Chaotic edge thinking

Understanding why work practices fail

Dr Laura Rook[1], Genevieve Watson
1 Charles Darwin University

Abstract

Mental models can affect people's actions and have the capacity to affect how people achieve organizational outcomes. An ethnographic complexity-based inquiry into the mental models of staff and management about work practices was undertaken within a not-for-profit organization. Interviews were conducted to uncover the mental models held by management and staff about actual work practices and ideal work practices. A comparison of the individual mental models revealed that individuals in the organization were in a state of chaotic edge thinking, where everything is perceived as a threat, procedures are formed to control, and people are reacting radically. This was a result of the miscommunication between members of the organization and an environment characterized by a negative phrase space. It is suggested that the identification of individual mental models about work practices is beneficial for knowing how a person's actions are influenced, and in this case, why work practices failed.

Introduction

Mental models are an internally constructed thought or framework on which we base our actions. It is for this reason that they are of interest to be studied as it is our actions that create our reality[1,2]. This becomes a reality for organizations when it is realized that not only do these mental models affect people personally, but they have the capacity to affect how people achieve organizational outcomes [3,4,5,6,7,8,9,10,1,2].

The research presented in this paper was conducted within a not-for profit organization within the hospitality industry. The study examines the views held by staff and management about 'actual work practices' and 'ideal work practices'. This was examined in order to understand how mental models about work practices can impact upon the actions of the individuals in the organization.

A complexity-based inquiry method was followed. The complexity paradigm and principles offered by Kuhn[11] provides an alternative way of viewing and engaging in the sense making of the organization. In doing so, the research is satisfying the '…urgent need for new ways of approaching and engaging with organizational life'[11]. In a complex system there are numerous interacting agents, and in the case of organizations, people and groups are the agents which adapt to feedback simultaneously with explicit coordination or central communication[12]. Complexity theory was used to inform the research by viewing the organization as complex, adaptive and emergent, and through the application of complexity principles in the analysis. In addition, via an extensive literature review, a robust definition of an individual mental model was developed and used to shape the questions used in the interviews. A total of fifteen individuals, seven managers and eight staff members, participated in the research.

The study findings support the notion that the optimal place for an organization to be is on the edge of chaos where organizations as complex adaptive entities are most profitably placed. However, management and staff in the organization under study hold different individual mental models about work practices, and the environment is characterised by a negative phrase space due to miscommunication and a lack of communicative connectedness, therefore work practices are failing to operationalise.

The following sections explore the literature on the identification of mental models in research, and the use of complexity theory in application to organizational life. The methodology and methods used to conduct the research are then explained, followed by a brief description of the context of the study. The findings are then presented followed by the conclusion.

A review of the literature

Mental models

Mental models have been described by theorists in many disciplines including systems dynamics[13,14,15,16], and the interdisciplinary fields of human machine interaction, cognitive science, psychology and organizational learning[3,17,8,18,2]. In each of these disciplines theorists have followed independent paths in attempting to describe and define the concept of a mental

model [10]. As Doyle and Ford [19] have pointed out, differences about the concept and how it should be defined has hindered communication among researchers, and the definitional aspects under the same generic terms continue to go unnoticed.

As the literature presents no clear and unambiguous definition of an individual mental model for organizational research, an individual mental model definition was developed for use in this research and for future application. Mental model literature was compared and close attention was paid to the definitional aspects to reveal similarities across disciplines[10]. It was argued that in the case of defining a mental model, there is some consensus in the concept being internally held and as having an effect on how a person acts [10].The definition of an individual mental model used in this research refers to a mental model held by one person rather than the widely discussed concept of a shared mental model[20,21,22,23,18,24]. The mental model definition used in this research is presented below. For a more detailed deconstruction of each of the terms used in the development of the definition see Rook [10].

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

— Rook (2013):42

Analysis of past research, in relation to mental models highlights that various methodologies have been used to study the concept and its impact. The different methods, used to extract peoples' mental models, include: case study analysis[5,7]; the taxonomic cognitive interview procedure [25]; qualitative interviewing and document analysis [26]; conceptual modelling [27,28,6]; textual analysis [29]; mapping [29,30] and more recently, the repertory grid technique [31] and the laddering method [32]. A complexity-based inquiry method has not been used to examine the concept of an individual mental model. The complexity-based inquiry method followed in this research is beneficial in gaining insight into why particular ways of doing things in an organization occur and therefore is a good fit for mental model identification of the current and ideal work practices in the organization being studied [11].

Complexity theory

The community of scholars working with the concepts of complexity are aiming to discern the nature of complex adaptive systems. According to Stacey [33] who reviewed the positions of five leading figures in the field of complexity, Gell-Mann[34], Goodwin [35], Holland [36], Kauffman [37], and Langton [38], there are four matters in which complexity scholars take different positions. These matters are: the significance of self-organization, the nature of emergence, the importance of unpredictability and the implications for the scientific method [33]. However, what all of the scholars hold in common is an interest in systems as being comprised of a large number of interdependent, interconnected and evolving parts[39]. Essentially, 'complexity theories can offer new ways of viewing and managing organisations' [40].

Despite the numerous literatures surrounding the use of complexity in looking at systems, the primary purpose of this study was to access, identify and understand the mental models held by staff and managers about the work practices in the organization. Therefore, the principles or what is described as 'metaphors' in Kuhn's [11] book: 'Adventures of Complexity; for organizations near the edge of chaos', was specifically selected as the principal complexity paradigm to be followed. Kuhn[11] uses the term metaphor to described experiences in organizational life as she sees 'all concepts as metaphorical in nature "because" our concepts, thoughts, ideas, notions or theoretical constructs are intimately related to our consciousness, to the lens via which we see the world of our experience'. Relevant to the identification of mental models in this study, Kuhn[11] presents complexity concepts as metaphors in order to 'provide thought provoking and productive ways of understanding organizational forms, processes and practices'.

Kuhn's [11] complexity-based inquiry method provides a way of 'gaining insight into why particular ways of organising to get things done arise and persist in organizations'. This is of particular importance to this research as it allows for the adaption of the complexity-based inquiry methods, and metaphors, to the work practices by looking at my interest of concern, the mental models. The metaphors are described in the following methodology section.

Methodology

Ethnography

Ethnography is a qualitative approach to research that aims to arrive at an in-depth understanding of how individuals, in different cultures, make sense of their lived reality [41]. This study sought to identify the individual mental models of management and staff. As such, the very nature of the concept of a mental model, being internally held, supports the ethnographic approach to understanding how different groups make sense of their lived reality. In essence, an ethnographic approach was adopted as the research sought to reveal the intricacies of people's sense making (their mental model), and explain the behaviour of others in

certain social settings, such as work practices, through the method of coherent conversations.

Sample

A total of fifteen individuals, seven management and eight staff, were chosen as participants through purposive sampling. Purposive sampling is a form of non- random sampling that involves the selection of a sample with a particular purpose in mind [42]. Those people in the organization, 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. The characteristics of the participants are presented in table 1 below:

Table 1

Participant characteristics		
Characteristics	**Management**	**Staff**
Description	Management participants included both top level and mid-level management.	The term staff is used in preference to employee to distinguish people at a management level from people at below management level. The term staff was chosen as it is how people employed in the organisation under study, describe persons employed by the organisation, at a below management level position.
Total no. of Participants	7	8
Age range	29-47 years	21-58 years
Time in position with employer	3-19 years	3 months- 11 years

Complexity-based inquiry

Complexity theory principles influenced the research, as it was considered in all steps of the research process that the organization was a dynamic, self-organising and emergent entity. The implications of this are that the members of the organization and the practices and processes were viewed as being interconnected, interdependent and evolving. This influenced how the interview questions were developed and how the analysis of the interview narratives evolved. The complexity-based inquiry principles of 'fractal' and 'attractor analysis' were used to reveal the way people think, while the metaphors of 'communicative connectedness', 'phase space-phrase space', 'sensitive dependence on initial conditions', 'edge of chaos-chaotic edge' were used to understand organizational life. The metaphors were used as the principal tools to provide an understanding of the mental models of staff and management, about work practices.

Coherent conversations

In order to conduct a complexity-based inquiry, coherent conversations were used, as they provide a way to gain insight into 'why particular ways of organising arise and persist in organizations' [11]. Coherent conversations may take place on a one-to-one interview basis or as a group conversation. This research used coherent conversations to create a continual open ended conversation between the participant and researcher. Coherent conversations 'aim to hold a permissive conversation , one that accepts the entirety of topics that people bring into the conversation and which is critically self-reflective of the processes via which the conversation emerges' [11]. Coherent conversations generate narratives that can be analysed through complexity-based techniques, such as fractal narrative analysis, attractor narrative analysis, communicative connectedness and phrase space [43]. Characteristics of coherent conversations as an inquiry method include that they are 'permissive and not agenda bound, they may reveal the way people think, as much as what they say, they make the conversation dynamics and relationships as apparent as everything that is being said, are self-reflective of the conversation process and are both intuitive and logical' [11]. This aligns with the research topic as it aims to investigate the personally constructed, internal interpretations of a persons mental model, which essentially requires understanding how the individual thinks.

Coherent conversations were used to create a continual open ended conversation between the participant and researcher. This flexible interview technique was chosen so as to generate narratives that then can be analysed through complexity-based techniques and metaphors to reveal the participants' mental models of work practices. The coherent conversations took place face-to-face in a comfortable environment chosen by the participant and centred on how the participant viewed and felt about the work practices in the organization as well as what they felt to be their idea of ideal work practices. Through paying attention to what the participant says, as well as observing how they are feeling, the participant's mental model of the work practices were

revealed. Guiding questions were used in the interviews as prompts to increase the continuity of the conversations. All interviews were recorded and transcribed. Participants were invited to view their interview transcripts to confirm accuracy.

Analysis: Applying the metaphors

The participant's interviews were analysed using the complexity concepts presented as metaphors in order to provide an efficient way of understanding the organizations processes and practices. An explanation of each of the metaphors applied is provided below:

Attractors

According to Kuhn [11] attractors 'function as organising forces that guide actions' or 'energies that motivate'. Essentially, attractor analysis enables researchers to make sense of the narrative without simplification by identifying the motivators or values that are guiding and shaping the behaviour and attitudes of the individuals in the study[11,43,44]. In this research the metaphor of attractor was applied through the identification of management and staff mental models about current work practices and ideal work practices and identifies what motivates them to complete tasks in the workplace. The two group's mental models were then compared for similarities.

Fractality

A fractal is 'an entity with characteristics simultaneously apparent across multiple scales of focus'[11]. Through studying the fractal of an individual the researcher can make generalisations about the larger fractal (organization) from which the smaller fractal (individual) is derived. In this study identifying staff and managements mental models about current and ideal work practices patterns of self-similarity become apparent.

Communicative connectedness

The term, communicative connectedness was created as a way of describing the interconnectedness between people. As a complexity perspective construes a world as closely linked and understood as being related to everything else, the nature and quality of communicative connectedness is critical[11]. In this study through examining the type and quality of the communication between people in an organization, the nature, or character, of the organization will be revealed.

Phase space – phrase space

In complexity science phase space refers to all the possible states of a complex entity[43]. Phase space shows us that although there are many possibilities, '…an entity occupies only a minute proportion of its possible phase space'[11]. Phrase space on the other hand, takes this concept and applies it to human beings and is used to describe the way that our ideas and our ways of living through language are strongly shaped by the communities of which we are a part of[11]. In this study the phase space of the organization was identified through analysing the phrase space of the participants including identifying their attractors and paying close attention to the language used to describe the organizational environment.

Sensitive dependence on initial conditions

This complexity metaphor 'stresses the significant influence of the initial conditions and small perturbations on shaping the overall emergence of a complex system' [11]. This means it is important to know the possible sensitive dependence on initial conditions so as to understand how the influence of small or large changes will shape the emergence of the system. In this research a history of the organization is presented in order to provide an assessment on how change has shaped the organization over time and how the organization and individuals have responded thus providing analysis of the dependence on initial conditions.

Edge of chaos – chaotic edge

Traditionally, the edge of chaos in complexity literature is described as the point in an organization's phase space where complex self- organising systems support organizational adjustment and development, thus viewing their environment full of potential [11,45]. However, Kuhn *et al.* [46] have found it useful to discern an edge of chaos attitude from chaotic edge thinking. Chaotic edge thinking describes where people being at the edge of chaos can feel potentially dangerous and anxiety provoking [11]. In this study this metaphor is applied through revealing and understanding the participant's mental models of the current and

ideal work practices including an analysis of the types of language and phrases used to describe the practices within the organization.

Findings

Setting the scene

It is important to look at the history of the complex system being studied through examining the history that you begin to view how the self-organizing, dynamic and emergent complex system has evolved. This historical outline can help in understanding complexity metaphors, such as the need to consider the sensitive dependence on initial conditions.

The not-for-profit organization examined in this research is a registered NSW club in the hospitality industry. The land on which the premises are located today was given to a group of ex-servicemen and a clubhouse was built in the 1940s. Moving into the early 50s, a few poker machines began making an appearance on the premises. At this time poker machines had not yet been legalized and provided some much needed financial stability. As a result, membership of the club began to increase and with affairs more stabilized, a variety of additional social activities were organised. However, in 1956 the operation of gaming machines in NSW clubs was legalized at a price of a licensing fee made payable, at the time, to the hospitals fund[47]. Before this, since the mid 1880s the NSW government tended to ignore the illegal operation of poker machines largely because clubs depended on them financially and they allowed clubs to continue to attract membership and provide a comfortable environment beyond that provided by hotels [47].

In the early 1960s membership had increased once again and profits were strong, thus a new members bar was opened. Many sporting activities continued with the club becoming very successful in a variety of events for the community. However, in the same year the government introduced turn over tax on profits from gaming machines and the following annual club report found the period to be the biggest financial struggle the club had experienced as they had to pay back previous building loans, as well as pay turn over tax and poker machine licences to the government. Again, in the late 60s registered clubs were forced to comply and absorb into the operations of the business an increase in registration fees for poker machines, visitor and supplementary tax.

From 1970s to 1990s the club remained in an unstable state. In the early 90s the club hit rock bottom. At the next annual general meeting the president and treasurer were both voted out. Repaying the debt was difficult for the club, as it was later revealed that the club was virtually insolvent. After much perseverance and determination to keep the club from folding, the club aimed to reduce the reliance on gaming machines for finance by building extensive function facilities.

There have been periods of disorder and periods of growth throughout the history of the club. In a discussion with the current president of the club, it was stated that the club hopes to be strong enough to face future challenges and continue to provide a local place, local jobs and home-away-from-home where people can meet friends, swap yearns, hold meetings and generally spend their leisure hours.

Revealing the way people think

Managements attractors

Attractors can be understood or described as the energies that motivate actions in people. Kuhn[11] states that 'if you appreciate what the attractors are that are driving behaviors then you can understand how these behaviors are valid for those involved' thus potentially enabling managers to constructively review work practices.
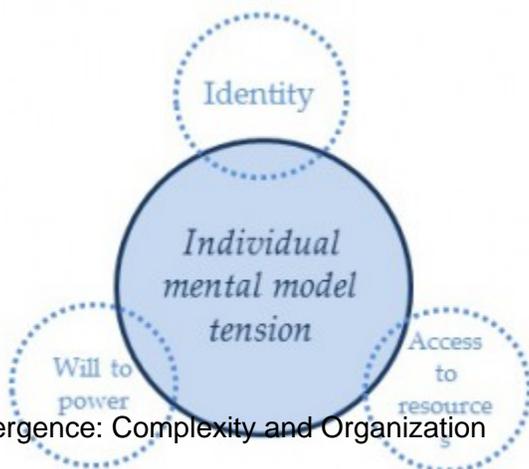
Identity

Identity is 'that constructed image into which the human entity is born, wants to be seen and by which it seeks distinction from others'[11,48]. Identity is understood to be comprised of the permanence of the individual or organization over time and across changing circumstances. It is also understood to be related to how an individual differentiates themselves from others for the purpose of recognising others as, belonging to 'one of us' or, being dissimilar[11,49].

The first aspect of identity as a major attractor is demonstrated to be interested in, the permanence of the organization over time and across changing circumstances. This can be applied generally to the way things are done, the current work practices at the club. The club adheres to the internally developed 'articles of memorandum and association' that detail the relationship between the outside community and the club since its inception. Additionally, the club must ensure that it is compliant with numerous legislative requirements such as: Federal (ASIC, Registered Clubs Act, Tax, GST, Anti- terrorism, Industrial Relations, OLGA); State (OHS); and local council (Entertainment licences, Food and Pest) regulations. This regulatory compliance was discussed by a participant when explaining the decision-making structure of the club and demonstrates how compliance shapes its identity:

> *You understand we run off a set of articles, association, memorandum... There is concessional taxation, it means no one can actually get a derivative from the business; it has to go back into the business. We don't pay any income tax, very unusual situation for any income for members, that in itself has a very complex structure and it's got a lot of compliances with ASIC and things like that so we have huge compliances.*

This comment suggests that all the 'bits' of legislation impact the work practices of the club, thus influencing permanence, through changing circumstances that imprint on its identity. The permanence of the identity of the club over time was also discussed by other managers where they discuss how certain activities are always completed in a certain way, thus showing a lack of change and suggests permanence. For example, a management participant stated:

> *Bosses tend to stipulate and think that their way, and only their way, is the right way to go about it.*

The second form of identity relates to how an individual differentiates themselves from others and places themselves in perspective with others in the organization. This form of identity motivates management participants to distinguish them from other management through looking at how other managers complete the same task, and the same work practice. Through discussing the closing procedures at the end of the night, five of the seven managers interviewed, discussed their mental model of the main bar checklist. The identity formed around the same task (main bar checklist) is revealed as being different for each manager. For example, two management participants stated that:

> *I would probably streamline it a bit more, I like to keep things fairly simple...I know myself that I have looked at the book at the end of the night and everything has been ticked off and not everything has been done.*
>
> *I think it's a great idea but I don't think it should be set out like that, I think it should all be broken down into separate sections.*

Every manager in the study differentiates themselves from the others in discussing the main bar checklist. 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 either belonging to others, as 'one of us', or differentiating themselves from others. In the interviews, managers consistently used the term 'we' as a reference to the organization as a whole while they used 'they' when talking about staff. However, it was clear as the coherent conversations continued that managers' didn't identify as belonging to 'each other' as a management group. For example, three managers stated that:

> *I guess some other people, management, are a little bit harder than me.*
>
> *Managers tend to put their own spin on things.*
>
> *Managers will direct staff a lot different.*

The above narrative illustrates that managers 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.

Access to resources

According to Kuhn [11] in order to 'maintain the integrity of our identity as well as our difference from others we require access to resources'. The resource most widely discussed in the management mental models is access to knowledge. The role and function of management is changing as a result of global economic and political uncertainties, technological advancements, new regulatory requirements, pressure to provide a work life balance for employees and responding to and managing the company strategic changes [50]. Knowledge management is critical and for many organizations, the value of intellectual assets far exceeds the value of physical and financial assets [51]. Therefore, to function as a manager, the need to make the most of organizational knowledge is greater now than in the past, as the changes in the climate of the organization means companies will differentiate themselves on the basis of what they know [52,51]. This means that having access to, or gaining access to, knowledge can be an energy that motivates the behaviour of an individual. In the mental models of management, knowledge about the operations of the organization is held by only a few managers. A participant openly discussed the organizations way of limiting knowledge and also the restrictions they place for other managers gaining knowledge.

Yeah, so I would babysit them (managers) absolutely and no one would ever know, even to the point where I would draft their letters so people get an impression that they are in charge.

Furthermore, it was repeatedly discussed by managers that the organization had not invested in training staff, and that they, as management, didn't give staff the information they require to understand and complete their role in the organization. Some managers stated that it was their duty or role to give staff access to the knowledge that they require to complete their jobs. In saying so, however, these managers did not consider that their limited access to knowledge may be a precursor to staff's limited access to knowledge. As a manager stated:

We (management) all need to be on the same page so when we come on to shift we are all together teaching everybody what needs to be done and how it needs to be done.

Another resource issue that was revealed in the mental models of managers was the limited access to staff. Two managers spoke at length about the issue of cutting back shifts being a necessary part of their work practice, while a third manager discussed the limited time, or limited thought, put into accessing new staff for employment. This impediment to the human resources of the club was a motivator or energy that shaped the managers behaviour on shift, as they talked about having to look at ways of sending people home early when it was not busy and delegating the extra work. For example, a manager stated:

You have to be aware of what staff are on shift, and the wages that are being paid to keep them back here to clean a room.

Will to power

The third attractor motivating behaviour of management is the will to power. Philosopher Friedrich Nietzsche proposed the will to power construct as a primary motivator of an individual's behaviour. According to Kaufmann [53] Nietzsche's conception of the will to power is approached from two distinct points of view. Firstly, Nietzsche thought of it as a man's desire or craving for worldly success [53]. Secondly, he thought of the will to power as a 'psychological drive in terms of which many diverse phenomena could be explained' such as gratitude, pity and self-abasement [53]. This suggests that the will to power can manifest itself in the psychological drive to manage and control, to organise and overcome, as the individual strives to have their own views, beliefs, and interpretations of reality accepted by others [11,53]. A manager below described a situation where they strive to have their own views about the future of the organization accepted, however it was quashed by another's psychological drive to manage and control through their own views:

Problem thing is I am paid to advise them on things, often they don't listen to what I say, that's fine I could be wrong, but I always end up with a huge problem at the end of the day on my desk, and it's always because they didn't do what I advised and but I don't care, I still get paid, you got to be pragmatic.

This overt display of power shows how the manager struggled to organise and manage the work practices of the organization with others through trying to make the Chief Executive Officer see their way on future strategies for the organization.Generally, across the managers' 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. For example, two manager's state:

> *I am not allowed to say what I want to say.*
>
> *The boss doesn't like complaints and he doesn't want to put it out there with a form.*

While other managers argued that the work practices in the organization are framed to control, with comments such as:

> *Yeah they are doing it to control and to prevent criticism.*
>
> *They are looking at wanting to keep old procedures in place and not move forward.*

Additionally, the will to power can be seen in the desire or craving for worldly success as some managers strived to have their own views, beliefs, interpretations of reality accepted. The quotes below illustrate how each manager controls and overcomes using power in their own way:

> *Well I like just having control of the run sheet and of staff, making sure everything is pointing in the right direction.*
>
> *As long as the important thing is I can go down on that floor and know exactly what's going on.*

Individual mental model tension

The will to power allowed for the fourth attractor of 'individual mental model tension' to materialise in the managers' narratives. Individual mental model tension refers to the tension in a manager's mental model between the current reality of work practices at the club, and their mental model of a future way of doing things. This tension arose out of each manager's desire for their own identity, the will to power and access to resources, making four attractors of which a managers behaviour is motivated by (see figure 2 below).
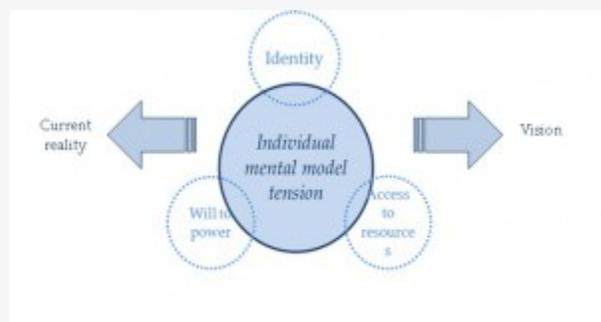

Fig. 2: The managers' mental model tension

Figure developed from the universal human attractor set (the individual mental model tension and connected identity, access to resources, and will to power attractors).

In discussing the work practices of the club, all seven managers, expressed their view of current reality, and throughout the conversation referred to what they envision the club should, or could do, to get things done more efficiently. Below, is an example of one manager's narrative showing this tension:

Manager's current reality:

> *I wouldn't say they were good (work practices), I would say they are open to interpretation.*
>
> *The training isn't good enough.*
>
> *The club doesn't have the resources to put the time into correct staff training.*
>
> *The training isn't good enough.*

Manager's vision:

My belief is there should be someone in charge of training and given the time to train.

There should be good management from the top down with good communication so that everyone understands what the business is trying to achieve.

This manager described a tension between their mental model of the current work practices, and the way they see things should be done or altered 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 to do things. This struggle for tension balance is described below by another manager as they discuss how decisions about what needs to be done are made:

There is no pull factor here to optimise performance.. and what I do, and I'm very good at, I have a very good memory for things so I just wait for a critical incident, and problems just end up in my office that's just a fact of the matter, that's how it happens, on my desk, so what I do is I need to sort those things, so between you and me (pause) because no one is really looking at it because nobody wants to deal with the problem, I push everything that I know that is wrong through the place to fix the problem, but I will push everything else through I can, so I'm using a construct to fix other areas of the business on an excuse, but I have to wait for a critical incident.

This manager's comments illustrate how a balance in their mental model tension had to be found between their current reality and their vision of how decisions are made. This manager used a reactive framework based on the occurrence of critical incidents (current reality) to make changes to the whole organization, which as a result enabled other areas of the organization to benefit also (vision).

Staff attractors

Dissimilar to managers, the narratives obtained from interviewing the staff, did not present a collective attractor set. The attractor's that motivated staffs were found to be different for each individual. The attractors found in the mental models of staff at the club included; customer service, sustainability, money, teamwork, and gratitude. Each are presented below.

Customer service

Four of the eight staff interviewed revealed customer service as the most important work practice for them. Despite this similarity among these four staff members, each discussed different elements of customer service. For example two staff members stated:

Customer service is making sure my customers are happy and that my job is done and be responsible.

The most important work practice is probably how you deal with the customers, like how you talk to them and if you like ignore them or whatever; yeah the customers are most important.

The difference in the interpretation of customer service by staff members suggest that each of their mental models in regards to the work practice of customer service is the same as the guiding definition: 'personally constructed, internal interpretation of external phenomena' which inevitably affects how a person acts to provide customer service[10].

Sustainability of the club

Two staff member were motivated by an interest in the survival or sustainability of the club. They stated that:

It worries me that if they do not make a substantial change in upper level management the place will not survive.

I don't want the club to run out of money, like you want people to come here... the club has been here for so long and you have people that have been members for years like 30 years or more and there is history behind it, like some of the people I work

It is suggested that the survival of the club is a positive attractor for staff to be motivated by. For these two staff members every work practice or action is shaped around ensuring that the club is perceived by customers as a place to return to for regular comfort, good service, and happy staff members so as to enhance the sustainability of the club.

Money

One staff member voiced their concern over the lack of guidelines at the club and how valuable their knowledge and experience gained from other workplaces has been in deciding what needs to be done. Through their very honest dialogue the staff member discussed different scenarios relating to the lack of respect for seniority, and management, the lack of communication, and the increased rudeness and unpleasantness they received from staff and management. Therefore, as evidenced in the quote below, it is not surprising that this staff member was motivated by money.

To me as far as I am concerned, if that's the way how they dish it, I like it or I don't like it, and then I get on with it as I need the job for my money.

Teamwork

One staff member had been employed at the club for 10 years. The conversation about work practices lead to their mental models of historical, existing and projected operations of the club. Historically their mental model of work practices was that in the past the club was less controlled, while their existing mental model of work practices was that 'I just think there are more rules and regulations coming into the club… I think the club does ultimately control the staff and is now less trusting'. The staff members mental model of projected phenomena is seen in their thought that change in rule and regulations will continue to occur at the club as 'I think in society, things are getting like that'. More importantly, the staff member illustrates that they are affected by their personally constructed mental model of external phenomena (staff working together as a team). This is shown in the statement below:

I think that it's important that everyone is getting in and helping each other out, helping if there is a line up at the bar, all working together.

It is suggested that teamwork is an energy around which this staff member's working life was organised, as a result of their personally constructed mental model of historical, existing and projected work practices.

Gratitude

When responding to the question about the most important work practice undertaken in their job, one staff member advised of a real life situation of good customer service they provided and the gratitude they received. The staff member described a time when the club was not busy and they were able to ensure that the customer's needs were met in every way, from point of sale to the delivery of the food and drinks. The staff member went out of their way to make sure the customer was comfortable, had everything they needed (water, sugar, coffees after the sandwiches), and a smile. The participant described this situation as 'coming to do my job right'. Through the open conversation about this situation the staff member added:

I feel like you know to go that extra mile is important to maintain good customer and club relationships, and you know they came back and dropped in a letter of thanks and a tip to the front desk. It made my night and it has encouraged me to keep doing what I was doing.

Through talking about their experience of this particular night, the staff member expressed that it is the gratitude of customers that they are motivated by and are attracted to continue their strong value of customer service.

Fractal analysis

Fractal analysis identifies patterns that exist across multiple scales of the organization[11]. This study revealed that across all levels of the organization (upper management, mid-management, and staff) there are conflicts that prevent or impact negatively on efficient work practices in the organization. The organization must comply with external (legislation) and internal

(memorandum and articles of association) environmental restrictions and this impacts on how work is performed in the organization. The conflicting element for managers is their individual mental model tension in which their vision for the organization versus reality, or the current way things are undertaken and structured, are in conflict. For staff on the other hand, the conflict with their work practices lies in the many different mental models and attractors that staff members hold. Each staff member has a different attractor and a different mental model about how work should be completed.

The second fractal apparent across all scales of the organization refers to the lack of efficient communication practices. It can be deduced from the data that when discussing their views, about the work practices at the organization, managers are focussed on the bigger picture while staff focus on, and choose to discuss, day to day activities. This fractal is illustrated by the two comments below, where a manager takes a more overall view of improving staff performance, while a member of staff identifies potential improvements at an operational level:

> *I think motivation is a big thing, especially in this place and if you don't have people motivated it results in umm high absenteeism and loss of productivity and things like that... it doesn't matter what resources or abilities you have, if you don't have people motivated you won't get a good end result (Manager).*
>
> *We need new glasses upstairs; we need more equipment, cleaning equipment (Staff).*

It is suggested that this difference in perspective accounts for the lack of efficient communication, or miscommunication, between managers and staff, as each group is focussing on a different aspect of the organization's scale of operation.

Additionally, further miscommunication between managers and staff is highlighted in the following comment made by a staff members:

> *There is also no consistency of how they let staff know of the new things happening in the club, Manager A may be on and might talk to you for 45 mins about something that will take me two minutes to tell you.*

Furthermore, the horizontal miscommunication between managers is illustrated in the quote below where a manager discusses the difference in focus of important tasks and that managers are not working together:

> *We need better communication because the managers don't work together... and we all have different ideas...I think some of them don't care, because some people have got their priorities set differently and focus on different parts of the club, having three managers.*

Both the miscommunication and lack of communication can also be seen between higher level managers and staff as evidenced in the quotes below:

> *I think our communication could be a little better but from higher to staff members I don't think there is a lot of communication, to resolve it and try and fix, well you can never fix it.*
>
> *umm I think my idea of a work place with good work practices would have management be able to communicate with their colleagues, as well the person that actually owns the club to be hands on with what the club is doing, because some owners they don't know what to tell their managers to do until they put the shoe on, and understand what goes on down below and actually know people's names, that would be great. Yeah I think to actually know who people are and be more personalised... I think just for myself it's about communication with everybody.*

The fractal of miscommunication is also evident between upper level management and mid-management:

> *Manager B (higher level manager) does fairly good communication but at times is hard to understand... they could be more direct in the way they talk.*
>
> *I was never given any direction (from higher level management) of this is what I want you to achieve, it was pretty much just cut back staff. There's no direction as to what he wanted... It was pretty much this is what we are doing, do your best. There was just no goal so the communication on that was pretty poor and that was a major, major thing.*

It is clear that miscommunication was a fractal evident across multiple scales of focus, the organization, and through the management dialogue between managers and staff.

Understanding organizational life

The mental models of managers and staff were compared to provide a broader picture of the whole organizational system. The principles of communicative connectedness, phase space and phrase space, and the sensitive dependence on initial conditions were used to analyse the mental models about work practices in order to understand organizational life.

Communicative connectedness

Communicative connectedness concerns the quality of interconnectedness between the self-organising, dynamic and emergent complex system (Kuhn, 2009). The mental models of staff and managers revealed that communication is a primary issue impacting on the productivity of the work place. Communication between managers and staff was described as being insufficient and inflexible, restrictive and conflicting, and dependent upon who was rostered on shift. Comments were made such as:

> *We kinda rely on memos and umm messages and that sort of thing, a bit of signage, umm which isn't as good as face to face, talking to someone or asking someone to do it a certain way.*
>
> *Yeah I think they should do more hands on stuff than write up memos and things like checklists and stuff.*

Staff and managers identified a lack of sufficient, open communication throughout the organization. The staff also expressed that the current way of communicating (memos) was inefficient and identified the need for more face to face or verbal communication, as opposed to memos. Several staff members expressed the need for face to face staff and management meetings to overcome this insufficient method of communication:

> *I think there should be a staff meeting every month, like if staff have any problems a meeting will help.*
>
> *I think there should be staff meetings, everyone should be told all together so someone can't turn around and say well I didn't know that, I wasn't told that.*

Two staff members described the practice of communicative restriction enforced by the organization. Staff communication with both customers and other staff members was controlled and discouraged while working. Both staff described the restricted communicative practice as unnecessary and demoralising and as having impacted on their work practices. For example, it was stated that:

> *I have been told that I can't talk to customers while working and that I can't talk to staff while working… it makes it very difficult to communicate.*
>
> *Unnecessary ones, geez, (pause) little things like don't want to have staff members talking to each other because that looks bad to customers or I can't surmise as to why we can't have staff members talking to each other but its frowned upon, gatherings of staff are immediately quashed by supervisors, managers etc I think a lot of that is for sake of appearance to top level management let's say but there is probably certain benefits that do come from staff talking to each other etc, they could be talking about their jobs at times and as long as it's not currently at the process of serving the customer and it's not taken away from customer service, customers aren't receiving second class service because of it, I don't think it should matter. At the same time it really doesn't stop that from happening, because routinely I see situations where a customer is being served, while the person serving them and another staff member in that general area is having a running conversation with them, which is preventing them from having conversations with the customer.*

Thirteen of the fifteen participants expressed concern for the current lack of consistency in communication between shifts. According to Kuhn [11] conversations are influenced by the type of relationship we have such as in boss, employee, friend, and the quality of the relationship such as in a trusting one, one where a joke can be shared, or one of animosity. 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 and the relationship caused a collapse of interconnectedness as evidenced in the following statements:

...we do shift work and people are obviously on different days at different times and sometimes you might go three or four days without seeing another person, so the communication differs.

Well obviously working with three different managers on different shifts, each manager has a different way they interpret that, so it varies for the staff on shift to shift.

There are significant implications for this insufficient and inflexible, restrictive and conflicting communicative environment. The insufficient method of communication and conflicting communication provided on each shift causes a lack of trust in management and staff members and a concern over a lack of knowledge of legitimate work practices. As a result of the restriction on communication, staff members are providing lesser quality customer service as some staff members described the common practice of having a conversation with their colleague while serving a customer at the same time. Due to a lack of communication, the connection about work practices, and sharing how each perceives to get things done, is lost. Consequently, several staff members have proposed communication could be improved through a more flexible, open communicative connected system.

As a complexity perspective conceives everything as being related to everything else[11,54], such as in relationships, examining the quality of interconnectedness is critical. The participants' mental models support the importance of the complexity metaphor of communicative connectedness in that they expressed a need for interconnectedness between all people in the organization. It is suggested that the lack of communicative connectedness provides an explanation as to why members of the organization do not have a shared mental model for how things get done within the organization. Improving the communication connectedness in the organization would enable the building of connections in the mental models of employees and thereby permit increased efficiency for the organization through staff following work procedures and therefore completing their daily tasks.

Phase space and phrase space

Identifying the attractors of staff and management enables the phase space and phrase space of the environment to be revealed[11]. Kuhn[11] describes phase space as 'the space comprising all the possible states of a complex entity'. Plotted regions of stability and instability can be seen and the entities entire evolution can be traced within this space[11]. Phrase space is an extension of phase space and plays on the word 'phrase' in that it takes the concept of phase space and applies it to human beings, to language. Phrase space is a concept 'used to describe the way that our ideas and, consequently, our ways of living are mediated through language'[11]. Phrase space shapes our social environments, our sense of who we are and how we might be able to relate to others or how our views align with or differ from those of others[11]. Manager' phrase space construes a world where there is much tension, control, and where change is reactive. According to Kuhn and Woog[43] phrase space, on the other hand, is the ability to describe or talk, a space into being. Managers' language used to describe their environment is reactive and somewhat negative; therefore they are creating a space that is negative and restrictive. The perception of a negative reactivity becomes the reality through verbalisation:

It's still that sort of school yard sort of you know you have to put your hand up and all that sort of stuff.

Really all I can say is everything here is on a reactive level and really only push factors push things through.

It feels like the area we are in at the moment is very negative area in the fact that if you do something wrong then that will be noticed, if you do something really good you don't get much.

For staff members the phase space can be seen as conflicting through communication, and lacking in order. Staff members described and talked into being a lack of standards for work practices and the need for clearer directions, while also reinforcing that the conflicting communication from each manager leads to confusion:

Nothing is clear cut as to what we should and shouldn't do within our work practices.

Procedures are not always documented and are not consistently repeated from staff member to staff member.

I think you want to be able to repeat what you do in a business consistently you have to have it put into a formal operations manual, body of documents.

Overall, comparing the phrase space of staff and managers suggests that both are negative, implying that the possible phase space of the organization is also negative.

Sensitive dependence on initial conditions

This complexity metaphor considers how sensitive an organization's initial conditions are in order to understand how small, or slight changes to those conditions may impact upon and shape the overall emergence of the complex system.

Initial condition one

The club evolved after two groups of ex- serviceman united into one association to create the club. From here a memorandum and article of association was created to officially form the company. The formation of this document is the first set of initial conditions as it sets out the structure of the organization. The article of association includes that the club is a not-for-profit company. This means that no one is able get a derivative from the business, and that if the club gets into trouble you cannot sell it, amalgamation is the only possibility. The club is highly dependent on the regulation and structure laid out in this document for its operations. Any small change (legislation) that impacts upon the already formed memorandum and articles of association require changes to be made to these documents which are then sent to the relevant authorities for approval.

Secondary condition

In the 1950s poker machines were introduced into the club and even today poker machines at the club are perceived to be a primary way of obtaining revenue. In the first quote, a manager discusses their distaste for poker machines yet acknowledges that they provide a large portion of total revenue.

> *I understand where the heavy half of the money comes from and this is why this place is struggling, it's from problem gaming, that's the line, someone who has cake and coffee and put 20 bucks through big deal, that's not the problem. The problem is we all get our money, it's not from them, it's from people who are laundering, and putting significant sums through.*

The following comment further highlights that over the period of 1950- 2004 the club has relied heavily on gaming machines for financial stability:

> *It is ironic that in the 1950s the club relied heavily on the introduction of poker machines to commence building the clubhouse and up until the year 2004 the club was very dependent on them.*

The above two quotes identifies that the introduction and continuation of gaming machines is an initial condition in the club. In 2009 the clubs annual report, the CEO stated that several legislative changes together with the global financial crisis had impacted upon the number of members visiting the club, thus resulting in less gaming revenue. This recognises that there is a sensitive dependence on the initial conditions of poker machines being part of the club operations. This suggests that the club is heavily dependent on gaming machines for revenue and therefore any small changes with regards to legislation governing the use of gaming machines will have a large impact on how the club operates. A manager openly expressed their reason for compliance being the most important work practice is to reduce the amount of perturbation to their initial conditions:

> *The one thing I know is there is always something coming your way that you can't control so you keep everything run really tight, and you will be able to survive anything.*

This comment supports the second condition as they talk about the impact of any changes through legislation and compliance from regulatory authorities in the outside world will have enough of an impact to shape the emergence or destruction of the complex system.

Chaotic edge or the edge of chaos

A person holding an edge of chaos perspective views their environment as full of potential[11]. Organizations can also exist within an environment of chaotic edge thinking, where people view their situation as full of threat[11]. An edge of chaos perspective is illustrated below. This particular manager is trying to achieve an edge of chaos perspective through their attempt to make the organization see that adaption and development should be fostered.

> *I think too this place has never, ever, ever, umm embraced technology in any sense so they have no advantage there. Even the*

> *technologies they are forced to do, substantial investments aren't utilised to where they could be, and I think it's more because that old style work fashion where you don't liberate people to do, you know to become self-managed...really at a higher management level you're um always reacting, you're not looking proactively at something.*

Despite the manager's efforts, the organization remains in a chaotic edge thinking situation where consistently the work practices are being formed to ensure that threats are minimised. The idea of designing practices to minimise threat to the organization is further illustrated below where a manager discusses the way in which the organization minimises change or threat through control:

> *My view is that the club is a highly procedurally driven although those procedures are not always documented and are not consistently repeated from staff member to staff member. That is to say for everything you do from poker machine payout to a refill, there are procedures for everything that is to be done.*

This is also exemplified through the restrictive communicative practices, negative phrase space and the fractals identified as being of a negative nature. Chaotic edge thinking means that the organization is not operating to its fullest potential, rather it the environment is viewed by managers and staff as being full of threats. Therefore, work practices are designed to control and there are tensions in the mental models about work practices by both managers and staff, and as such work and current work practices fail.

Conclusion

The purpose of this research was to compare the mental models of staff members and managers about work practices at an organization following a complexity-based inquiry approach. A complexity perspective offers a way of seeing the organization as comprising a number of interacting, self-organising entities with identifiable, underlying patterns of order and relationships. Comparisons of mental models of work practices as held by managers and staffs reveals significant differences both within and between the groups. This research provides a significant contribution to knowledge through its unique research design and findings. The research highlights the importance for organizations to understand the interacting, dynamic and emergent properties of the entire system an organization operates within. This can have a significant impact on the efficiency of work practices.

The complexity paradigm used in this research provides a framework for making sense of the work practices in a not-for-profit organization, as experienced by those employed by the organization. Using the metaphors of attractors, fractals, phase space/phrase, sensitive dependence on initial conditions and chaotic edge/edge of chaos, the conditions of the organization were explored. The research reveals that the attractors of staff and managers, as evident in their mental models of work practices, are closely influenced by the patterns of inference happening at the whole of organization level. The organization is revealed as exhibiting a fractal of restrictions in communication and work completion. This fractal is characterised by a negative phase space exhibiting chaotic edge thinking by organization members. These elements impact on how things get done and how staff and managers perceive current and future work practices within the organization. The combination of mental model identification and a complexity paradigm provides explanations for the failure of work practices as it is revealed that there is a lack of trust and a demoralising culture pursuant to the negative chaotic edge thinking and negative phrase space in the organization. It also provides evidence to suggest that any new work practice, or program, implemented in this organization will, potentially, fail to be effective as the environment is inhibiting the efficiency and productivity of the organization and those working within it.

Communicative connectedness is a primary issue of concern of all participants. Both staff and managers commented on a lack of communication between shifts and insufficient, restrictive and inflexible types of communication at the organization, and requested management and staff meetings as a way to enhance the connectedness in the organization. The lack of interconnectedness was found to be apparent across multiple scales of the organization (top level management, mid-level management and staff). This lack of interconnectedness and lack of an open communication policy in the organization hinders the evolution of the organization as a self- organising, adaptive and flexible system. At all levels of the organization there are conflicts or restrictions that are hindering on the ability for all members of the organization to complete their job successfully. As described in the discussion of the findings this includes individual mental model tension, lack of access to resources and miscommunication.

Even though the research confirms the benefit of viewing an organization through a complexity- based lens, it is recommended that future research of individual mental models could benefit from combining a complexity-based inquiry method of coherent conversations with observation. This is expected to provide support to support the empirical findings of this research through confirming a person's actions align with their espoused mental models. The environmental analysis examining organizational life revealed several areas within the organization that need improving and as such the research provides further evidences that any new work practice, or program, implemented in an organization would benefit from a complexity-based inquiry of the environment within which the organization operates.

Acknowledgements

References

1. Senge, P. (1990). The fifth discipline; the art and practice of the learning organization, ISBN 9780385517256.

2. Senge, P. (2006). The fifth discipline; the art and practice of the learning organization, ISBN 9780385517256.

3. Argyris, C., & Schon, D. (1978). Organizational learning, ISBN 9780201001747.

4. Baets, W. (2006). Complexity, learning and organisations, ISBN 9780415381789.
REFERENCE LINK

5. Harrison, J., & Boyle, E. (2006). Falling into capability learning traps; the role of the firms predominant managerial mental models. Management Decision, 44(1), 31-43.

6. Hill, R., & Levenhagen, M. (1995). Metaphors and mental models: sensemaking and sensegiving in innovative and entrepreneurial activities. Journal of Management, 21(6), 1057-1074.

7. Jensen, J., & Rasmussen, O. (2004). An inquiry into the foundations of organizational learning and the learning organization. The Learning Organization, 11(6), 478-490.

8. Kim, D. (2004). The link between individual and organizational learning. In K. Starkey, S. Tempest & A. Mckinlay (Eds.), How organizations learn; managing the search for knowledge (2nd ed., pp. 29-50), ISBN 1861527462.

9. Lozano, R. (2008). Developing collaborative and sustainable organisations. Journal of Cleaner Production, 16(4), 499-509.

10. Rook, L. (2013). Mental Models: A robust definition. The Learning Organization, 20(1), 38-47.

11. Kuhn, L. (2009). Adventures in complexity; for organisations near the edge of chaos, ISBN 978095623100.

12. Plowman, D. A., Baker, L. T., Beck, T. E., Kulkarni, M., Solansky, S. T., & Travis, D. V. (2007). Radical change accidentally: The emergence and amplification of small change. Academy of management Journal, 50(3), 515-543.

13. Craik, K. (1943). The nature of explanation, ISBN 9780521047555.

14. Forrester, J. (1971). Counterintuitive behaviour of social systems. Simulation, 16(2), 61-76.

15. Morecroft, J. (1994). Executive knowledge, models and learning. In J. Morecroft & J. Sterman (Eds.), Modelling for learning organisations, ISBN 978-1563272509.

16. Sterman, J. (1994). Learning in and about complex systems. System Dynamics Review, 10(2-3), 291-330.

17. Fulmer, R., & Keys, B. (2004). A conversation with Chris Argyris: the father of organizational learning. In K. Starkey, S. Tempest & A. Mckinlay (Eds.), How organizations learn, managing the search for knowledge (2nd ed., pp. 16-28), ISBN 1861527462.

18. Norman, D. (1983). Some observations on mental models. In D. Gentner & A. Stevens (Eds.), Mental Models (pp. 7-14), ISBN 0898592429.

19. Doyle, J., & Ford, D. (1998). Mental models concepts for system dynamics research. System Dynamics Review, 14(1), 3-29.

20. Converse, S. (1993). Shared mental models in expert team decision making. Individual and group decision making: Current issues, 221.

21. Denzau, A. T., & North, D. C. (1994). Shared mental models: ideologies and institutions. Kyklos, 47(1), 3-31.

22. Johnson, T., & L'O'Connor, D. (2008). Measuring team shared understanding using the analysis constructed shared mental model methodology. International Society for Performance Improvement, Performance Improvement Quarterly, 21(3), 113-134.

23. Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. Journal of applied psychology, 85(2), 273.

24. Van den Bossche, P., Gijselaers, W., Segers, M., Woltjer, G., & Kirschner, P. (2011). Team learning: building shared mental models. Instructional Science, 39(3), 283-301.

25. Hodgkinson, G., & Johnson, G. (1994). Exploring the mental models of competitive strategists: the case for a processual approach. Journal of Management Studies, 31(4), 525-551.

26. Brantley, W. (2009). The effect of mental models on creating organizational alignment around a change vision. (Doctor of Philosophy Public Policy and Management), Walden University.

27. Chen, G. (2005). An organizational learning model based on western and chinese management thoughts and practices. Management Decision, 43(4), 479-500.

28. Friedman, S. (2004). Learning to make more effective decisions: changing beliefs as a prelude to action. The Learning Organization, 11(2/3), 110-128.

29. Carley, K., & Palmquist, M. (1992). Extracting, representing and anlyzing mental models. Social Forces, 70(3), 602-636.

30. Kim, D. (1993). A framework and methodology for linking individual and organizational learning. (Doctor of Philosophy), Massachusetts Institute of Technology, Massachusetts. Retrieved from
REFERENCE LINK

31. Crudge, S., & Johnson, F. (2007). Using the repertory grid and laddering technique to determine user's evaluative model of search engines. Journal of Documentation, 63(2), 259-280.

32. Grunert, K., Trondsen, T., Campos, E., & Young, J. (2010). Market orientation in the mental models of decision makers: two cross-border value chains. International Marketing Review, 27(1), 7-27.

33. Stacey, R. (2003). Strategic management and organisational dynamics; the challenge of complexity (4th ed.), ISBN 9780273658986.

34. Gell-Mann, K. (1994). The quark and the jaguar, ISBN 0716727250.

35. Goodwin, R. (1994). How the leopard changed its spots, ISBN 0006546765.

36. Holland, J. (1998). Emergence from chaos to order, ISBN 9780192862112.

37. Kauffman, S. (1995). At home in the universe, ISBN 9780195111309.

38. Langton, C. (1996). Artificial life. In M. Boden (Ed.), The philosophy of artificial life, ISBN 9780198751557.

39. Carroll, T., & Burton, R. (2000). Organizations and complexity: searching for the edge of chaos. Computational and Matharmatical Organization Theory, 6(4), 319-337.

40. Rook, L., & McManus, L. (2016). Viewing WIL in business schools through a new lens; moving to the edge of chaos with complexity theory. Emergence: Complexity and Organization, 18(2)

41. Nagy Hesse-Biber, S., & Leavy, P. (2006). The practice of qualitative research, ISBN 9781412974578.

42. O'Leary, Z. (2014). The essential guide to doing your research project, ISBN 9781446258965.

43. Kuhn, L., & Woog, R. (2007). From complexity concepts to creative applications. World Futures: The Journal of General Evolution, 63(April- June: 3-4), 176-193.

44. Kuhn, L., & Woog, R. (Producer). (2006, 11/05/10). Inquiry into community enabling: a review of the Mt Druitt enablers program, Report to chain reaction and the Ian Potter foundation. Retrieved from
REFERENCE LINK

45. Lewin, R. (1999). Complexity:life at the edge of chaos, ISBN 9780226476551.

46. Kuhn, L., Woog, R., & Hodgson, M. (2003). Applying complexity principles to enhance organisational knowledge management. Paper presented at the Proceedings, global business and technology association conference: challenging the frontiers in global business and technology: implementation of changes in values, strategies and policy, Budapest, Hungary

47. Hing, N. (2006). A history of machine gambling in the NSW club industry: from community benefit to commercialisation. International Journal of Hospitality and Tourism Administration, 7(1), 81-107.

48. Levick, D., Woog, R., & Knox, K. (2007). Trust and goodwill as attractors; reflecting on a complexity-informed inquiry. World Futures, 63, 250-264.

49. Melucci, A. (1996). The playing self: person and meaning in the planetary society, ISBN 0521564018.

50. Robbins, S., Bergman, R., Stagg, I., & Coulter, M. (2006). Foundations of management (2nd ed.), ISBN 9780733971006.

51. Waddell, D., Creed, A., Cummings, T., & Worley, C. (2014). Organisational change development and transformation (5th ed.), ISBN 9780170236577.

52. Davenport, T., & Prusak, L. (Producer). (2000, 27/09/2010). Working knowledge: how organizations manage what they know. ACM: Ubiquity. [Online publication]
REFERENCE LINK

53. Kaufmann, W. (1974). Nietzsche; philosopher, psychologist, antichrist (4th ed.), ISBN 9780691160269.

54. Mainzer, K. (2007). Thinking in complexity: The computational dynamics of matter, mind, and mankind, ISBN 978-3540722274.