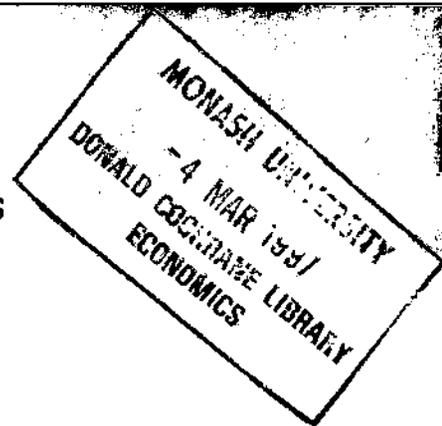


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**TEACHING ORGANIZATIONAL  
BEHAVIOUR CONCEPTS USING SYSTEMS  
THINKING AS AN INFORMING PARADIGM**

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**Abstract**

The success of Peter Senge's (1990) *The Fifth Discipline* and the later *The Fifth Discipline Field Book* (Senge, Roberts, Ross, Smith, & Kleiner, 1994) has created considerable interest in the area of systems theory and thinking and their application to management and management education. This paper makes the proposition that systems thinking can be applied as a framework or as an *informing paradigm* for teaching undergraduate and graduate Organisational behaviour subjects. It addresses the application of the systems thinking tool of *causal loop diagramming* to the teaching of organisational behaviour concepts.

## INTRODUCTION

This paper addresses three observations made by Glass (1996) in a discussion regarding the concepts of non-linear systems and chaos and its application to managers. Glass (1996) made the following conclusions:

1. Organisations no longer operate as closed systems which are free from outside influences. Organisations are complex open systems that are continually being influenced by, and influencing, their environments.
2. The environments in which organisations operate are generally not stable enough for management to be able to develop a relevant, competitive strategy that will always be applicable. With such constant change it is not possible to develop detailed strategies to keep pace with the rate of change.
3. There are no clear levers that will lead to a known response, "...the simple linear models of cause and effect have broken down and many actions can lead to quite unexpected (positive or negative) consequences." (Glass, 1996, p.100). For example, firing staff will not necessarily lead to efficiencies in the organisation.

Gleick (1991) in a discussion of Kuhn's 1962 seminal work on scientific revolutions concluded that paradigm shifts have an interdisciplinary nature, characterised by people straying outside the normal bounds of their discipline. Gleick argued that this activity sometimes brings a totally different perspective and new and dramatic insights. This paper examines the way in which the application of systems thinking to organisational behaviour case studies encourages students to look at the situation using a different paradigm or framework. Systems thinking provides a paradigm that can be applied across a wide range of examples of organisational behaviour in a consistent and comprehensive way and provides a methodology for producing an integrative view of the discipline.

Richmond (1994) suggested that there are various definitions of systems thinking, and his preferred approach will be used in this analysis. He stated, "...systems thinking is the art and science of making reliable inferences about behaviour by developing an increasingly deep understanding of underlying structure." (p. 139). Forrester (1993) stated that understanding a system's structure can demonstrate how the parts of a system are connected, how the parts influence one another, and how past behaviour and future consequences arise from decision making and their interrelationships. Forrester (1993) and Kim and Senge (1994) concluded that despite the widespread recognition of the importance of understanding interdependency and change, there has been little penetration of systems thinking techniques in mainstream management practice or education.

Peter Senge (1992) illustrates the philosophical approach that is fundamental to this discussion of the value of systems thinking concepts as "informing paradigms" in the teaching of organisational behaviour:

Systems thinking embraces a wide variety of approaches that recognize the importance of interdependence, interactions, and dynamic processes in understanding reality, and in the field of management, approaches to influence change in complex social systems. Systems thinking is an inclusive term that draws together and recognizes the extraordinarily diverse threads that enrich the systems view (Cited in Gould-Kreutzer, 1993, p. 105).

In organisational behaviour and other management disciplines, an understanding of interdependence, interactions, and dynamic processes is something that is often not adequately addressed or, completely omitted, from most graduate level management courses. Mowday and Sutton (1993) conducted a comprehensive review of the research undertaken in Organizational Behaviour and found that the reciprocal relationships and in particular feedback dynamics are often not evident in traditional Organizational Behaviour research. They cited several reasons for this absence:

1. It is a much more difficult task for theory builders to develop models that include reciprocal relationships between the context and individuals or groups. Since most organisational behaviour theories omit reciprocal relationships, most hypotheses tested between context, individual and/or group relationships focus on unidirectional relationships between variables.
2. "...studies that capture complex interactions are frequently more formidable undertakings because variables of interest must often be monitored over lengthy periods of time." (Mowday & Sutton 1993, p.217).

In contrast systems thinking concepts focus attention on the long term effects of actions and decisions over time, the impact of positive and negative feedback and decision lags. These concepts are highly relevant to the study of Organizational Behaviour and are often missing from Organizational Behaviour theoretical models. However, Mowday and Sutton (1993) also concluded that recently there has been some evidence of studies that recognize the complex interaction between context, individual and groups in organisations. Some of these studies include the research conducted by Weick (1990) and Dutton and Dukeridge (1991).

Many of the models that are frequently cited in the literature as being suitable models for teaching systems thinking are fundamentally biological and environmental based models derived from disciplines where thinking in systemic terms has been well established. However, much of the existing management theory does not sit well with fundamental systems concepts. As Cavaleri and Obloj (1993) observed, systems thinking is based on a different set of assumptions to those of traditional management and in this sense provides a way to reframe situations. It is the authors' contention that Organizational Behaviour has been dominated by thinking that is predominantly linear in nature and which takes little account of the concepts of balancing, and re-inforcing feedback mechanisms which will be discussed later in the paper.

The systems methodology discussed in this paper has been used to teach Organizational Behaviour to 10 classes of graduate level students, over a 3 year period. It is felt that, as systems thinking necessitates understanding the long term consequences of behaviour, its application is more appropriate to students with prior business experience, such as 'mature age' students, rather than under-graduate students. System thinking seeks to deepen the existing understanding and lead to an examination of the mental models that students have about the management process.

## **DISCUSSION**

Glass's (1996) observations about the non-linear nature of today's business environment are relevant to the design of the teaching syllabus of Organizational Behaviour at the postgraduate level at Monash University. This has been achieved by the application of fundamental principles of systems thinking and system dynamics. The following discussion outlines some of the insights gained from using systems thinking as an informing paradigm in the teaching of Organizational Behaviour. Systems thinking concepts enable the practitioner to view organisations and their sub-

systems as more than simply linear systems which behave in predictable ways. Systems thinking incorporates feedback from positive and negative reinforcement systems that open up the possibility of non-linear and hence unpredictable behaviour. For example, an organisation may elect to use overtime, and penalty award rates to create extra operational capacity when required. In practice, however, this approach may not be successful because the workers may actually slow their work rate to spread the work over a longer period and ensure they have work left for the more highly paid overtime. In effect, the reward for working longer hours of the penalty payment rates could actually lower the productivity level. In this example, productivity does not increase with the reward level in a linear fashion, but rather declines as the reward level increases.

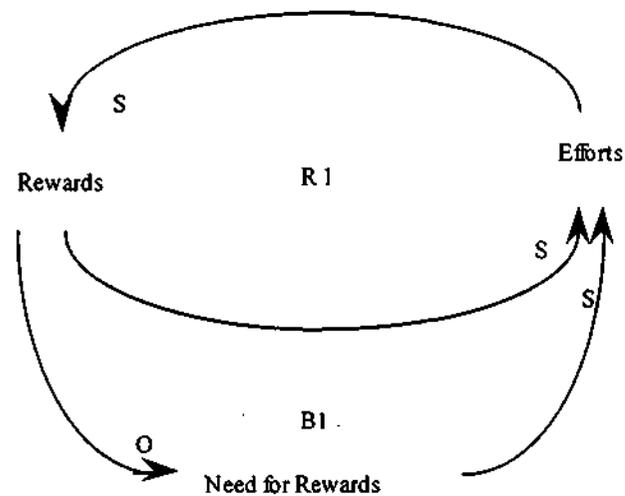
Goodman (1991) concluded that systems thinking can be thought of as a language for communicating the complexities and interdependencies of change in an organisation. The specific set of language rules that govern systems diagrams can reduce ambiguities that may occur when analysing complex issues. It also forces an explicitness of mental models.

As a communication framework it has the following advantages:

1. It focuses on the "closed interdependencies" and therefore on circular rather than linear relationships.
2. Systems thinking tools such as causal loop diagrams and archetypes are a visual language that help clarify and summarise complex issues and clearly identify the key elements involved. The use of this visual language introduces the student to the important process of "exposing mental models" (Forrester, 1993, p.190). The exposure of mental models involves surfacing assumptions, often implicit, in the way students think about organisational issues. Class discussions about the use of money as a motivator, for instance, invariably surface assumptions about human behaviour, the nature of work and issues of "higher order motivation" that are often taken for granted.
3. It is the rigorous use of the language of systems thinking, which includes feedback, positive and negative loops, lags, necessary and sufficient causation, reference mode behaviour which lays the basis for these discussions to take place under a set of rules that helps provide common ground for debate.

Causal loop diagrams (CLD) can provide a useful way to illustrate how variables in a system are interrelated in the form of a closed loop that demonstrates cause and effect linkages (Lannon-Kim, 1991) and are an important component of the language of systems thinking (Forrester, 1993). There are certain terms or "language" used in causal loop diagrams (Kim, 1990). An arrow ( $\rightarrow$ ) indicates a causal link between two variables. An S placed next to an arrowhead, indicates a causal change in the same direction. An O indicates a causal change in the opposite direction. An R indicates a "reinforcing" loop that amplifies or compounds change. A reinforcing loop can be described as a positive feedback loop that amplifies change. A B represents a "balancing" feedback loop that seeks equilibrium by negating change in one direction by pushing in the opposite direction (Kim, 1990).

Causal loop diagram techniques will now be applied to the reward - productivity example given above. The relationship between reward and motivation is often seen as a continuous reinforcing process. However, systems theory would propose that the reward-motivation link would strike a negative feedback or balancing loop in the form of the satiation arising from a decline in the need for the reward.



**Figure 1: Reinforcing and Balancing Loops**

This paper will now apply systems thinking concepts and causal loop diagrams to shed further light on House's Path Goal Theory of Leadership (Robbins, 1991). This is an excellent example of an organisational behaviour theory that, when combined with systems thinking, yields useful insights for both the practitioner and researcher.

### **Causal Loop Diagrams and House's Path Goal Theory of Leadership**

According to Kim (1990) causal loop diagrams, "...make explicit one's understanding of a system's structure, provide a visual representation to help communicate that understanding, and capture complex systems in a succinct form." (p.3). Forrester (1994) concluded that the most important single concept to be understood about systems thinking is that of the feedback/closed loop structure. From a system dynamics perspective, a causally closed system is one in which the causes creating the behaviour of interest lie within the system (Forrester, 1994).

Richmond (1993, p.124) stated that:

When exercising closed loop-loop thinking, people will look to the loops themselves (i.e., the circular cause-effect relations) as being responsible for generating the behaviour patterns exhibited by a system. This is in contrast to holding some set of external forces responsible; external forces tend to be viewed as precipitators rather than as causes. They are considered to be capable of calling forth the behaviour patterns that are latent within the feedback-loop structure of a system but not of causing these behaviours (in the sense of shaping their essential characteristics).

House's Path Goal Theory of Leadership states, "...it's the leader's job to assist his or her followers attaining their goals and to provide the necessary direction and/or support to ensure their goals are compatible with the overall objectives of the group or organization" (Robbins, 1991, p. 369). Path goal theory also identifies four styles of leadership: Directive, Supportive, Participative and Achievement-oriented, all of which a leader will use to get a "best fit" according to varying

situations (Vecchio, Hearn & Southey, 1992). The Path Goal Theory is a contingency model that holds that effective leadership is a function of the interaction between these leader behaviours and contingency variables, in particular subordinate characteristics and environmental factors. Essentially, the leader clears the pathway towards individual and organisational goals. This in turn motivates the followers. Motivated followers have an impact on the environment, internal and external. This in turn may change organisational goals which affects leader behaviour. The situation is one of ongoing dynamic exchange not only between the variables as the theory suggests but also over time and with feedback as systems thinking principles suggests.

In teaching House's theory and using systems thinking as an informing paradigm to illustrate the issues of causation, students are required to develop models of increasing complexity to capture the dynamic interaction between leader, followers, organisational goals and the external environment.

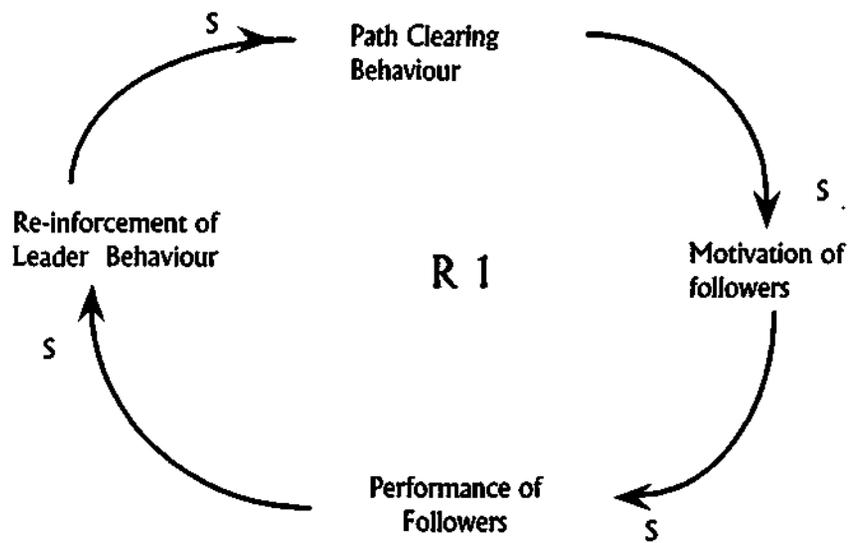
The causal modeling methodology is useful for two reasons. First, it provides a powerful visual medium for explaining ideas to students and it provides a simple grammar for the discussion of organisational phenomena. Second, it is an excellent technique for enabling students to appreciate the need for qualitative thinking when discussing the process of management. This is important as the need for developing complex, long term causal connections and feedback loops is essential for the understanding of the dynamics of the management process.

In the first step of this process, students generate a partial feed back loop which focuses on leader behaviour, path clearing behaviour and motivation and performance of the followers. Figure 2 represents this concept in diagrammatic form and demonstrates that this theory defines motivation as the only determinant of performance. The implication of such a linear model is that this behaviour has no potential limits as the leader continues to clear the path, the performance of followers continues to increase. This is clearly not the case. In creating such diagrams, the students gain an understanding of the use of systems thinking constructs to create richer and more complex models necessary for understanding the management processes. In this case, it is a consideration of two questions: Is there a limit to this behaviour? and What motivates the leader?



**Figure 2: Linear Model of Leadership**

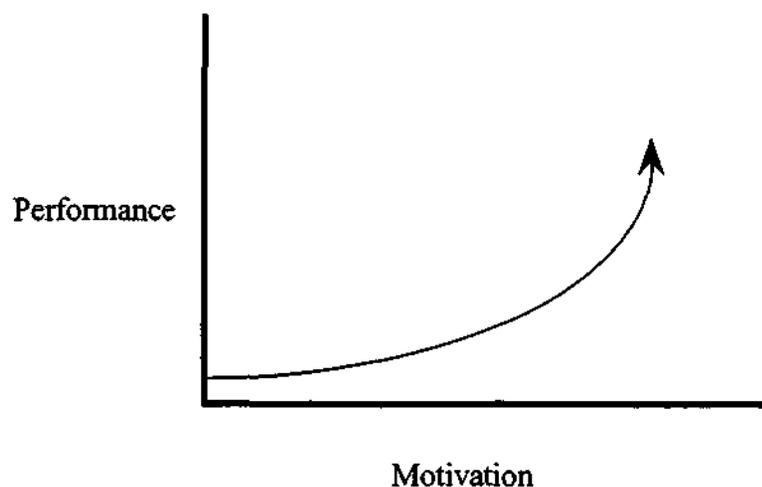
This example was designed to focus on the behaviour of the leader. For the purposes of this discussion, let us assume that there is a direct and single causal link between motivation and performance. The model developed by Porter and Lawler provides a more comprehensive and systemic view (Porter and Lawler, 1968) and is illustrative of the importance of feedback both in motivation in the real world and in understanding behaviour in a class setting. Porter and Lawler suggest that behaviours (desired or undesired) should provide the feedback for whether or not the behaviour is repeated. Figure 3 demonstrates how the linear model of leadership could incorporate feedback loop.



**Figure 3: Closed Loop for Leadership.**

It is here that specific systems thinking concepts such as causal loop diagrams (CLDs), are used to generate pertinent questions in the classroom. These questions arise from the process of *closing the loop*. The first stage of understanding arises from an understanding of this loop as a re-inforcing, or positive feedback loop designated by R1. To gain this understanding, the students are *walked through the loop*. They see that, as path clearing behaviour increases, motivation increases, designated by the S on the causal connection arrow, performance increases, as performance increases re-inforcement of leader behaviour increases and as re-inforcement of leader behaviour increases, path clearing behaviour increases. The cycle is then repeated.

At this point, students are introduced to the concepts of reference modes and behaviour over time. A reference mode is a representation of behaviour over time. It takes the form of a graphical representation of the anticipated relationships of two variables. A relevant question to ask at this stage is, *What will performance do in this model?* The model implies that it will increase. The reference mode that students usually produce is shown in Figure 4.



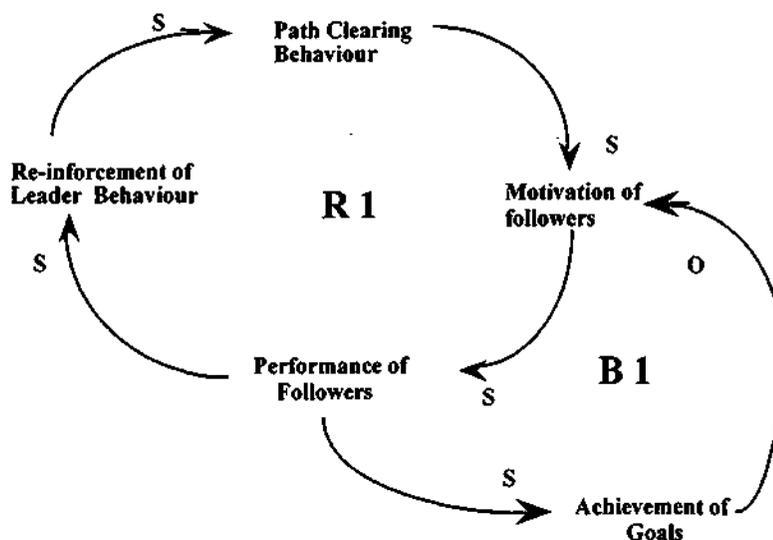
**Figure 4 Reference mode for Performance.**

The more astute students will suggest that the curve explains situations where motivation is increasing and the re-inforcing loop sets up a virtuous spiral, where performance improves. However a vicious spiral where motivation declines leading to a deterioration in performance could also be represented by a reference mode diagram.

Linear models such as House's Path Goal theory, however, do not address such questions as whether motivation, and consequently performance, is stable, increases or decreases over time. It is only when feedback is incorporated into the model that students can be led to consider such issues. Nor does House's theory address the question of what may lead to changes in behaviour over time in the total model. In this case, it is suggested that leader behaviour is influenced by subordinate behaviour. This is a *mental model* of what motivates leaders. It is not necessarily true, but it does serve to introduce to students the question of what motivates leaders.

The causal loop diagram in Figure 4 suggests that the behaviour in this re-inforcing loop would go on forever with the performance of the followers improving infinitely. This clearly is not sustainable over time. Here the important concept of balancing or negative feedback loops can be introduced. Each positive feedback loop, such as the closed loop for leadership, will eventually strike a negative feedback or balancing loop. That is, there is a point where there is a limit to the increase in follower performance. For example, the workers can become tired, go on holiday or resign. All of these are negative feedback mechanisms that limit the growth in performance.

Discussion of these balancing and re-inforcing loops for the leadership example help the students raise questions such as: Will leadership behaviour become ineffective once follower goals are met? What is the impact of satisfying follower needs over the long term? Will it result in a gradual replacement of organization goals with individual goals or is it possible for leaders to continue redefining goals over extended periods of time? Figures 5 and 6 represents two possible stages of the development in the student's thinking of the effect of balancing and re-inforcing loops.

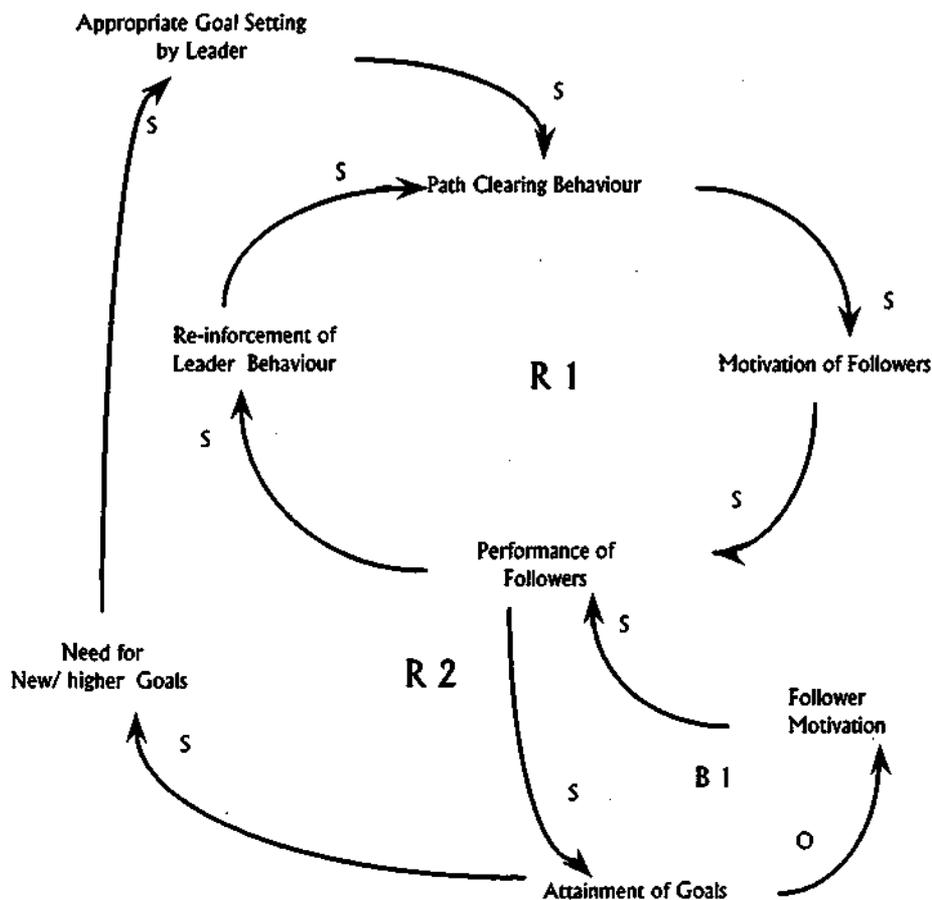


**Figure 5: Incorporation of a balancing loop.**

Loop B1 in Figure 5 indicates that, as performance increases, goal achievement increases, as goal achievement increases, motivation declines (notice the O, indicating an opposite movement on the causal arrow). Students can now walk through the model again and test the implications of

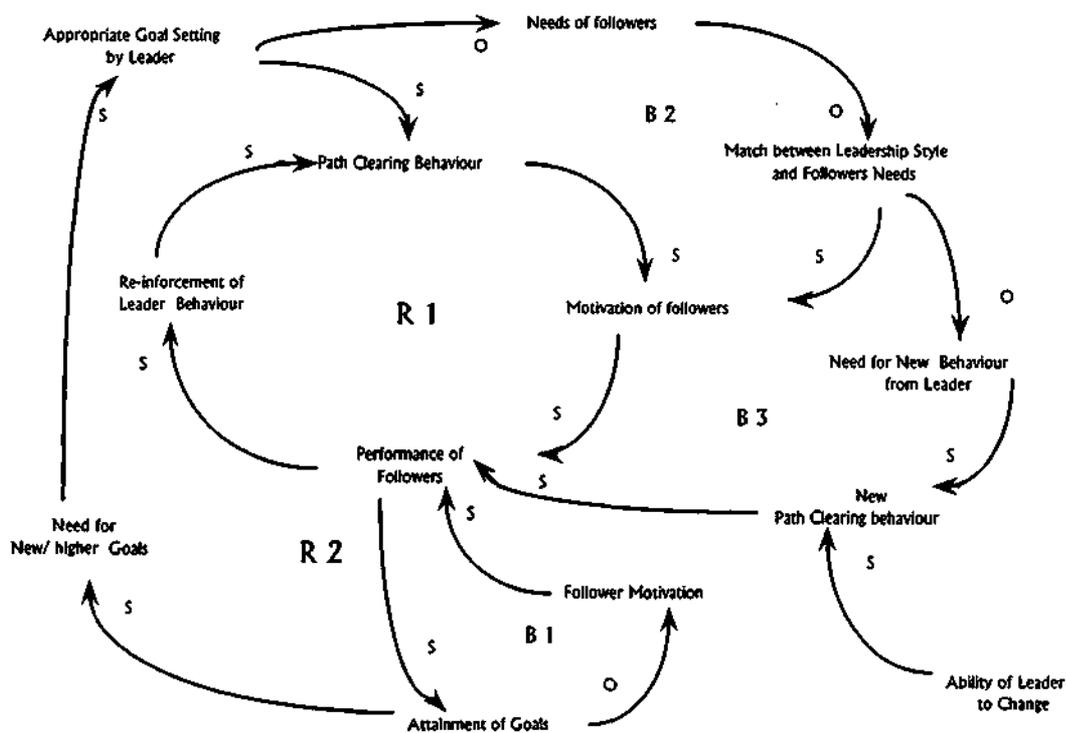
declining motivation on the model. At this point, they can discuss the effects of declining performance on leader behaviour. This leads the discussion of leadership motivation into the deeper issues of what motivates leaders.

By now students are capable of developing more complex models that capture the likely behaviours in this situation.



**Figure 6: Extended Loop for Leadership.**

At this stage of the model development students can suggest the dynamics of the inter-relationship between leader and followers and identify goal re-setting as a possible activity for a leader. They will recognize that there are limits to the extent that followers can be motivated as shown in the balancing loop B1. As the goals of the group are redefined, the needs of the followers will change, thus a new model emerges which allows some constraint on motivation and performance that will necessitate new behaviour from the leader.



**Figure 7: Leadership Model with Constraints of Leader's Ability to Act.**

The revised model in Figure 7, enables the students to identify the leverage point in the system which also concurs with that proposed by the House theory. This leverage point is the ability of the leader to adapt the leadership style to meet changes in contingencies. This is a contingency theory of leadership which suggests that the leader's behaviour is contingent on a range of factors. In particular, House's theory suggests that the leader's behaviour is contingent on environmental and subordinate contingency factors. However, such a theory remains a linear proposition because there is no explanation of how the outcomes of the system such as performance and satisfaction feed back into the leader's behaviour and then into the whole system. This is the contribution that a systems thinking perspective can bring to students understanding of this model of leadership. It endeavours to 'close the loop' by feeding the outcomes back as inputs. In this context systems thinking becomes an extension of contingency theory, dealing with the same concepts of interrelation and interaction, but adding the rich complexity of feedback. It also moves students from linear thinking which is time based, to systems thinking, which is causation based.

## CONCLUSION

Organisations often operate as open systems which are characterised by non-linear feedback environments (Glass 1996). It is important that business, and particularly management educators, use tools and frameworks that enable students to come to terms with these issues. Systems thinking concepts are becoming increasingly accepted and, as shown in the example in this paper, can act as an *informing paradigm* for organisational behaviour concepts, as well as make them more relevant and useful in many students' work environments.

Richmond (1993) defines seven critical thinking skills for systems thinking:

1. Dynamic thinking to understand behaviour over time

2. Closed loop thinking as feedback thinking which helps see situations not as a result of external forces but as a result of the dynamics of the structure.
3. Generic thinking to understand the similarities that emerge across systems.
4. Structural thinking to deal with the rate-flow-stock problem.
5. Operational thinking as an extension of structural thinking, but including the dynamic effect of time. The focus is on conservation and flow.
6. Continuum thinking which is established by model simulation and determination of the outcomes that are continuums based on the dynamics of the model and not a result of "if-then-else" thinking.
7. Scientific thinking which introduces the need for quantification and hypothesis testing.

In our experience at Monash University, the first three skills, dynamic thinking, closed loop thinking and generic thinking, have been applied to the teaching of organisational behaviour. We have used causal loop techniques as the main tool to establish the concepts of causation, positive and negative feedback (or in causal loop terminology, re-inforcing and balancing loops) and closed-loop feedback systems. Skills 4 to 7 have been used to successfully teach subjects such as strategic management where the modeling principles are applied in depth. Using the systems thinking concepts as an *informing paradigm* for the teaching of organisational behaviour also reinforces for students the interconnections and cross fertilisation of concepts in the different subjects that they undertake in their business degrees.

The application of systems thinking techniques is becoming increasingly relevant because of the degree of environmental turbulence most organisations are experiencing (Glass 1996). Systems thinking is a useful language for communicating these complexities and interdependencies (Goodman, 1991). It has been argued that the application of these fundamental systems thinking concepts can increase students' understanding of how the organisational behaviour concepts can be applied to their own work situations. This approach concurs with Troncale's (1995) perspective which is that the strategy for the success in teaching systems sciences is being able "...to use them to teach widely accepted and critically important subjects." (p.642). Systems thinking should be viewed as an enabling discipline or *informing paradigm* methodology for inclusion in organisational behaviour teaching. This approach opens up for students the possibility of developing an added perspective through the integration of different paradigms.

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