DOCUMENT RESUME

ED 391 243 EA 027 308

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TITLE Towards a Social Theory of School Administrative Practice in a Complex, Chaotic, Quantum World.
PUB DATE Apr 95
NOTE 36p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 18-22, 1995).
PUB TYPE Speeches/Conference Papers (150) -- Viewpoints (Opinion/Position Papers, Essays, etc.) (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Educational Administration; Elementary Secondary Education; Evolution; Foreign Countries; Holistic Approach; Leadership; *Organizational Theories; School Administration; *Social Systems; Social Theories; *Sociology; Systems Approach; *Theory Practice Relationship
IDENTIFIERS Chaos Theory; Luhmann (Niklas); Quantium Theory

ABSTRACT

Educational administration, like many other social sciences, has traditionally followed the rubrics of classical science with its emphasis on prediction and control and attempts to understand the whole by understanding in ever finer detail how the parts fit together. However, the "new" science (especially quantum mechanics, complexity, and chaos theory) has challenged the view that to understand the parts is to understand the whole. Scientists now take into account such phenomena as holism and emergence, self-reference, self-renewal, self-organization, and autonomy. In recent times social scientists have incorporated these understandings from the new science into the social sciences. This paper presents some of the theories of one such social scientist, Niklas Luhmann. The first part applies Luhmann's theory to the field of school administration. The next two parts consider the usefulness of the theory of schools as self-referential systems, first as a framework for research, and second, as a basis for understanding the social reality in which administrators operate. (Contains 45 references.) (LMI)

Towards
A Social Theory
of
School Administrative Practice
in a
Complex, Chaotic, Quantum World.

Paper presented at the

American Educational Research Association

(AERA)

1995 Annual Meeting

San Francisco

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April, 1995

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It is both sad and ironic that we have treated organizations like machines, acting as though they were dead when all the time they've been living, open systems capable of self-renewal.
— Wheatley (1994:77).

But here we are on the edge of chaos because that's where, on average, we all do best.
— Kauffman (in Waldrop, 1992:332).

ABSTRACT: . . . Educational Administration, like many other social sciences, has traditionally followed the rubrics of classical science with its emphasis upon prediction and control and attempts to understand the whole by understanding in ever finer detail the parts and how they fit together. The "new" science (especially quantum mechanics, complexity and chaos theory), however, has challenged the view that to understand the parts is to understand the whole. Scientists now take into account such phenomena as holism and emergence, self-reference, self-renewal, self-organization and autonomy. In recent times, social scientists have incorporated these understandings from the new science into the social sciences. This paper present some of the theories of one such social scientist, Niklas Luhmann. In the first part, it attempts to take Luhmann's theories and apply them to the field of School Administration. The second and third parts of the paper attempt to demonstrate the utility of this theoretical perspective for research in educational administration and for providing understanding of the social reality in which school administrators operate.

'Think globally, act locally' is an evolving emphasis in contemporary society with its reduced orientation towards geographical and political boundaries and increasing reference to world markets, multi-national organizations and trans-national political confederations. Yet the co-ordination of social life for the individual is still dependent upon the smaller, more intimate social systems to which he or she makes reference and in which he or she can take meaningful action. This paradoxical relationship between the global and the local is a conundrum confronted in contemporary science in quantum physics and this can provide a view of reality that generates new images of and insights into social relationships (see Wheatley, 1994:42). Quantum phenomena, however, represent only one aspect of the New Science. New understandings are emerging in other disciplines such as Biology, and in the more general theories of Complexity and Chaos, and these too are profoundly changing the frames through which we see the world and, in particular, how we think about organizations. Notions of predictability and control of closed, mechanical systems are being replaced by understandings of autonomy, self-renewal and self-

organization in dynamic, complex systems: systems that live on the edge of chaos and order.

The first part of this paper draws upon the social theories of the German Professor of Sociology, Niklas Luhmann, as a spring board for the development of a theory of school administration within this dynamic, complex, social systems view of schools. The second part draws upon three research projects to show how the theory outlined in Part 1 can guide research and offer insight into the organizational problems confronted by schools. Part 3 explores further the "new map" for social space derived from the "new science" perspective and the implications it presents the educational administrator.

PART 1

NIKLAS LUHMANN AND SELF-REFERENTIAL SOCIAL SYSTEMS.

Here we sit in the Information Age, besieged by more information than any mind can handle, trying to make sense of the complexity that continues to grow around us.
— Wheatley (1994:145).

Everything interlocked, and no piece of the puzzle could be considered in isolation from the others . . .
— Waldrop (1992:27).

1. Niklas Luhmann:

The March 1993 edition of *The Practising Administrator* carried an article on the American sociologist, Talcott Parsons. According to its author: "Talcott Parsons was probably the most influential American sociologist of this century" (Lancaster, 1993). Without doubt, his work has significantly influenced the study and practice of Educational Administration and in Australia, his influence can be detected in the writings of such pioneers in the field as W.G.Walker (1970; Bassett, *et al*, 1963) and A. Ross Thomas (1967, 1972). As Sungaila (1988(a)) has noted: Parsons is "a scholar whose work many writers and researchers in educational administration have . . . found persuasive."

More recently, however, the social theories of a former student of Parsons, the German Professor of Sociology, Niklas Luhmann have been introduced into the Australian discourse of educational administration by Sungaila (1988(a); 1988(b); 1989; 1990). They too have been found to be persuasive, not only in developing

conceptual frameworks for research (Beavis, 1992(a); Hanson, 1989), but also in explaining various phenomena in the field (Beavis, 1992(b)). But Sungaila and her students are not the only ones to find utility in Luhmannian thought, Hills and Gibson (1992) in Canada have also been attracted to Luhmann's ideas and particularly how they can help the field of educational administration understand its own research.

Providing a brief overview of some of the main ideas in Luhmann's theories and indicating their applicability to educational administration present some significant difficulties. In the first place, the greater part of Luhmann's work is written in the German language — a language with which the writer is not familiar. Only in the last decade or so have selections of his work been translated into English. Luhmann's writing style is a second difficulty as it is very dense and exceedingly demanding. Moreover, the difficulties of his style make one wonder what may have been lost in translation. Third, his theories are extraordinarily comprehensive and wide-ranging and his argumentation has been described as "neither linear nor circular but rather labyrinthine" (Luhmann, 1982(d):270). Such theories can neither be fully grasped from any isolated work — even one of the scale of *A Sociological Theory of Law* (Luhmann, 1985) — nor even from a series of isolated articles.

In spite of such difficulties, Luhmann's work has much to offer the study and practice of educational administration and significant rewards await those researchers and practitioners who persevere to overcome them.

1.1. Luhmann's Biography:

Niklas Luhmann was born in Lüneburg, Germany, in 1927. His early training was in law and administration, and in post-war Germany he practised as a lawyer and worked in public administration. In 1960-61 he was a student at Harvard where he pursued his interests in the structural-functionalism of Talcott Parsons and in administrative theory. Following a period at the School of Administrative Science at Speyer, he was appointed Professor of Sociology at the University of Bielefeld: a position he held until his retirement in 1993.

1.2 Luhmann's Pedigree; Parsons, Habermas, and the Phenomenologists.

Luhmann's work draws heavily upon that of Talcott Parsons and his theories are recognised as being Parsonsian to some degree in terms of method, abstractness, and breadth (Beyer, in Luhmann, 1984(c):xii). He was a student of Parsons in his Harvard year, and although he readily acknowledges his indebtedness to Parsons, he diverges from him at a number of key points and sees his theories as

having progressed beyond those of Parsons (see, for example, Luhmann, 1982(b):128).

He is a contemporary of Jürgen Habermas, another scholar who "has clearly influenced contemporary thought in educational administration" (Sungaila, 1988(a):2). According to Albrow (in Luhmann, 1985:vii), "among West Germans Luhmann has long been recognised as at least the equal of his partner to intensive debates, Jürgen Habermas." Luhmann's theories, while diverging from Habermas at significant points, have nevertheless been honed by his intellectual engagement with this other influential scholar (see, for example, Luhmann, 1983:989; Habermas, 1975:130-143).

The influence of Husserl and the European phenomenological tradition is also evident in Luhmannian thought and Beyer sees Luhmann's theory as "Husserlian to some degree in its occasional use of phenomenological method and in its radicalness" (in Luhmann, 1984(b):xii).

1.3. Luhmann's Style: Nomadic and Original.

Unlike Habermas, whose work may be attached to a particular school of thought (the Frankfurt School), Luhmann has not been identified with any such internationally recognised tradition: indeed, he describes his intellectual preference as being for "nomadic behavior" whereby he searches "all fields for deep sources" (Luhmann, 1983:988). His theories therefore result from the synthesis of ideas derived from quite diverse intellectual traditions. Bednarz (in Luhmann, 1989) claims the main four to be: the *systems-theoretical approach* of Talcott Parsons, *cybernetics*, *phenomenology* and the very recent *theory of autopoiesis*. Drawing upon such diversity offers great potential for insight and Luhmann's work is in the very forefront of contemporary thought challenging many of the classical notions of organizational theory (Luhmann, 1982(d):24). The uniqueness and originality of his work have won him the reputation as "the most original German sociologist since Max Weber" (Holmes and Lamore, 1982:xxxvii).

Luhmann's work, therefore, is seen as being significant for educational administration for three major reasons — his Parsonsian heritage, his engagement with Habermas and, particularly, his interdisciplinary approach.

2. Some Key Luhmannian Concepts:

The highly complex nature of his theories makes it almost impossible to focus only on a few concepts and see in them the essence of his approach. Inevitably

concepts refer to other concepts in his labyrinthine grid. As Beyer (in Luhmann, 1984(c):xiii) notes, Luhmann's theory is characterised by "radical relationality": it is a theory in which all concepts are inter-related and, more significantly, interdependent. Nevertheless there are certain themes which recur consistently and which demand attention. Among these are complexity and contingency, an insistence upon systems theory, self-reference, reflexivity, differentiation, a theory of generalized media of communications and evolutionary theory.

2.1. Complexity and Contingency:

While in one sense it would be misleading to suggest that Luhmann begins with the problem of the overwhelming *complexity* of contemporary social life, he nevertheless sees it as "a universal and fundamental phenomenon that arises both in reality and in our knowledge of reality" (Luhmann, 1982(d):64). By complexity, Luhmann means that there are more choices available than can possibly be selected, thus burdening the acting individual (or system) with the necessity to choose from a range of possible meaningful behaviours. This implies that social life must also be *contingent* as one could always have chosen otherwise. These always-possible-otherwise choices remain within the horizon of possibilities and can be actualised at some future time so that change is an ever present possibility.

In time, as a consequence of learning and evolution, complexity inexorably increases (Waldrop, 1992:296). Such increased complexity and contingency is enriching, and life is so much the better for the fact that more choices are available: furthermore, it means that there is always the possibility of negating a choice, selecting otherwise, and starting over again. The problem faced by the individual, however, is that such choice can be a burden and the choosing actor is compelled to take some risk whenever a selection is made — the risk of making the *wrong* choice. Complexity and contingency must therefore be *reduced* and made less of a burden and it is precisely to achieve such reduction that social systems form. As Luhmann states: "systems are reductions of the complexity of the world" (Luhmann, 1982(d):192); or in Poggi's more metaphoric language: "Systems are . . . islands of lower complexity within environments, that is within fields of higher complexity" (in Luhmann, 1979:x).

2.2. Systems Theory:

The key, then, to the formation of social systems is the *difference* between the complexity of the system and the complexity of the environment in which it is located. But what exactly *are* social systems, and how are they formed? How can

choices be "reduced" while not being eliminated? The answer to the latter question lies in the fact that systems provide *structure* which guides the selections being made and one makes one's choices by reference to these structured systems. A teacher in a school, for example, does not select behavioural choices according to the totality of choices available for social interactions, but rather with reference to the more limited choices that are *expected* within a school context or environment. And it is these *expectations* that structure social systems: boundaries of expectable behaviour are drawn within the continuity of the spectrum of the possible giving rise to system formation (Luhmann, 1982(d):345).

In relation to what a social system *is*, according to Luhmann:

> We can speak of a 'social system' whenever the actions of several persons are meaningfully interrelated and are thus, in their very connectedness, marked off from an environment. As soon as any communication whatsoever takes place among individuals, social systems emerge (Luhmann, 1982(d):70).

In essence, then, social systems are emergent phenomena (like the plots of novels) that can be distinguished from environments and that facilitate communication. As such, they are *abstract communicative networks* that define often vague and imprecise conditions for social compatibility and interaction (*cf.* Holmes and Lamore, in Luhmann, 1982(d):xviii).

Such a view of social systems stands in some contrast to the more traditional view where a system is understood as an ordering of relationships through which parts are bound into a whole with the relation of the whole to its parts interpreted through a means/ends schema whereby all the parts have to prove themselves to be means to some end represented by the whole systems (Luhmann, 1982(d):25). As Luhmann says: "The classical framework . . . which Parsons himself still used, was shaped by the concepts of whole, part, and hierarchy." But he goes on to point out the difficulty inherent in such a view:

> If we think of a whole as consisting of parts we stumble upon the paradox that the parts taken individually do not add up to the whole. But that means that the whole itself must be a part of the whole. In the past, this seems to have led to discussions about the *majores partes*, the part that represented the whole without being the whole itself. . . . (Luhmann, 1982(d):2).

For Luhmann, it is not the internal relationship among the parts that is of significance and that defines a system's unity, but rather, *how the system distinguishes itself from its environment, and how it negotiates with that environment.* That is, how it is able to manage its internal ordering so that it will maintain itself in the face of the threats posed by its environment (Luhmann, 1982(d):37).

Again it is a system's structure that is the key. Rather than having its identity consist of particular elements that are held immune from change, a social system *stabilizes the structures that enable the system to function.* This means that for a system to maintain its identity, the expectations which are structuring the system must be kept stable over what Luhmann identifies as the three dimensions of social life — the temporal (i.e., over time), the social (i.e., among the interacting individuals) and the material (i.e., concerning thematic contexts) (Luhmann, 1985).

2.2.1. The Temporal Dimension:

The threat to temporal stability is disappointment or surprise — *i.e.* I expect you to behave in a particular manner according to the norms of the system, but you choose to behave otherwise. For example, a teacher may say "good morning" to a student in the school corridor. The teacher expects the student to give a courteous reply. Instead, the student may reply with a grunt — in other words, the teacher's expectation has been disappointed. So what does this mean? Does it mean that the teacher can no longer expect courteous replies from students? If this is the case, then the teacher is again confronted with the full complexity of the field of possibilities and the reduction achieved by the school-as-social-system is thrown into doubt.

From a functional point-of-view, there are two (and only two) possible ways to react to disappointment and surprise — by learning from the experience and adapting the expectation to match the disappointing behaviour so that, for example, the teacher comes to expect discourteous replies from school students and learns to live with that expectation (in which case the expectation is said to be held *cognitively*); or by maintaining expectation counterfactually, that is, continuing to expect courteous replies from students in spite of any disappointing replies (in which case the expectation is said to be held *normatively*). Thus disappointment is dealt with by a cognitive/normative differentiation of expectation: one distinguishes between those expectations that one is prepared to adapt and change from those that one will hold counterfactually. But in the case of normative expectations, this alone is not sufficient, something more must be done. Actors must show that their expectation has been disappointed either by having an explanation available to explain why normative expectation was preserved contrary to the presenting facts or by sanctioning the disappointing behaviour.

Successful mechanisms for the relief of disappointment are available in various cultural devices within social systems. Myths, legends, stories and sagas are part of the culture of a school and can be used to preserve expectation over time, especially by providing "saving stories" in the face of disappointment. Rites, rituals

and ceremonies can give concrete meaning to myths and, through stereotyped action, can be used to explain away disappointment. Sanctions are the most common means of dealing with norm violation, and punishment can isolate the disappointing behaviour from the norm and the latter can be preserved. Alternatively, positive sanction can bind appropriate behaviour to normative expectation. Thus by the differentiation of cognitive and normative expectation, and the availability of cultural devices to explain away disappointing behaviour, structures of expectation are stabilized over time. Furthermore, the differentiation of cognitive and normative expectations provides these structures within themselves their own mechanisms for change and evolution (see discussion below at 2.5.1).

2.2.2. The Social Dimension:

Expectations are stabilized among the school population by means of institutionalization. In Luhmannian thought, institutionalization has a quite specific meaning and expectations are institutionalized when they are the expectations presumed to be held by unidentifiable third parties within the system, that is, when there is a presumption of consensus concerning those expectations — these are the expectations that "everyone" (whoever the unidentifiable "everyone" may be) agrees upon.

This *presumption* of consensus rather than any *actual* consensus is vital. In the first place, in a complex world, an actual consensus is very rare if not impossible to achieve. Further, concrete agreements can be broken and are thus more fragile than presumed ones. A *presumed* consensus can cope with some disappointment.

To maintain the presumption of consensus, the agreed upon expectations need to be communicated among the school. Language is one means of communication, but in situations of increased complexity, there are other more generalized means of communication (see 2.7 below) which have greater chances of success in ensuring that more complex communications are received. Among a social group, and especially one in which there may be conflict and contention over expectations, that is, one which is essentially political in nature, *power* is such a generalized medium of communication. So power will be used to maintain the presumption of consensus. The principal of a school is a power-holder, and he or she has a number of power sources available to heighten the probability of successfully communicating the presumed consensus. For example, the principal's special relationship to the school's governing body is empowering when communicating with staff.

2.2.3. The Material Dimension:

Finally, material stability requires contexts in which themes of expectations can be identified and stored. There are four such contexts that can be used in a social system: persons, roles, programs and values. Each of these contexts presuppose one another so that programs, for example, are based upon values, they require roles to put them into effect and roles assume there are persons to carry them out. Each of these contexts therefore is being used within any particular system. They operate, however, at differing levels of abstraction and with differing levels of security.

Persons are very concrete contexts for identification and storage. As a boy, the writer expected to behave in a particular manner in a particular person's classes chiefly because he believed that was what that person expected. Now this was not something the writer identified in this person's role as teacher, but rather in *his person.* It was very concrete and very dependent upon the individual. Being dependent upon the individual, however, means a low level of security for the storage of expectations. If the person changes in any way, then all the expectations identified and stored in him or her are put at risk.

At the next level, there were expectations that the writer identified in the role of teacher and they were not dependent upon the particular person mentioned above or any other individual. He expected that all teachers expected him to learn. That expectation is related to the role of teacher, giving it greater generality and greater security as it is one level removed from the idiosyncrasies of particular individuals.

At yet another level there were school rules which identified expectations and these were not dependent upon either particular roles or particular persons: they are at a more general level; they are programs. This level has yet greater security as the storage is not dependent upon persons or even the roles they perform. Here the expectations are in some verbally fixed form. They will be written down or on some computer disc!

At the most abstract level there were values within the school, but these are only of use if expressed in some more concrete form such as in programs, or roles or even particular persons, or in artefacts such as prizes and awards. Being so abstract, values are hard to get at, so they are hard to change and there is great security for expectations stored in values. So expectations become materially

stabilised by their identification and storage in various contexts: in particular, in persons, in roles, in programs, and in values.

Storing and identifying expectations in persons is most successful in primitive or family-type situations. As complexity increases, so the need to store at a higher level becomes more important and one can see this trend in the history of schools. A small school founded and run by a person will have most expectation stored in that person. As the school develops and other staff are employed, expectations will be identified in roles rather than in individuals. Today with mega-schools, or whole systems of schools, even this is not enough and most expectations will be identified in programs including all the printed (or CD) material that abounds within the school. Values are too abstract a level to be of use in identifying concrete every-day behavioural expectations. For example, one may value education, but that is of little help in processing the day-by-day interactions that occur within a school.

Thus, by means of temporally, socially, and materially stabilized structures of expectation, *identity can be maintained in spite of continual and uncontrollable change in the environment.*

2.2.4. The Individual and The System.

An aspect of Luhmann's systems theory that is particularly contentious (e.g., Hejl, 1984; Habermas, 1975:142) concerns the fact that *his social systems do not have human beings as their elementary units.* For Luhmann: "The social system as a structured system of meaningfully interrelated actions *excludes*, rather than includes, the concrete human being" (Luhmann, 1985:104; 1990:30). Human beings belong to a system's environment. This is not to say, however, that by relegating individuals to the environment rather than centre stage, Luhmann's theory is not concerned with the human psychological-organic system: on the contrary, "from the stand-point of systems theory", says Luhmann (1982(c):4), " 'environment' is by no means an area to be considered of secondary importance ; . . . *it is the single most important condition for systems formation* " (Emphasis added). Furthermore, by abstracting from the particular personalities of its individual members, a social system is able to create new possibilities from which all individuals may profit (Holmes and Lamore, in Luhmann, 1982(d):xxi). Nevertheless, the separation of individuals from social systems is a particular difficulty that can ultimately lead to a Descartian-type dualism. The writer prefers a holistic model which includes *both* people *and* their communications seeing these as two levels of description of the whole: analogous to the hardware and software descriptions of computer systems (Beavis, 1992(a)). As Wheatley (1994:34) suggests, the quantum world indicates that

determining whether the individual or the system is the more important influence on behaviour is not an either/or question. In her view, what is critical is "the *relationship* created between the person and the setting."

For Luhmann, however, social systems are abstract systems of meaningful communication structured by stabilized behavioural expectations, whose boundaries are "the difference between meaningful communication and other processes" (Luhmann,1982(a):132).

2.3. Nested Systems:

System formation occurs at a number of levels and in such a way that there is a "nesting" of diverse types of systems within one another (Luhmann,1982(d):86). At the broadest, most inclusive level, there are *societal systems*. The boundaries of these systems are the boundaries of possible meaningful communication limited only by accessibility and understandability, and their principal function is to provide a prepatterned and orderly access to the complexity of the proximate environment of smaller systems contained within them.

At the other end of the scale, Luhmann identifies *interactional systems*. These emerge when present individuals perceive one another and interact. Their tangible boundaries are "revealed by the fact that we can only speak *with* but not *about* those who are present, and conversely, only *about* but not *with* those who are absent" (Luhmann,1982(d):71).

Inserted between societal systems and individual interaction systems there is a third type of social system, *organizations* (in which category one would locate "schools"), and these have acquired increasingly greater significance in complex social orders (Luhmann,1982(d):75). Organizations mark their boundaries with the distinction between membership and nonmembership and they bring into play new, impersonal, motives for action (Luhmann, 1979:93).

On its own, none of these levels can grasp the length, breadth, and depth of social reality. A school, for example, exists within a broader society which prepatterns many of its relationships, while at the same time the school itself provides a prepatterned environment for myriad interaction systems from encounters in the hallway, to staff meetings or school assemblies.

2.4. Autopoietic (Self-Referential) Systems:

Luhmann sees social systems as belonging to a special class of systems, namely, autopoietic systems. These are systems which, through their own self-referential processes, generate and maintain themselves. Because environments are necessarily more complex than systems, they offer more possibilities than any system can successfully exploit. As a result, systems "constitute themselves through processes of self-selection, just as creatures constitute themselves through processes of 'autocatalysis' " (Luhmann, 1982(d):70).

For Luhmann, the glue of social systems is meaning and one only selects actions, or communications, that are meaningful. Meaning, however, is only meaningful if it can be referred to other meaning (*cf* searching for the meaning of a word in a dictionary) so that the genesis of meaning depends upon the cross-references produced in the communication between human beings. In other words, social systems are *self-referentially* reproducing themselves in their own processes (i.e., through their communications). In this sense, they are *operationally closed* systems. At the same time, they are *informationally open* to stimulation from their environments. Luhmann illustrates this by analogy with the brain which

> in its operations . . . is a fully closed nervous system that, on the level of its own operations, maintains no contact with the environment and precisely for this reason is able to process very few . . . stimuli from its environment in highly complex ways (Luhmann, 1990:190).

Thus, autopoietic systems are neither just closed nor open systems: they are *both at the same time* (Luhmann, 1990:40). Such simultaneous openness and closure is only part of the paradox of autopoietic systems as their self-reference implies logical circularity and conceptual emptiness. Nevertheless, contemporary research into self-referential orders has addressed such problems (e.g., see von Foerster, 1984; Varela, 1975) enabling Luhmann (1990:41) to claim that "self-reference makes possible system openness to changing themes with a relative constancy of the structures guiding the operations"; and Wheatley (1994:147) to speculate that: "If management practice is ever to be simplified into one unifying principle, I believe it will be found in self-reference."

As noted, self-reference implies tautology and emptiness and for self-referential social systems to live with this, it is essential that they mediate their operations through external reference points. In a lexical system, for example, the word "table" only has meaning because it can be referred to a concrete object *outside* the lexical system. Self-referential systems must therefore not only be able to

observe the distinction between themselves and their environments, they must also be able to observe relationships between themselves and their environments. This can be achieved by reflexive (or second-order) functioning.

2.5. Reflexivity:

Reflexivity is a constantly recurring theme in Luhmannian thought. He defines reflexivity as the application of a process to itself. It is a particular form of self-reference. Reflexive mechanisms are structural features enabling the success of a process to be enhanced or reinforced by its application to itself, or to processes of a similar kind, before it fulfils its proper function (Luhmann, 1982(d):100). The expectations, for example, that structure social systems are in fact the reflexive expectations of expectations. This arises from the *double contingency* of social life referred to by Parsons (Luhmann 1985:26) whereby any social action requires interacting partners, each of which is free to make and communicate his or her own selections from among contingent choices so that the one cannot expect the other's *actual* behaviour but only the other's *expected* behaviour. Unlike our expectations of the physical environment where the rising of the sun, for example, is dependent upon determinist physical laws, our expectations of other peoples' choices of behaviour cannot be predicted — you are not my puppet and I am not yours! Thus one can only expect one's interacting partner's expectations.

Expectations are not the only structures requiring reinforcement by reflexivity in the face of complexity. Luhmann states:

> The social mechanisms of cognition, norm-setting, learning, trust, and the institutionalization of expectations of behaviour are, in their elementary, non-reflexive forms, simply not adequate for the constitution of highly differentiated social systems, the circumstances of which are so complex that it pays, indeed becomes essential, to make such social mechanisms reflexive. In this form they are directed into themselves and thus intensified in their effect (Luhmann, 1979:66).

Reflexivity enables self-referential systems to observe themselves in relation to their environments (and thus deal with tautology). This is because reflexive functioning shifts attention from the *observed* to the *observer* enabling the latter to be included within its own observations. In order to understand this more clearly, consider by way of illustration, the notion of purpose. Now purpose can be applied to itself and be used reflexively, that is, purpose has a purpose, and the *purpose of purpose* is to keep *the person* with the purpose on target. Thus at the reflexive level, attention has shifted from taking action because of purpose (first-order) to understanding the person who has the purpose (second-order). More generally, social systems are concerned with observation which, in the formal sense,

refers to every kind of registering and processing of information including communications processes (Luhmann, 1990:51). They are observing systems (von Foerster, 1984) that observe by referring to the distinction between themselves and their environments and process information according to that distinction. Because this is self-reference, there will be things that the system cannot see (the eye cannot see itself), moreover, at the cognitive level, it cannot see that it cannot see. By functioning reflexively, however, social systems no longer merely observe themselves *as distinct from* their environments, they can observe themselves as observers and thus understand themselves *in relation to* their environments. They are able to arrive at interpretative understandings of the meanings they give to their own situations and their interactions with others.

It is the writer's conclusion that school councils are important in the reflexive functioning of schools. School councils are the interpreters (second-order) of the interpretations that schools have already given to themselves (first-order). In the matter of public examination results, for example, the direct analysis of the students' results by the school is replaced by observing the school council's analysis of the results, and the school's observation of the examination results will be guided more by the prognosis of this reference group than from its own, direct analysis.

2.5.1. Cognitively Open/Normatively Closed:

It was noted above that the cognitive/normative differentiation of expectations provides a mechanism for change and evolution. At the reflexive level, there are four possible configurations of expectations of expectations — cognitive expectation of cognitive expectation, cognitive expectation of normative expectation, normative expectation of cognitive expectation, and normative expectation of normative expectation. It is such a differentiation that enables systems to be simultaneously open and closed. Autopoietic systems are "normatively closed and cognitively open" (Luhmann, 1985:283), and as such they live on the edge of chaos and order. To illustrate this point, it may be noted that many schools have school uniform norms and these are counterfactually stabilized in their structures of expectation so that the school's normative expectation is that pupils expect to wear the uniform. In this way the school is a normatively closed system. While preserving this norm, styles of dress may change within the community (the environment). If the school is to continue functioning meaningfully within that environment, then it may be necessary for it cognitively to adapt its school uniform to be in accord with the presumed consensus of the community *vis a vis* style of dress. In this way the school remains normatively closed with reference to the school uniform norm while at the same time being cognitively open and adapting this norm to environmental conditions. Schools

normatively expect pupils' cognitive expectation to wear its uniform. Thus self-referential systems, while being normatively closed systems, are at the same time, cognitively open to their environments.

2.5.2. Non-equilibrium:

Cognitive openness implies a changing environment which in turn implies non-equilibrium between the system and the environment. Schools exist in a society which is in constant flux and this will result in high non-equilibrium between the school and its environment. At the beginning of the 1980s, for example, it was the presumed consensus of New South Wales society that the norm for secondary schools would be to educate no more than twenty-five percent of the population beyond the School Certificate (a credential available after ten years of schooling). In the early part of the decade, this norm became inexpedient and so was challenged and a new norm institutionalized so that the presumed consensus now is that secondary schools should educate ninety-five percent of the community beyond the School Certificate. Thus, in this matter of pupil enrolments, secondary schools have been subjected to environmental change which has meant non-equilibrium in terms of pupils leaving the school at particular times and in terms of changed configurations within the school as the proportion of senior pupils (and particularly in respect of their academic abilities) has increased.

At the reflexive level, the system itself is the environment for its subsystems and here again non-equilibrium must be the order. As Jantsch (quoted in Sungaila, 1989(b):5) observes: "with the help of . . . energy and matter exchange with the environment, the system maintains its inner non-equilibrium, and the non-equilibrium, in turn, maintains the exchange process." In the situation just considered, the senior student body, as a sub-system of the school was in disequilibrium with the remainder of the school as a result of increased numbers. Schools have dealt with this internal disturbance by changing curriculum offerings to deal with a broader range of abilities.

2.6. System Differentiation:

As just noted, the process of system building itself, in fact, functions reflexively in the process of system differentiation. According to Luhmann (1977; 1982(d)), contemporary society is primarily functionally differentiated, that is, it contains specialised subsystems such as the political system, the economic system, education, the law, science, each of which is itself an autopoietic system with a specific function to fulfil for the whole of society. The political system obtains binding

decisions in the face of conflict; the law enables communications about the legality or illegality of behaviour; science is concerned with the truth or falsity of knowledge; education has the function of making social selections (does my education equip me for such-and-such a career?). In each case, the functional system differentiates itself from society and thus replicates within society the difference between a system and its environment: society is now the environment for its subsystems. In this process, there is a strengthening of selectivity in that the boundaries of possible communication are drawn around a specific function and there is a host of other communications that any given subsystem can ignore when selecting its own actions. In a functionally differentiated society, there is considerable interaction among the differentiated systems as they must rely upon one another to fulfil necessary functions: for example, education must depend, *inter alia*, upon legal sanctions, political decisions, economic provisions, family acceptance and scientific research.

Such functional differentiation also occurs at the social system level and schools have within them their own "political", "economic", "legal", "academic", "pastoral" and other sub-systems.

One consequence of the functional differentiation of modern societies is rapidity of change. This is because within such systems the interactions of the subsystems produce ever more possibilities than can possibly be selected — a necessity for evolutionary change as will be discussed below.

2.7. Communication Media:

Communication is at the very heart of Luhmann's theories. Societal systems, organizations, interaction systems are all systems of communication. Language therefore plays an important role in Luhmannian thought. Language, however, is not the most successful medium of communication in the face of high complexity. More generalized media are required to communicate effectively selections which others can then accept as the premise for further selections (i.e., to communicate reduced complexity (Luhmann, 1979:113)), and Luhmann develops a theory of generalized media of communication which, he claims, "came into play when language and common beliefs about the world no longer sufficed for the coordination of social action" (Luhmann, 1982(d):334). Those to which he refers most commonly include power, money, love, and truth — media earlier described by Parsons. Unlike Parsons, however, he is not limited to just those four and refers to others such as art, faith, and law. Each of these media is associated with a particular symbolic code and articulates a particular functional subsystem: power is the medium articulating

politics; money the medium articulating the economy; love the medium articulating the family; truth the medium articulating science.

Because these media are generalized, they result in structures of expectation and patterns of motivation which make it possible for selections made by one party to be relevant to another: the other is not only aware of these selections, but makes his or her own selections as consequences of them (Luhmann, 1979:48-49). Furthermore, symbolic generalization allows temporal, social and material specifics to be ignored: "Thus, money [for example] makes it possible to ignore the differences typical of *when* something is bought, the material content of *what* is bought, and the *persons* involved in the purchase" (Luhmann, 1982(d):207)

One of these media, *power*, is of particular relevance to organized systems. By power, Luhmann means a medium of communication that allows decisions to be transmitted (Luhmann, 1982(d):147). It communicates a reduction of complexity *binding* upon others (Luhmann, 1982(d):117), and it "involves causing outcomes despite possible resistance, or, in other words, is causality in unfavourable circumstances" (Luhmann, 1979:107). Power, however, being symbolically generalized, is not the same as *coercion* which is concrete and specific (Luhmann, 1979:112).

As a result of their occupying key positions in communication networks (Luhmann, 1982(d):147), educational administrators possess and exercise power. As decision-makers, they can choose one specific possibility from among many and subordinates are in turn motivated to accept this selection as the premise for their own decision making. A significant point, however, is that when the complexity of a system exceeds a certain threshold, power must function reflexively: that is, it must be applicable to itself. This means that power can be overpowered and no longer is it the threatening concept of the "powerful" and the "oppressed" but rather a two-way medium for ensuring effective communication in unfavourable circumstances. Furthermore, when operating reflexively, that is, when power can be applied to power, power can safely be increased within a system: "Only when the overpowering of power is assured can the potential of power be increased without hesitation" (Luhmann, 1979:67).

2.8. Evolutionary Theory.

Finally, a word about Luhmann's theory of social evolution by which he describes how structural changes can be stabilized in society and its subsystems. Such a theory has certain similarities with evolutionary theories in the biological world in

that it requires three different types of mechanisms: mechanisms of variations; mechanisms of selection; and mechanisms of stabilization. This does not, however, lead to a "survival-of-the-fittest" Darwinism (Luhmann, 1984(a):62). The *mechanism for variation* is to be found in language and system differentiation which are capable of overproducing possibilities from which selections must be made. These generate the fluctuations and increase the non-equilibrium which can push the system over the edge of chaos. The *mechanisms of selection* are based upon successful communication making the media of communication the selection mechanisms. Systems themselves stabilize in their structures successful selections and so system-formation is the *mechanism of stabilization* (Luhmann, 1976(a):512). Because evolution feeds upon deviations from normal reproduction, and such deviation is random and cannot be predicted, a system's evolution can never be planned. Nevertheless, "a self-referential system which tries to absorb planning may speed up its own evolution, because it becomes hypercomplex and will force itself to react to the ways in which it copes with its own complexity" (Luhmann, 1982(a):134).

3. Schools As Self-Referential Systems:

The theory of Educational Administration towards which this paper is attempting to contribute, seeks to explain how schools, as organized social systems, self-referentially structure their communications in such a way that enables them to maintain their identities over time in spite of increasingly complex environments (self-renewal), while at the same time evolving and changing so that their own complexity is sufficient to deal with the information that continues to grow around them (self-organization).

In summary, the school is conceptualized as a self-referential system in a world that is complex (that is, where there is an over-abundance of choices available to it) and contingent (that is, the school could always have chosen otherwise). To cope with this, the school maintains structures of expectations that are produced (and reproduced) by the interactions of its members. Indeed, being in the social world of double contingency, it is reflexive expectations of expectations that are produced and that structure the school and enable it to function. By reference to these structures of expectations of expectations, the school can make choices that are meaningful (it chooses self-referentially) and that preserve its identity (it is self-renewing) — it is an autopoietic system. But these structures of expectations of expectations must be guaranteed stability if they are going to fulfil this function. They must be stabilized temporally (over time), socially (among the members of the school), and materially (accessible within various contexts within the school — in persons, in roles, in programs, and in values).

But school as self-renewing systems is not the whole story, because schools do not remain static; they change and evolve in response to increased environmental complexity and contingency. This is achieved by processes of self-organization.

Although normatively closed to their environments so that all choices that a school makes are made self-referentially, a school is nevertheless necessarily open to its environments with which it must make exchanges and with which, as a consequence, it will be in disequilibrium. This means that a school will be subject to disturbances or fluctuations —- disappointment and dissent will occur. For the most part this will be dealt with by the school's autopoiesis and the school will dampen the disturbance and continue unchanged. Some fluctuations will be such, however, that they will be amplified within the school to a point where its autopoiesis will be overcome and a new self-renewing regime instituted — this is the school's self-organizing mechanism.

In the next two parts of this paper, the usefulness of this theory of schools as self-referential systems will be considered first as a framework for research (Part 2) and second as a basis for the actions of administrators (Part 3).

PART 2:

THE THEORY AND RESEARCH.

We social scientists are trying hard to be conscientious, using methodologies and thought patterns of seventeenth-century science, while scientists, travelling at the speed of light, are moving in a universe that suggests entirely new ways of understanding.
— Wheatley (1994:141).

All complex adaptive systems — economies, minds, organisms — build models that allow them to anticipate the world.
— Holland (in Waldrop, 1992:177).

In Part 1 some of the social theories of Niklas Luhmann have been discussed and from this a theory of schools as self-referential social systems outlined. This theory has been used by the writer in three research projects. In the first, it provided the theoretical framework for investigating the participation of the governing bodies of certain Australian independent schools in their school's self-renewal (Beavis, 1992(a)). In the second, it was used to explain the failure of a school to implement Total Quality Management (TQM) techniques (Beavis, 1994). In the third, it provided an explanation of the effectiveness of Peer-Assisted Leadership (PAL) as a means of enabling school leaders to research their own domains and function more effectively (Beavis and Bowman, 1994).

1. Governance and Independent Schools:

Using the theory of Part 1 as the guiding conceptual framework, and a case study methodology, the governing bodies of five Anglican independent schools (two boys' schools, two girls' schools and one co-educational school) in the Anglican Diocese of Sydney were investigated by the writer (Beavis, 1992(a)). The case of one of these, the school of which the writer is principal, was considered in greater detail while the other four schools were used to provide corroborative evidence. Such a methodology was selected because it was considered that the assumptions upon which it is based are congruent with those of the conceptual framework. First it provided data of a qualitative, rather than a quantitative nature: the concern of the study being "how" rather than "how much". Reducing concepts to numbers seemed totally inappropriate in an holistic approach. Second, a case is a bounded system, and that is congruent with the systems approach of the framework. Third, the epistemological assumptions of a case study are that knowledge is based upon informants' explanations and interpretations. While such knowledge has no security within a paradigm espousing linear logic (as it must ultimately have foundational propositions which do not

themselves require interpretation or explanation), within a paradigm of mutual causation, interpretations and explanations are quite secure as sources of knowledge, so long as they possess an internal coherence. Self-referential systems themselves rely upon mutually consistent presupposition, so again, the epistemological assumptions of the method are congruent with those of the framework.

The study was obviously limited in that it only considered a particular class of school (Anglican, independent) and it only investigated the self-renewing aspect of these schools.

In brief, the findings from this study indicate that the governing body (the council) of an independent school participates in the school's self-renewing processes in each of the temporal, social and material dimensions. In the temporal dimension it was found to differentiate the expectations that structure the school's life as either cognitive or normative. In the case of cognitively held expectations the council was found to adapt these expectations in the face of disappointment. With normatively held expectations, the council was found to participate in the mechanisms that allow them to be saved in the face of disappointment by its use of policies, sanctions, myths, and rituals.

In the social dimension, the council participates in the processes which sustain the presumption of consensus over the expectations to be expected and it clearly used power from various sources to communicate and maintain this presumption both within itself and within the school as a whole.

In the material dimension the council was found to identify and store expectations of expectations in persons (particularly in the person of the principal whose appointment was seen as the council's most significant action), in roles (again particularly that of the principal), in programs (particularly those of a broad nature such as policies, aims and philosophies), and in values.

Furthermore, it was found that a council enabled these processes to operate reflexively within a school. In particular, the process of institutionalization in the social dimension, which involves maintaining a presumption of consensus, requires that the expectations expected are those of unidentified third parties in the system. A school council is itself a "third party". It is a visible third party, however, and is not **un**identified. In a school, it is the council's expectations that everyone expects everyone else to expect. In other words, the process of institutionalization is itself institutionalized as a result of having a council. That is, every one expects that

everyone expects what the council expects. Institutionalization is operating at a reflexive level — it is operating upon itself before fulfilling its proper function.

Similarly, in the other dimensions, the council sanctions the sanctions in the temporal dimension (it must approve the dismissal of pupils and/or staff) and it identifies the contexts for the identification and storage of expectations in the material dimension (it appoints the principal, and sets the global policies within which other more local policies are set).

While the purpose of this study was not to investigate the theoretical framework *per se.* (it was assumed to be a valid way of attending to social reality), the fact that it was able to offer an explanation of the participation of the governing body in the life of an independent school suggests its usefulness to the field of educational administration.

2. A Failure to Change:

More recently, the writer was involved in an action research project concerning the implementation of Total Quality Management (TQM) at his school (St Andrew's). This provides evidence of the theory's utility to explain how change can be effected or (in this case) blocked. In brief, over a period of approximately two years, the writer (together with others) investigated TQM in a school context and then attempted to implement some of its methods in a relatively small project within the school. The attempt was a failure (for details see Beavis, 1994; and Bechervaise, Tarte and Tarte, 1994).

While there are no simple explanations of this failure, there is, nevertheless, evidence of the school as a system maintaining its identity and protecting itself from environmental disturbances. If change is to be effected and a new management style implemented, then the old patterns by which people are structuring their interactions within the system must be brought out into the open, challenged and replaced. The problem is, however, that these structures are seldom clearly recognised within the system and their identification is not always explicit. Expectations of expectations are emergent phenomena evoked by contexts and only "spelled out" if identified in programs.

For example, one of the particulars of the old order at St Andrew's was recognised by a member of the "quality circle" formed for the project, who had only joined the staff within the previous two years. He believes that St Andrew's is "a very hierarchical school" so that there is an expectation of hierarchy structuring staff relationships. Such a structuring of relationships is inconsistent with TQM which is

recognised as turning hierarchies upside-down. The failure to expose and overcome these expectations of hierarchy is, in the writer's view, a significant factor in the failure of this attempt to implement TQM.

From the principal's perspective, however, there is a much irony in this situation as he had as one of his goals at St Andrew's the reduction of the hierarchical nature of the school and the empowerment of people to take responsibility to perform whatever tasks are necessary for the functioning of the school. During his time as principal, he believes that the school has indeed moved in this direction. Obviously, however, the system as a whole still structures its interactions on the basis of expectations of hierarchy. So where are these expectations identified and stored within the school? Having reflected upon discussions with the member of staff who brought this to his attention, the principal came to the conclusion that there is a high probability that they are identified and stored within the context of his own person. While on the one hand he has sought to break down such expectations, on the other, he has done this incrementally and has never exposed them *per se* and, having been on the staff for over twenty-five years and principal for the last fifteen, in the eyes of others, he is identified strongly with the past where expectations of hierarchy were indeed very strong.

To introduce TQM either means that the principal has to change his ways so that new expectations of expectations become identified with him or he has to be removed from the scene. (In fact the latter will occur as he is about to conclude his service with the school at the time of writing.)

Here one can again see evidence of the usefulness of this theoretical approach to explain change, or failure to change, within a school. Attempting to make change without first identifying wherein the relevant expectations of expectations are stored that are structuring the school's interactions, is doomed to failure.

3. Reflexive Leadership with PALs:

Finally, the writer's participation in the process of structured inquiry known as Peer-Assisted Leadership (PAL), has provided additional evidence of the usefulness of this framework to explain phenomena encountered in research activities (Beavis and Bowman, 1994).

In 1993, Ms Ginny Lee from the Far West Laboratory for Educational Research and Development, devised and implemented a modified version of the Laboratory's Peer-Assisted Leadership (PAL) program with a group of principals in Australia. Fourteen principals participated in the initial program and since that time

an additional thirty-two have been involved in this program of professional development using research methods. In investigating the experiences of the initial fourteen heads, one of the findings concerned the many positive outcomes reported from the processes of both observing and being observed.

The theory of Part 1 suggests that the power of PAL is in its enabling individuals to function at a reflexive level and thus become reflexive leaders: leaders who are able to include themselves in the their own fields of observations. Such functioning offers a solution to the second-order problem of not seeing (not being aware) that in first-order functioning there are things that cannot be observed (*cf.* the blind spot in monocular vision). Such problems need to be solved by second-order means and PAL is such a second-order means for principals to observe those things about their own leadership behaviour that otherwise they cannot see (or rather, that they cannot see that they cannot see! (von Foerster, 1984)). One principal expressed something of this **un**awareness of a principal's **in**ability to see when he wrote:

> . . . the major value of PAL was something totally unexpected. I stumbled on it. After the first report back session, I was reflecting on how many major events happen when there is an observer in the school. . . . What a coincidence was my first thought. However, from later reflection I drew the conclusion that there are many such dramatic incidents in our daily lives. Because of their frequency, we see them as normal. . . . we come to believe that is what constitutes a normal life for a Principal (*PAL Penfriends* No. 4).

Here, then is evidence of the significance of reflexive processes and how this theory can explain why such processes are so necessary for leaders in the face of increasing complexity.

From these three examples, one can see that the theory articulated in Part 1 has major implications for disciplined inquiry as it offers a new perspective from which researchers can explore the field of Educational Administration. What is offered is a perspective that is informed by insights and understandings from contemporary science; that focuses upon the whole rather than the parts; that offers new views of leaders and their behaviours; that recognises autonomy and self-reference as something other than organizational pathologies and points to how these can be understood and dealt with rather than how to predict and control an uncontrollable future: matters to be considered further in Part 3.

PART 3:

THE THEORY AND THE PRACTISING ADMINISTRATOR.

We fear both ambiguity and complexity in management because we still focus on the parts, rather than the whole system.
— Wheatley (1994:109).

The moment you depart from linear approximations, you're navigating on a very broad ocean.
— Cowan (in Waldrop, 1992:66).

The theory articulated in Part 1 also has implications for practising administrators and those in leadership roles in schools, or indeed, in any organization. In the first place, reflexive practice has been seen as essential in dealing with increased complexity. Such reflexivity must apply at all levels within the school from the individual to the corporate. One aspect of this will be that there must be included within the school's communications this theory itself. In other words, actors' observations and communications within the school must be mediated through this theoretical lense. Or changing the metaphor, this theory must provide the map by which they find their way around the organizational space. In fact, whether recognised or not, actors are using maps of one kind or another in all their interactions. The concern is that the maps they have been using, and many still use, are derived from older understandings that, while helpful, have now been recognised as being limited in their applications and ineffective in the face of increasing complexity.

1. The "Classical" Maps Derived from the "Old" Science:

Predictability and control are two pillars (if not *the* two pillars) of the Scientific Age. The regularity of the rising of the sun, the constancy of the proportions of oxygen, nitrogen, carbon dioxide and other gasses in the atmosphere, as well as a host of other physical phenomena enable us to order our lives in the present and to predict how things will be in the future. Within the physical world, predictability and control have led to the marvellous advances in science and technology that we almost take for granted.

Modern physics has reached a point where physicists believe that they are on the verge of discovering a Theory of Everything, that is, they believe that they will discover a few elegantly simple laws from which every other phenomenon (physical or otherwise) will be able to be deduced in a logical sequence. No doubt this will be a great discovery. If one knows the present state of a system, then these laws can be applied and one can predict its state tomorrow or at any future time. What control this

suggests!! But, as Cohen and Stewart (1994:364) have noted, one can but imagine the scale of the complexity and the enormous effort that would be required to deduce

> tomorrow's stockmarket prices by calculating the future history of every subatomic particle in every market dealer and in the relevant environment, such as their computers, the chairs they sit on, the buildings in which they work and so on.

It simply is not a feasible proposition: nor is it a sensible one.

This does not mean that tomorrow's market prices cannot be predict with some degree of probability. But a Theory of Everything, no matter how simple and elegant the formulae, will not be useful. That map would require such enormous effort to interpret and use that it would be infinitely easier to live it out in reality; and in any case, the prices will be known long before the calculations have been completed.

The ability that science endows to predict and control, however, must not be trivialised. It has enabled the tremendous technology that is enjoyed in the modern world. The concern is that the spectacular success of (largely) Newtonian physics has so bedazzled us that it has served to provide the maps used to guide us in *all* areas of life: including Educational Administration.

Further, in this mechanistic way of observing the world, prediction and control are paramount, and where there is evidence that such prediction or control is not being achieved, then one must consider that one has encountered an organizational pathology and seek to find remedies to redeem the hallowed predictability and control (especially if one is in a leadership position and charged with the responsibility for control!)

2. Quantum Weirdness:

But how generally applicable are these mechanistic, reductionist maps generated by "classical" science? Newtonian Physics was severely shaken earlier this century with the work of Albert Einstein and Werner Heisenberg and others. Their discoveries concerning relativity and quantum uncertainty indicated that physical reality was perhaps not as straightforward as had been thought. Some strange, even weird, phenomena seemed to be manifest at the sub atomic level. Particles could "appear" and "disappear". One could measure a particle's momentum, but this ruled out measuring its position. Or *vice versa*, one could measure position but now momentum measurement was no longer possible. And were ultimate particles "particles" in the sense of some infinitely small billiard ball that could not be broken into anything smaller? "Particles" at this level do not seem to exist as independent

"things" but rather to manifest themselves in relationships. Davies (1984:102) states that:

> At the heart of the subject lies the bald question: is an atom a *thing*, or just an abstract construct of imagination useful for explaining a wide range of observations? If an atom *really* exists as an independent entity then at the very least it should have a location and a definite motion. But the quantum theory denies this. (Original emphasis.)

Essentially, the quest of Newtonian Physics has been to find the ultimate particle, so that, understanding it, it would be possible to understand any aggregation of such particles. Such is a reductionist approach whereby linear chains of cause and effect take one on a logical journey from one premise to the next. It is an approach which is concerned with the parts and how they fit together in configurational structure. It says that the whole is no more than the sum of its parts. But the relational emphasis of quantum mechanics (an unfortunate term) points to a systems approach to reality which challenges the notion of linear chains of cause and effect. Systems theory highlights mutual causality and feed-back mechanisms and underlying currents toward holism (Wheatley, 1994:9). Systems are seen as wholes, which may be differentiated into sub-systems, but these are also wholes, so the emphasis is not on "how they fit together" but rather how they relate to one another and deal with one another. Here one is confronted with the flux of dynamic process where the whole is something *more* than simply the sum of the parts.

3. Leadership Using the New Map From the "New Science" :

In such a situation, understanding leadership for example, is not a matter of how the organizational chart reads — who reports to whom, what is the hierarchy — or what are the traits of an effective leader. The new map shows that leadership must be seen in terms of relationships — who are the followers? Who is being empowered by the leader? Who are the stakeholders?

The "new science" has shown that, while predictability and control are still essential to our technology, the spheres within which they hold are more limited than was once thought the case. They do not apply at the levels of either atomic physics or cosmology. Furthermore, they imply linear chains of cause and effect and these do not occur in complex situations where there is mutual causality and feedback. They also require a precision which is impossible to achieve even in systems obeying determinist laws.

Complex dynamical systems must be viewed as wholes which display emergent features arising from their internal operations and relationships.

Leadership must be seen within a systemic context and the emphasis must therefore move away from prediction and control to an *understanding of contingency and autonomy*. Traditional views of leadership with their charismatic heroes who make all the key decisions, give clear directions and use well-intentioned manipulation to energise the troupes to work towards common goals are deeply rooted in an individualistic non-systemic world view (Senge, 1990:340) and do not suffice for the world of complexity and contingency.

3.1. The Global and the Local.

Using the new map based upon contingency and self-reference, the leader will need to "think globally and act locally". Thinking globally will involve leaders in giving attention to what have traditionally been regarded as some of the softer aspects of organizational life — attending to the guiding visions and values of the organization. Providing the overarching stories and communicating the theoretical constructs within which people can make sense of their own participation.

Acting locally will involve focussing upon things as vague as nuances; initiating small starts and sowing seeds for change — the nucleation processes which create the fluctuations so essential to the system's self-organizing mechanisms. And talking up those that are successful so that they are amplified throughout the system (Sungaila, 1989).

The leader will need the courage to challenging the autopoietic mechanisms which will oppose self-organisation by rocking the boat and standing alone — pushing the system across the edge of chaos into the realm from which a new regime can emerge. Courage is required because in this the leader runs the risk either of alienation or that the disturbance will open the way for someone else's changes to be institutionalized.

3.2. Vision, Values and Purpose.

One contemporary writer has linked vision with field theory of modern science and she talks about a "field of vision" (Wheatley, 1994:53). Field theory indicates that physical reality is structured by fields of one kind or another — electromagnetic fields, gravitational fields, quantum fields. Fields are unseen structures that can only be detected by their effects. The expectations of expectations discussed in Part 1 in this sense form a field which structures the social space of a school.

It is the work of the leader to ensure that the school's vision and values, which materially impact upon its structures of expectations of expectations, permeates its entire organizational space and makes transparent to others their present reality. Like the art critic, the leader presents a fuller appreciation, an enhanced understanding, of the system as it is and as it might be. It involves helping people to achieve more accurate, more insightful and more empowering views of organizational reality.

Leadership has been described as a "language game" (Pondy, in Grady, 1989:41) and the leader must be out there stating, clarifying, discussing, modelling, talking up so that the entire social space is filled with the messages the school cares about. The guiding vision of a school must not simply be that of the principal, it must be the vision owned by the entire school so that it can be given operational effect in the structures of expectation of expectation; and this will only come about if it is being talked about within the school.

Values, as has been indicated, provide the most abstract context for the identification of our expectations. They are presupposed in each of the other more concrete contexts of programs, roles and persons. But they must themselves be expressed and made clear — and this too is the work of the leader; identifying and preaching values so that they too fill the organizational space.

Values are often expressed in what Senge (1990:345) calls a leader's "*purpose story*" which provides a larger 'pattern of becoming' that gives unique meaning to the leader's aspirations and his hopes for the organization. Such purpose stories provide the overarching explanations of why leaders do what they do, of how their organizations evolve and how that evolution is part of something larger. It is at once a personal story (local) for the leader and yet a universal story (global) that provides a context of deep issues that transcend the problems of any one organization and implies a sense of urgency that makes action imperative and illuminates the leader's personal vision. For leaders in christian schools, for example, this purpose story will obviously be linked to the leader's personal faith commitments.

4. In Conclusion:

In this paper, an attempt has been made to outline a map of organizational life that takes into account insights drawn from the so-called "new science". The need for such a map is evident as the more traditional maps, which have been derived from a mechanistic/determinist science, imply a predictability and control that is seldom achieved in social systems. Quantum physics, complexity and its close cousin "chaos",

show us that such predictability and control belong to a rather narrow set of problems and conditions. Social life, where there are freely choosing individuals, brings with it a contingency whereby the future is always open and unpredictable. Furthermore, complexity is essentially a science of emergence and features emerge from the deep relationality of complex systems: features that cannot be identified in any of the individual "parts" of the system. Quantum physics shows that, even in physical reality, there is this deep connectedness that indicates the importance of relationships. Such complexity is at once an advantage in that it brings a richness of possibilities for the individual, and a disadvantage in that it compels choice that can be overwhelming and risky. It is by emergent structures of expectations that systems are able to deal with this complexity and maintain their identities.

Social life, however, contains freely choosing others, and this implies a double contingency. This is a second-order problem and requires second-order solutions so that, for example, it is the reflexive expectations of expectations that structure social systems. Expectations are not the only reflexive aspects of social systems and in independent schools, their school councils play a role in enabling other processes, and in particular, institutionalization to function reflexively.

Administering schools by this new map requires new approaches from leaders. Attempts to control the future by some of the traditional means of management are doomed to frustration. Leaders must take an alternative approach and attend to some of the so-called "soft" aspects of organizational life — vision, values, culture, understanding and insight. And this, too, is best achieved reflexively so that principals are leaders of leaders who disperse leadership throughout the school and who mediate their personal observations with the assistance of a colleague (a PAL).

Many writers in organization and management theory are now writing within this "new science" perspective and exhorting school administrators to become reflexive practitioners and leaders of "learning" organizations (cognitively open/normatively closed). If this is to become a reality, then they will need to abandon their old, mechanistic/determinist maps designed to show the way to prediction and control, and take up the new, holistic maps showing the contours of autonomy and self-reference.

5. Envoi:

It has been well-said that "a way of seeing is a way of not-seeing". The maps we produce are themselves *contingent* so that any map that can be drawn can prevent administrators from seeing other possibilities, therefore we must be ever

vigilant in our observations of observations and always be asking new and challenging questions to ensure that whatever maps we use do indeed correspond to the territory currently being traversed.

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