ACEPHALOUS GROUPS AND THEIR DYNAMICS FROM A COMPLEX SYSTEMS PERSPECTIVE

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ABSTRACT

Human dominance-based hierarchies perceiving the world as separate parts open for exploitation have led to crises in areas such as ecology, economics, and politics. One response by many activist and other groups is the growing use of distributed, loosely structured groupings I will call "acephalous". While they may have nested levels just like a dominance hierarchy, group members have equal power and responsibility, giving members a stronger sense of ownership within the group. This also shifts the focus from goal seeking to maintaining group relationships.

A variety of acephalous groups at differing scales are investigated from a complex systems perspective. From small support groups we look at larger worker co-operatives, alternative spirituality groups and terrorist networks.

Digital technologies have opened new possibilities for social activist groups. Groups such as the Arab Spring and the Occupy Wall Street movement have found that combining the power of the internet with a loose acephalous structure has been very effective at breaking down old dominance-based hierarchies, but they have not yet developed the ability to create and maintain effective alternatives. We explore acephalous groups to assess their strengths and weaknesses and seek ways for them to become more effective.

Keywords: Acephalous, complex adaptive system, distributed leadership, adaptive cycle, viable systems model

INTRODUCTION

Dominance-based structured hierarchies, where those higher up the hierarchy are able to dominate and control those lower down, are deeply embedded in human systems. Animals species, especially more evolved ones, typically have leaders who maintain control through violence and intimidation (Peterson & Wrangham, 1997). These dominance hierarchies, which caused enormous suffering to countless millions, reached their peak in the great empires with kings, Pharaohs and Tsars. Once education levels rose and new modes of communication and transport enabled citizens to be sufficiently informed about affairs of state, democracies became established and decision making started to return to the people. Dominance hierarchies are, however, still firmly established in the global, commercial world that drives so much of our lives today.

Early 21st century life is increasingly complex and chaotic. Structures and processes that have been adequate in the past are often found to be inadequate to meet present day needs

A complex adaptive system perspective on acephalous groups and their dynamics

(Bar-Yam, 2005). Dominance-based hierarchies that see the world as separate parts to be exploited without regard for the interconnectedness of life have led to global problems that threaten our very existence. Unless we can adopt other means of organising ourselves and the way we interact with each other and nature, we may find ourselves unable to meet the challenges of our age (Flannery, 2011; Laszlo, 1996; G. Taylor, 2008).

Paul Ray (Ray & Anderson, 2000) wrote of culture creatives, who are people seeking to grow beyond the traditional and modern modes of living. They typically seek a connection with nature, a spiritual outlook, are socially active and hold a high value on relationships. They are estimated to comprise around 25% of the population of the US and the percentage is growing.

One of the responses to dominance-based hierarchies from people such as the culture creatives is the formation of distributed groups with little or no structured leadership (acephalous groups). These acephalous groups seek fairer, egalitarian structures that recognise our interdependence and give members a more real say in the organisation. Acepahlous groups could be seen as a vehicle for providing a service of community building, which in turn provides culture creatives with a means of relating to the natural environment in a more holistic way.

Goal seeking is primary for dominance hierarchies, whereas acephalous groups have a stronger focus on maintaining group relationships (Brocklesby, 2007; Vickers, 1968a). Henry Mintzberg writes of ad hoc groups, which are very similar to acephalous groups and he sees such group structures as the way of the future (Travica, 1999).

Table 1: A comparison between a structured hierarchy and an acephalous group

Structured Hierarchy	Acephalous Group
Centralised control	Distributed control
Leader gives directives	Consensus decision
Leader holds information	Everyone has access to information
Top down structure	Network structure
Leader ultimately responsible	Shared responsibility
Rewards according to role	Equal rewards

Table one outlines the main differences between a structured hierarchy and an acephalous group. In reality there are very few pure acephalous groups and we should rather be looking at a continuum between the two. In a pure acephalous group decision making is spread across the group with equal responsibility and equal rewards.

SCALE EFFECTS IN ACEPHALOUS GROUPS

Scale can have an enormous effect on the operation of a group. How a system chooses the scale of sub-levels is also important (Bar-Yam, 2005). Bar-Yam cites the collapse of the USSR because of imposed centralized control. The lack of authority at lower levels

prevented the implementation of better local solutions. Other nations such as USA and Australia have a federal system allowing greater local flexibility.

The effectiveness of the operation of a human group at any particular scale is determined to a large degree by the parameters around human existence. Basic needs of group members (food, water, warmth and safety) need to be met and then belonging, esteem and self actualisation needs (Maslow, 1970) must be catered for if members are to play their role effectively in the group. The larger the group, the more difficult it is to meet these needs.

The scale of the human body in comparison to the environment in which we live determines such things as the number of people who can work effectively in a given space, the travel time taken to meet together, and our physical ability to change our environment, which in turn affect the effectiveness of a group.

The psychological nature of being human, the dynamics of interpersonal interactions, the technology and education available will also impact on the group in ways such as in the maximum stable number of group members (See Dunbar's number below), how labour is divided (Jeanson, Fewell, Gorelick, & Bertram, 2007) and the ability to resolve conflict.

SMALL SIZED GROUPS

Acephalous structures work very well for small groups. Group dynamics are simpler because everyone knows each other, including their reputation, skills, abilities, and deficiencies. Small acephalous groups work well especially if individual members are skilled in specific areas. Many small groups will use such techniques as shared leadership, rotating leadership, open meetings and consensus decision making. These would include groups such as the Women's Refuge, the Green party, and Alcoholics Anonymous.

OM:NI

One example of a small, simple acephalous group is OM:NI (Older Men: New Ideas, http://www.omni.org.au/). It operates in New South Wales, Australia, providing a structure for older men to meet and discuss common issues that confront their lives. Many small towns throughout NSW have an OM:NI group, which form groups of seven or eight up to around 20 people, who meet regularly. They have rotating facilitators and make consensus decisions. Because the group function is not complex, issues are generally easily dealt with within the whole group. There is an overarching structure, set up as an incorporated society.

THE EFFECTS OF INCREASING GROUP SIZE

As group size increases, the number of intra-group relationships multiplies and acephalous functioning becomes problematic. The number of dissenting voices increases, as does the time needed for discussions. People are more likely to be away for important decisions, and personal tensions become more likely. In larger groups more people are

strangers to each other. A person's reputation is not necessarily known, introducing a level of wariness and suspicion that is a barrier to connectivity.

Cohesion thus becomes harder to maintain with larger groups. The more people are attracted to the underlying worldview (Vidal, 2008) or values system (Vickers, 1968a) that drives the group, the more committed they are likely to be. Thus, a larger number of people in a group can be sustained if cohesion is high.

As group size increases the group becomes increasingly unstable, especially if it is beyond Dunbar's number of 150 people (Dunbar & Hill, 2003). Typically the group then appoints a leader or leaders, thus creating a hierarchy[1]. One or more people thus take on more responsibility and are ceded the authority to act on behalf of the whole group. Many problems are solved. Only leaders need full information and decision making is left (one hopes) to the most competent people. Decision making becomes swift and a unified vision is easily projected.

While this is more effective in many ways, this structured leadership often heralds the beginning of power dynamics and distinctions such as classism, sexism and racism. The controlling hierarchy is then open to use its power over others and marginalize sub-groups it sees as a threat. If members choose an acephalous structure to avoid these power related problems, other means of dealing with the issues of scale must be found.

Triangle Foods

Jon Walker (Walker, 2006) describes Triangle Wholefoods, which began as a small acephalous co-operative packaging and distributing wholefoods, but grew to become a significant venture with 35 members and a turnover of €6 million. Maintaining a co-operative format was challenging and required significant adaptation to changing circumstances. Since Triangle foods undertakes far more operations than OM:NI, greater co-ordination is needed. When the group was small, it was easier for everyone to remain informed and have the necessary discussions to operate the co-operative. As it grew bigger tools and techniques such as whiteboards, frequent co-operative meetings, clear task assignment, computer spreadsheets, etc. were needed.

HIERARCHIES

One of the four properties of a complex adaptive system (CAS) according to Simon (2007) is that they naturally form hierarchies. Sub-units often take on specific tasks and these sub-units may themselves form sub-units resulting in a nested hierarchy. As with a small world network, clusters and hubs typically form (Barabasi, 2003; Buchanan, 2002) within the nested hierarchy. As any system grows in size, the structures required to co-ordinate its operation also grow. The system must be able to not only sustain itself, but also the internal co-ordinating structures (Beer, 1984).

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[1] This can be related to the release phase of the adaptive cycle discussed later.

A complex adaptive system perspective on acephalous groups and their dynamics

As the amount of information to be processed increases and becomes more complex, the formation of a hierarchy reduces the level of complexity and uncertainty. Resources can be more efficiently utilised (Ahl & Allen, 1996). Acephalous groups can still operate effectively in hierarchies, as long as power differentials are not ascribed to the levels. The challenge for an acephalous group is to allow and enable hierarchies to form, while avoiding the negative effects of dominance hierarchies.

Acephalous hierarchies can easily fall into becoming dominance hierarchies. Charismatic or strategic thinking individuals can easily gain an undue influence over the group. If maintaining an acephalous structure is a core value of the group, constant monitoring is necessary to avoid unequal power balances from undermining the group's processes.

LARGER SIZED GROUPS

Convergence

Convergence gathering (http://www.convergence.net.nz) is an alternative spirituality group in North Canterbury, New Zealand. They have held an annual gathering lasting five or six days for 28 years attended by 300-600 people. While they have a legal structure, in practice they appear to have neither a formal nor informal structured leadership. There are members who are more influential, especially those with a long history in the group, but they have no greater say than any other member. Sub-groups, which are themselves acephalous, work during the year on the various aspects such as the kitchen, programme, and site maintenance. As much as possible decisions regarding the gathering are made at the gathering by all those present rather than being made "behind the scenes".

The group has a strong sense of the need to live in harmony with the natural environment and concepts such as the Gaia hypothesis (Lovelock, 2000). This emphasis is deep within the mythology of the organisation and pervades all of the organisation's activities.

There is no membership as such and people self-select the areas to work in and how much time they offer. This does mean there is a steady flow of people in and out of the organisation, which can be problematic in terms of finding people willing to undertake certain tasks. Often people will drop out for a number of years and return later. A safe, supportive atmosphere has developed over the years. While contributions of time and energy by attendees is highly encouraged, it is not mandatory and there are some people who attend, seeing the time as a holiday rather than needing to share in the tasks.

At the gathering there are morning meetings and lunchtime notices, where issues affecting the whole gathering (Beer's system four and five) can be discussed. Communal meals also help keep people connected to the whole event. A drug and alcohol ban helps maintain a family atmosphere. More recently the group has been organising mini weekend gatherings through the year and the site was opened up after the Christchurch earthquakes for people to stay while their homes were uninhabitable.

A complex adaptive system perspective on acephalous groups and their dynamics

Confest

Confest is a similar gathering to Convergence held twice a year in New South Wales, Australia, but 3-4000 people attend (St John, 1999; http://www.confest.org.au/). Confest is far more of an event provided for attendees by a managing group. More structure and levels of hierarchy are required to operate at this scale.

The larger numbers increases the range of attendees and activities. Though discouraged, Confest has a large contingent of people using drugs and alcohol, thus changing the atmosphere of the gathering and bringing a different set of issues to be dealt with. The larger numbers means more activities occur in localised clusters reducing whole group interactions. It is also not practical to have communal meals, so a level of cohesion and connectedness is lost. There is still much scope for self-organisation, emergence and innovation, such as the 400 or more workshops spontaneously offered by attendees.

Mondragon

In the Basque region of Spain a young Catholic priest named José Maria Arizmendiarrieta was the inspiration for the establishment of a worker's co-operative in 1941 (Whyte & Whyte K., 1991). This grew until the whole city of Mondragon was run through worker co-operatives including a hospital, bank and university. It still operates today with annual sales of nearly €10 billion despite significant hurdles, such as recession, internal conflict, technological change and restructuring itself many times over. In 1991 only three of the 103 co-operatives started in Mondragon had failed.

Each co-operative is run by a committee which has representatives from all levels of the business, elected on a rotating basis. They have a ruling that no worker may earn more than nine times that of any other worker and most parts have a ratio of 5:1 or even 3:1. At this scale a large degree of organisation and structure is required. Mondragon appears more like a conventional commercial venture than the other groups discussed, but the conscious style of operation maintains an egalitarian ethos enabling each ordinary worker to have a greater input into the direction of the co-operative of which they are a part.

Al Qaeda

Terrorist networks like Al Qaeda also find acephalous structures effective. Marion & Uhl-bien (2003) suggest that Al Qaeda formed into a loose network because of their geographic spread and the need for secrecy. They state that it was not the leaders that created Al Qaeda, but the movement that created the leaders. Al Qaeda has have been very successful in their aims because each sub-group is so autonomous and not reliant on centralised command.

ACEPHALOUS GROUP FUNCTIONING

Many of the skills and qualities needed in an acephalous group are the same as in a structured hierarchy, such as effective communication, releasing dysfunctional modes of

A complex adaptive system perspective on acephalous groups and their dynamics

operating, a willingness to take reasonable risks, valuing diversity, conflict resolution, motivation, group cohesion and matching scales to tasks (Gunderson & Holling, 2002). Some skills and qualities such as obedience to authority are no longer critical, while taking personal responsibility or an openness to change become more crucial.

In an acephalous group, individual members have a greater ability to influence the whole group. This is likely to increase the members' sense of ownership and commitment, thus improving the cohesiveness of the group. Power differentials between members are reduced in an acephalous group, thus the likelihood of abuse against members or minority groupings should be less.

Rather than those in command having greater knowledge of the working of the system, all members need to be knowledgeable for the whole group to make effective decisions. More time and energy must be put into ensuring all people have adequate skills and access to information flows. Each member has a responsibility to participate in learning opportunities and share their knowledge.

While each member needs to be valued for their contribution and have a real voice in the functioning of the group, there needs to be a recognition that some members will have more skills and expertise at certain areas of the groups functioning. These people need to have their expertise valued and utilised, but in a way that does not allow them to have undue influence over the group.

Decision making is generally slower in an acephalous group. All people need to at least be given the opportunity to take part in decision making. This often brings conflict as the more people involved in a decision, the wider the range of opinions. If an individual does not agree with actions being taken, they have a personal responsibility to act. At the same time, however, people need to be willing to be tolerant of contrary opinions and work towards the best outcome for the whole group rather than seeking partisan solutions with win/lose outcomes. Individuals in an acephalous group who do not fully participate reduce the group's effectiveness.

Coping with internal threats to acephalous groups

Any complex adaptive system is open to a flow of resources, energy and information. The flows through a dissipative system (Prigogine, 1984) need to be regulated because some things may be toxic to the system. In a structured hierarchy the leader generally has the authority to censure or exclude anyone seen as toxic to the group. In an acephalous group, the whole group must decide and this can be slow. There is a more open, participatory ethos in an acephalous group, so expelling a person is seen as a more drastic measure than it might be in a structured hierarchical system.

Rules are necessary for any group so that behaviour remains within the attractors that maintain the group's cohesion and identity. If too many agents chose to break the rules, defecting from the social contract for personal advantage, as is sometimes seen in game theory (Davis, 1997), the effectiveness of the group drops. In acephalous groups,

A complex adaptive system perspective on acephalous groups and their dynamics

"policing" the rules can become problematic, as no particular person or group of people tends to have the specific authority or responsibility to act. It is somewhat like a crowd of people standing back when someone needs help, waiting for someone else to take the initiative first. Fines, punishment, or even expelling a defector from the group may be effective, but acephalous groups generally prefer supporting people back into complying with the rule sets. This slower process in expelling a toxic member may result in more harm to the system than necessary.

Because there are no overt leadership roles, there is a greater temptation for members in an acephalous group to manipulate the group process through covert means. Such a person might try to gain control within the group by influencing others through rumours, inciting discontent, telling untruths, etc. and because of the open structure such a person can become more difficult to stop than in a structured hierarchy.

Acephalous groups have strengths and weaknesses. They are not a "silver bullet" to solve group process difficulties, but rather form a piece of the jig saw puzzle that may overall help us find more effective ways of group functioning in the 21st century. Malcolm Gladwell (2010) writes, "There are many things, though, that networks don't do well. Car companies sensibly use a network to organize their hundreds of suppliers, but not to design their cars." Acephalous groups would not be good at performing heart surgery. A person might easily bleed to death waiting for a critical decision to be made.

The legitimate network and the shadow network

Stacey (1996) introduced the concept of the legitimate network and the shadow network within an organisation. The legitimate network is linked to the dominant schema and the recessive schema is linked to the shadow network. This is obvious in a hierarchical structure. The management level controls the legitimate network and the shadow network grows from the membership. The shadow network can erupt into consciousness, highlighting deficiencies in the legitimate network in a similar way to Jung's shadow coming into consciousness (Jung, 1981). The power differentials are also clear. Stacey stresses that both networks are needed and that change generally comes from the shadow network rather than the legitimate network, that tends to maintain the status quo.

In an acephalous group, however, the two networks are not separated. There is no sub-group of people controlling the legitimate network. There will still be a difference between established policies and alternative ideas that arise, but those working in the shadow network have as much access to the legitimate network as anyone else, thus hopefully increasing the likelihood that emergent ideas will be given a fair hearing.

LEADERSHIP IN ACEPHALOUS GROUPS

A simpler term to describe groups with an unstructured leadership would be "leaderless", but the term acephalous acknowledges that even though there is no structured leadership, leadership must nevertheless be apparent for any group to function effectively.

A complex adaptive system perspective on acephalous groups and their dynamics

It would be as true to say there are many leaders as it is to say there are none. We might just as accurately describe such groups as "hydra" groups, after the mythical many headed creature that Hercules encountered. Decision making is distributed across the group instead of being centralised in the hands of a few. Each person has a responsibility to be informed about the whole system and its environment, maintain relationships with other group members, and take the initiative when needed.

While leadership is often traditionally described as exerting control over an organisation to maintain stability, Marion & Uhl-Bien (2001) and Plowman et al. (2007) suggest that from a complex systems perspective, the role of leadership is not to predict or dictate a desired future, but to enable emergent, self-organising processes within the group. Leaders therefore assist group members to make sense of what is happening. This includes embracing uncertainty, disrupting and reframing patterns, and encouraging novelty. There also needs to be an awareness that too much disruption and uncertainty can tip a system into deep chaos (Gleick, 1987).

Leadership also co-ordinates activities and encourages participation of group members (Gigliotta, Miglino, & Parisi, 2007; M. Taylor, Crook, & Dropkin, 1961). Leadership shifts from the "great man" out front to the quiet, but persuasive enabler leading the group from inside. This leads to leadership styles that are more subtle and "hidden", which can mean leadership remains unnoticed and unacknowledged.

Uhl-Bien, Marion, & McKelvey (2007) formulated Complex Leadership Theory in which three leadership functions are determined. The first is *adaptive leadership*, which is an informal emergent dynamic between agents that leads to creativity and learning.

Secondly, *administrative leadership* structures tasks, enables planning, manages crises and conflicts, etc., and thirdly, *enabling leadership* is about fostering adaptive behaviours. They also write about leaders fostering tension in order to enable emergent responses. This is in sharp contrast to the usual goal of leadership of maintaining stability.

Some people naturally have the temperament to become leaders, while others are happy to be followers. Some people may choose leadership roles for personal gain, while for others it is about making a contribution. There is usually some mix of both. In terms of Stacey's anxiety containment (Stacey, 1996), a leader is someone who takes on the anxiety of others in the group less able to contain their anxiety. While this is in some ways beneficial, it can relieve the follower of the need to make a full commitment.

All members need to demonstrate leadership in an acephalous group. The traditional leader must let go of old controlling styles and followers must learn to not leave the responsibility to others. Sometimes acephalous groups use a rotating leadership or a use a self-selecting leadership for each task that arises.

Stephen Guastello (Guastello, 2007) found leadership emerging from a leaderless group to follow a swallow-tail catastrophe model where, after a time, there emerges a small

group of primary leaders, a small group of secondary leaders and a larger group of non-leaders[2]. This fits our intuitive understandings of groups; namely that there is almost ubiquitously a small group of highly committed people at the hub of an organisation, a small group of well committed people making an important contribution, but not putting in the effort required to become a primary leader, and those who wish to participate, but not shoulder significant responsibility. We can expect a similar distribution in acephalous groups. An acephalous group can effectively operate with some degree of unequally distributed leadership, but it will reach a point, before a structured hierarchy would, when such an imbalance negatively impacts on the group's ability to fulfil its tasks.

Ideas are contested and memes, like genes, may or may not survive to influence a group (Dawkins, 1976). The way new memes emerge to influence the group are more subtle in an acephalous structure. Having an innate sense of the viral spread (Barabasi, 2003) of ideas and how to engender or block such a spread will increase a person's influence in the group. Structured hierarchies tend to be more about convincing a person in authority of your ideas rather than gaining broad support as in an acephalous group.

Ashby (1947) recognised requisite variety as a necessary feature of a well functioning complex system. The greater the requisite variety, the more options available to cope with any situation that might arise. Even though a group will have the same requisite variety within it, whether it operates as a hierarchy or an acephalous group, this variety may not be made available in a structured hierarchy for a number of reasons.

Leaders in a dominance hierarchy often assume a greater knowledge leaving the potential of those lower down the chain untapped. If a leader controls a group entirely, the group is restricted to the skills and abilities of that one person (Marion & Uhl-Bien, 2001). In a structured hierarchy, the people who actually work at the coal face often have very useful practical ideas that go unheard. People lower down on the chain often do not have confidence in their ideas and become wary of speaking out. The channels of communication are often not conducive to two-way dialogue, so the system loses its ability to access its full requisite variety (Ashby, 1947).

An acephalous group has the potential to move beyond many of these problems. Members have more power to speak up with their ideas, but now there is a contestation dynamic with more voices vying to have their ideas adopted by the group. Members must and new skills set and indeed a whole new mindset to work effectively in an acephalous group. They need to stand up for their ideas when appropriate, embracing a new line of flight (Deleuze & Guattari, 2005), while at other times they must let them go and fit in with the group. Conflictual dynamics are as present in acephalous groups, but one would hope there is openness to working with that conflict and the skills to find suitable resolution.

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[2]When the distribution of leadership is graphed, the shape in suggestive of a swallow with a head, body and large tail

A complex adaptive system perspective on acephalous groups and their dynamics

HUMAN COMPLEX ADAPTIVE SYSTEMS

Human beings are capable of forming CAS like any other living form, but our level of consciousness, use of language, sense of ethics and social organisation mean we have added qualities to be taken into consideration in terms of understanding a human complex adaptive system. Vickers (Vickers, 1968b) wrote of humans as appreciative systems as beings able to appreciate the situation they are in a make judgements accordingly. Clearly, this describes higher level of functioning with added complexity.

Human beings have agency (Checkland, 1999). We can choose our actions rather that just follow natural laws or a set of algorithms. On the one hand, we are no longer left trapped behaving as automata, merely responding from instinct. We have choice and the ability to create a different and better future for ourselves than would have otherwise. On the other hand we become responsible for our actions. If we choose unwisely we can create dystopic futures (Slaughter, 2004) for ourselves that do not enhance our well being.

Having agency requires us to be able to assess our present situation, which we do by looking for patterns and comparing them to past experience to create meaning (Weick, 1995). Next, we need to envision plausible future outcomes (Inayatullah, 2008) and make a decision based on imperfect knowledge; or as Kauffman quotes Nietzsche, "To live as if we knew" (Kauffman, 2008:P235).

Ralph Stacey (Stacey, 1996) mentions four factors to be taken into account when considering human CAS as compared to other CAS. First, humans are subject to emotion and aspiration, inspiration and anxiety, honesty and deception, imagination and curiosity. Stacey writes particularly of anxiety as a driver of behaviour. This makes human behaviour far more complex than non-human CAS.

Next, we are caught in the struggle between conforming to the behaviour of rest of the group and following our individual desires. This adds enormous complexity compared to merely follows algorithms. Personal desires may directly conflict with the direction of the group and cliques may form with their own agenda within the group.

Third, we are affected by power differentials. They are more likely in a structured hierarchy, where there is often a split between workers and management breeding distrust and dissention. That is not to say power differentials do not affect acephalous groups. Even with agreements about power sharing, it is easy for humans to slip back into using power over others for personal benefit or for a person's perception of the group's benefit. Some wielding of power over others will be conscious, but the unconscious use of power over others is more difficult to deal with and can be seen as an erupting of the shadow network (Stacey, 1996) into manifestation. The underlying egalitarian premise of acephalous groups enables the abuse of power to be challenged in ways not possible in a structured hierarchy. Paradoxically, in a group with leadership, formal or otherwise, there needs to be a tension between the leader and members to enable the leader to be challenged and if necessary, replaced for the long term viability of the group.

A complex adaptive system perspective on acephalous groups and their dynamics

Finally, we are capable of system thinking. We can reflect upon our experience, make sense of it and alter our behaviour. We have the capacity to stand back from a situation, consider other relevant factors and forecast likely future events. This double loop learning (Bateson, 2000; Checkland, 1999) uses feedback loops to compared an organisation with its stated objectives and adapt their actions accordingly. This creates reflective opportunities so learning I (a change in specificity of response), learning II (a change in the process of learning) and even learning III (a change in the process of learning II) (Tosey, 2006) as described by Bateson (2000) may be possible.

VIABLE SYSTEMS MODEL

Stafford Beer's Viable Systems Model (Beer, 1984) proposes that any complex adaptive system must contain five sub-systems that are viable systems in their own right. System one is the operation; the work done at the coal face that the organisation is set up to achieve. Typically there are a number of operational tasks being undertaken simultaneously. System two monitors system one and is involved with stability and conflict resolution, while system three optimises and generates synergy between the units. There is a temptation to create a managerial position in system three, where the number of interacting sub-units becomes increasingly complex. System four looks ahead to future plans and strategies and adapts to changing environments. System five formulates policy.

In an acephalous group, all members are responsible for all five systems. On the one hand this means the efforts and skills of the whole group are potentially applied to all tasks increasing the requisite variety (Ashby, 1947), but on the other hand, if no individual has personal responsibility for a particular task, it may slip by unnoticed.

Acephalous groups may still form hierarchies and sub-units to undertake specific tasks, so long as it is understood that higher system tasks do not claim dominance over lower system tasks. A policy sub-group, for example, can be formed, so long as there is a consensus agreement and the sub-group is not closed off from the rest of the group.

THE ADAPTIVE CYCLE

Gunderson and Holling (Gunderson & Holling, 2002; B. Walker & Salt, 2006) developed the adaptive cycle from observing ecological systems. They later found the cycle to be relevant to financial and social systems. The observed a four phase cycle comprising: exploitation, conservation, release, and reorganisation. During the phase of re-organisation a group or ecological system may either be starting anew or starting a new cycle. The potential and resilience of the system is high, but it is not yet well connected.

As the system grows into the exploitation phase, it slowly becomes more connected and internally regulated. Resilience remains high and rapid growth occurs. This phase may last a long time, but eventually as the system becomes more connected and structured, it becomes increasingly fixed, so resilience drops. Limits to growth become apparent as it enters the conservation phase.

A complex adaptive system perspective on acephalous groups and their dynamics

Finally, the system becomes so fixed that it loses resilience and growth is no longer possible. The system moves into a release phase where structures breakdown to release resources. The release may be gentle or catastrophic depending on circumstances. The longer and stronger the growth phase, the more catastrophic the release phase often is. This phase also has the potential for creative destruction (Schumpeter, 1962) where the previously locked up resources are released to be used in new, creative ways more suited to new circumstances. From the release phase the system returns to the beginning of the cycle at re-organisation, but may be at a higher level than in the previous cycle.

This might be linked into M. Scott Peck's four stages of community (Peck, 1987). He also proposes a four stage process from pseudo community, to chaos, to emptiness, to true community. We again see a process of the group coming together (reorganisation and exploitation), but the act of coming together generates forces that destabilise the group (conservation). By working through the chaos and loss (release), a new, more effective community may be born (reorganisation).

We would generally expect acephalous groups to be less likely to become structure bound, and thus might maintain the exploitation or conservation phase longer, but other factors such as group conflict might bring them to a release phase. Again, all members of the group have a responsibility to be aware of the changing cycles within the group and, looking forward, take steps to improve functioning. Group skills and the goodwill generated by a more egalitarian structure may help the group navigate through the release phase in a more positive way.

ACEPHALOUS GROUPS AND SOCIAL MOVEMENTS

Acephalous groups structures have been particularly utilised in social action groups, who have often seen the egalitarian nature of acephalous groups to reflect their aims of creating a more egalitarian society.

Putnam (2001) explains the search for new forms of a response to the loss of social capital over recent decades. He cites the lack of civic involvement as exemplified in the dramatic drop in the number of bowling leagues, but an equal rise in the number of individuals bowling. Acephalous groups can help in group bonding, bridging and civic engagement. Theda Skocpol (1994) in contrast sees the need for people to see their actions having an impact on the wider political sphere as well as local engagement and here again acephalous groups have shown themselves to be effective.

Anthony Giddens (1998) see the move towards self fulfilment through new social movements, rather than through social structures like political parties. Many people seek this lost sense of community and find an acephalous community structure expresses the openness and egalitarian nature they seek.

Deleuze (Deleuze & Guattari, 2005) often used the metaphor of a rhizome, which fits well with CAS and acephalous group functioning. A rhizome is a plant stem that grows horizontally under or along the ground forming a plexus of links interconnecting the

A complex adaptive system perspective on acephalous groups and their dynamics

many parts without a hierarchical structure. It is flowing and dynamic and can give rise to new plants. He then talks of lines of flight that allow one to disrupt the existing hegemony and escape to form new, authentic ways of being. Acephalous groups also have the potential to disrupt old ways and lead to new, innovative possibilities.

VERY LARGE SCALE ACEPHALOUS GROUPS

Over recent years we have seen very large scale acephalous groups seeking social change. These groups are typically less formally structured than those already discussed. People tend to spontaneously coming together for a specific purpose. A critical factor enabling these groups to develop is the introduction of new technologies (Howard et al., 2011). We now have unprecedented abilities to communicate with others at a distance (Zuo, Gard-murray, & Bar-yam, 2012) as media like Facebook and Twitter become ioncreasingly ubiquitous. Wikipedia and other peer to peer networks have shown themselves to be robust distributed networks with minimal structure, even on large scales (Bauwens, 2005). Widely distributed decision making across a wide network means groups are functioning more like complex adaptive systems (CAS) found in nature and groups are able to position themselves nearer the edge of chaos (Gleick, 1987) where emergence to higher levels of organisation becomes more likely.
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World Trade Organisation Meeting in Seattle, 1999

Paul Hawken described an early use of acephalous groups effectively using technology at the protests against the World Trade Organisation (WTO) meeting in Seattle in 1999 (Hawken, 2000). Hawken was a part of an eclectic mix of protest groups trying to disrupt the meetings. Small autonomous groups with cellphones were able to co-ordinate their actions faster and more effectively than the centralised, hierarchical control used by the WTO security forces. In spite of considerable force used against the protesters, security forces were unable to halt a significant disruption of the meeting. The well connected, autonomous clusters of protesters were able to quickly call for help or report a movement of security personnel. Sub-units made local decisions as to how to best respond as is typical of small world networks (Barabasi, 2003).

Arab Spring and Occupy Wall Street

More recently the Arab Spring and Occupy Wall Street movements have used the power of the internet and social media such as Facebook and Twitter (Caren & Gaby, 2011) to mobilise people in the same way as Paul Hawken. There is, however, some controversy over how influential the new technologies are in bringing about social change.

Malcom Gladwell (2010) wrote an article for the New York Times suggesting that technology may not be as important a factor in the Arab Spring. He said technologies such as Facebook and Twitter very powerfully mobilising weak ties (Granovetter, 1973), but they are only effective when they demand little of a person. Gladwell believes that bringing about social change requires a strong committed core of well organised people and a widespread high level of personal commitment to the cause, particularly citing the American civil rights protests of the 1960s. Indeed, Geoffrey Vickers was aware in the

A complex adaptive system perspective on acephalous groups and their dynamics

1960s that our ability to cope with new technologies had more to do with our communication systems that the technologies themselves (Vickers, 1968b).

Andrew Woods (2011) commented in response to Gladwell's article that often people remain silent because they think their views are not shared by others. Digital media can make people aware that this is not so and thus embolden them to become more active.

The new technologies increase connectivity by allowing people to communicate instantaneously, share views and ideas, and swaying public opinion. The internet also linked protesters to an international audience. Howard et al. (2011) examined the logs of tweets sent during the uprisings and matched them to the events as they occurred, finding that social media played a critical role in the political uprisings. The self immolation of Mohamed Bouazizi in Tunisia was the butterfly flap (Gleick, 1987) that ignited the Arab Spring, unleashing a cascade of events leading to the fall of governments. That event would not have had such an impact without the unrest from decades of oppression reaching critical levels, thus forming a self–organised criticality (Bak, 1996). Spreading the word through the internet almost certainly assisted in maintaining the cascade of support, when it might have otherwise faltered, had it only relied on geo-physical means of communication.

Caren & Gaby (2011) wrote about Facebook as an effective entry point for people to learn about the Occupy Wall Street movement, as a fast way to disseminate a large number of messages, and to keep geographically distant people in touch with events.

Many groups use acephalous structures specifically because they effectively challenge dominance hierarchies. Acephalous groups operate so differently that the strategies normally deployed by a dominance hierarchy often do not work. (Watts, 2011). A dominance based hierarchical group will immediately look for a leader to negotiate with, but there is no leader. They look for a precise set of rules that govern the group's operation. Instead they find loose agreements with fuzzy edges (Kosko, 1994). When they look for chains of command, there are none. Next, they look for a clear statement of objectives or demands over which to negotiate. Again, this is often not found.

These larger social movements have been very effective at resisting and opposing traditional hierarchical power structures. No doubt we will see more such examples in future. They are, however, not as effective at creating and maintaining new structures or processes. There may be lessons to be learned from some of the smaller scale operations such as Mondragon and Convergence, which have proved themselves to be robust and resilient over several decades.

Such new, emergent ways of distributed decision making even lead us to question the place of democracy (Fukuyama, 2012). Open rating systems used by Amazon, Trip Advisor, and crowdsourcing (Dawson & Bynghall, 2011) may herald new ways of assessing public opinion. Winston Churchill stated, "It has been said that democracy is

the worst form of government except all the others that have been tried.[3]" Might we be seeing the first glimpses representative methods of decision making rather than one where 49% of the people may not get what they want?

CONCLUSIONS

Emergent acephalous groups are becoming more prevalent in the beginning of the 21st century. They are often seen as a more egalitarian way of operating, and have shown themselves to be very effective, at least under certain conditions. We need to remain mindful of Malcolm Gladwell's advice (Gladwell, 2010) to be clear of what tasks are suited to an acephalous style of operation and not see acephalous work groups as a silver bullet solution. They are a part of the jigsaw puzzle of the solutions we need to generate a better, fairer, more peaceful future.

Scale has proved to be an important consideration in terms of finding the best way to structure an acephalous group. As group size increases the arrangements of sub-systems and intergroup relationships must adapt to ensure ongoing viability. Small groups require little or no infrastructure, but as group size increases, higher levels of organisation are required. Each new level presents new challenges to maintain the acephalous nature of the organisation.

Networks such as those involved in the Arab Spring and Occupy Wall Street have been very effective at opposing old dominance based structures, but not been effective creating alternatives. Examples of effective acephalous organisations exist, such as OM:NI, Convergence, Triangle Foods and Mondragon. Further investigations into such organisations and to acephalous group operation may help this emerging trend to grow more effectively, particularly in the area of bringing about social change.

REFERENCES

Ahl, V., & Allen, T. (1996). *Hierarchy theory: A vision, vocabulary, and epistemology.*, New York, Columbia University Press.

Ashby, W. R. (1947). Principles of the self-organizing dynamic system, *The Journal of general psychology.*, *37*(2): 125-8.

Bak, P. (1996). *How nature works: The science of self organized criticality.*, New York, Copernicus, an imprint of Springer-Verlag.

Bar-Yam, Y. (2005). *Making things work: Solving complex problems in a complex world.*, Cambridge, Massachusetts, Necsi Knowledge Press.

Barabasi, A.-L. (2003). *Linked: How everything is connected to everything else and what it means for business, science., and everyday life.*, New York, Plume.

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[3] http://www.quotationspage.com/quote/364.html

A complex adaptive system perspective on acephalous groups and their dynamics

Bateson, G. (2000). *Steps to an ecology of mind: Collected essays in anthropology, psychiatry, evolution, and epistemology.,* Chicago, University of Chicago Press.

Bauwens, M. (2005). *P2P and Human Evolution : Peer to peer as the premise of a new mode of civilization.,* Retrieved June 2012 from http://www.networkcultures.org/weblog/archives/P2P_essay.pdf.

Beer, S. (1984). The Viable System Model: Its provenance, development, methodology and pathology, *Journal of the Operational Research Society.,* *35*(1): 7-25.

Brocklesby, J. (2007). The theoretical underpinnings of Soft Systems Methodology — Comparing the work of Geoffrey Vickers and Humberto Maturana. *Systems Research and Behavioural Science.,* *24*(2): 157-169.

Buchanan, M. (2002). *Nexus: Small worlds and the groundbreaking theory of networks.,* New York, W.W Norton & Company.

Caren, N., & Gaby, S. (2011). *Occupy online: Facebook and the spread of Occupy Wall Street.,* Retrieved June 2012 from doi:http://dx.doi.org/10.2139/ssrn.1943168.

Checkland, P. (1999). *Systems thinking, Systems practice.,* Chichester, West Sussex: Wiley.

Davis, M. D. (1997). *Game Theory: A nontechnical introduction.,* New York, Dover Publications.

Dawkins, R. (1976). *The selfish gene.,* Oxford, Oxford University Press Inc.

Dawson, R., & Bynghall, S. (2011). *Getting results from crowds: The definitive guide to using crowdsourcing to grow your business.,* Sydney, Advanced Human Technologies Inc.

Deleuze, G., & Guattari, F. (2005). *A thousand plateaus; Capitalism and schizophrenia.,* Minneapolis, University of Minnesota Press.

Dunbar, R., & Hill, R. A. (2003). Social network size, *Human Nature.,* *14*(1): 53-72.

Flannery, T. (2011). *Here on earth: A natural history of the Planet.,* Melbourne, Australia.

Fukuyama, F. (2012). The Future of History, *Foreign Affairs.,* 91(1). Retrieved June 2012 from http://www.foreignaffairs.com/articles/136782/francis-fukuyama/the-future-of-history.

Giddens, A. (1998). *The Third Way: The Renewal of Social Democracy.,* Cambridge, UK, Polity Press.

Gigliotta, O., Miglino, O., & Parisi, D. (2007). Groups of agents with a leader, *Journal of Artificial Societies and Social Simulation.,* 10(4):1. Retrieved June 2012 from http://jasss.soc.surrey.ac.uk/10/4/1.html.

A complex adaptive system perspective on acephalous groups and their dynamics

Gladwell, M. (2010). Small change: Why the revolution will not be tweeted. *New York Times*. Retrieved June 2012 from http://www.newyorker.com/reporting/2010/10/04/101004fa_fact_gladwell?currentPage=all.

Gleick, J. (1987). *Chaos: Making a new science*., London, Abacus Books.

Granovetter, M. (1973). The strength of weak ties, *American Journal of Sociology*, *78*(6): 1360-1380.

Guastello, S. J. (2007). Non-linear dynamics and leadership emergence, *The Leadership Quarterly*., *18*(4): 357-369.

Gunderson, L. H., & Holling, C. S. (2002). *Panarchy: Understanding transformations in human and natural systems* (1st edition.)., Washington DC, Island Press.

Hawken, P. (2000). *What skeleton woman told the WTO in Seattle*. Retrieved June, 2012, from http://www.ratical.org/co-globalize/PaulHawken.html.

Howard, P., Duffy, A., Freelon, D., Hussain, M., Mari, W., & Mazaid, M. (2011). *Opening closed regimes: What was the role of social media in the Arab Spring*. Retrieved June 2012 from www.pITPI.org.

Inayatullah, S. (2008). Six pillars: futures thinking for transforming., *Foresight*, 10(1): 4-21.

Jeanson, R., Fewell, J. H., Gorelick, R., & Bertram, S. M. (2007). Emergence of increased division of labor as a function of group size, *Behavioral Ecology and Sociobiology*., 62(2): 289-298.

Jung, C. (1981). *Archetypes and the collective unconscious*., Princeton, Princeton University Press.

Kauffman, S. A. (2008). *Reinventing the Sacred: A New View of Science, Reason, and Religion*., New York, Basic Books.

Kosko, B. (1994). *Fuzzy Thinking: The New Science of Fuzzy Logic*., New York, Hyperion.

Laszlo, E. (1996). *The Systems View of the World: A Holistic Vision for our Time*., New Jersey, Hampton Press.

Lovelock, J. (2000). *Gaia: A new look at life on earth*., New York, Oxford University Press.

Maslow, A. (1970). *Motivation and personality*., New York, Harper and Row.

Marion, R., & Uhl-Bien, M. (2001). Leadership in complex organizations, *The Leadership Quarterly*., 12(4): 389-418.

A complex adaptive system perspective on acephalous groups and their dynamics

Marion, R., & Uhl-bien, M. (2003). Complexity theory and Al-Qaeda: Examining complex leadership, *Emergence*., 5(1): 54-76.

Peck, M. S. (1987). *The different drum: The creation of true community-The first steps to world peace*., London, Arrow Books.

Peterson, D., & Wrangham, R. (1997). *Demonic Males: Apes and the Origins of Human Violence*., New York: Mariner Books.

Plowman, D. A., Solansky, S., Beck, T. E., Baker, L., Kulkarni, M., & Travis, D. V. (2007). The role of leadership in emergent, self-organization, *The Leadership Quarterly*., 18(4): 341-356.

Prigogine, I. (1984). *Order out of chaos*., London, Heinemann.

Putnam, R. D. (2001). *Bowling alone*., New York, Simon & Schuster.

Ray, P., & Anderson, S. (2000). *Culture creatives*, *How 50 million people are changing the world*., New York, Three Rivers Press.

St John, G. (1999). *Alternative cultural heterotopia: ConFest as Australia's marginal centre*., Bundoora, Victoria, Australia, La Trobe University.

Schumpeter, J. A. (1962). *Capitalism, socialism, and democracy*., New York: Harper Perennial.

Simon, H. (2007). The architecture of complexity. *Proceedings of the American Philosophical Society*., 106(6): 467-482.

Skocpol, T. (1994). *Social revolutions in the modern world*., New York, Cambridge University Press.

Slaughter, R. A. (2004). *Futures Beyond Dystopia: Creating Social Foresight*. London and New York: Routledge/Falmer Stacey, R. (1996). *Complexity and creativity in organisations*., San Francisco, Berrett-Koehler Publishers.

Stacey, R. (1996). *Complexity and creativity in organisations*., San Francisco, Berrett-Koehler Publishers.

Taylor, G. (2008). *Evolution's edge: The coming collapse and transformation of our world*., Gabriola Island, British Columbia, New Society Publishers.

Taylor, M., Crook, R., & Dropkin, S. (1961). Assessing emerging leadership behaviour in small group discussion, *Journal of Educational Psychology*., 52(1): 12-18.

Tosey, P. (2006). *Bateson's levels of learning : A framework for transformative learning*., Retrieved June 2012 from http://epubs.surrey.ac.uk/1198/.

Travica, B. (1999). *New Organizational Designs: Information Aspects*., Stamford, Connecticut, Ablex Publishing Corporation.

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*., 18(4): 298-318.

Vickers, G. (1968a). Science and the appreciative system. *Human Relations*., 21(2): 99-119.

Vickers, G. (1968b). *Value systems and social processes*., London, Tavistock Publications.

Vidal, C. (2008). Wat is een wereldbeeld? (What is a worldview?). In H. van Belle & J. van der Veken (Eds.), *Nieuwheid denken. De wetenschappen en het creatieve aspect van de werkelijkheid*., Acco, Louven.

Walker, B., & Salt, D. (2006). *Resilience thinking: Sustaining ecosystems and people in a changing world*., Washington DC, Island Press.

Walker, J. (2006). *The VSM Guide*. Retrieved June 2012 from http://www.esrad.org.uk/resources/vsmg_3/screen.php?page=preface.

Watts, D. J. (2011). What are leaders really for? *Harvard Business Review*., Retrieved June 2012 from http://blogs.hbr.org/cs/2011/11/what_are_leaders_really_for.html#.TtEXVNOGo8I.twitter.

Weick, K. E. (1995). *Sensemaking in organizations*., Thousand Oaks, CA: Sage Publications, Inc.

Whyte, W., & Whyte K. (1991). *Making Mondragón: The growth and dynamics of the worker cooperative complex* (2nd Edition)., Ithaca, New York, ILR Press.

Woods, A. (2011). These revolutions are not all twitter. *New York Times*., New York, Retrieved from http://www.nytimes.com/2011/02/02/opinion/02iht-edwoods02.html.

Zuo, W., Gard-murray, A., & Bar-yam, Y. (2012). *An exploration of social identity : The geography and politics of news-sharing communities in Twitte*r., Retrieved June 2012 from http://necsi.edu/research/social/nyttwitter/.