Exploring the nature of nonlinear organizational change

A case study of a 'run-on-deposits'

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Abstract

The notion of nonlinear change, the most recent addition to the lexicon of change types, emerged as a logical extension of viewing organizations as complex adaptive social systems. As such it may be nothing other than a 'label' following a rich tradition of poorly conceptualized change concepts, yet may also contain the promise of improved explanatory power with regard to organizational change dynamics. This paper explores the theory of nonlinear change with particular reference to macro-scale and micro-scale change processes and tests its application with a 'bank run' or 'run-on-deposits' in a case organization. The retrospective analysis of newspaper reports covering a period of 18 months echoes the theoretical fundamentals of nonlinear change and highlights the central role of human affect as a catalyzing source of nonlinear change, the importance of 'field' (context), and the need for changed managerial approaches to minimize the catastrophic impact of nonlinear change.

Introduction

It has been established that between 65 and 75% of organizational change initiatives are deemed unsuccessful (Beer & Nohria, 2000; Grint, 1998; Mourier & Smith, 2001; also cf. Applebaum & Wohl, 2000; Mariotti, 1998). One reason may be the fact that the extant change literature guiding organizational change efforts has not been developed on a sufficient scientific basis (Bamford & Forrester, 2003; Van Tonder, 2004c). This situation is not aided by the fact that managers tend to cling to change concepts and practices that are substantially outdated and invalid (cf. Collins, 1996; Nortier, 1995). Indeed, the study of change has remained an insufficiently circumscribed and attended to phenomenon, exhibited, for example, in the fact that the distinction between change as empirical phenomenon and as subjectively experienced is hardly taken into consideration. (Collins, 1998; Pettigrew, 1988, 1990; Van Tonder, 2004c).

The arrival of complexity theory in the social sciences has stimulated renewed interest in the study of organization change as it promises a potentially more useful framework with which to make sense of otherwise inexplicable organizational change dynamics (Van Tonder, 2004b). It is in fact now quite common to view organizations as complex systems (cf. Ashmos, et al., 2000; Beeson & Davis, 2000; Dooley & Van de Ven, 1999; Maguire & McKelvey, 1999; Styhre, 2002; Sullivan, 1999). Against this context the purpose of this paper is to explore and test the theory of nonlinear organizational change through application to a recent case of a 'bank run' or a 'run-on-deposits'.

We follow Van Tonder’s (2004a) view of change as a dynamic, time-bound, and non-discrete process evident in an empirical difference over time in the state and/or condition of the entity with or within which it occurs. Acknowledging the difficulty of pinning down complexity in a definitional sense (Maguire & McKelvey, 1999), the view of complexity used here is an exceedingly common one that veers towards ‘descriptive complexity’. It is accordingly viewed as that mixture of a significant number of variables within a setting or ‘field’, a high degree of interdependence between them, as well as a high frequency of interaction among these variables. Thiétart and Forgues (1995) for example suggested that complexity, in organizational terms, commences when three or more variables are interdependent and interact on a consistent basis.

Context: The evolution of change and type change

We also note that Lewin’s (1951) initial notion of change as a sequence of activities that emanate from disturbances in the stable force field that surrounds the organization (or object, situation, or person) has since been superseded by, among others, concepts such as first and second-order change (Bartunek, 1993; Bartunek & Moch, 1987; Watzlawick, et al., 1974), Alpha, Beta, Gamma change (Golembiewski, et al., 1978), transformation (Levy & Merry, 1986), evolutionary and revolutionary change (cf. Greiner, 1972; Tushman & Romanelli, 1985; Gersick, 1991), Type I and Type II change (Van Tonder, 1999) and more recently chaotic change (most often referred to as nonlinear dynamics or chaos – cf. Thiétart & Forgues, 1995) (See Table 1 for a selection of the more common and/or contemporary concepts).

With every new change concept and typology that is created the veil of confusion that prevents the scholar and manager from understanding the nature and dynamics of change and organizational change, is lifted somewhat to reveal more of the elusive
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Table 1

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<th>'Conventional' change types</th>
<th>'Extreme' change types comparable or equivalent to a definition of nonlinear change</th>
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<td>Chaotic change (also referred to as complex change or catastrophic change): A rapidly unfolding form of comprehensive change, triggered by an insignificant or small incident, with unpredictably catastrophic outcomes.</td>
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Evolutionary change: A slow stream of incremental adjustments in response to minor internal or external environmental changes (but essentially directed by the environment) and which accumulates over time to bring forth major qualitative change (e.g., the emergence of a new species) (equated to Darwinian gradualism). Revolutionary change: Short, compact periods of disruptive and qualitative i.e. transformational change, also referred to as punctuational change.

First-order change: A quantitative and rational change of limited scope in one or a few dimensions, within and consistent with existing schemata (present understandings or meaning structures). Second-order change: a qualitative and discontinuous change in the structure and form of schemata (or meaning structures), invariably resulting in a new worldview. At the organizational level, it will tend to be a multidimensional and multilevel change based on a different logic and observable in most behavioral dimensions.

Alpha change: Some variation in the existing condition or state of a phenomenon – also described as 'on-the-scale' change – implying that this variation is measurable in terms of a measurement instrument (scale). Gamma change: Is a quantum shift in the way that a specific phenomenon or object is conceptualized. It entails the redefinition and reconceptualization of a phenomenon – a major change in perspective or frame-of-reference. Compared to Alpha and Beta change, it is described as 'off-the-scale' change. Whereas Alpha change involves observed variation or visible change, Beta change involves a modified view of this change and Gamma change a complete conceptual redefinition.

Type I change: A steady state, incremental or step-by-step sequential change which generally evolves over an extended period of time, does not have a disruptive influence on the system and is generally perceived to be within the control of the system. Type II change: A major, disruptive, unpredictable, paradigm-altering and system-wide change which has a very sudden onset and escalates rapidly to a point where it is perceived as being beyond the control of the system.

Transformation (or transformational change): A qualitative and metamorphic form of change, which entails a fundamental and material alteration of the structure, nature, and appearance or shape of an entity such as an organization.

which emerged from the application of complexity theory to the organization. Different expressions of nonlinear change such as complex, Type II, catastrophic, dissipative, chaotic, and fatal chaotic change consequently have surfaced in the literature, but they are used largely as synonyms. We use the phrase nonlinear change here conveniently as a collective phrase to encapsulate the different change concepts which, in character, appear to embody an ‘extreme’ type of change. A more useful approach that will circumvent the problem created by confounding ‘labels’, is to attempt description of the dynamics of the change process as, for example, on definitional parameters such as those suggested in Figure 1.

When we attempt to delineate the nature of different change types in terms of the basic defining parameters in Figure 1, meaningful convergence and divergence among the different change concepts emerge in a manner quite unlike that implied by seemingly different labels. Variations among different types of nonlinear change (should they exist) can potentially be differentiated on the basis of dynamics rather than ambiguous ‘labels’ that presume variation. While it is beyond the scope of this discussion to elaborate on the implications of different types of change, the
benefit of profiling change for purposes of research and organizational practice is obvious. The parameters suggested in Figure 1 should enable the profiling of varied change processes or episodes ranging from, for example, a heart attack to the gradual unfolding of an ecosystem. A caveat though; although most change events or processes may be amenable to a degree of description, precise definitions of the points at which change commences and concludes are bound to be sources of debate, as change is hardly ever discrete, and subjectively perceived and experienced.

Nonlinear change

In general, nonlinear systems are typically described as systems of perpetual change, but this is an incorrect representation for it is not change per se that distinguishes it from other systems. Closed and open systems are characterized equally by perpetual change (although seldom recognized). Rather, it is the qualitatively different profile and nature of the type(s) of change in nonlinear dynamic systems that differentiate them from that of the ‘traditional’ systems concepts.

If we then turn to nonlinear organizational change, we are reminded that the meaning parameters of any conceptualization of change is anchored in, and typified by, the context within which it occurs (Bolton & Heap, 2002; Van Tonder, 2004b, 2004c). When we acknowledge the existence of different (valid) forms of nonlinear dynamic systems (e.g., complex versus chaotic systems) we implicitly subscribe to change forms that, in broad terms are similar, but at a finer level of discrimination will reflect variance, which is associated with the dominant and distinctive features of these systemic contexts, e.g., ‘complex’ and ‘chaotic’ change.

While complex and chaotic systems differ in several meaningful ways, the primary distinction is that complex systems are only occasionally exposed to chaotic change dynamics. For the rest, fairly ‘ordered’ change types such as Type I or evolutionary change (see Table 1) i.e., change profiles likely to be conveyed by lower values on the defining parameters in Figure 1, will be observed. This is a consequence of a complex system’s ability to consolidate and reintroduce stability after nonfatal chaotic change.

Some authors for example differentiate between subtypes of nonlinear dynamic systems which include conservative and dissipative systems. The former, which includes classical and quantum systems, essentially conserve energy while dissipative systems are characterized by the movement of energy across ‘field potentials’ into the surrounding environment (‘dissipation’). Indeed, the (accelerated) movement of energy constitutes a central feature of Prigogine & Stengers’s (1984) concept of a dissipative structure. These nonlinear dynamic or complex change types are to a degree ‘knowable’ in terms of the framework provided in Figure 1, and we consequently observe that nonlinear change largely populates the extremities of the descriptive parameters (values are likely to range between 4 and 5).

The bulk of the literature suggests that nonlinear change is change characterized by the disproportionate magnitude of the change trigger (insignificantly small) and the change consequence (unpredictably large), i.e., nonlinearity. In chaotic systems nonlinear change would assume the character of fatal, catastrophic change, as well as non-fatal chaotic change. In complex systems the phrase will embrace similar nonlinear change with the rider that, through intervention, the change may be stabilized to a degree and convert/switch to more linear forms of change. In such instances the concept of fatality may be muted and a limited degree of reversibility of impact over time may be possible.

In the instance of dissipative structures in particular (e.g., organizations), nonlinear change is further construed from within a ‘field’ of forces and is described in terms of the flow of energy across energy differentials. In keeping with our argument of earlier, a finer distinction between different nonlinear change types at this stage, i.e., beyond complex and chaotic change (for example between ‘conservative nonlinear change’ or ‘dissipative nonlinear change’), may prove to be substantially impractical. Our basic defining parameters of change (Figure 1) should prove more useful. From this perspective the basic tenets of nonlinear dynamic systems would suggest that nonlinear change will simultaneously be prominent on at least the dimensions of predictability, control, impact and probably pace, for it to be regarded as such. The ‘surprise’ or ‘suddenness’ feature of nonlinear change is, for example, captured by the time/pace dimension. If we then further subscribe to change as “energy-on-the-move” (Van Tonder, 2004c) the time/pace dimension effectively articulates the rate of energy flow (cf. Goerner, 1995), which is characteristically prominent in dissipative systems. ‘Predictability’ in turn embodies the linearity-nonlinearity dimension of organizational change while ‘control’ reflects the perceived influence of organizational representatives based on their subjective estimation of the pace, intensity, scope, and predictability of the unfolding change. As with all change processes the manner in which the ‘beginning’ and ‘end’ of the change is defined, remains a critical consideration. In this regard some guidance can be derived from a consideration of the anatomy of nonlinear change at both a macro and a micro scale, which is illustrated with an example from the financial sector.

A case in point: Nonlinear change in the financial sector

The financial sector, surprisingly, has been characterized by several examples of what can be termed nonlinear change....
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With annual returns to shareholders varying between 30% and 40% for the last 10 years, the run on its deposits at the case organization was sudden and unexpected and, although its balance sheet was sound, this could not avert its collapse. Following state intervention, the dynamics in the bank (as well as the rippling effects throughout the industry) were stabilized, but the bank’s assets were sold, which marked its permanent demise. Drawing on 360 newspaper reports covering approximately a year before and after the ‘run’, unfolding events were fitted to a theoretical model of nonlinear change (Figures 1 and 2). The ensuing discussion illustrates the nature of nonlinear change at both macro- and micro-scale.

Anatomy of nonlinear change: Macro-scale

A macro-scale nonlinear change in organizations is one of cyclical order and disorder that can be further disaggregated into three major phase transitions (see Figure 2) with the first representing the shift from relative stability and minimal complexity, to complex and fragile stability on the edge-of-chaos. The second phase transition refers to the organization’s crossing over into the domain of chaos and ultimately its descent into chaos, while the third phase transition represents the emergence of (a ‘leap’ to) a new level of order and stability. In phase 1 the organization is subjected to powerful yet balanced counteracting forces which simultaneously exert pressure towards stability (A1), yet also towards instability (B1). With passage of time the organization is ‘pushed’ to greater levels of complexity and into a threshold zone bordering on chaos (Q2) referred to as the ‘far from equilibrium’ zone and ‘the edge-of-chaos’. If the organization cannot contain the energy build-up and increasing complexity, a minute, insignificant activity (perturbation) could become a trigger event or breakpoint (‘bifurcation’ – Q3) which will prompt a dramatic, chaotic phase transition (A2 to A3 and B2 to B3 in Figure 2), from which newfound ‘order’ and stability will emerge – if not in the organization, then in the suprasystem (e.g., at industry level). If increasing complexity and energy build-up over time cannot be ‘managed’, the system lapses into the next order-disorder-order cycle.

Anatomy of nonlinear change: Micro-scale

Nonlinear change at micro-scale more pertinently refers to the second phase transition of the organization from the edge-of-chaos to the domain of chaos proper, and embodies the dramatic visual revolution referred to earlier (refer Figure 2: from A2/B2 to C3) and which requires only a minute perturbation (at A2/B2) to prompt the onset and ‘descent’ into chaotic change at point

(Rosser, 2002). Indeed, Demirguc-Kunt & Detriagiache (1998) have identified 31 banking crises for the 14-year period between 1980 and 1994. Of these, several were accompanied by massive attempts by depositors to withdraw their funds – referred to as a ‘run-on-deposits’ or a ‘bank run’. Despite analyses of substantial ‘panic runs’ dating back to 1890 (cf. Kindleberger, 1996), it is still not possible to anticipate and prevent bank runs. According to Ortiz (2002) several common features characterized the crises that emerging market economies experienced after 1994, namely that the affected economies were considered star performers; the crises were not anticipated; and the magnitude of the crises were much larger than expected. This articulation provides a succinct summary of what is referred to here as nonlinear change and applies equally well to events at the case organization (a banking institution).

Unfolding events at the case organization leading up to and culminating in the ‘run on deposits’ fit the phases of nonlinear change exceedingly well and allude to the intensified pressure and growth in complexity (see Figure 3).
Autocatalysis, resonance ("correlation") and energy flow

A micro-scale nonlinear change is perhaps best illustrated with behavioral examples that have variously been referred to as ‘swarming’ or ‘herding’ behavior in social collectives. Grinn (1998) refers to the collective catastrophic hysteria that was observed for example in vanquished armies for no apparent reason, while Ortiz (2002) highlighted ‘herd behavior’ (together with ‘panic’, external shocks, and several other factors) in major balance-of-payment crises. In these examples nonlinearity is once again confirmed in the disproportionately large consequence (hysteria, panic) relative to a minuscule trigger event. A second major feature of this behavioral phenomenon is its ‘runaway’ nature, i.e., the absence of control, which assumes a dynamic of its own (an emergent phenomenon) which ultimately culminates in catastrophic outcomes. Autocatalysis and resonance bring more descriptive clarity at this level.

‘Autocatalysis’, technically, cannot be disentangled from the complementary micro process referred to as ‘resonance’ or ‘correlation’, but for our purposes it is necessary to differentiate the two micro change processes. Autocatalysis or autocatalytic interaction can be described as a continuous, self-sustaining, iterative and recurring excitation process that occurs when a suitably high degree of complexity characterizes the nonlinear dynamic system and a significant energy differential (‘field potential’) exists as, for example, when the organization finds itself at the edge-of-chaos (A2 and B2 in Figure 2). The onset of a process of autocatalysis literally requires an insignificant trigger or perturbation to stir system components into spontaneous catalysis, i.e., exciting and energizing one another. System energy accumulates and converges and resonates (a function of the self similarity characteristic of nonlinear dynamic systems) which then amplifies and further excites the system on a continuous, and exponentially spiralling, basis until a point of ‘critical mass’ (and breakpoint) is reached, i.e., when the ‘field potential’ is such that spontaneous dissipation occurs (i.e., chaotic change or release of energy). Autocatalysis facilitates and accelerates processes that would otherwise not have occurred or would have occurred at a very slow pace. High interdependence among system components ensures that ‘stirred-up’ energy is continuously fed back into the system and into the ‘stirring-up’ process where it amplifies and fuels the process (a positive feedback loop), and consequently leads to the development of a network of catalytic events. Non-reinforcing feedback, which dampens energy flow and excitation (i.e., negative feedback loops), also occurs, but these are significantly negated by the extent of positive feedback.

‘Resonance’ or ‘correlation’ in turn refers to the alignment and channelling of energy from system components and which have been mobilized through excitation. It is this aligned mass of energy in circulation that leads to the emergence of some systemic phenomenon. For resonance to occur, a substantial degree of self-similarity (recurring systems features, regardless of the level of scale) has to be present. In essence autocatalysis and resonance, further broaden our understanding of nonlinear change at this level.

From within a dissipative structures perspective this spontaneous and ever-spiralling process of excitation-resonance-amplification-excitation (refer Figure 4) results in the accumulation and convergence of spontaneously released energy until a significant ‘field potential’ is reached, i.e., a significantly large discrepancy between different concentrations of energy.
Once this energy differential reaches a critical magnitude a spontaneous flow of energy from high to low concentrations ('dissipation') occurs (Prigogine & Stengers, 1984). Goerner (1995) describes this critical value, or breakpoint, as the moment when the system has reached its maximum flow capacity – a threshold parameter that marks the point where the energy differential between interdependent, but opposing, change forces reaches an unknown yet specific critical proportion and is vulnerably sensitive to the smallest energy fluctuations in the 'field'. If energy build-up continues a 'search' for a more efficient energy outlet to release the pressure is prompted. Increasing pressure is then concentrated in those areas where less resistance is encountered, until it gives way in the form of a 'chaotic' dissipation of energy.

In the case organization change-reinforcing ('positive') feedback amplified and accelerated energy flow and build-up in the absence of significant resistance ('negative' or disorder dampening feedback) until the energy flow reached the maximum flow capacity. For the case organization this occurred when the capricious emotional disposition of institutional investors prompted the sale of their shareholding. It is at this point that the critical threshold is crossed and the system 'switched' ('bifurcated'). Energy was redirected to this new flow channel (sale of shares, withdrawal of deposits) which resulted in a spontaneous and dramatic flow, or dissipation, of energy (the 'run' on the deposits) to the point of levelling out resource (energy) concentrations, i.e., restoring a condition of equilibrium.

A useful illustration of change in the form of energy dissipation is provided by the example of an in-flight accident that ruptures the aircraft's frame, to the extent that the highly pressurized cabin atmosphere is brought into contact with the substantially depressurized surroundings of the aircraft. The pressure differential ('field potential') prompts an immediate and intense rush of air (energy flow from a high to low concentration which, depending on the magnitude and reversibility of the change consequences, may be categorized as either fatal or non-fatal chaotic or nonlinear change. We can also equate the build-up of energy among systems components in complex, nonlinear dynamic systems to the build-up of emotional energy in individual employees as a result of autocatalysis among employees in, for example, an employee complaining to another about treatment by a manager, which invokes sympathetic anger and leads to more rousing word-of-mouth, etc. This being the case, we also immediately recognize the parallels between the dramatic dissipation of energy in a complex adaptive system such as an organization, e.g., a strike by the workforce, and from a psychoanalytical/Freudian perspective, the cathartic release of emotional tension at the individual level. Autocatalytic change at this level suggests a period of optimum synergy when near perfect alignment among human systems (psychological, physiological, etc.) is momentarily achieved – to the extent that intrasystemic constraints (resistance) is minimal, resulting in the spontaneous rapid release of energy of significant proportions which are substantially disproportionate to the stimulus value (consider also Freud's metaphorical 'breaking of the dam wall' as a human application of dissipative systems change – Van Tonder, 2004c). It is here that the psychology of the individual, or to be more precise, the deeply entrenched preconscious and intertwined elements of cognition and emotion, surface from the ‘past’ to rouse and rally the various intra-individual systems into coherent collective action.

Of particular importance is that this circular exchange of energy between systems and system components in a field is necessary for self-organization (Coleman, 1999), but this self-organization can emerge at different systemic levels: if the organization’s identity is maintained through the different organization-environment interactions and phase transitions, the organization will emerge in a revitalized new form. In the case organization this circular exchange of energy extended uncontrollably beyond the confines of the organization and consequently its identity was not sustainable. Self-order subsequently emerged at a higher systemic level, i.e., at the ‘field’ level, which took the form of intervention by the state and the introduction of industry-specific regulations and measures to contain similar forms of chaotic change in the future.

**Discussion and implications: Nonlinear change and retrospective sense making**

The retrospective ‘fit’ of a nonlinear change framework (macro- and micro-scale) onto the case organization provides substantial explanatory power with regard to the dynamics and possible origins of the ‘chaotic change’ to which it was exposed. Depending on the vantage point, this change can be characterized as either ‘fatal’ or ‘nonfatal’ nonlinear change:

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At the institutional level the change was fatal: the institution collapsed, most shareholders and stakeholders lost their equity, and what assets remained (e.g., mortgage and other loan books) were taken up by other players in the industry.

At the level of the individual ‘agent’ the change would be deemed ‘nonfatal’ as a degree of reversibility could be secured with most investors and depositors eventually recovering their life savings and investments in the aftermath of the catastrophic demise of the case organization. This in itself serves as

Fig. 4: Hypothesized autocatalysis in the ‘run-on-deposits’ of a banking institution
Adapted from Van Tonder, 2004c, with permission of Van Schaik Publishers.