although few within the cybernetic school may have considered the second option, our thesis is that, not only does interpretive research within the social science school suggest the value of doing so, but also the developing logic of complexity theory itself is entirely compatible with an interpretive, and in our case a narrative, approach.

Indeed, similarities between complexity theory and literary studies have been explored by a number of authors (Argyros, 1992; Dyke, 1990; Hayles, 1990, 1991; Reisch, 1991; Stonum, 1989), although these have tended to focus on poststructural analysis rather than the narrative aspects of second-order complexity, which is our focus here. Although there are important connections between poststructuralism and the narrative approaches we explore, our ambition is not to compare traditions or analyze developments within literary theory, but rather to suggest ways to apply narrative literary theory to the study of organizational complexity. There is, however, one sense in which our approach to complexity is similar to that of poststructural literary theorists who have addressed this topic. Like them, we take the view that the key concepts of complexity science do not so much constitute a theory with predictive validity as a guide for interpretation (Hayles, 1990).

From the interpretive perspective, chaos and complexity are metaphors that posit new connections, draw our attention to new phenomena and help us see what we could not see before (Rorty, 1989). This is the contribution they make to our understanding of organizational complexity. Such a perspective departs radically from the established orthodoxy, which is derived mainly from the Santa Fe Institute (Waldrop, 1992). Whereas most Santa Fe scientists tend to conceive of complexity in the classic reductionist manner of searching for the common principles underlying a variety of utterly different systems (see for example Holland, 1995), the perspective adopted here seeks to generate new insights, and thus contribute to expanding the possibilities for thought and action, through the use of the narrative perspective and of the metaphor of complexity (Morgan, 1997; Rorty, 1989).

To frame our thesis we employ a distinction between logico-scientific and narrative modes of thought developed by Bruner (1986, 1996). We use this framework to make a comparison of cybernetic and interpretive social science approaches and use this comparison to suggest the value of developing a narrative approach to complexity theory. We then explicate and critique the logico-scientific mode of thinking within the context of complexity theory itself and point out the multiple ways in which the narrative mode compensates for the inherent limitations of logico-scientific thinking. We conclude with a peek at what we believe developing a narrative approach to understanding organizational complexity would offer.

### Complexity and its interpreters: Logico-scientific and narrative modes of thought

In *Actual minds, possible worlds*, Bruner (1986) claimed that:

There are two modes of cognitive functioning, two modes of thought, each providing distinctive ways of ordering experience, of constructing reality. The two (though complementary) are irreducible to one another. Efforts to reduce one mode to the other or to ignore one at the expense of the other inevitably fail to capture the rich diversity of thought.

(p. 11)

Bruner called the two modes of thought 'logico-scientific' (or paradigmatic) and 'narrative', arguing that:

the types of causality implied in the two modes are palpably different. The term *then* functions differently in the logical proposition 'if x, then y' and in the narrative *recit* 'The king died, and then the queen died.' One leads to a search for universal truth conditions, the other for likely particular connections between two events – mortal grief, suicide, foul play.

(pp. 11–12)

To compare the two modes, Bruner claimed, is to understand the difference between a sound argument and a good story. He contrasts the logico-scientific and narrative modes on a variety of dimensions, which we have summarized in Table 1 and expand upon in later sections of this article.

Viewed from a higher logical level, it could be said that the logico-scientific mode itself constitutes a particular type of narrative – and, indeed,

**Table 1** Comparison of Bruner's two modes of thought

	<i>Logico-scientific mode</i>	<i>Narrative mode</i>
Objective	Truth	Verisimilitude
Central problem	To know truth	To endow experience with meaning
Strategy	Empirical discovery guided by reasoned hypothesis	Universal understanding grounded in personal experience
Method	Sound argument Tight analysis Reason Aristotelian logic Proof	Good story Inspiring account Association Aesthetics Intuition
Key characteristics	Top-down Theory driven Categorical General Abstract De-contextualized Ahistorical Non-contradictory Consistent	Bottom-up Meaning centered Experiential Particular Concrete Context sensitive Historical Contradictory Paradoxical, ironic

Source: Bruner (1986: 11–43).

a narrative, it is. However, following Bruner, it is analytically useful to keep the two modes distinct, as they are characterized by a different logical organization and, as shown later, are connected to different types of actions. Moreover, the usefulness of this distinction for the study of second-order complexity comes in recognizing that the two modes capture much of the difference between the understanding we glean from variance models and from interpretive accounts in the fields of organization science mentioned earlier. Of course, when social organization is described using such different modes of thought, it is not surprising that different views should emerge. What is intriguing about structuring the comparison between social science and cybernetic approaches in this way is that it points to the absence of the narrative mode within complexity theory (see Figure 1). If Bruner is correct in arguing that narrative mode thinking is important, then this absence in the discussion of complexity deserves discussion. It is this absence that we intend to address in this article. In this part of the article we briefly review narrative approaches within interpretive organization studies, then make the case

for considering complexity to be a matter for interpretive study, and finally specify what we mean by a narrative approach to complexity.

### Narrative approaches to interpretive organization studies

One of the foremost proponents of narrative in the study of organizations, Czarniawska (1997a, 1997b, 1998), defines three narrative approaches offered to organization studies thus far: narrating organizations, collecting stories, and organizing as narration. Narrating organizations consists of telling about organizations using a narrative structure (e.g. a sequence of events or plot, in literary terminology). This approach most often produces case studies, though Czarniawska also includes in this category fictional stories and novels relating organizational life (e.g. Joseph Heller's *Something happened*). Czarniawska says that the second category, collecting stories, was initially focused on documenting cultural artifacts (e.g. Martin, 1982; Martin et al., 1983; Smircich & Morgan, 1982; Wilkins, 1983), but has recently turned to storytelling within organizations as an approach to

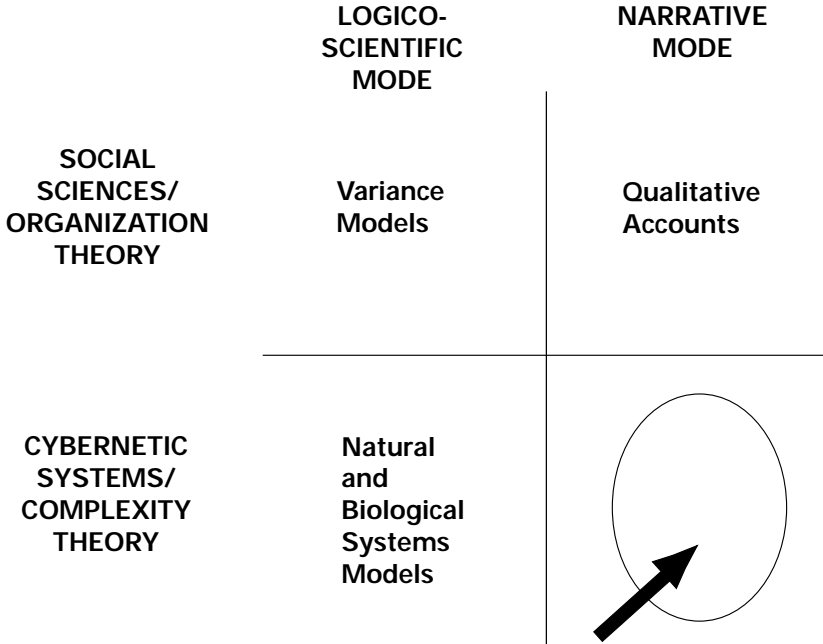


Figure 1 Framing the interpretive approach to complexity theory

capturing the narrative mode of meaning construction (e.g. Boje, 1991; Boyce, 1995; Gabriel, 1995; Shaw et al., 1998).

Czarniawska's final category of organizing as narration is where she places interpretive organizational research, to which she sees her work contributing (Czarniawska, 1997a, 1997b, 1998). This grouping applies the interpretive devices of literary theory to the narratively structured data of interpretive research (e.g. Barry, 1997; Corvellec, 1997; O'Connor, 1995). However, because not all interpretive organizational research derives from literary theory (e.g. much was developed on the basis of anthropological or sociological traditions), we feel that, to a large extent, the narrative approach falls within interpretive studies rather than the other way around. In any case, we are in full agreement with Czarniawska (1997a: 29) when she claims that the interpretive approach 'further[s] our understanding of the complex and unpredictable – the major concern and interest of current organization studies'.

### Why complexity is a matter of interpretation

What is complexity? It is our contention that the puzzle of defining the complexity of a system leads directly to concern with description and interpretation and therefore to the issue of second-order complexity. There is apparently no consensus around when a system should be regarded as complex. As Waddington (1977: 30) remarks: 'no one has yet succeeded in giving a definition of "complexity" which is meaningful enough to enable one to measure exactly how complex a system is'. Casti (1994: 10) concurs and admits that 'the line of demarcation between the simple and the complicated is a fuzzy one'. Waddington notes that complexity has something to do with the number of components of a system as well as with the number of ways in which they can be related. But is it indisputably clear what the components of a system are or how they are related?

Echoing mathematical information theory (Hayles, 1990; Shannon & Weaver, 1949), Casti (1994: 9) defines complexity as being 'directly proportional to the length of the shortest possible description of [a system]' (see also Gell-Mann, 1994: 30–41). If, for example, in a series of numbers there is a clear pattern, whereas in another series the numbers are placed randomly, the latter is more complex than the former, because no shorter description of it can be given other than repeating the series itself (Barrow, 1995). However, the length of a description cannot be determined objectively; it depends on the chosen language of description, as well as on the two parts of the communication process. A stone, says Casti (1994), is a very simple object to

most of us (that is according to a commonsense description of it), but to a geologist it is rather more complicated. The conclusion Casti draws from this is that complexity is, in effect, in the eye of the beholder: 'system complexity is a contingent property arising out of the interaction *I* between a system *S* and an observer/decision-maker *O*' (Casti, 1986: 149). To put it more formally, the complexity of a system, as seen by an observer, is directly proportional to the number of inequivalent descriptions of the system that the observer can generate (Casti, 1986, 1994). The more inequivalent descriptions an observer can produce, the more complex the system will be taken to be.

Casti's definition of complexity is an interesting one for it admits that the complexity of a system is not an intrinsic property of that system; it is observer-dependent, that is, it depends upon how the system is described and interpreted. Consequently, if an observer's language is complex enough (namely, the more inequivalent descriptions it can contain) the system at hand will be described in a complex way and thus will be interpreted as a complex system. What complexity science has done is to draw our attention to certain features of systems' behaviors which were hitherto unremarked, such as non-linearity, scale-dependence, recursiveness, sensitivity to initial conditions, emergence. It is not that those features could not have been described before, but that they now have been brought into focus and given meaning (Hayles, 1991; Prigogine, 1989; Shackley et al., 1996).

To put it another way, physics has discovered complexity by complicating its own language of description. We argue that a similar refocusing occurred in organization science when interpretive approaches were developed drawing attention to issues such as reflexivity (e.g. Chia, 1996; Cooper & Burrell, 1988; Giddens, 1991; Woolgar, 1988), narrativity (e.g. Czarniawska, 1997b; Czarniawska-Joerges, 1994; Hatch, 1996; Van Maanen, 1988; Weick & Browning, 1986), and paradox, ambiguity and contradiction (e.g. Feldman, 1991; Filby & Willmott, 1988; Hatch & Ehrlich, 1993; March & Olsen, 1976; Meyerson, 1991; Poole & Van de Ven, 1989; Putnam, 1985; Quinn & Cameron, 1988; Weick, 1979; Westenholtz, 1993).

Weick (1979) was one of the first to argue for an observer-dependent definition of organization. His notion of organizing made us realize that what we experience as organization is the outcome of an interactive sense-making process. Moreover, a constant theme of Weick's thought, like Bateson's, has been an appreciation of the paradoxical nature of organizational behavior (see also Brunsson, 1989; Hatch, 1997; Pascale, 1990; Perrow, 1977; Quinn & Cameron, 1988; The Price Waterhouse Change Integration Team, 1996). For instance, Weick (1979: 222) gives the example of a bank whose very functioning is inherently paradoxical. A bank's motto is 'To make money you



have to lend it rather than store it'. But the bank acts as if this statement is both true and false. Says Weick (1979: 222):

[The bank] acts as if the statement is true by continuing to select from enacted inputs those occasions where there is an opportunity to lend money at a profit. It acts as if this statement is false by urging customers to be thrifty and use the bank as a repository for the results of that thrift. It is good to save and bad to borrow, it's good to borrow and bad to save. That complicated definition is something a bank must manage as a routine matter.

Notice how appreciating the paradox of the bank demands appreciation of second-order complexity (i.e. statements describing a bank's behavior). The bank is pursuing two contradictory policies simultaneously. Because more than one (in this case, two) inequivalent descriptions of the bank's behavior can be generated, it is seen as being more complex than it would otherwise be.

How could one, practitioner-cum-observer, hope to make sense of such behavior? What might be an appropriate mode of thought able to accommodate contradictions? If practitioners are to increase their effectiveness in managing paradoxical social systems, they should, as Weick (1979: 261) recommends, 'complicate' themselves (see also Bateson, 1979; Beer, 1973; Weick, 1995). But complicate themselves in what way? By generating and accommodating multiple inequivalent descriptions, practitioners will increase the complexity of their understanding and, therefore, will be more likely, in logico-scientific terms, to match the complexity of the situation they attempt to manage (Bartunek et al., 1983; Bolman & Deal, 1991; Bruner, 1996; Morgan, 1997), or, in narrative terms, to enact it (Weick, 1979).

Hatch and Ehrlich (1993) provide an example of managers complicating themselves via narrative activities. In their study of the humor of a management team, these researchers found that managing security issues (i.e. finding effective means of securing the assets of the corporation against pilfering and theft) placed managers in the role of guarding their own employees. However, the guard role contradicted their attempts to encourage trust and teamwork in their unit, another important item on the corporate agenda. Reflection on their status as guards in a system demanding a collaborative form of organization was a recurrent theme in their joke making. As Koestler (1964) has shown, humor is built upon bisociation – the ability to mentally and emotionally traverse both paths of a bifurcating line of thought, the recognition of which provokes laughter (see also Mulkay, 1988). Thus any potential choice point can become a point of bisociation by shifting from one

level of complexity (serious, rational, linear) to another (humorous, playful, paradoxical). Bisociation through humor permitted the managers of Hatch and Ehrlich's study a more complex view of their organization, complex in the sense that it offered a both/and, rather than an either/or, orientation to the contradictions of managing and organizing. What is more, in taking the form of a joke, the bisociation becomes linked to narrative because joking is one way for managers to narrate their experiences (and their organizations).

We argue that the features of complex systems described by complexity theory (non-linearity, scale dependence, recursiveness, sensitivity to initial conditions, and emergence) can only be appreciated and acted upon from the position of second-order complexity. This claim is based on our assumption that the features of complexity are descriptions and interpretations assigned by complex observers to systems whose existence itself is a matter of definitional agreement. Expanding the focus from the system itself (first-order complexity) to also include those who describe the system as complex (second-order complexity) exposes the interpretive-cum-narrative dimensions of complexity.

### The interpretive dimensions of complexity

Complexity science highlights at least five properties that are proposed to be held in common by natural, biological, and social systems (see Casti, 1994; Crutchfield et al., 1986; Davis, 1990; Hayles, 1989, 1990, 1991; Kamminga, 1990; Kellert, 1993; Stewart, 1993):

- 1 Complex systems are non-linear: there is no proportionality between causes and effects. Small causes may give rise to large effects. Non-linearity is the rule, linearity is the exception.
- 2 Complex systems are fractal: irregular forms are scale dependent. There is no single measurement that will give a true answer; it depends on the measuring device. For example, to the question 'how long is the coastline of Britain?' there is no single answer, for it hinges on the scale chosen to measure it. The smaller the scale, the larger the measurement obtained.
- 3 Complex systems exhibit recursive symmetries between scale levels: they tend to repeat a basic structure at several levels. For example, turbulent flow can be modeled as small swirls nested within swirls, nested, in turn, within yet larger swirls.
- 4 Complex systems are sensitive to initial conditions; even infinitesimal perturbations can send a system off in a wildly different direction.

Given that initial conditions cannot be adequately specified with infinite accuracy, complex systems have the tendency to become unpredictable.

- 5 Complex systems are replete with feedback loops. Systemic behavior is the emergent outcome of multiple chains of interaction. As the level of organization increases, complex systems have the tendency to shift to a new mode of behavior, the description of which is not reducible to the previous description of the system's behavior. These emergent novelties represent points of bifurcation.

Positioning the narrator as the interpreter of these five properties moves us from the logico-scientific to the narrative mode and presents complexity as a second-order phenomenon. To see this, imagine yourself in the position of the person describing a system in the terms listed above. Although you may call non-linearity, scale dependence, recursiveness, sensitivity to initial conditions and emergence properties of the system, they are actually your descriptive terms – they are part of a vocabulary, a way of talking about a system. Why use such a vocabulary? Is it because it corresponds to how the system really is? Not quite. Because the system cannot speak for itself, you do not know what the system really is (Rorty, 1989). Rather, you use such a vocabulary because of its suspected utility – it may enable you to do certain things with it. A new vocabulary, notes Rorty (1989: 13), 'is a tool for doing something which could not have been envisaged prior to the development of a particular set of descriptions, those which it itself helps to provide'. Our language cannot be separated from our goals and beliefs (Taylor, 1985). Switching to the narrative mode of thinking makes this obvious because, in narrative mode, the researcher making claims about systems is in full view – his/her goals and desires are reflected in his/her language. It is thus that second-order complexity is engaged – the complexity (subjectivity) of the researcher (i.e. narrator) attempting to understand complexity is revealed and made available for analysis.

To see the transformation of properties into descriptors by the means of bringing the researcher–narrator into our frame of reference, take the case of non-linearity. The lack of proportionality between causes and effects captures our attention precisely because we expect linearity. We interpret the non-linearity of complex systems as counterintuitive or surprising, but the surprise rests on our perspective and in our violated expectations, not in the system we describe in this way. Similarly, scale dependence is not a property of systems, but of our interpretation of them; it is our concepts that are indeterminate, not the system we describe using these concepts. From a position of second-order complexity, recursiveness, sensitivity to initial conditions and

emergence are likewise revealed as interpretations. To shift perspective from one level to another, to define where an event begins and ends, and even to consider some congregation of occurrences to be a system, are all interpretive moves, not properties of systems (Checkland, 1981). In other words, the complexity we discover when we apply the methods of complexity science is a function of the second-order complexity we introduce by our involvement.

We claim that the narrative approach gives us access to second-order complexity, which we demonstrate later by taking a narrative approach to recursiveness. However, this is not the only case we can make for the narrative approach to organizational complexity; a strong case can be made from within complexity science itself. To develop this case, we critique the logico-scientific mode of thinking and examine its limitations, for it is in relation to the limits of logico-scientific thought that the contribution of the narrative approach is perhaps most easily understood by those who have never before considered taking a narrative approach.

### The logico-scientific mode of thinking and its limitations

As historians of science and philosophers have shown, the rise of scientific rationalism in post-17th century Europe involved a radical shift in how humans thought about the world (see Feyerabend, 1987; Foucault, 1966; MacIntyre, 1985; Shapin, 1996; Toulmin, 1990). Toulmin (1990: 200) sums up the shift as a search for a 'rational method' motivated by a 'decontextualized ideal' – the ideal of universal, general, and timeless knowledge (Toulmin, 1990: 30–6). Nowhere have the principles of the 'rational method' been manifested more clearly than in Newton's work, whose influence on the social and economic sciences has been profound (Cohen, 1994; Mirowski, 1989; Smith, 1997).

The 'Newtonian style' (Cohen, 1994: 77), or what other researchers call the 'Galilean style' (Varela et al., 1991: 17), involves a particular approach towards the world, the main features of which are as follows. First, the scientific method deals with the '*primary qualities*' (Goodwin, 1994; Pepper, 1942) of the phenomena under investigation (e.g. mass, velocity, position, etc.), which can be quantified and measured. Second, science constructs idealized models of the phenomena it studies, either with the help of mathematics or through the creation of controlled conditions in a laboratory, or both (Latour, 1987). A consequence of the Newtonian style is that it is both acontextual and ahistorical. It is acontextual insofar as it involves 'switching off' all contextual influences upon the phenomenon under study so that its intrinsic properties may be revealed to the scientist (Ackoff, 1981; Kallinikos,

1996). It is ahistorical because it is marked by synchrony (Kellert, 1993): the state of a system is thought to be known solely in terms of the way the system is at a particular moment. As Kellert (1993: 93) remarks: 'Physics considers that we know everything relevant about a system if we know everything about it at one point in time'.

There are several examples of the Newtonian style of thinking in the social sciences. Cohen (1994) relevantly discussed the case of Malthus' theory of population, and Mirowski (1984, 1989) showed that neo-classical price theory was developed in the late 19th century as an imitation of energy physics. In psychology, the study of cognition has long been conducted in the laboratory (Lave, 1988; Salomon, 1993; Varela et al., 1991). For example, commenting on memory research, Banaji and Crowder (1989: 1192) are only slightly able to conceal their distaste for complexity. 'The more complex a phenomenon', they note, 'the greater the need to study it under controlled conditions, and the less it ought to be studied in its natural complexity'. Finally, in organization science, Barnard (1976: xl-vi) remarked that 'abstract principles of structure may be discerned in organizations of great variety, and that ultimately it may be possible to state principles of general organization'. Notice how easily Barnard moves from talking about organizations to talking about organization. Behind the awesome variety of organizations there is an underlying set of universal principles of organization. How does one discover those principles? Through the study of aggregates of the phenomenon at hand under statistically controlled conditions (Ansoff, 1991). In other words, as soon as one dispenses with the contingent, as well as deceptive, experience of diversity, one comes upon a small set of generally applicable principles. Experiential contingency gives way to theoretically contrived necessity (Reed, 1996).

From the above it follows that social scientists should search for regularities obtained under well-specified conditions, establish their validity and, ideally, codify them in the form of rules to be followed by practitioners (Tsoukas, 1994, 1998). Notice how well scientific rationalism fits within Bruner's logico-scientific mode of thought (Table 1), and how equally well Bruner's narrative mode represents the Other against which logico-scientific thinkers have defined themselves.

What form does logico-scientific knowledge take? How is it organized? Ideally, it consists of propositional statements: 'if, then' statements relating a set of empirical conditions, called the factual predicate ('If X . . .'), to the consequent, that is to a set of consequences that follow when the conditions specified in the factual predicate obtain ('. . . then Y'; see Holland, 1995; Johnson, 1992; Schauer, 1991). As Bruner (1986: 12-13) notes, propositional knowledge:

employs categorization or conceptualization and the operations by which categories are established, instantiated, idealized, and related one to the other to form a system. [ . . . ] It deals in general causes, and in their establishment, and makes use of procedures to assure verifiable reference and to test for empirical truth. Its language is regulated by requirements of consistency and noncontradiction.

What might be examples of propositional knowledge in organization studies? There are plenty: 'if size is large then formalization is high'; 'if technological complexity is high (or low), then work is non-routine'; 'if the organization uses a prospector strategy, then centralization is low'; 'if environmental uncertainty is low then centralization is high', and so on (see Baligh et al., 1990; Glorie et al., 1990; see also Mintzberg, 1979, 1989; Webster & Starbuck, 1988). These conditional statements serve as explanations of certain recurring organizational phenomena and purport to be the basis for formulating rules for guiding human action in the future.

Propositional knowledge is recursively employed: organizational scientists explain and predict organizational phenomena by means of propositional statements such as those mentioned above; and practitioners are guided in their work by rules, namely by statements prescribing that 'in circumstances X, behavior of type Y ought, or ought not to be, or may be, indulged in by persons of class Z' (Twining & Miers, 1991: 131). The factual predicate of rules is derived from events that occurred in the past and is meant to guide action in the future. Thus any novel situation is described by decomposing it into familiar parts, the behavior of which can be described by tested rules (Holland, 1995). In that sense, the future is understandable in (i.e. reducible to) the terms of the past; time does not really matter because the new is comprehensible in terms of the old.

Thinking propositionally and managing by rules has certain advantages which stem mainly from the fact that propositional statements are abstract and defined exclusively in terms of their syntax. Thus they are applicable across a variety of contexts after a particular interpretation (i.e. semantics) has been attached to them in each particular case (Casti, 1989; Kallinikos, 1996; Tsoukas, 1998). However, an excessive reliance on the propositional mode of thinking has certain limitations. What are they? First, propositional statements are generalizations that, by themselves, cannot deal with particular circumstances or singular experiences. Second, propositional statements incorporate purposes and motives that cannot be formulated propositionally. And third, propositional statements do not include time, thus leading to paradoxes. It is each of these limitations of propositional knowledge to which the narrative mode of thinking offers a

complementary strength (Table 2). Later we expand on each of the limitations and point out how a narrative approach offers an important 'corrective' to knowledge about organizational complexity. Each 'corrective' is developed more fully in the following section in which we suggest how a narrative approach to complexity might look.

### Imperfect generalizations

Rules are generalizations connecting types of behavior by types of actors to types of situations. To assert the existence of a rule is necessarily to generalize (and categorize, label), just as to institutionalize human interaction is, of necessity, to imply the existence of rules (Berger & Luckmann, 1967). Rules, however, are implemented locally, namely within contexts in which idiosyncratic configurations of events may occur in a manner that has not been specified by a rule's factual predicate (Shackley et al., 1996; Tsoukas, 1996). The circumstances confronting a practitioner always have an element of uniqueness that is not, and cannot be, specified by a rule. In other words, the indeterminacy of local implementation cannot be eliminated (Brown & Duguid, 1991; Orr, 1990). In commonsense terms, what can go wrong, will go wrong. Only the practitioner possessing 'the knowledge of the particular circumstances of time and place' (Hayek, 1945: 521) can undertake effective action in the moment. The 'tyranny' of the local, the particular, and the timely cannot be escaped in the context of practical reasoning (MacIntyre, 1985; Taylor, 1993).

Notice that the rules the practitioner applies are derived from what has been known about previous failures or successes, thus the practitioner comes ready equipped with historical understanding of sorts. But this aggregate, codified, past-derived knowledge is not very useful when it comes to examining a particular problem (Orr, 1996). To comprehend a particular problem the practitioner needs to follow a bifurcation path (Kellert, 1993). As Prigogine (1980: 106) observes with reference to natural systems, 'interpretation of state C implies a knowledge of the history of the system,

**Table 2** The limits to logico-scientific thinking and some narrative 'correctives'

<i>Logico-scientific limits</i>	<i>Narrative 'correctives'</i>
Imperfect generalizations	Contextuality and reflexivity
Tacit justification	Expression of purposes and motives
Requires consistency and non-contradiction	Temporal sensitivity

which has to go through bifurcation points A and B'. Put very simply, one cannot understand why a system is at point C without understanding *how* it came to be there. That historical 'know how', cannot be provided by propositionally organized renderings of human experience in organizational settings; instead it requires a contextually sensitive narrative understanding – in short, it needs a story with a plot (see Bruner, 1996; Dyke, 1990; MacIntyre, 1985; Reisch, 1991). The question is, what mode of thinking might take the features of practical reasoning and historically based knowhow into account? As is shown later, narratively organized knowledge provides such a mode.

### Tacit justification

Underlying the implementation of rules is the achievement of a certain goal or the fulfillment of what Schauer (1991: 26) calls 'justification'. For example, the manual issued by a photocopier company to service technicians includes rules such as: 'If this error code is displayed then check this or do that.' The justification for this rule is obviously the company's desire to satisfy the customer in the most efficient manner. A rule's factual predicate ('If this error occurs . . .') is causally related to the rule's justification – the satisfaction of the customer will be brought about by following the rule.

Why does one need justifications? 'Justifications exist', says Schauer (1991: 53), 'because normative generalizations are ordinarily instrumental and not ultimate, and justifications are what they are instrumental to'. A justification lies behind the rule, it is the reason for having a rule. As such, justifications are implied; they are not explicitly contained in the rule. This is important, for in order to fulfil the justification, one may occasionally need to break the rules (e.g. when the machine displays a misleading error code)! However, within a purely propositional framework of knowledge, such a paradoxical requirement cannot be accommodated. As Bruner (1986: 13) noted, the 'requirements of consistency and noncontradiction' are constitutive of this mode of thinking. The conclusion should deductively flow from the premises (Hayek, 1982).

Moreover, given that a justification is implicit, it cannot be conveyed to practitioners in a propositional form. Just like Polanyi's (1975: 39) tacit knowledge, a justification is 'essentially unspecifiable': the moment one focuses on it, one ceases to see its meaning. If a justification were to be propositionally articulated it would inevitably be based upon a further implicit justification, and this implicit–explicit polarity would be reproduced *ad infinitum*. Justification is to a rule what a shadow is to an object. It follows,



therefore, that in the propositional mode of thinking, why practitioners should follow a particular rule cannot be conveyed; what a rule is for cannot be stated. A rule provides the method but not the purpose. As we show later, the exploration of purposes (and motives) is in the domain of narrative mode thinking.

### Consistency and non-contradiction

In an organized context, managing by rules alone leads inescapably to paradoxes that cannot be accommodated by logico-scientific thinking. The reason is that time is not included in the logic of propositional statements. As Bateson (1979: 63) insightfully noted, 'the *if . . . then* of causality contains time, but the *if . . . then* of logic is timeless'. For example, the *if . . . then* in 'If the temperature falls below 0°C, then the water begins to freeze' is different from the *if . . . then* in 'If Euclid's axioms are accepted, then the sum of all angles in a triangle is 180 degrees'. The first statement makes reference to causes and effects, whereas the second is part of a syllogism; the first includes time, the second is timeless (Prigogine, 1992). When causal sequences become circular (von Foerster, 1981), their description in terms of logic becomes self-contradictory – it generates paradoxes (Bateson, 1979; Beer, 1973; Capra, 1988; Clemson, 1984). However, as we show below, narrative, because of its sensitivity to the temporal dimension of experience, is well suited to avoid (or reveal) such conflation of logic and causality.

To sum up, the key features of the propositional mode of thinking are as follows: it deals in generalizations, its justification of rules is tacit, it is regulated by the requirements of consistency and non-contradiction, and it ignores time. If, as argued above, second-order complexity is seen as a property of the interaction between an observer *O* and a system *S*, and considering that a propositionally thinking observer is led to neglect the particular, the local, and the timely, all of which are important features of the life-world (the world-as-experienced) (Varela et al., 1991), it follows that the quality of interaction between *O* and *S* for such an observer will tend to be poor. This is because an observer guided by propositional thinking alone will be unable to handle paradoxical requirements or contradictions such as those illustrated above with examples provided by Weick (1979) and Hatch and Ehrlich (1993). Such paradoxes and contradictions, by definition, cannot be handled by propositional logic according to which one should aim for consistency and non-contradiction in (as well as between) one's thinking and one's acting.

Finally, it is interesting to note that although propositional thinking

requires that paradoxes be formally avoided, action that is guided exclusively by propositional thinking tends to generate paradoxes. Ironically, what is avoided in logic, turns up in practice! Thus a propositionally thinking observer will find it difficult to manage a system that is characterized by non-linearity, feedback loops, and sensitivity to initial conditions – the very features used to define a system as complex. It is precisely these features, however, that favor the narrative mode and argue for the narrative approach, to which we now turn.

### The narrative approach

More important than the novelty of its knowledge claims in mathematics and physics, the wider appeal of complexity science stems from its contribution to the emergence of a new imagery in terms of which the world may be understood (Prigogine, 1997). Such imagery, as has already been mentioned, fosters an awareness of dynamic processes, unpredictability, novelty, and emergence, leading to what Kellert (1993: 114) calls 'dynamic understanding'. The main features of dynamic understanding in the sciences are that it 'is holistic, historical, and qualitative, eschewing deductive systems and causal mechanisms and laws' (Kellert, 1993: 114).

It is interesting to see that notions such as 'holistic', 'historical', and 'qualitative', which have traditionally been the trademark of interpretive social science, are now appearing in the language of physicists. As several researchers have noted (see Capra, 1996; Goodwin, 1994; Hayles, 1990, 1991; Prigogine, 1997; Shotter, 1993; Toulmin, 1990), the appeal of such a vocabulary in scientific discourse signifies the disenchantment with the Newtonian ideal and the attempt to pursue, instead, more meaningful, open-ended, and systemic modes of inquiry. It is precisely the sense of dynamic understanding, as we argued earlier, that the narrative mode of thinking conveys, and we intend to explore what this approach might contribute in the remainder of this article.

In this section we illustrate the narrative approach and second-order complexity via an exploration of the ways in which narrative corrections to logico-scientific thinking produce new insights into complexity issues. However, to adequately illustrate the potential contribution of the narrative approach we feel that we must narrow our ambition to considering just one of the features of complex systems articulated by complexity scientists. Therefore, we concentrate our focus on recursiveness. We do this in order to develop the narrative approach to complexity in a way that reveals its own (i.e. second-order) complexity, as well as illuminating the holistic,

historical, and qualitative features of the dynamic understanding in which it deals.

### Contextuality and reflexivity

Genette (1980) argues that narrative can refer to three separate things: the written or spoken narrative statement, the events and their relationships that are the subject of the narrative (he calls this the story), or the act of narrating. When the narrative statement and the story are considered together, the issues of interpretation and context become pronounced. This is because the difference between what is told about and what is told gives rise to questions about the meaning of a narrative and the context in which it is interpreted (the act of narrating and the act of listening are both considered to be interpretive acts taking place in specific contexts which inspire and support the development of particular meanings). When the narrative statement and the act of narrating are considered together, the position of the narrator (along with the motives of the narrator, discussed later) becomes an issue for reflection. That is, the difference between the statement and the act of making it causes the narrator to come into view.

Ricoeur (1984) claimed, building on Aristotle's notion of *muthos* (emplotment) that narrative thinking produces plots. According to Aristotle's *Poetics*, narrative is plot driven. Events, mental states, happenings – in short, the constituents of a narrative (Burke, 1945, described these dramatically as act, agent, agency, scene, and purpose) – are sequentially placed within the overall configuration that is the plot. To make sense of the particular constituents of a narrative, one needs to grasp its plot. And vice versa; in order for one to understand a plot one needs to grasp the sequence of events that relate its constituent elements (Taylor, 1985). Thus, the parts and the whole are mutually defined and defining, or, in the terms offered by complexity theory, they are recursively ordered. However, the narrative perspective allows us to carry the insight of recursivity further than simply suggesting we look for structural similarity between narratives and plots or between plots and their constitutive elements. Second-order thinking about complexity focuses our attention on how, in making plots, we construct and use narrative thinking. This is what Ricoeur addresses with the concept of emplotment and Bruner with the concept of narrative mode.

Emplotment raises several important issues, the most obvious of which is sequencing. According to Ricoeur (1984) emplotment organizes the continuous flux of experience into describable sequences with beginnings, middles, and ends. We return to the issue of sequencing later in our discussion

of temporality. Two others, to be addressed here, concern context and reflexivity.

### *Contextuality*

As Polkinghorne (1988: 36) explained, 'The narrative scheme serves as a lens through which the apparently independent and disconnected elements of existence are seen as related parts of a whole'. Thus, plots give meaning and connection that would otherwise be absent. The connection that plots give is, in part at least, the context provided by the sequence of events and the relationships between them that are highlighted by the sequencing. What happens in a narrative, happens situationally (or situatedly). Providing or invoking a context for meaning making is thus an important part of narrating.

Whereas in logico-scientific thinking, propositions or rules connect categories of behavior to categories of actors and situations, narrative thinking places these elements into a sequenced, contextualized statement with a plot. But once the plot has been constructed, the elements are explicit, local, tangible instances engaged in events with consequences. The narrative mode of thinking enlivens and energizes the emplotted characters and events. In narrating, a narrator communicates and captures nuances of event, relationship, and purpose that are dropped in the abstraction process that permits categorization and correlation in the logico-scientific mode. In narrative we have a more concrete rendering of causality. It is historical and specific, not general and contingent (Table 1). 'This did happen in this way', versus 'this should happen if the following conditions hold'. In terms of addressing organizational complexity, this concreteness is a contribution that narrative approaches make to understanding in that it supplies the specific context within which events occurred. Whereas within logico-scientific thinking context becomes contingency, in narrative mode, context is situation and circumstance. Thus narrative thinking gives us access to and appreciation of context that logico-scientific thinking cannot provide.

Boje (1991) argued that context is essential for interpreting narratives that occur in organizational settings. He claimed that without participating in the organization that contextualizes a narrative, its meaning will be difficult, if not impossible, to grasp. O'Connor shows how context can be revealed using narrative analysis. Hers is a view informed by literary theory in which contextualism refers to the self-containment of a work of literature (i.e. the view that literary works have no reference to things beyond themselves). The literary view supports text analysis (which O'Connor, 1995, illustrates) as a means to reveal the context and embedded assumptions of

narrative processes. Boje's work, in contrast, positions the narratives he examines within a broader framework. This broader framework is the organization that provides context for the narrative act (i.e. the telling and interpreting of stories), which is what he means by his phrase 'the storytelling organization'. Thus Boje places narratives within a context of both narrating and organizing, whereas O'Connor looks to texts produced by organizational members for insights into the assumptions, motives and orientations that frame their narrative statements. In either approach, narrative thinking provides sensitivity to the situational particularity missing from the propositional statements favored by the logico-scientific mode of thinking. As can be seen, the narrative mode, in contrast, both demands and engages contextualized understanding and this contextualized understanding contributes to second-order complexity.

Each interpretation invokes a new context producing recursive symmetry of a narrative sort. If complexity is a matter of interpretation, as we have argued, then each 'reading' will produce another layer of context. Thus, taken together, O'Connor and Boje illustrate the connection between complexity theory and narrative. O'Connor's work addresses the fact that narrative statements contain references to the context of the events they tell about, whereas Boje points out that narrative acts also have a context – the context of the teller and their telling which helps to interpret the narrative act. But interpreting the narrative act produces further contextualizing *ad infinitum* (von Foerster, 1984) – a narrative form of recursive symmetry involving sensitivity to the context of interpretation and the paradox of inescapability from context no matter how many interpretive moves we make. Acknowledgement of this paradox brings narrative consciousness of our embeddedness, which brings us to reflexivity.

### ***Reflexivity***

The narrative mode of thinking reminds one that behind every narrative there is a narrator. A story told presupposes a storyteller; it is not an outcome of logical necessity but a product of contingent human construction. As White (1987: 178) argues, echoing Ricoeur, 'narrative discourse does not simply reflect or passively register a world already made; it works up the material in perception and reflection, fashions it, and creates something new, in precisely the same way that human agents by their actions fashion distinctive forms of historical life out of the world they inherit as their past'. In other words, the domain of narrative discourse has verisimilitude. The closest we can come to explaining verisimilitude in logico-scientific terms is to say that narrative discourse is isomorphic with the domain of action: humans

reproduce as narrators what they do as agents, and vice versa (MacIntyre, 1985; White, 1987). However, in narrative terms, verisimilitude means more than this; it is the subjective resonance that occurs between the listener's/reader's experience of the world and the narrator's rendition of it. It imparts credibility to the narrative, the narrator and the narrative act (Fisher, 1987), but also provides experience with authenticity (Fisher, 1987).

As we have already argued at some length earlier, appreciating complexity requires a second-order of thinking about complexity. That is, not only must we engage with the system under study, we must also confront our own complexity. In narrative terms, complexity theorists are part of the stories they tell about complex systems – they are narrators of complexity (in both senses of that ambiguous phrase, they narrate about complexity and they are complex narrators). Once inside the frame of the story, complexity-theorists-as-narrators are subject to narrative analysis that can be conducted in a variety of ways. One of these ways is suggested by narratology.

Inspired by Genette (1980, 1982, 1988, 1992; see also Hatch, 1996 for an application of narratology to organization theory), narratology concerns the positioning of the narrator in relation to the story told and the narrative act. Genette offered two analytical dimensions to the study of narrative position: narrative perspective (who sees?) and narrative voice (who says?). Genette explained narrative perspective in terms of the relationship between the narrator and the story told which he claimed defines whether the story is seen from an internal or an external point of view. Building on Genette, Hatch (1996) claimed that narrative perspective parallels social scientists' concerns with epistemology (i.e. subjectivism versus objectivism). Genette explained narrative voice in terms of the relationship between the narrator and the narrative act, which he claimed is captured by whether or not the narrator includes him or herself as a character in the story told. Hatch compared this dimension with social scientists' concerns with reflexivity (e.g. Giddens, 1984, 1991; Woolgar, 1988) and pointed out that the question for social scientists is one of deciding whether or not the researcher will be represented in the research story told, which is our interest here.

A step toward appreciating and understanding second-order complexity would be achieved by analyzing the positioning of narrators in writing on complexity theory. We are inclined to argue that narrative positions that are reflexive are more complex than those occupied by the non-reflexive narrators who dominate contemporary social science writing, particularly writing about complexity theory. Because a reflexive narrator does not balk at entering the domain of explicating and commenting upon meaning and interpretation, such narrative positioning should help complexity researchers to reflect critically on the features they attribute to systems (i.e. non-linear, scale

dependent, recursive, sensitive to initial conditions, and emergent) and expose the purposes and motivations that link them to the systems they seek to address (e.g. the desire for predictability).

Reflexivity is related to contextuality in the sense that inclusion of the narrator in the narrative involves another layer of context. Narrative thinking reveals a story told by a narrator, occupying a particular position, interpreted by listeners, engaged together in a narrative act. Stories are contextualized by narrators whose positions give context via insight operating inside the context of narrative acts, etc. The recursiveness of context extends to the recursiveness of narrative thinking so that thinker and thought become so intertwined as to render the possibility of disentanglement unimaginable and ourselves more complex.

A deep understanding of second-order complexity has been shown by certain reflexive practitioners who have been aware of their own complexity (subjectivity). For example, Sir Geoffrey Vickers (1983), a senior British civil servant, manifested such awareness in his writings on policy making through his concept of 'appreciative systems' – the value judgments underlying executive decision-making. More recently, the well-known financier George Soros (1994) made 'reflexivity' a central concept of his theory of the operation of financial markets. To the extent that the actor's thinking is part of the situation to which it relates, notes Soros, there is no reality independent of human perceptions. Because an actor's understanding of a situation influences the situation, such an understanding is always imperfect. Being aware of such imperfection (what Soros calls 'participant's bias') makes an actor see social processes as open-ended and brings into focus his/her own role in shaping them.

In other words, for Soros, a reflexive actor – an actor aware of the interplay between his/her thinking and acting – is a more complex actor than a non-reflexive one, because more inequivalent descriptions of a situation can be generated. Whereas for a non-reflexive actor reality has certain definite features which can be captured by a limited number of descriptions, for a reflexive actor, reality is, partly at least, dependent for its description on an observer's vocabulary. In defining a situation, being aware of the role of your own as well as of others' vocabularies enables you to generate more descriptions of it (Tsoukas & Papoulias, 1996).

### Purposes and motives

Narrative organization is causal; in narrative accounts it is not only sequence that is important but, crucially, consequence (Randall, 1995). Indeed, causality is what distinguishes a plot from a mere story. As Forster famously

remarked ‘ “The king died and then the queen died is a story” “The king died and then the queen died of grief” is a plot’ (Forster quoted in Randall, 1995: 121). In the first instance (in a story) we ask: ‘And then?’, whereas in the second instance (in a plot) we ask: ‘Why?’ Whereas, in the logico-scientific mode of thinking an event is explained by showing that it is an instance of a general law, in the narrative mode of thinking an event is explained by relating it to human purpose. Narrative preserves both time (to which we return later) and human agency.

Narrative is infused with motive. Burke (1945, 1954) claimed that motive is a linguistic product because motives are interpretations of our own and others’ reasons for acting. As such, they are framed by the discourses in which they and we operate and are couched in terms provided by that discourse. Thus, when we narrate, we give evidence of our motives in a way that is largely (although not completely) absent from our logico-scientific mode of speaking and writing. As a matter of interpretation, motives are presented throughout narratives and may be imputed by the narrators themselves, and/or by their listeners/readers. As interpretations, motives are not fixed entities, they are open to multiple readings framed by the contexts and orientations of the readers caught up in the narrative act (which may include the narrator him or herself).

As a discourse, organization provides the terms in which motives are spoken of. That is, when organizational members are asked to justify their actions, they do so in the terms provided by the organizational discourses in which they participate. For example, downsizing is justified by the necessity of economic circumstance; acquisition in terms of opportunities for revenue creation or profit taking. As discourses change, so justifications change. In the knowledge age, downsizing becomes a matter of reducing redundancies in competence; acquisitions are performed to take advantage of another company’s database or to acquire its knowledge resources. As language shifts, so do the terms in which we speak about our motives.

In Part I, ‘On interpretation’ of *Permanence and change*, Burke (1954) presented his thesis on motives as interpretations and as linguistic products (see also Taylor, 1985). Burke positioned his arguments in contrast to the enterprise of reductionist natural science, claiming that what this orientation excludes from view is ‘social motives as such’ (Burke, 1954: li). In relating motives to interpretations and positioning both against rationalizing science, Burke (1954: 62) pointed out that:

Those who look upon science as the final culmination of man’s rationalizing enterprise may be neglecting an important aspect of human response. Even a completely stable condition does not have the same



meaning after it has continued for some time as it had when first inaugurated.

In positioning his argument thus, we find Burke's thesis entirely compatible with Bruner's distinction between logico-scientific and narrative modes of thinking. Thus, when Burke discusses motives as absent from rationalizing science but present in ordinary language, we cannot help equating his position with what Bruner called the narrative mode. Moreover, Burke also positions language, and thus the motives that he claimed are constituted by language, within the confines of a particular context or 'orientation' to use his term. A motive, according to Burke (1954: 25) is 'a term of interpretation, and being such it will naturally take its place within the framework of our *Weltanschauung* as a whole'. Motives as interpretations are 'centered in the entire context of judgments as to what people ought to do, how they [prove] themselves worthy, on what grounds they [can] expect good treatment, what good treatment [is], etc.'. That is another way of saying that motives, as interpretations, require cultural context to recover or create their meaning. Thus, Burke (1954: 25) concluded, attributions of motive by which people explain their conduct are 'but a fragmentary part of [their] larger orientation,' and 'a terminology of motives [. . .] is moulded to fit our general orientation as to purposes, instrumentalities, the "good life," etc.'

Burke permits a clear view of what we have called second-order complexity. In describing motivation as a linguistic product situated in a dominant discourse, he suggests a more complicated understanding of motives, an understanding once removed from the psychological level and placed instead at the organizational level where the discourse itself, which defines the terms in which motivation can be spoken of, is located (Harre & Gillett, 1994). By seeing motives in relation to discourse, Burke complicates our understanding and offers a narratological viewpoint. We say this because to speak about second-order complexity, or the discourse of motives, is to express what is meant by the narrative mode of thinking. That is, the narrative mode, because it instantiates the discourse as well as the story told within it, matches the requirements of addressing second-order complexity.

Organizational complexity, in our view, is well served by a narrative approach precisely because of its relationship to motives. Both being 'linguistic products' in Burke's terms, they have an affinity that we might profit by recognizing. To give just one example, in considering the five features of complex systems presented earlier, acknowledgement of the narrator describing systems in these terms makes us aware of the discourse (i.e. the discourse of complexity theory) that the narrator invokes, and of the positioning of the narrator within that discourse, which gives us our appreciation of his or her

motives, in other words, a way to frame the narrator that produces a motivation-rich sense of understanding. Weick, of course, would call this sense-making. But either way, having a device for framing motives, leads us to a narrative approach to complexity, and narrative in turn provides a more complex orientation (i.e. both first- and second-order appreciations are accommodated) to the study of organizing. Once again, we engage (enact, employ) recursiveness when we switch to the narrative mode of thinking.

### Temporality

Narrative is factually indifferent but temporally sensitive: its power as a story is determined by the sequence of its constituents, rather than the truth or falsity of any of them (Bruner, 1990; Czarniawska, 1998). Temporality, therefore, is a key feature of narrative organization, helping also to preserve particularity. As Hunter (1991: 46) notes with respect to medical narratives: 'By means of the temporal organization of detail, governed by the "plots" of disease, physicians are able to negotiate between theory and practice, sustaining medicine as an inter-level activity that must account for both scientific principle and the specificity of the human beings who are their patients'.

Ricoeur's (1984) treatise on *Time and narrative* supports the claim that a narrative approach to complexity theory uniquely emphasizes the temporal dimension of experience and simultaneously explores the issues of consciousness that are raised by the juxtaposition of narrative and time. As Ricoeur (1984) argued, one cannot engage in narrative as either a narrator or reader/listener without the experience of time. In his study, Ricoeur (1984: 20) demonstrated this with a passage from Augustine's *Confessions*:

Suppose that I am going to recite a psalm that I know. Before I begin my faculty of expectation is engaged by the whole of it. But once I have begun, as much of the psalm as I have removed from the province of expectation and relegated to the past now engages my memory, and the scope of the action which I am performing is divided between the two faculties of memory and expectation, the one looking back to the part which I have already recited, the other looking forward to the part which I have still to recite. But my faculty of attention is present all the while, and through it passes what was the future in the process of becoming the past. As the process continues, the province of memory is extended in proportion as that of expectation is reduced, until the whole of my expectation is absorbed. This happens when I have finished my recitation and it has all passed into the province of memory.

According to Ricoeur, this passage illustrates how memory (past) and expectation (future) interact to influence attention and thereby produce the three-fold present of our experience (the present of the past, the present of the present, and the present of the future). Although this example may seem trivial, Augustine went further, generalizing his point to other levels of experience (Ricoeur, 1984: 22, from Augustine's *Confessions*):

What is true of the whole psalm is also true of all its parts and each syllable. It is true of any longer action in which I may be engaged and of which the recitation of the psalm may only be a small part. It is true of a man's whole life, of which all his action are parts. It is true of the whole history of mankind, of which each man's life is a part.

These last statements evoke images of fractals and recursive symmetries, but portray them along their temporal rather than their spatial axes. We believe that increasing sensitivity to the ways in which memory and expectation contribute to complexity is a valuable contribution that narrative approaches can make to the study of complexity (in this instance with respect to recursiveness) and organizations.

To carry on a little way exploring what this contribution might look like, we consider another Augustinian idea promoted by Ricoeur – *distensio*. Following Augustine, Ricoeur suggested that, when engaged, memory and expectation extend us across time, allowing us to bridge past and future in the present moment. Things in memory and in imagination are potentially present and *distensio* occurs when we stretch our consciousness across past, present, and future. Furthermore, Ricoeur argued, it is the relationship between expectation, memory and attention forged by *distensio* that gives us the experience of time.

Could it be that through distended experience we construct and make use of the temporal dimension, as Ricoeur suggested? If so, it could likewise be that narrative is part of our distensive capability, both in the sense of invoking memory and expectation, and, as Augustine also showed, via engagement in the process of relegating the future to the past on a moment-by-moment basis. Only that to which we attend can make the journey from expectation to memory, and in this regard, narrative may be an important attention-giving device. If this is the case, then narrative helps us experience time by offering a means of passing expectation into memory. Furthermore, memory and expectation, once engaged, enlarge our consciousness in (and of) the present. Such enlargement increases our complexity.

Ricoeur's '*distensio*' and the way it contributes towards the complexification of the subject can be illustrated nicely by drawing on Weick and

Roberts' (1993) study of high reliability organizations. Weick and Roberts developed the notion of 'collective mind', which they take to be, not a given property of a collectivity, but the pattern whereby individuals heedfully interrelate their actions. The more heedfully individuals interrelate their actions, the more likely it is that unexpected events will be handled adequately. The significance of this cannot be overestimated because in high-reliability organizations it is extremely important that interactions between small, unexpected events do not escalate to yield catastrophes.

How might heedful interrelating be increased? Weick and Roberts (1993) suggest three ways, the first of which is directly relevant to our discussion of *distensio*: by making connections across time, activities, and experience. Weick and Roberts (1993: 366) explain: '[by connecting longer stretches of time] more know-how is brought forward from the past and is elaborated into new contributions and representations that extrapolate farther into the future'. By making connections between the past, the present, and the future, collective mind becomes more complex and, thus, is strengthened, because 'the scope of heedful action reaches more places' (Weick & Roberts, 1993: 366). In this regard, Weick and Roberts (1993: 368) extol the significance of organizational members developing their 'narrative skills', because it is through them that collective mind becomes richer and more complex. 'Stories', argue the authors, 'organize know-how, tacit knowledge, nuance, sequence, multiple causation, means-ends relations, and consequences into a memorable plot' (Weick & Roberts, 1993: 368).

In their study of the use of history by decision makers, Neustadt and May (1986) similarly extolled the virtues of what they call 'thinking in time-streams' – looking at an issue in the present with a sense of the past and an awareness of the future (see also Schon, 1983). Citing examples of several influential USA policy makers, the authors make it clear how the interlacing of past, present, and future complexifies policy-makers' thinking, making them potentially more effective. Commenting on George Marshall in particular, Neustadt and May note Marshall's acute sense of history which, while informing his decisions at a point in time, made Marshall focus his eyes 'not only to the coming year but well beyond. [. . .] By looking back, Marshall looked ahead, identifying what was worthwhile to preserve from the past and carry into the future' (Neustadt & May, 1986: 248). Policy-makers' skills in making such connections across time are necessarily of a narrative kind.

As argued earlier, narrative plots can be far more intricate than logico-scientific causal models can, because narrative connections can also be forged through associations that are not causal in the logico-scientific sense. In narrative, for example, things can be connected by co-occurrence, spatial proximity, formal similarity or metaphor, all types of association that logico-scientific

modes of thinking try to eliminate as distractions from the discovery of scientific generalizations. Nevertheless, these connections may well help us to understand, in addition to recursiveness (explored above), the non-linearity, indeterminacy, unpredictability, and emergence of complex systems. We leave these explorations for future development of the narrative approach.

Narratives not only allow for multiple connections among events across time, they also preserve multiple temporalities. As well as being linked to clock time, narrative time is primarily humanly relevant time (Ricoeur, 1984): its significance is not derived from the clock or the calendar, but from the meanings assigned to events by actors (Bruner, 1996). In this sense narrative time is not symmetrical. Returning to Forster's and Bruner's example quoted earlier, the moment after the King's death is for the Queen qualitatively different from the moment before his death. Burke (1954: 62) similarly noted that: 'Even a completely stable condition does not have the same meaning after it has continued for some time as it had when first inaugurated.' It is this asymmetry of time (so elegantly argued in the sciences by Prigogine – see Prigogine, 1992, 1997; Prigogine & Stengers, 1984) that gives narrative its dynamic texture. For some researchers narrative time is like a turbulent current 'characterized by an overall vector, the plot, itself composed of areas of local turbulence, eddies where time is reversed, rapids where it speeds ahead, and pools where it effectively stops' (Argyros, 1992: 669). By accommodating multiple temporalities, narratives are far more complex than propositional statements in which, as we saw earlier, time is absent.

## Conclusions

To summarize, a narrative approach to complexity theory suggests that our understandings of complex systems and their properties will always be grounded in the narratives we construct about them. When we characterize initial conditions as perturbations of a system, we construct the beginning of a plot (the system is a character or protagonist and the perturbation is a situation or antagonist) that may conclude with the system moving off in a direction that is surprising. As with unpredictable characters in other stories or in life, the complex system is interpreted as volatile or capricious. When the multiple interactions of systemic behavior in complex systems produce emergent (new) modes of behavior, in narrative terms the plot thickens, the characters develop. To put this more reflexively, when we theorize about complexity, we narrate. Being conscious of our narrativity develops the second-order of complexity upon which we earlier claimed complexity itself rests. This article has been about developing second-order

complexity alongside our appreciation of organizational complexity via a narrative approach.

In presenting arguments in favor of taking a narrative approach to complexity theory, we analyzed the primary mode of thinking typical of complexity theorists and suggested a role that the narrative mode of thinking could play in compensating for the limitations of complexity theory's well-practiced logico-scientific mode of thought. Interpretive organization theory has been used to show how the narrative mode complements and extends the findings of complexity theory and complexifies our thinking about organizational complexity. A few ideas from narrative theory have been presented to give a sense of the contribution that further development of narrative approaches to understanding complexity theory might offer to organization theory. A critique of the logico-scientific mode of thinking indicated absences in complexity theory that narrative theory might fill, and these possibilities have been explored in relation to contextuality, reflexivity, purposes/motives, and temporal sensitivity, all of which were related to recursiveness in order to demonstrate how the narrative approach contributes to understanding organizational complexity.

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