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## Minds at the edge of chaos

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## Minds at the edge of chaos

### Abstract

The concept of a mental model is increasingly becoming of interest to organisations, as it is a person's beliefs, thoughts, interpretations, or otherwise termed, 'mental model' that can affect our actions and therefore how people achieve organisational outcomes (Jensen & Rasmussen 2004). This paper establishes a robust definition of the concept of a mental model for future research. The research was conducted using coherent conversations as part of a complexity-based inquiry. This project seeks to understand and explore the views held by individuals about actual work practices and ideal work practices. This research concludes that the individuals, who make up the organisation, are in a state of chaotic edge thinking, where everything is perceived as a threat, procedures are formed to control, and people react radically. Moreover, this is concluded to be due to miscommunication and a lack of communicative connectedness between staff and supervising managers.

### Keywords

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### Disciplines

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# Minds at the edge of chaos<sup>1</sup>

by Laura Murray and Genevieve Watson<sup>2</sup>

## Abstract

*The concept of a mental model is increasingly becoming of interest to organisations, as it is a person's beliefs, thoughts, interpretations, or otherwise termed, 'mental model' that can affect our actions and therefore how people achieve organisational outcomes (Jensen & Rasmussen 2004). This paper establishes a robust definition of the concept of a mental model for future research. The research was conducted using coherent conversations as part of a complexity-based inquiry. This project seeks to understand and explore the views held by individuals about actual work practices and ideal work practices. This research concludes that the individuals, who make up the organisation, are in a state of chaotic edge thinking, where everything is perceived as a threat, procedures are formed to control, and people react radically. Moreover, this is concluded to be due to miscommunication and a lack of communicative connectedness between staff and supervising managers.*

This project seeks to understand and explore the views held by individuals about actual work practices and ideal work practices. The paper initially states the definition of a mental model, developed for this research via an extensive literature review. The research is a complexity-based case study, of the individual mental models of staff and management, about work practices, within a not-for-profit organisation with data provided from coherent conversations. It is concluded that the mental models held by management and staff about work practices are different and that the organisational environment is characterised by a negative phase space due to miscommunication or a lack of communicative connectedness. The conclusions have

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<sup>1</sup> This study has been approved by the University of Western Sydney Human Research Ethics Committee (HREC). The approval number is: H8402. Permission was also gained from the organisation to contact potential participants and conduct the study.

<sup>2</sup> Laura Murray is a Phd candidate and Genevieve Watson a Lecturer in the School of Management at University of Western Sydney

implications for work integrated learning. Following the conclusions recommendations are made for further research.

To avoid confusion, this research will use the term 'management' to describe executive or supervisory employees and 'staff' to describe non-executive employees as this is how people, employed in the organisation, describe employees at different levels.

The term 'mental model', developed from a literature review for use in this research, refers to an individual's mental model; a mental model held by one person rather than the widely researched and discussed concept of a shared mental model. Therefore, the concept of an individual 'mental model', when used as a term in this research refers to:

*A concentrated, personally constructed, internal interpretation, of external phenomena (historical, existing or projected), or experience, that affects how a person acts.*

Other authors have also been thorough in defining a mental model, and in specifying how they have been able to identify and access an individual mental model, in their research papers (Brantley 2009; Carley & Palmquist 1992; Christensen & Olson 2002; Friedman 2004; Grunert et al. 2010; Hill & Levenhagen 1995; Johnson 2008; Kim 1993; Morrison & Rosenthal 1997; Solansky et al. 2008; Zhang 2008).

Through looking at the past research of the concept of a mental model, it is evident that varying methodologies have been used to study the concept and its impact. In summary, the different methods that have been used to extract peoples mental models, include; case study analysis including historical case study analysis (Harrison & Boyle 2006; Jensen & Rasmussen 2004); the taxonomic cognitive interview procedure (Hodgkinson & Johnson 1994); qualitative interviewing and document analysis (Brantley 2009); conceptual modelling (Chen 2005; Friedman 2004; Hill & Levenhagen 1995); textual analysis (Carley & Palmquist

1992); mapping (Carley & Palmquist 1992; Kim 1993) and more recently the repertory grid technique (Crudge & Johnson 2007) and the laddering method (Grunert, Trondsen, Campos and Young 2010).

To date, amongst all the methods used to research the concept of an individual mental model, a complexity-based inquiry method has not been used. Moreover, it was discovered that some theorists have overlooked defining the concept of a mental model in presenting their research while attempts to define the concept are somewhat ambiguous. Therefore, this research aims to fill these gaps in the literature by the creation of a definition to be used for this and further research of the concept in organisations, and by using a complexity-based inquiry method for analysing the mental models of individuals within an organisation.

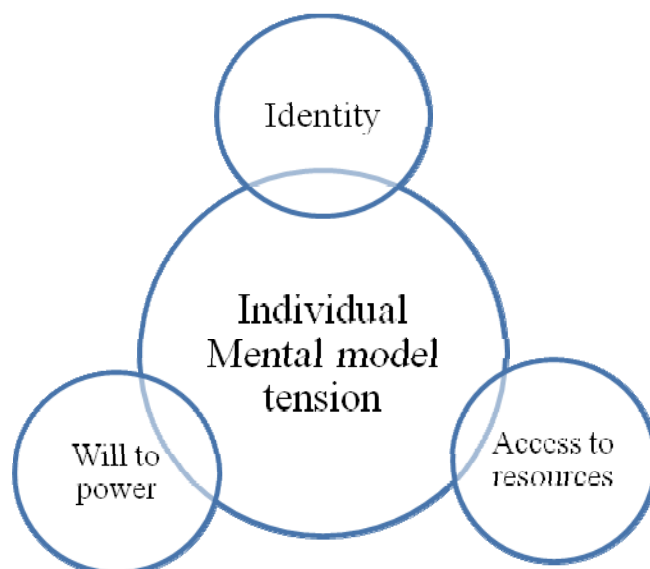
As part of a complexity-based inquiry method, coherent conversations, attractor and fractal analysis, along with the metaphors described in Kuhn's (2009) book, were specifically selected as the principal tools to provide an understanding, of the mental models of staff and management, about work practices. Specifically, the findings are discussed in terms of attractors, fractility, communication connectivity, phase space-phase space and edge of chaos positioning- chaotic edge thinking.

A total of fifteen individuals, eight management and seven staff, were chosen as participants through purposive sampling as the focus of the research is aimed at specifically investigating people that have the characteristics of management, or staff, in the organisation (O'Leary 2010). Those people in the organisation, identified as management or staff, were each given an information letter and consent form and were invited to volunteer to take part in the research with the opportunity to withdraw without penalty at any time.

This research uses coherent conversations to create a continual open ended conversation between the participant and researcher. Coherent conversations generate narratives that then can be analysed through complexity-based techniques such as fractal narrative analysis,

attractor narrative analysis, communicative connectedness and phrase space (Kuhn & Woog 2007) to reveal the participants' mental models of work practices

The mental models of work practices as held by people working at management level revealed a tripartite attractor set. This attractor set conforms to what is known as the Universal Human Attractor Set (Kuhn 2009) or the Globalization Attractor Index (Woog & Dimitrov 2004). The three attractors within this set, identity, access to resources and will to power are shown to be the organising motifs around which the manager's mental models are organised. However, different to the universal human attractor set identified, a fourth attractor was found in the data, 'individual mental model tension'. This fourth attractor comprises of an individual's struggle or tension with finding a balance within their mental models, of the current work practices and their mental models of ideal work practices. Essentially the fourth attractor is so great that the tripartite attractors are shaped around this tension (see figure 1 below). It is important to highlight that although management as a group is motivated by these attractors, each manager associates with the motivator in different ways.



**Figure 1: Management's attractor set**

Identity is “that constructed image into which the human entity is born, wants to be seen and by which it seeks distinction from others” (Levick, Woog & Knox 2007, p.258). Identity is how an individual recognises and uses differences from, and sameness to, others to classify others as, belonging to ‘one of us’ or, being dissimilar (Kuhn 2009; Melucci 1996).

The first aspect of identity, as a major attractor, is concerned with; the permanence of the organisation over time, and across changing circumstances. This can be applied generally to the way things are done, that is, the current work practices, at the organisation.

The second form of identity relates to; how an individual differentiates themselves from others and places themselves in perspective with others in the organisation. At the organisation, this form of identity motivates management to distinguish from other management through looking at how the other managers complete the same task, the same work practice. Five, of the seven managers interviewed, discussed their mental model of the same work practice indicating the identity formed around the same task is revealed as being different for each manager. Each manager has differentiated themselves from the others in discussion. Essentially, the attractor of identity influences managers to find themselves within their environment and situation.

The third aspect of identity relates to; the ability of an individual to see themselves as belonging to others, as ‘one of us’. In the conversations, management consistently use the term ‘we’ as a reference to the organisation as a whole while they use ‘they’ when talking about staff. However, it is willingly made obvious as the coherent conversations continued that management don’t identify with other management as belonging to each other as a group.

The data shows that people working as management have used the third aspect of identity to differentiate themselves from staff but also from their own colleagues. Essentially, this form

of differentiation from their own colleagues (identity) motivates their behaviour as evidenced in the mental model revealed.

According to Kuhn (2009, p.110), in order to “maintain the integrity of our identity as well as our difference from others we require access to resources”. The resource of most concern, the most commonly referred to in the mental models held by management, is the access to knowledge. To function as a manager, the need to make the most of organisational knowledge is greater now than in the past, as the changes in the climate of the organisation means companies will differentiate themselves on the basis of what they know (Davenport & Prusak 2000).

This means, that having access to, or gaining access to, knowledge can motivate the behaviour of an individual. In the mental models held by management, knowledge about the operations of the organisation is held by only a few managers. Participant 8 openly discussed the organisation’s way of limiting knowledge, and also the restrictions made to prevent other managers gaining knowledge.

Moreover, it is repeatedly discussed by management that the organisation has not invested in training staff, and that they, as management, withhold some information staff require to understand and complete their role in the organisation. Some managers say that it is their duty or role to give staff access to the knowledge that they require to complete their jobs. In saying so, however, these managers have not considered that their limited access to knowledge may be a precursor to staff’s limited access to knowledge.

Another resource issue that was revealed in the mental models of management is the limited access to staff. Two managers (15, 4) talk at length about the issue of cutting back shifts, being a necessary part of their work practice, while a third manager (8) discusses the limited time, or limited thought, put into accessing new staff for employment. This impediment to the



human resources of the organisation is a motivator or energy that shapes the managers behaviour on shift, as they talk about having to look at ways of sending people home early when it is not busy and delegating the extra work to those still working. The third manager also argues the difficulties in accessing new staff. They are concerned that hiring staff is always done at the wrong time, suggesting that the organisation is regularly struggling to find access to staff.

The third attractor motivating behaviour of management is the will to power. Participant 12 described a situation where they strive to have their own views about the future of the organisation accepted, however it is quashed by another's psychological drive to manage and control through their views.

This overt display of power shows how the participant struggles to organise and manage the work practices of the organisation with others, by trying to make other managers see their view of future strategies for the organisation. Generally, across the managements' mental models the will to power is seen through the descriptions of restrictions put on what some managers are told they can and cannot say. Other managers argue that the work practices in the organisation are framed to control.

Additionally, the will to power can be seen in the desire or craving for worldly success as some managers strive to have their own views, beliefs, and interpretations of reality accepted. The mental models expressed show how each manager controls and overcomes using power in their own way.

In the next section the will to power is further enhanced by the 'individual's mental model tension'. This means that the further their mental model of current work practices strays from the persons mental model of perfect work practices, the more power is exerted through an attempt to make others see their way.

The will to power has allowed for the fourth attractor of ‘individual mental model tension’ to materialise in the management data. Individual mental model tension refers to; the tension in a manager’s mental model between the current reality of work practices at the organisation, and their mental model of a future way of doing things in the organisation. This tension arose out of each manager’s desire for their own identity, the will to power and access to resources, making four attractors (see figure 1) of which a manager’s behaviour is motivated by.

In discussing the work practices of the organisation, the seven managers that participated in the research, expressed their view of current reality, and throughout the conversation referred to what they envision the organisation should, or could do, to get things done more efficiently.

Participant’s 11 and 4 describe a tension between their mental model of the current work practices, and the way they see things should be done. The vision is to be more flexible, adaptive and efficient. This tension motivates the behaviour of the managers as they endeavour to try and find a balance between what is currently accepted as the way to do things, and the way they would like things to be done. This struggle for tension balance is described by another manager as they discuss how decisions, about what needs to be done, are made. This particular participant is using the reactive framework based on the occurrence of critical incidents (current reality) to make changes to the whole organisation, which, as a result, enables other areas of the organisation to benefit also (vision).

Dissimilar to management, the data obtained from interviewing the staff, has not presented a collective attractor set which all individuals have differentiated and shaped their mental models around. It was found that the attractors motivating staff are different for each individual. Thus, the attractors found in the mental models of staff at the organisation include: customer service, sustainability, money, teamwork, and gratitude.

From the interview data, it is found that participants 6, 9, 3 and 2 thought of customer service as the most important work practice for them. Despite this similarity among these four staff members each discussed a different aspect of customer service.

On the other hand, participant 13 along with participant 2 who has already been described as being motivated by customer service, are both motivated by an interest in the survival, or sustainability of the organisation. It can be suggested that the survival of the organisation, as an attractor, could be considered to be a positive feature for the organisation. This means that, for these two staff members, every work practice, or action, will be shaped around ensuring that the organisation is perceived by customers as a place to return to.

Participant 14 spent the conversation voicing their concern for the lack of guidelines at the organisation and how valuable their knowledge and experience, gained from other workplaces, has been in deciding what needs to be done at the organisation. Through their very honest dialogue the participant talks of different scenarios relating to the lack of respect for seniority from staff and management; the lack of communication; and the increased rudeness and unpleasantness they receive from staff and management. Therefore, it is not surprising that this staff member is motivated by money, keeping the job for money. The attractor is shaping the behaviour of the individual in that they are becoming complacent with the unfair, unguided work practices and just remembering to “get along with it” for the money.

Participant 10 has been at the organisation for about 10 years as a staff member. The conversation about work practices lead to them revealing mental models of historical, existing and projected operations of the organisation. Historically, their mental model of work practices is that in the past the organisation was less controlled, while their existing mental model of work practices is that “I just think there are more rules and regulations coming into

the (organisation)... I think the (organisation) does ultimately control the staff and is now less trusting” (10). The participant’s mental model of projected phenomena is seen in their thought that change in rules and regulations will continue to occur at the organisation as “I think in society, things are getting like that” (10). More importantly, the participant’s behaviour is affected by the personally constructed mental model of external phenomena (historical, existing or projected) whereby they are motivated by the aspect of staff working together as a team. Essentially, it can be suggested that teamwork is an energy around which this staff members working life is organised, as a result of their personally constructed mental model of historical, existing and projected work practices.

When answering the question about the most important work practice undertaken in their job, Participant 1 tells of a real life situation of good customer service they provided and the gratitude they received. Through talking about their experience of this particular night, the participant has expressed that it was through the gratitude of customers that they are motivated or attracted to continue their strong value of customer service in their actions.

Described by Kuhn (2009) communicative connectedness is about looking at the quality of interconnectedness between the self organising, dynamic and emergent complex system. As a complexity perspective conceives everything as being related to everything else, such as in relationships, examining the quality of interconnectedness is critical. Essentially, it is argued that by looking at the type and quality of the communication between people in an organisation, the nature or character of the organisation will be revealed (Kuhn 2009). In the mental models of both management and staff communication is a primary issue discussed as being insufficient and inflexible, restrictive and differing between management and staff depending on who is rostered on shift.

In the data arising from conversation, it becomes obvious, through the dialogue, with both staff and management, that there lacks sufficient, open communication throughout the organisation. Furthermore, participants have also expressed that the current types or ways of communicating (memos) are inefficient; expressing the need for more face to face or verbal communication as opposed to memos. Additionally, seven other participants have expressed the need for staff meetings, and five participants have expressed the need for management meetings.

In the conversations with participants, two staff participants expressed a concern regarding the restriction, by the organisation, of staff not being able to talk to other staff, and customers, while working. Both the participants described the restricted communicative practice as an unnecessary work practice at the organisation. Furthermore, participant 13, discusses how the organisation is really severing the possible benefits of having staff communicate effectively at an appropriate time to get the job done. Instead, as a result of the restriction on communication, staff members are providing lesser customer service as they are having a conversation with their colleague while serving a customer at the same time, thus impacting on the work practice of providing good customer service.

Another aspect of communicative connectedness discussed by thirteen (2,3,4,5,6,7,8,10,11,12,13,15) of the fifteen participants is that communication differs on every shift. In the mental models of participants the quality of relationships varies between staff and between staff and different managers. It can be suggested that this difference in the relationships built with each manager and staff member is the problem underlying the difference in communicative connectedness experienced each shift. Essentially, the distinct difference in the quality of communication (relationship) causes a collapse of interconnectedness.

The participant's mental models support the importance of the complexity metaphor of communicative connectedness in that they have expressed a need for interconnectedness between all people involved in the organisation. It can be suggested also that the lack of communicative connectedness discussed by participants, both management and staff, explains why the data revealed that all people in the organisation have different attractors and mental models. Essentially, due to a lack of communication, the connection about work practices, and sharing how each perceives to get things done, is lost. Thus, due to this disjuncture, several participants have made requests for improved communication through a more flexible, open communicative connectedness system.

Fractal analysis means to look for patterns existent across multiple scales of the organisation. From the data, it appears that across all levels of the organisation (organisation, management, staff) there is something conflicting with the level, preventing or impacting on getting things done efficiently. The organisation must comply with the external (legislation) and internal (memorandum and articles of association) environment and this impacts on how things get done in the organisation.

The conflicting element for management is their individual mental model tension in which their vision and the current reality or current way things are done and structured are in conflict or tension with each other. While for staff the conflict with getting things done lies in the many different mental models and attractors that the collective of staff hold. In the data it has not been found that staff have a similar attractors for which they shape their individual mental model around (such as in the case of management), instead each staff has a different attractor and different mental model about how things get done.

The second fractal apparent across all scales of the complex system refers to the miscommunication discussed by participants in the data. It can be seen from the conversations

that when discussing their views about the work practices at the organisation management are focussed on the bigger picture while staff focus and choose to discuss the day to day activities. This can be seen where a manager (participant 5) argues that the way in which work practices could be improved is through motivation, while a staff member (participant 2) argues that the way in which work practices can be improved is through getting new equipment.

It can be suggested that this difference in perspective accounts for the miscommunication between management and staff as each level is focussing on a different aspect of the operations of the organisation. Nonetheless, it is distinctly obvious that there is a miscommunication issue between staff and management. Moreover, there is horizontal miscommunication between managers evident where a manager discusses the difference in focus on important tasks and that managers are not working together. This miscommunication or lack of communication can then be seen between higher level management and staff. Also, the fractality of miscommunication is evident between higher level management and lower level management. Miscommunication is a fractal identified in the data as it is evident across multiple scales of focus, the organisation, and through the dialogue of management and staff.

When you take a step back and consider the attractors of staff and management, it is obvious that identifying the attractors helps to understand the phase space of both management and staff. For management their phase space construes a world where there is much tension, control, and where change is a result of a reaction to something going wrong. According to Kuhn and Woog (2007) phrase space, on the other hand, is the ability to describe, or talk into being. Therefore, it can be suggested that phrase space is evident through management's talking into being the reactive and somewhat negative atmosphere of the phase space.

Management have described and talked into being the phase space that exists, thus making it phrase space.

For staff the phase space can be seen as conflicting through communication, and lacking of order. Staff members described and talk into being a lack of standard for work practices or the need for clearer directions, while also reinforcing that the conflicting communication from each manager leads to confusion. Overall if you compare the phrase space of staff and management, it could be suggested that both are very negative, suggesting that the possible phase space of the organisation is also negative.

A person holding an edge of chaos perspective views their environment as full of potential. It is also suggested that organisations exist within an environment of chaotic edge thinking where people view their situation as full of threat. An edge of chaos perspective is what participant 9 is trying to achieve through their attempt to make the organisation see that adaption and development should be fostered.

However, despite the participant's efforts, the organisation remains in a chaotic edge thinking situation where the work practices are being formed to control and ensure threat is minimised. This concept of designing practices to minimise threat to the organisation is confirmed where each participant discussed the way in which the organisation minimises change or threat through control.

The purpose of this research as to compare the mental models about work practices as held by staff and management working at an organisation using a complexity-based inquiry. A complexity perspective offered a way of seeing the organisation as comprising of a number of interacting, self organising entities with identifiable, underlying patterns of order and relationships.



A definition of the concept of an individual mental model for use in this research, and future research, was developed, as a review of the literature found no clear and unambiguous definition for research of the concept in organisations.

Fundamentally, when the mental models of work practices as held by management and staff were compared, they were found to be different. Not only are management and staff mental models different when compared, but within the two participant groups, mental models are different.

To sum up, it was evident in the mental models of work practices as held by management that there is a sense of permanence in the way things are done. Knowledge is a resource that management speak of having limited access to, but they also recognise their own restrictions on sharing knowledge with staff. Managers use their will to power to attempt to have their beliefs and views about the way things are done and should be done heard. The attractor 'individual mental model tension' was introduced as a motivating force behind the actions of management, that on a day to day basis, an individual manager struggles to balance the current reality, with their vision.

On the other hand, staff mental models of work practices find no collective attractor. Each individual participant finds comfort in their own understanding (mental model) of the attractor that motivates them. As opposed to management's attractors of identity, access to resources, will to power and individual mental model tension, staff attractors are identified as customer service, sustainability of the organisation, money, teamwork and gratitude. Essentially, the attractors of management and staff are different, as are the mental models of the work practices they discuss that shape these attractors. It is also evident in the data that, in numerous situations the participants of one group, say staff, had entirely different mental models of the same phenomenon or attractor.

It was revealed in the data, that communicative connectedness is a primary issue of concern of the participants. Both staff and management argue a lack of communication between shifts and insufficient, restrictive and inflexible types of communication at the organisation, and request management and staff meetings as a way to enhance the connectedness in the organisation. This lack of interconnectedness is also identified as fractal two, as it is apparent across multiple scales of the organisation (organisation, staff and management). It can be suggested that this lack of interconnectedness, lack of open communication policy in the organisation hinders the evolution of the organisation as a self organising, adaptive and flexible system.

This lack of communicative connectedness and the differences in the mental models held by management and staff, leads to the third most important concluding point. It is evident in that data, that at all levels of the organisation there is something conflicting with getting things done and this is discussed as fractal one. This means that the organisation, management and staff all have something conflicting or restricting them from getting things done. As described in the discussion of findings this includes individual mental model tension, lack of access to resources or miscommunication.

Generally, the majority of participants express a need for training at both management and staff level. It can be suggested that this request comes from a lack communication of the roles each person must fulfil. Several participants have argued that currently the lack of training accounts for many problems in the system. This negative position can be related to the generalised negative phase space of the organisation, evident in both staff and management's mental models.

Despite the significant contribution to knowledge and unique research design and findings of this research, there are several recommendations for future research. Research of individual

mental models could benefit from the use of combining a complexity-based inquiry method with observation. Using observation could support further the empirical findings here.

The research highlights the importance for students undertaking work integrated learning in an organisation to be aware of the centrality of communication and the different perspective of their work supervisor (big picture vis-a-vis a day to day focus). This information could be used to better design work integrated courses to incorporate the skills students need (as staff) to better use and feel more positive about their placements. That is, talk about their work experiences as positive spring boards at the edge of chaos rather than the anxiety ridden chaotic edge most find themselves on. The same is true for inducting industry supervisors.

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