

The Coaching Ripple Effect:
The Individual and Systemic Level Influence of Leadership Development.

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Acknowledgements: This project was funded through the following
Grant awarded by Institute of Coaching, at McLean Hospital, affiliate of Harvard
Medical School

Australian Research Counsel Industry Grant

Supported by the Coaching Psychology Unit, University of Sydney

Learning Solution, University of Sydney

This document will form part of a PhD thesis

Abstract

Introduction & Aims

How the quality of the complex web of daily interactions effect the wellbeing of individuals and the broader wellbeing of an organisation is largely unknown. Often organisations embark on leadership development programs in an attempt to influence systemic level change of organisational culture or wellbeing. Most approaches assume a linear model that does not take the complexity of organisations seriously. Leadership development through Coaching has shown positive results for individual level measures of wellbeing and relationships exist between leadership style, employee stress and wellbeing (Skakon, Nielsen, Borg and Guzman, 2010). What is largely unknown is how change in leaders can impact these variables through influencing the experience of others in an organisation. Can this influence ripple through the broader complex dynamics of an organisation? Complex Adaptive Systems theory (CAS; Eidlison, 1997) provides a useful approach to thinking about organisational change and the wellbeing of individuals embedded in these systems (Cavanagh, 2006). The relatively new methodology of Social Network Analysis (SNA; Scott, 2000) provides researchers with processes that better account for relational components of systems, highlighted in CAS.

Design & Methods

An ABA design coaching intervention study was conducted across an organisation (N=225). Wellbeing measures were taken for all employees and a social network analysis was conducted on the degree and quality (positivity and negativity) of all organisational interactions. 20 leaders (n=20) received 8 coaching sessions over a 16-20 week period. Individual self report measures of goal attainment as well as 360 feedback on transformational leadership were assessed in the control, pre and post.

Findings

Significant increase in the goal attainment (pre: $M = 4.21$, $SD = 2.07$, post: $M = 7.05$, $SD = 1.35$), transformational leadership (pre: $M = 14.56$, $SD = 2.86$, post: $M = 15.49$, $SD = 2.88$) and psychological wellbeing measures (pre: $M = 167.85$, $SD = 16$, post: $M = 174.95$, $SD = 15.08$) were observed for those who received coaching. Average change in the perceived quality of interaction improved for those who received coaching ($M = .196$, $SD = .308$) however the perception of change in quality of the interaction others believed they were having with those who received coaching declined ($M = -.226$ $SD = .367$). It was found that the closer any member of the network were perceived to be connected to those that received coaching, by the coachees themselves, the more likely they were to experience positive increases in wellbeing ($r = .223$ $p < .05$).

Conclusions

This research has important implication into organisational wellbeing initiatives and how we measure the impact of interventions aimed at organisational change. It also highlights the influence of leadership coaching beyond the individual leader while moving forward our conception of organisations as complex adaptive systems into the applied space of intervention design.

Introduction

Published articles, PhD's and empirical studies on coaching have dramatically increased in recent years. While empirical outcome based research still only represents a small portion of these publications (Grant, 2008), coaching psychology is shaping up to be an increasingly popular change methodology. While popularity may encourage research interest, there is much yet left unexplored in our understanding of the effectiveness and impact of coaching.

A wide variety of approaches to coaching exist in the industry. Articles concerning the application of evidence based methodologies from other disciplines to the coaching context abound (Kemp, 2008). These include cognitive approaches (Auerbach, 2006), the application of appreciative inquiry (Gordon, 2008), narrative perspectives (Drake, 2009) and adult developmental theory (Laske, 1999) to name just a few.

Research on coaching at the individual level has been related to, increased goal striving, hope and wellbeing (Green, Oades, & Grant, 2006); increases in goal commitment, attainment and environmental mastery (Spence & Grant, 2007); Increases in cognitive hardiness, mental health and hope (Green, Grant & Rynsaardt, 2007); the reduction of workplace stress and anxiety (Gyllensten & Palmer, 2005); Improvements in transformational leadership (Grant, Green & Rynsaardt, 2010; Cerni, Curtis & Colmar, 2010); and the enhancement of outcome expectancies and self-efficacy (Evers, Brouwers & Tomic, 2006).

The sophistication and volume of coaching research is increasing (Grant, 2009). However, the published research tends to focus heavily on individual level outcomes. While the individual is of primary concern in all coaching engagements, a broader scope of inquiry may provide a new set of tools and approaches which may dramatically shift our understanding of coaching and leadership development interventions in the organisational context.

The importance of coaching for groups and teams has been asserted previously (Arakawa & Greenberg, 2007). Despite this, the impact of coaching at the level of the group, team, organisation or system has largely been ignored. The limited research that does exist in this area has focused mostly on return for investment (Feggetter, 2007; McGovern et al., 2001; Palmer, 2003). How leadership development through coaching may impact broader organisational measures such as collaboration, communication flow, relationships and the wellbeing of others in a system has been left empirically untested. If the wellbeing of organisational members is of any importance this focus must shift. Focusing on these broader organisational impacts of coaching may provide a deeper understanding of coaching at both the individual and organisational levels and greater clarity about the role of coaching in the process of effective organisational change.

Complex Adaptive Systems Theory

In order to assess the impact coaching may have on the organisation and its members it is important to have an underlying theory of organisational systems to help direct inquiry and research. Complex Adaptive System theory (CAS) is a useful theory that helps to explain the complexity of organisational behaviour at more than just the level of individual outcomes. CAS theory views organisations as diverse networks of interacting systems that grow and adapt in response to change in the internal and external environment (Eidelson, 1997).

According to complexity theory, systems adapt in novel ways, system components interact and provide feedback to the system impacting on ongoing behaviour and change (Cavanagh, 2006). The causal structure of this feedback systems impact on change is often non-linear (Cavanagh & Lane, 2012) making prediction difficult and usual approaches to statistical inquiry often redundant. In applying CAS to organisations, the non linearity must be taken seriously when considering leaders and individuals as components of the system.

The communication in, and networks of, relationships between the individuals become the dynamic connections between organisational subsystems. The presence, absence and quality of these connections provide a way to assess the relationships between the components of the organisation and the degree of relatedness of the organisation as a whole. By focusing more directly on this interconnectivity, CAS theory can be applied more directly to an understanding of organisational change. Focusing on the embeddedness of individuals in the complex web of organisational relations allows us to account for changes in the system that occur due to iterative, non-linear processes within the system.

The role of the leader

Leaders are active influential agents in organisations. It has been suggested that leadership is concerned not only with the influence of the supervisor on subordinates, but also with the incremental influence of the leader throughout and around the system at large (Osborn et al., 2002). As change in a system occurs, leaders and other agents adjust to new information. Each agent expands their behavioural repertoire, which in effect, expands the behavioural repertoire of the system (Kauffman, 1993). In extending this, if coaching changes both the leader and the way in which the leader interacts with the system, this should lead to change in the organisation, team or group under investigation.

The key data of interest, from a CAS perspective, are the nature of the interactions between the system members. These data are essentially relational and exist between individuals rather than being embedded in a given individual. One way of assessing the influence of coaching on an organisation is to assess changes in the way members of an organisation are connected and interact. I.e. changes in the pattern and quality of their communication. If leaders are considered as important system components that contribute to the experience of others in the system then the pattern and quality of leadership communication becomes particularly important.

Analysing relational data

Interaction research has been plagued with a heavy commitment to a laboratory-based experimental methodology, driven by an analytic-reductionist paradigm. While laboratory studies are able to control for confounding factors, they provide limited real life application of the research findings (McGrath, 1997; Moreland, Hogg & Hains, 1994). Cragan and Wright (1990) agree that the use of more realistic groups in group interaction research is required.

In a similar vein Levine and Moreland (1990) conclude theories that focus on simple behaviour in laboratory groups are no longer required, and researchers are looking for an accounting of more complex behaviour in natural environments. McGrath (1997) suggests that group research needs to occur in context, considering groups as complex, adaptive, dynamic systems. This reinforces the call for a new and more complex research framework (Frey, 1994; Fuhrman & Burlingame, 1994; Moreland, Hogg & Hains, 1994).

One of the more recent and interesting research projects analysing group interaction dynamics, filmed groups of executives during their yearly strategic planning meeting, coding their interactions over time (Losada & Heaphy, 2004). Losada's model of interaction analysis incorporated newer understanding of key dimensions of group interaction behaviour, including a ratio of positivity to negativity based on the earlier work of Bales (1950; Bales & Cohen, 1979) and Gottman (1981; Gottman, Markman & Notarius, 1977), advocacy to inquiry from research conducted by Argyris and Schön (1978), and other-focus to self-focus from the work by Hax and Majluf (1991), and Buber (1970, as cited in Losada & Heaphy, 2004).

To assess the dynamic nature of interactions across time Losada developed mathematical algorithms based on his experience in group observation (Losada, 1999). An important concept from Losada's work was that of connectivity. Connectivity can be thought of as the influence members have on each other, as measured by recurrent

patterns of behaviour across time. It was found that the level of connectivity, or the number of correlated communication patterns, was strongly associated with team performance. In this way Losada was able to access the dynamic nature of group interaction in a manner previously unexplored.

Losada (1990) realised that the mathematical formula he developed, to match the time series data he had witnessed through team observation, were the same set of differential equations used by Lorenz (1963; Strogatz, 1994) to understand change in another complex adaptive system – the weather (more specifically, these equations were found to represent forced dissipative hydrodynamic flow in fluid dynamics). The Lorenz equations have assisted in the 3-dimensional mapping of the non-linear or dynamic system properties, examining how these systems evolve over time in complex patterns. They are algorithms that can help predict the behaviour of many different types of complex systems on the basis of change in key variables. (Thompson & Stewart, 1986). The application of these equations to group interaction research has been a promising step forward in considering groups as complex adaptive systems.

Using these three ratios, Losada developed the Meta-Learning model (Losada & Heaphy, 2004). This model mathematically related the ratios of Advocacy/Inquiry with Other/Self and clearly linked positivity/negativity and connectivity to the performance of business teams (Losada & Heaphy, 2004). It was found that the most important ratio to consider was that of positivity to negativity and ratios of approximately 5 to 1 of positivity over negativity were indicative interaction dynamics of high performing teams.

Losada and his colleagues research is particularly important for two reasons. Firstly because, alongside Gottman (Gottman & Levenson, 1992) they are among the first to apply non-linear methods to assessing group dynamics. Secondly, this research formalises the mathematical link between basic positivity to negativity ratios and the previous time series analysis data using the Lorenz equations (Losada, 1999). Losada's model and supporting data suggest, that simple and easily obtainable measures of positivity and negativity could be used to predict patterns of performance in senior

leadership teams. Interestingly, Gottman in his famous research on communication dynamics in married couples has found almost identical relationships between the ratio of positivity to negativity in a couple's communication and the long term success of the marital relationship (Gottman, Markman & Notarius, 1977; Gottman & Levenson, 1992).

The individual experience of positivity and negativity

At the dyad level, Gottman has shown that Positivity to Negativity ratios (P/N) could be used to discriminate distressed from non-distressed couples (Gottman, Markman & Notarius, 1977), and that low P/N ratios predicted a significantly greater risk for marital dissolution and lower marital satisfaction (Gottman & Levenson, 1992). More recently Losada and Fredrickson (2005) used the mathematical formulas from the Meta-Learning Model to predict levels of positivity to negativity in individuals characterised with flourishing mental health. Waugh and Fredrickson (2006) have also found that a similar threshold of P/N can determine those that are able to reach a complex understanding of others from those who cannot.

Assessing P/N ratios at the group and individual level independently is not enough. Attention needs to be paid to the distribution of positivity and negativity amongst individuals in groups. Through analysing the distribution of P/N ratios of group members we can get a better understanding of how the individual level interacts with the group or organisational level.

As noted above P/N ratio's of higher than about 3:1 or 5:1 tend to represent flourishing in different forms, at the individual level (Losada & Fredrickson, 2004; Waugh & Fredrickson, 2006), at the dyadic level (Gottman & Levenson, 1992) and at the team or group level (Losada & Heaphy, 2004). It would seem a logical next step to consider how P/N ratios may be important at the organisational level. If P/N of interactions in organisations are related to individual experience, we may find that the distribution pattern of experiences in an organisation could relate to measures such as organisational climate, commitment and collaboration. Also, at the individual level, the

positivity and negativity that characterises the communications within an organisation may have significant influence over the experience of individuals. This may influence factor such as wellbeing, engagement and satisfaction (Harter, Schmidt, & Keyes, 2004).

The Organisational level: Social Network Analysis

Analysing the impact of coaching on the quality of communication at the organisational level may help us to understand the mechanism by which leaders are able to influence the way systems they work in, are experienced, organised and interact. Leaders may influence the communication and relationships between individuals. To date analysis of relational data such as interactions, communication and relationship quality, has been left untested in coaching research.

Social Networking Analysis (SNA) is a methodology that can assist in exploring relational data (Scott, 2000) and has had some success in related leadership research (Balkundi & Kilduff, 2006). SNA also takes into account the interconnectivity observed in complex adaptive systems – potentially yielding a more ecologically valid analysis than more common linear approaches. SNA is a relatively new technique primarily concerned with understanding networks and the way in which the network members are related (Scott, 2000). Relational data consists of things such as contacts, ties, information flow, influence and communication between individual agents (i.e., network members, or “components of a system” to use Scott’s terminology). These relations do not belong to the individual agents but are part of the relational system between system agents or system components (Scott, 1991).

SNA is a technique that allows researchers to focus at a systems level on the relational data in networks. In doing so it allows research questions to focus on emergent properties and interconnectivity of a system (Scott, 1991).

While SNA has been applied in a wide variety of fields including management, anthropology, political science and psychology (Hatala, 2006), a lack of empirical research on leadership and social networks has been noted (Brass, Galaskiewicz, & Tsai, 2004). Balkundi and Kilduff (2006) outline the potential for SNA in investigating leadership and highlight three networks of interest: (1) the direct ties surrounding leaders, (2) the pattern of direct and indirect ties embedding the leader in the organisation or system and (3) the inter-organisational linkages formed between leaders across organisations.

SNA has had some success in investigating leadership in organisations. These include investigations of group performance and leader reputation (Mehra et al., 2006a), leadership distribution in teams (Mehra et al., 2006b) transformational leadership, group interaction and organisational climate (Zohar & Tenne-Gazit, 2008), advice and influence networks of transformational leaders (Bono & Anderson, 2005), and social capital in relation to intra-firm networks (Tsai & Ghoshal, 1998).

While results seem promising, SNA has only been used to analyze leadership in groups or organisations as they exist at one point in time. Little SNA research, if any, has focused on how existing groups, teams or organisations may change following an intervention designed to improve patterns of interactions and communication. This severely limits the application of SNA to organisational and leadership development. If we are to consider organisations as CAS with non-linear emergent properties that are by definition difficult to predict, research that focuses on intervention directly and measures change in the complex systems and organisations, is required. Focus is needed on the relational data that embed members in these networks and how change in these systems may affect the experience of others they are connected to.

Coaching is concerned with supporting positive change primarily in leaders and enhancing leadership effectiveness. Leaders are active agents in their organisational context that drive interaction and communication at a number of levels. Following the call to action of Balkundi and Kilduff (2006), analyzing not only the network of

communication ties that directly surround and embed leaders in a system, but also the quality (positivity / negativity) of these connections is an important extension of SNA research on leadership and organisational change. By analyzing these data both pre and post leadership coaching, an understanding of the effectiveness of coaching in creating broader organisational change may emerge.

Focusing on relational data and considering more than just individual and dyadic level impact of organisational and leadership change initiatives is a direct application of complex adaptive system theory to coaching and organisational research. The impact of coaching at both the individual and organisational levels, through the application of Social Networking Analysis, may provide a richer understanding of the way in which relationships between leadership, individual change and organisational networks, change and emerge over time.

Hypotheses on individual and systemic level impact of leadership development through coaching

Individual Dimension Leadership development through coaching has been shown to be beneficial at the individual level for those receiving coaching directly (Green, Oades, & Grant, 2006). Therefore direct change should be observed in the level of wellbeing, goal attainment and transformational leadership for those that receive coaching over the intervention period.

Hypothesis 1: Significant positive increase will be observed in self report measures of wellbeing for those receiving coaching, during the intervention period.

Hypothesis 2: Significant positive increase will be observed in goal attainment measures for those receiving coaching, during the intervention period.

Hypothesis 3: 360 feedback measures of Transformational leadership will increase for those that receive coaching during the intervention period.

Relation dimension If as predicted by hypothesis 3 ratings of transformational leadership increase through the coaching intervention, this would mean that others in the system are experiencing these individuals differently. Therefore in some way their behaviour in the system would have changed in order for others to have observed it. If this change is positive, as predicted, it could be assumed that the leaders would then be experiencing the system more positively which could translate into others in the system experiencing these leaders more positively.

Theories of transformational leadership suggest that leaders higher in transformational leadership are better able to build trust, act with integrity, inspire others, encourage innovative thinking, and help others to develop for themselves (Avolio, Bass & Jung, 1995) These five features of transformational leadership are all relational in some way. If transformational leadership qualities are observed to be changing in an individual then this change in experience of the leaders must be transmitted somehow to those that they are connected to. One explanation is that this may occur through the quality of interaction that these leaders have with those around them.

There are measures of change in the quality of interactions that may access this hypothesised change in dynamics. The first is the perception of the quality of interaction that the coached leader has of themselves with others. In social networking analysis this is thought of as an outward directed relation (Communication Out) or the perceptions of an identified individual of the relations they have with others (Freeman, 2004). The second is the perception of the quality of these interactions that others have of the leaders being coach. In social network analysis this is thought of as an inward directed relation (Communication In), or the perceptions others have of their relation with an identified individual (Freeman, 2004). Communication Out and Communication In may be, but are not necessarily equal.

It is possible that undergoing individual leadership development may change how a person perceives their relations with others independent of any measurable or noticeable change in behaviour. If actual behaviour is not changed it is unlikely the individual receiving development would be experienced by others as different. Consequently it is unlikely that these others would then undergo any individual level change themselves as a result of the development of the leaders with whom they are connected. In other words, in the absence of behaviour change in the coached leaders, the wellbeing of others in the system and any system level measures are likely to remain unchanged.

However, if coached individuals are experienced as improved on measures of transformational leadership (eg trust, inspiration etc), it could be expected that others in the system would experience greater levels of psychological wellbeing (Neilsen, Randall, Yarker & Brenner, 2008). More specifically trust in the relational context has been shown to play a pivotal role in relation to wellbeing, health and life satisfaction (Helliwell & Wang, 2001; Helliwell & Putnam, 2004). From a network perspective it would follow that those most connected to those that increased their levels of transformational leadership through the coaching intervention process, are most likely to experience change in wellbeing due to their embeddedness within the leadership network structure.

In order to assess this potential ripple effect of leadership development through coaching, in an organisation, change in the quality of interactions as perceived by those that received coaching (Communication Out) and any change to the experience of the quality of interactions by others, of those that received coaching (Communication In) needs to be assessed. If the Coaching Ripple Effect is observed, a positive change will be seen in measures of Out Communication and In Communication, for those that did receive coaching compared to those that did not.

Hypothesis 4: A positive increase in Coached participants' mean perception of the quality of their communication (Communication Out), compared to non coached participants during the coaching intervention.

Hypothesis 5: A positive increase in perception participants' have of the mean quality of their communication with coached individuals (Communication In), compared to that with non coached individuals during the coaching intervention.

If hypothesis 4 and hypothesis 5 are supported, an improvement in the wellbeing of those most closely connected to the coached individuals may be observed. CAS suggests that systems often resist change and will try to maintain equilibrium (Eidelson, 2004). If this is the case the further away individuals are from those that receive coaching the less likely these individuals are to be positively influenced by any change that may occur. Indeed, in order to maintain system equilibrium distant individuals may change in unexpected ways so as to compensate for any increased positivity observed closer to the intervention points (Dooley, 1997).

Given the greater level of unpredictability inherent in assessing change at increasing distance from the locus of intervention, it is most likely that change will be found in parts of the system closest to those that receive the intervention directly. However, individuals have multiple connections across complex systems, only some of which are to those who have received the intervention. If ones experience of the system is related to their place within the structure and architecture of the network as a whole it is important to take into account all their connections and not just those with targeted individuals.

Consider this, if Peter is directly connected to Meg (a recipient of coaching) and Meg has positively changed how she interacts with others, it can be suggested that Peter would observe this change and if it were sufficiently large enough, Peter might experience the work place differently. Peter may also be connected to more than one person who has positively changed, thereby increasing the probability that his

experience of the workplace may change in a positive direction. However, we also need to take into account the number of people to which Peter is connected who may not have changed positively (or indeed may have changed negatively), as these are likely to inhibit any positive shift in Peter's experience of the workplace. Hence, it is important to take into account Peter's experience of positive change in comparison to the number of connections in which he has experienced no change or negative change.

Further complicating matters is the possibility that if someone experiences a large degree of positive change in their experience of others, this individual could then become a conduit for others they are directly connected with. This suggests that an individual connected to a number of coached individuals experiences a proportionally larger degree of change in their experience of the system so that they then begin to change the quality of their interaction with others. If this flow on effect was to come about an individual's experience of the organisation could shift dramatically, possibly leading to increase levels of wellbeing and potentially other organisational level measures such as collaboration, engagement and work place satisfaction.

The difficulty in assessing the degree of interconnectivity in large complex interconnected systems is that the interconnectivity is almost impossible to segment due to the multiplicity of connections between people, and the large degree of variation in network positioning.

Social Network Analysis provides a number of metrics of interconnectivity. One group of such metrics involves the notion of Centrality. Centrality measures different ways in which a person may be embedded in a network of relations in a way which takes into account the other relations present in the network. For our purposes four types of centrality are important.

1. Degree Centrality: This is a quite simple measure of centrality. It provides a basic count of the number and strength of connection an individual has in proportion to the number they could have across the entire network,

2. Eigen Vector Centrality provides information on the degree to which an individual is connected to highly connected others,
3. Closeness Centrality is a measure of the degree to which an individual lies a short distance from most other individuals,
4. Betweenness Centrality indicates the degree to which an individual brokers connection paths between all other individuals, (Scott, 2000).

Unfortunately, no analytical techniques exist that enable analysis of changes in Eigen Vector, Closeness or Betweenness Centrality in specific sub groups comparative to the entire network. This limits the ability to assess network level changes that may be occurring local to only those that have received the coaching. One way to get around this is to create a sub network or network neighbourhood that only includes those connected to coached individuals and the connections that these individuals have with each other. Comparisons can then be made between any of the centrality measures in both the primary network and the coachee neighbourhood network, in relation to change in any individual level variables. Everyone included in the coachee neighbourhood network would have at least one direct connection with someone who had received coaching. Considering closeness centrality in particular, any measure of closeness would be related particularly to the coaching subgroup when compared to closeness centrality measures in the primary network. This means that a greater degree and/or strength of relationship between measures of individual level wellbeing and measures of centrality should be observed in the coached neighborhood network compared to the primary network for the intervention period. If this is observed it would indicate a higher propensity for individual levels of wellbeing to change the closer one is connected to others that have changed the quality of their interactions through the coaching they have received supporting evidence for a coaching ripple effect.

Hypothesis 6: The relationship between measures of change in wellbeing and centrality in the quality of interactions within the coached neighbourhood network will be stronger than those observed in the primary network.

The coaching ripple effect would also suggest that, if positive change in the quality of communication occurs in key sub networks, across the system to a great enough degree, other system level measures may also be observed to change. Specifically, one would expect a positive change in the density of the positive interactions in the system as a whole. For valued and directed networks, network density is defined as the sum of the value of all ties present divided by the number of possible ties. This can be thought of as the ratio of the number and strength of all present ties each individual has in a network, to the theoretical maximum number and strength of all possible ties (Hanneman & Riddle, 2005). This measures the degree of total interconnectivity of the system as a whole. If the positivity of communication across the network is improved to a great enough degree, measures of density of the quality of interaction network should improve over the intervention period.

Hypothesis 7: A positive increase will be observed in the density of the quality of interaction network post the intervention period.

Exploring the above questions contributes to the field of coaching and leadership research in a number of ways;

1. Through adding to the empirical coaching literature on the effectiveness of coaching at the individual level,
2. Through being one of the first studies to consider the impact of coaching on wellbeing through a complex adaptive systems theory of organisations
3. In the direct application of social network analysis as a methodology for assessing coaching intervention and organisational change, through considering the potential impact of leadership coaching and change in the leader beyond the leader themselves.

Design and Methods

Participants

Participants' were invited from an academic organisational network (n=225) to participate in the research. Participants were in two distinct categories, those that received coaching (n=20) and all others in the networks (n=225). Not all network members chose to participate with n=102 participants completing all data across all time points. Data on All members of the network (n=225) are used for all of the social network analysis processes as all perceived relationship with others, whether they participate or not, are important for analysing the participants experience.

Design

A repeated measures control period ABA design was employed. Participants in the coaching condition receive eight sessions of one to one coaching over a 16-20 week period. All participants were measured at three time points: a baseline control measure, prior to commencement of the coaching intervention and post coaching intervention.

Measures

The Psychological Well-Being Scale (PWB; Ryff & Keyes, 1995) was used to measure the wellbeing of all participants. Goal Attainment Scaling (GAS; Spence, 2007) was used to measure the degree to which coached individuals moved towards their communication goals. Transformational Leadership was measured using 360 degree feedback through the Multifactor Leadership Questionnaire (MLQ; Avolio & Bass, 1995).

A Social Network Analysis was conducted at all three time points in order to measure the quality and pattern of communication in the two organisations. Whole-network data was collected using the roster method (Wellman, 1988). Respondents were provided with alphabetical lists of the names of all organisation members and asked to assess the frequency that they communicate with each person on work related

matter on a regular basis (Scott, 2000), and the level of positivity and negativity of these interactions using five point likert scales. A positivity to negativity ratio was created out of the two scales providing a valued directed network of the quality of interactions across the organisation. Only relationships with a degree of interaction above 2 on the Likert scale were included in creating the network.

UCINET(Borgatti et al., 2002) was used to run network analysis for a range of social network measures including Density and Closeness Centrality.

Procedures

Eight coaches were used to administer the coaching intervention. Coaching consisted of developmental and cognitive behavioural approaches. All coaches had completed a minimum of a master degree in coaching psychology and have had at least 3 years experience as practicing coaches.

All coaches received a brief training program on specific application of developmental coaching techniques to enhancing positive interaction and quality relationships. Coaches worked with the Coachees to establish clear self directed goals around improving the quality of interactions in themselves and the workplace. The goals could represent anything in the workplace as long as it could be related in some way to quality of interaction.

Cognitive behavioural and developmental approaches to coaching were chosen as they are well suited to assisting clients with (1) identifying and specifying the desired quality of relationships in the client's context, (ii) the self regulation of cognitive processes important for interpersonal communication and (iii) the development and regulation of behavioural repertoires and multiple perspectives involved in interpersonal communication.

Group Supervision was provided to support all coaches during their coaching engagements. This encouraged shared experience and learning across the coaches ensuring fidelity and eliminating unnecessary variance on coaching approach.

Preliminary Results

A mixed between-within subjects' analysis of variance was conducted to assess impact of coaching on participants' scores of wellbeing across the three time points (Baseline, Pre and Post intervention) for both those that received coaching directly and all others in the system.

The means and standard deviations are presented in table 1. There was no significant interaction between group and time, Wilks' Lambda = .974, $F(2, 99) = 1.3$, $p = .28$, partial eta squared = .026. There was a moderate main effect for time, Wilks' Lambda = .906, $F(2, 99) = 5.11$, $p < .01$, partial eta squared = .094, with coached individuals showing an increase in wellbeing over the intervention period (see Table 1). The main effect comparing those directly coached with all other participants was significant, $F(2, 99) = 4.019$, $p < .05$, partial eta squared = .039. Suggesting that those received coaching directly had increased levels of wellbeing over the intervention period compared to those that did not receive coaching. These results support Hypothesis 1.

Table 1

Psychological Well Being Scores for Coached and Non Coached individuals across three time points

Time Period	n	Received Coaching		No Coaching		
		M	SD	n	M	SD
Baseline	20	169.90	16.50	82	162.17	17.94
Pre-Coaching	20	167.85	16.00	82	162.04	19.97
Post-Coaching	20	174.95	15.08	82	164.05	17.21

As goal attainment measures were only taken pre and post intervention a paired-samples t-test was conducted to evaluate the impact of the coaching on goal progress. Supporting hypothesis 2 significant increase in goal attainment scales from pre-

intervention ($M = 4.21$, $SD = 2.07$) to post-intervention ($M = 7.05$, $SD = 1.35$), $t(19) = 8.16$, $p < .0005$ were observed. The mean increase in goal attainment scores was 2.83 with a 95% confidence interval ranging from 2.11 to 3.56. The eta squared statistic (.78) indicating a large effect size.

A one-way repeated measures analysis of variance was conducted to compare scores on perceptions of transformational leadership (360) of those that received coaching across the three time periods. The means and standard deviations are presented in table 2. There was a significant large effect for time Wilks' Lambda = .86, $F(2, 74) = 6.29$, $p < .005$, multivariate partial eta squared = .145 supporting Hypothesis 3.

Table 2

Descriptive statistics for 360 ratings of Transformational Leadership for those coached, over time.

Time Period	N	Mean	Standard Deviation
Baseline	76	14.63	3.02
Pre-Coaching	76	14.59	2.86
Post-Coaching	76	15.49	2.88

The perceived quality communication was analysed in two directions. The perceptions participants had of the quality of their interaction with others, or Communication Out, and the perception others had of the quality of the interaction with the participants, or Communication In. The data were split into two groups coached and non-coached. Change score were calculated for the control period (Pre-Coaching – Baseline) and the Intervention Period (Post-Coaching – Pre-Coaching) In order to assess any change they may have occurred due to the coaching intervention and any differences between those coached directly and others in the network.

T-tests were conducted to compare the differences between the coached and non coached network members on change in the quality of interactions, for both In Communication and Out Communication. Given that participants are all members of the

same network and the data of interest here are relational, individual measures of connectivity are therefore interdependent. Similarly to other studies of full networks (Fliaster & Florian, 2010) it is assumed that observation of relational data within the same network are not independent leading to biases of ordinary-lest-squared (OLS) tests of significance (Krachkardt, 1988). Instead of ordinary OLS tests, T-tests were conducted within UCINET (Borgatti et al., 2002) using a bootstrapping method which estimate sampling variance by randomly reordering the network connections thousands of times, providing confidence intervals to determine whether any difference observed is largely due to chance. This was then used to test the significance of the differences. The means and standard deviations across the control and intervention periods are presented in Table 3 for Communication In and Table 4 for Communication Out.

There were no significant difference in mean change in quality of communication between the coached (Communication In: $M = -.024$, $SD = .378$; Communication Out: $M = .037$, $SD = .720$) and non-coached (Communication In: $M = -.004$, $SD = .551$; Communication Out; $M = -.010$, $SD = .521$), Over the control period (Pre-intervention – Coaching). There were statistically significant differences in mean change in quality of communications between the coached (Communication In: $M = -.226$, $SD = .367$; Communication Out: $M = .196$, $SD = .308$) and non-coached (Communication In: $M = -.033$, $SD = .561$; Communication Out: $M = -.062$, $SD = .618$). Significances values for Communication In were $p < .02$ and for Communication Out $p < .01$ (One-tailed). These results partially support hypothesis hypothesis 4 and 5 in that significant differences were only seen in the intervention period however the direction of the change was mixed.

Table 3

Group differences in mean change of quality of Communication In scores across the control and intervention periods

		Coached		Non-Coached		
Time Period	n	M	SD	n	M	SD
Control	20	-.024	.378	225	-.004	.551
Intervention	20	-.226	.367	225	-.033	.561

Table 4

Group differences in mean change of quality of Communication Out scores across the control and intervention periods

Time Period	n	Coached		n	Non-Coached	
		M	SD		M	SD
Control	20	.037	.721	81	-.004	.551
Intervention	20	.196	.308	81	-.062	.618

In order to assess the impact of connectivity of individuals to those that received coaching on individual levels of well being, Centrality measures were calculated for all participants at the baseline and pre-intervention time points. Specifically closeness centrality was calculated for individuals in the network and again in the coached neighbourhood network. Relationships between Closeness centrality, in both the entire network and the coached neighbourhood network, and change in wellbeing over the control period and the intervention period were calculated using Pearson product-moment correlation coefficient. All correlations are presented in Table 5.

There were no significant correlations with change in wellbeing during the control period in either the entire network ($n=116$) for In Closeness ($r = -.039, p = .680$) or Out Closeness ($r = -.039, p = .681$), or the Coached neighbourhood network for In Closeness ($r = .136, p = .173$), or Out Closeness ($r = -.143, p = .152$).

A negative relationship was observed for Out Closeness centrality and change in wellbeing over the intervention period across the entire network ($r = -.253, p < .01$). A similar relationship was observed for Out Closeness in the coached neighbourhood network ($r = -.206, p < .05$). A positive correlation was observed between In Closeness centrality and change in wellbeing for the coached neighbourhood network ($r = -.223, p < .05$). Higher levels of In Closeness in the coached neighbourhood network related to higher levels of positive change in wellbeing during the intervention period Partially supporting hypothesis 6.

Table 5

Pearson Product-moment Correlations Between Measures of Closeness Centrality and change in wellbeing.

Measure	1	2	3	4	5	6
1. Change in wellbeing – Control Period	-	-.765***	-.039	-.039	.136	-.143
2. Change in wellbeing – Intervention Period		-	.131	-.253**	.223*	-.206*
3. Entire Network In Closeness			-	na	na	na
4. Entire Network Out Closeness				-	na	na
5. Coached Network In Closeness					-	na
6. Coached Network Out Closeness						-

* $p < .05$, ** $p < .01$, *** $p < .001$ (2-tailed)

In order to assess the impact that the coaching intervention may have had at the organisational level, density measures of the quality of interaction network were taken across the 3 time point. As density measures assess the interconnectivity of the overall network the participant measures are interdependent. Bootstrap methods using UCINET were employed in order to mitigate the violation of the assumption of independence. 5,000 random sub samples of the network were made and levels of significance were assessed based on observed differences. Only participants that completed data for all three time points were included (N= 94).

There were no significant differences observed in the density of the quality of communication network over the three time periods. Hypothesis 7 was not supported. The difference between densities for the control period was $-.022$, $p = .80$. *The difference between densities over the intervention period was $.009$, $p = .91$.* Densities and standard Deviations are presented in Table 6.

Table 6

Densities and standard deviations of the quality of interaction network at three time points

Time Period	N	Density	Standard Deviation
Baseline	94	3.723	0.096
Pre-Coaching	94	3.701	0.102
Post-Coaching	94	3.710	0.093

Discussion

At the individual level Hypotheses 1, 2 and 3 were supported. Those that received coaching showed significantly improved scores on psychological wellbeing measures, felt they had significantly progressed toward attaining their nominated workplace goals and were observed by others to have increased their transformational leadership behaviours. This would suggest that at the individual level the developmental coaching process was beneficial to both the felt and observed experience of those coached.

These results support previous coaching research in establishing an empirical link between coaching and increases in psychological wellbeing and goal attainment (Linley et al., 2010; Green, Oades, & Grant, 2006; Spence & Grant, 2007); while also extending the limited and recent experimental evidence supporting the relationship between coaching and improvement in transformational leadership measures (Grant, Green & Rynsaardt, 2010; Cerni, Curtis & Colmar, 2010).

It is important to note that the improvements in transformational leadership were identified by others and not via self-report. This suggests that changes in the leader's interactions following coaching did have an impact on the way the leader was perceived. As expected no significant difference was seen in any change in quality of communication between the coached and non coached individuals during the initial control period. However, during the intervention period, those that received coaching on average rated their Communication Out to have improved. That is, the perceptions of coached individuals on the quality of their communications with others were thought to be more positive. This was significantly different to changes in Communication Out of those that didn't receive coaching. Given that support was also found for Hypothesis 3, (i.e., that others observed greater levels of transformational leadership in those who were coached, it seems probable that the quality of interactions between coached individuals and others did change.

However, this change was not always experienced as positive by those around the coached individual. The average quality of interaction, as rated by others (Communication In) was significantly less positive for those who were coached compared to those who were not coached.

The pattern of results presents us with some conundrums. Firstly, our results suggest that the Coaching intervention did impact the quality of communication there appears to be a disconnect between how those coached experience their interactions towards others and how those others experience these interactions.

One explanation for this might be that the coaching process encourages the coached individual to both try new ways of interacting and to address a wider range of difficult issues facing them and their colleagues. Those being coached are, by definition, being supported through the change process, and are therefore more likely to value these changes, and experience them as improvements on previous patterns of communication.

A very different experience may occur for those on the other side of this new communication. The new pattern of interaction may be experienced as a somewhat unexpected change in the normal functioning of the relationship. Changes in communication can be initially confusing and anxiety provoking, accounting for the lower perceived positivity of the interaction. In such situations people often turn toward others for support and understanding (O'Neill, 2000). This process of seeking support might explain why, contrary to hypothesis 7, the overall density of the quality of interaction in the primary networks remained stable.

It is also possible that the decrement in perceived positivity of leader's communication may be due to a lag effect in competency. In other words, a leader's elegance and competency in conducting new more challenging conversations might lag behind their initiative in commencing such conversations. Significant changes of style are rarely born fully formed. This may help to explain the finding that while others

perceived the leaders interactions as less positive, they also perceived the leader's style to be more transformational.

The unexpected pattern of findings in this study highlights a key assumption often made in assessing change – namely that positive development in an individual will be experienced similarly by others. The validity of this assumption is questionable for a range of reasons. Individuals often have different types of relationships with different people regardless of the frequency and general quality of the interaction. Furthermore, individuals respond to change and tension in a system differently. Any change can increase the tension. Change may be welcome by some and resisted by others. In order to avoid the complexity of creating a new form of a previously established relationship the change is instead resisted and could therefore be seen as increasingly negative. Further research is required in order to clearly establish an understanding of how an individuals' response to change may interact with key change variables. Future research should include a follow up retest to see if there is a lag time for both the improved execution of new skills and a lag time for others in the system to experience change in the interaction quality that those coached may be noticing earlier.

Interestingly, over the intervention period change in wellbeing across the network was more strongly related to an individuals' closeness in the coached neighbourhood network compared to the primary network in support of hypothesis 6. Specifically, In Closeness centrality, essentially a measure of how the degree of positivity in communication others perceive they have with a given individual in the coached neighbourhood network, related positively to change in wellbeing, post intervention. This is really a proxy for the frequency and strength of positivity of interaction coached individuals feel they have with a given individual. Put more simply if those coached rate their interaction with a given individual as strongly positive and an individual is connected to more of the coached individuals they would have a higher level of In Closeness centrality in the coachee neighbourhood network and are more likely to have experienced Increases in wellbeing post the coaching intervention.

It is important to note that the opposite is true when looking at Out Closeness. This again is a proxy for the strength and number of relationships individuals perceive they have with others. In the coachee neighbourhood network it is more likely that these perceived interaction relationships are more closely linked to those that received the coaching intervention. For those high in Out Closeness there was a negative correlation with change in wellbeing in both the primary network and the coached neighbourhood network. The strength of these correlations was also quite similar.

It may be that the similarity in Out Closeness across the two networks is the same because this measure is capturing individuals who feel they have many important communication relationships to manage. High Out Closeness in this sense indicates a propensity of an individual to highly value many relationships. Managing too many high quality relationships could actually be quite exhausting. As those that were coached change their approaches to interacting and the quality of their relationships with others in the system, their relationships with these individuals become more complex. This may put further stress on an individual with high levels of relationship maintenance requirements (High Out Closeness). This could explain the observed negative change in wellbeing for these individuals in both the Coachee neighbourhood and primary networks.

Another feature of high Out Closeness is that there is often a discrepancy between the number of important relationship a person feels they have, and the number of important relationships others feel they actually have with them. This lack of reciprocity may be a key to the lowered degree of wellbeing in those with high degrees of Out Closeness.

Even though individuals in the system perceived deterioration in the quality of their communication with those that received the developmental coaching intervention, the more positively and closely these individuals were identified by coached individuals, the more likely they were to experience positive changes in their psychological wellbeing.

This suggests that whether or not our leaders see their relationship with us as changing positively is more predictive of our wellbeing than how we ourselves rate the quality of their communication.

This again may reflect a lag effect. It may take more time for an individual to experience organisational change that may occur due to individuals shifting their behaviour across a system. Members of a system may need to get use to how the environment has changed before the change is accepted consciously. Even so, there does seem to be an influence on the wellbeing of others following change in the organisation, that is at least initially independent of the recipient's conscious perceptions of change.

This would suggest that focus on the how leaders in a coaching intervention perceive the quality of their relationships with others could have beneficial effects on the wellbeing of those they are connected. Designing coaching interventions to specifically encourage leaders to notice and reflect on positive changes in relationships could have beneficial consequences for others in their local network. Future research could specifically construct coaching engagement to analyse this more closely.

Our findings suggest a number of other implications for how we may think about designing interventions in organisational context. For instance, if we are supporting development in leadership how are we supporting the shift in perspectives both positive and negative for those that are connected to a given leader or many leaders? If we begin to think of this beyond just the dyadic level of leader to subordinate, leader to boss or leader to colleague, and more from an integrative systems perspective of embedded leaders in a relational context of interaction, we might start to explain some of the resistance and push back often seen in most organisational change programs. It is important to consider what impact changes in one or more individuals may have on those they are most connected to.

Another assumption is that only things that we experience as positive improve our levels of wellbeing. Psychological wellbeing is much more than just happiness. Psychological wellbeing is about meaning and purpose. It may be that the challenge of shifting relations provides a reminder of the meaning attached to these relationships therefore enhancing wellbeing.

Coaching engagements are largely concerned with effecting change at the individual level. Sometimes broader team level impacts are of concern and often coaching can be loosely connected to organisational goals. What are not often encompassed in the coaching process is how change in an individual relates to changes in the system and how these changes may affect the experience of others. Given that there does seem to be varying degree of impact of someone coached on others dependant on how closely connected they are with the coached individuals, It would seem that broader level impacts outside of the individual are important to consider.

One implication for this in considering organisational coaching and leadership development, is the question around who should be coached? When impact beyond the individual is important, then embeddedness in the network may help to determine who is best to receive the coaching support? It would seem from these results that if it was the wellbeing of the organisational members at large that are of organisational concern, then considering the network structure, architecture and embedded position of potential coaching candidates could be important. By considering structure and embeddedness, identifying the combination of individuals which would lead to the most influence through their connectivity in the network might be the best way to gain maximum benefit for the wellbeing of everyone in the system. This could help organisational level interventions become more efficient by maximising impact and saving on valuable resources and intervention costs.

Considering the broader level impacts of coaching is important specifically for evaluation and assessment purposes. It would seem that change in a leader may

actually reduce the quality of how others experience the leader. This means that it is important to consider how feedback and program evaluation are gathered as it may seem initially that things are getting worse post intervention if we consider only the direct experience others are having of the changed individual. Even though, as we have found here, there may be positive benefits gained from the change. Additionally, if we only focus on the individual and dyadic levels of analysis we may not see some of the beneficial changes that may occur in any intervention scenario.

Limitations

As statistical methods develop in social network analysis a deeper analysis of the connectivity of each individual to only those that receive an intervention maybe an important step forward in locating the Coaching ripple effect and the influence on wellbeing of which a small degree of evidence of has been found here.

In this research only one network has been analysed and while there are thousands of data points when considering changes in interaction, this pattern of findings may be a product of this particular system. Further research in different types of organisational networks may help to confirm this pattern of results.

Another issue is that whole network data was sought for the project. Unfortunately not all organisational members participated across the three time point resulting in missing data. While full network data is preferable in most network analyses, there were missing data from individuals across the time points in this sample. However, Costenbader and Valente (2003) have found that this is not such an issue when using the incoming ties of non-respondents in the analysis, as we have done here. It has also been observed that centrality measures do express a degree of robustness under conditions of missing data (Borgatti & Carley, 2006).

Conclusion

From these findings it would seem that it is important to consider an organisation as a complex adaptive system. Through the use of Social Network Analysis we have been able to look deeper into the complexity of interactive relationships in an organisation and how these are affected through leadership development.

More specifically we have found that coaching can improve an individual's level of wellbeing, goal attainment and transformational leadership behaviours. We have also found that through the coaching intervention, quality of interaction between individuals can shift however, these shifts are experienced differently by those that did not receive coaching support directly compared to those that did.

Finally, the coaching ripple effect does seem to occur and it seems to be the perceptions that coached individuals have of the quality of interaction they have with others that influences this process. However these relationships appear to be more complex than first thought. The pattern of perceptions between people are not always consistent, nor are they always predictive of wellbeing. However, some relationships do appear to be predictive. The more positively a coached individual rates their communication and their closeness with their people, the more likely they are themselves to be rated as a transformational leader, and the more their people are likely to experience improvements in psychological wellbeing.

While there is much more to discover and further analysis and experimentation is required, it would seem that an important step has been made in considering how our interconnectivity in organisations affects our wellbeing and how coaching leaders may influence the quality of experience of others with whom they are connected.

References

- Arakawa, D, & Greenberg, M 2007, 'Optimistic managers and their influence on productivity and employee engagement in a technology organisation: Implications for coaching psychologists,' *Coaching Psychology Review*, vol. 2, no. 1, pg. 78 -89.
- Argyris, C, & Schon, D 1978, *Organizational learning: A theory of action approach*, Addison Wesley, Reading.
- Auerbach, J 2006, 'Cognitive coaching,' *Evidence based coaching handbook: putting best practices to work for your clients*, pg. 103 -127.
- Avolio, B, Bass, B, & Jung, D 1995, *MLQ: Multifactor leadership questionnaire: Technical report*, Mind Garden, Palo Alto, CA.
- Bales, R, & Cohen, S 1979, *SYMLOG: A system for the multiple level observation of groups*, Free Press, New York.
- Balkundi, P, & Kilduff, M 2006, 'The ties that lead: A social network approach to leadership,' *Leadership Quarterly*, vol. 17, no. 4, pg. 419-439.
- Bono, JE, & Anderson, MH 2005, 'The Advice and Influence Networks of Transformational Leaders,' *Journal of Applied Psychology*, vol. 90, no. 6, pg. 1306-1314.
- Borgatti, SP, Everett, MG, & Freeman, LC 2002, *Ucinet for Windows: Software for Social Network Analysis*, Harvard, MA: Analytic Technologies.
- Borgatti, SP, Carley, KM, & Krackhardt, D 2006, 'On the robustness of centrality measures under conditions of imperfect data.' *Social Networks*, vol. 28, no. 2, pg. 124-136.
- Brass, D, Galaskiewicz, J, Greve, H, & Tsai, W 2004, 'Taking stock of networks and organizations: A multilevel perspective,' *Academy of Management Journal*, 47, vol. 47, no. 6, pg. 795-817.
- Cavanagh, M 2006, 'Coaching from a systemic perspective: A complex adaptive conversation,' *Evidence Based Coaching Handbook: Putting Best Practice to Work for Your Clients*, pg. 313-354.
- Cerni, T, Curtis, GJ, Colmar, SH 2010, 'Executive coaching can enhance transformational leadership' *International Coaching Psychology Review*, vol. 5, no. 1, pp.81-85.
- Cragan, J, & Wright, D, 1990, 'Small group communication research of the 1980s: A synthesis and critique,' *Communication Studies*, vol. 41, no. 3, pg. 212-236.

Costenbader, E, & Valente TE 2003, 'The stability of centrality measures when networks are sampled,' *Social Networks*, vol. 25, no. 4, pg. 283-307.

Drake, DB 2009, 'Evidence in action: A relational view of knowledge and mastery in coaching,' *International Journal of Evidence Based Coaching and Mentoring*, vol. 7, no. 1, pp.1-12.

Dooley, KJ 1997, 'A Complex Adaptive Systems Model of Organization Change.' *Nonlinear Dynamics, Psychology, and Life Sciences*, vol. 1, no. 1, pg 69-97

Eidelson, R, 1997, 'Complex adaptive systems in the behavioral and social sciences,' *Review of General Psychology*, vol. 1, no. 1, pg. 42-71.

Evers, W, Brouwers, A, & Tomic, W 2006, 'A quasi-experimental study on management coaching effectiveness,' *Consulting Psychology Journal: Practice and Research*, vol. 58, no. 3, pg. 174-182.

Feggetter, A, 2007, 'A preliminary evaluation of executive coaching: Does executive coaching work for candidates on a high potential development scheme,' *International Coaching Psychology Review*, vol.2, pg. 129-142.

Fliaster, A. & Schloderer, F 2010, 'Dyadic ties among employees: Empirical analysis of creative performance and efficiency.' *Human Relations*, vol. 63, no. 10, pg. 1513-1540.

Fredrickson, B, & Losada, M 2005, 'Positive affect and the complex dynamics of human flourishing,' *American Psychologist*, vol. 60, no. 7, pg 678 - 686.

Freeman, LC 2004, *The development of social network analysis* DC, Philips & H, Lipson, eds, Empirical Press.

Frey, L 1994, 'The naturalistic paradigm: Studying small groups in the postmodern era,' *Small Group Research*, vol. 25 no. 4, pg. 551-577.

Fuhriman, A, & Burlingame, G 1994, 'Group psychotherapy: Research and practice,' *Handbook of group psychotherapy: An empirical and clinical synthesis*, pg. 3-40.

Gordon, S 2008, 'Appreciative inquiry coaching,' *International Coaching Psychology Review*, vol. 3, no. 1, pg. 19-31.

Gottman, JM 1981, *Time-series analysis*, University Press, Cambridge.

Gottman, JM, & Levenson, R 1992, 'Marital processes predictive of later dissolution: Behavior, physiology, and health,' *Journal of Personality and Social Psychology*, vol. 63, no. 2, pg. 221-233.

Gottman, JM, Markman, H, & Notarius, C 1977, 'The topography of marital conflict: A sequential analysis of verbal and nonverbal behavior,' *Journal of Marriage and the Family*, vol. 39, no. 3, pg. 461-477.

Grant, AM 2008, 'Special Editorial: Another look at executive and organisational coaching,' *International Coaching Psychology Review*, vol. 21, pg. 6-7.

Grant, AM 2009, '*Workplace, Executive and Life Coaching: An Annotated Bibliography from the Behavioural Science and Business Literature*,' Coaching Psychology Unit, University of Sydney, Australia.

Green, L, Oades, L, & Grant, A 2006, 'Cognitive-behavioral, solution-focused life coaching: Enhancing goal striving, well-being, and hope,' *The Journal of Positive Psychology*, vol. 1, no. 3, pg. 142-149.

Green, S, Grant, A, & Rynsaardt, J 2007, 'Evidence-based life coaching for senior high school students: Building hardiness and hope,' *International Coaching Psychology Review*, vol. 2, no. 1, pg. 24-32.

Gyllensten, K, & Palmer, S 2005, 'Can coaching reduce workplace stress,' *The Coaching Psychologist*, vol. 1, pg. 15-17.

Hanneman, RA, & Riddle, M 2005, *Introduction to social network methods*, Riverside, CA. (published in digital form at <http://faculty.ucr.edu/~hanneman/>).

Harter, J, Schmidt, F, & Keyes, C 2003, 'Well-being in the workplace and its relationship to business outcomes: A review of the Gallup studies,' *Flourishing: Positive psychology and the life well-lived*, pg. 205-224.

Hatala, JP 2006, 'Social network analysis in human resource development: A new methodology,' *Human Resource Development Review*, vol. 5, no. 1, pg. 45-71.

Hax, A, & Majluf, N 1991, '*The strategy concept and process: a pragmatic approach*' Prentice Hall.

Helliwell, JF & Putnam, RD 2004, 'The social context of well-being,' *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, vol. 359 no. 1449, pg. 1435-1446.

Helliwell, JF, & Wang, S 2011, 'Trust and wellbeing,' *International Journal of Wellbeing*, vol. 1, no. 1, pg. 42-78.

Krackhardt, D, 1988, 'Predicting with networks: Nonparametric multiple regression analysis of dyadic data,' *Social Networks*, vol. 10, no. 4, pg. 359-381.

Kauffman, S, 1993, *The origins of order*, Oxford University Press, New York.

Kemp, T 2008, 'Self-management and the coaching relationship: Exploring coaching impact beyond models and methods,' *International Coaching Psychology Review*, vol. 3, no. 1, pg 32 - 42.

Kenny, D, & Judd, C 1986, 'Consequences of violating the independence assumption in analysis of variance,' *Psychological Bulletin*, vol. 99, no. 3, pg. 422-431.

Laske, OE 1999, 'An integrated model of developmental coaching', *Consulting Psychology Journal: Practice and Research*, vol. 51, no. 3, pp.139-159.

Levine, J, & Moreland, R 1990, 'Progress in small group research,' *Annual Review of psychology*, vol. 41, no. 1, pg. 585-634.

Linley, AP, Nielsen, KM, Gillett, R, & Biswas-Diener, R 2010, 'Using signature strengths in pursuit of goals: Effects on goal progress, need satisfaction, and well-being, and implications for coaching psychologists,' *International Coaching Psychology Review*, vol. 5, no.1, pg. 6-15.

Lorenz, E 1963, 'Deterministic nonperiodic flow,' *Journal of the atmospheric sciences*, vol. 20, no. 2, pg. 130-141.

Losada, M 1999, 'The complex dynamics of high performance teams,' *Mathematical and computer modelling*, vol. 30, no. 9-10, pg. 179-192.

Losada, M, & Heaphy, E 2004, 'The role of positivity and connectivity in the performance of business teams: A nonlinear dynamics model,' *American Behavioral Scientist*, vol. 47, no. 6, pg. 740 - 765.

McGovern, J, Lindemann, M, Vergara, M, Murphy, S, Barker, L, & Warrenfeltz, R 2001, 'Maximizing the impact of executive coaching: Behavioral change, organizational outcomes, and return on investment,' *The Manchester Review*, vol. 6, no. 1, pg. 1-9.

McGrath, J 1997, 'Small group research, that once and future field: An interpretation of the past with an eye to the future,' *Group Dynamics: Theory, Research, and Practice*, vol. 1, no. 1, pg. 7-27.

Mehra, A, Dixon, AL, Brass, DJ, & Robertson, B 2006, 'The social network ties of group leaders: Implications for group performance and leader reputation,' *Organization Science*, vol. 17, no. 1, pg. 64-79.

Mehra, A, Smith, BR, Dixon, AL, & Robertson, B 2006, 'Distributed leadership in teams: The network of leadership perceptions and team performance,' *Leadership Quarterly*, vol. 17, no. 3, pg. 232-245.

Moreland, R, Hogg, M, & Hains, S 1994, 'Back to the future: Social psychological research on groups,' *Journal of experimental social psychology*, vol. 30, no. 6, pg. 527-555.

O'Niell, MB 2000, *Executive coaching with backbone and heart: A systems approach to engaging leaders with their challenges*, Jossey Bass Publishing, San Francisco.

Osborn, R, Hunt, J, & Jauch, L 2002, 'Toward a contextual theory of leadership,' *The Leadership Quarterly*, vol. 13, no. 6, pg. 797-837.

Palmer, B 2003, 'Maximizing value from executive coaching,' *Strategic HR Review*, vol. 2, no. 6, pg. 26-29.

Ryff, C, & Keyes, C 1995, 'The structure of psychological well-being revisited,' *Journal of Personality and Social Psychology*, vol. 6, no. 9, pg. 719-719.

Scott, J 2000, *Social network analysis: A handbook*, Sage London.

Skakon, JK, Nielsen, et al. 2010, 'Are leaders' well-being, behaviours and style associated with the affective well-being of their employees? A systematic review of three decades of research' *Work & Stress* vol. 24, no. 2 pg.107-139.

Spence, G 2007, 'GAS powered coaching: Goal Attainment Scaling and its use in coaching research and practice,' *Coaching Psychology Review*, vol. 2, no. 2, pg. 155 – 216.

Spence, G, Cavanagh, M, & Grant, A 2006, 'Duty of care in an unregulated industry: Initial findings on the diversity and practices of Australian coaches,' *International Coaching Psychology Review*, vol. 1, no. 1, pg. 71–85.

Spence, GB, & Grant, AM 2007, 'Professional and peer life coaching and the enhancement of goal striving and well-being: An exploratory study,' *The Journal of Positive Psychology*, vol. 2, no. 3, pg. 185-194.

Strogatz, S 2001, *Nonlinear dynamics and chaos: With applications to physics, biology, chemistry, and engineering*, Perseus Books, New York.

Thompson, J, & Stewart, H 1986, *Nonlinear dynamics and chaos, Geometrical methods for engineers and scientists*, Wiley, Chichester.

Tsai, W, & Ghoshal, S 1998, 'Social capital and value creation: The role of intrafirm networks,' *Academy of Management Journal*, vol. 41, no. 4, pg. 464-476.

Wellman, B 1997, 'Structural analysis: From method and metaphor to theory and substance,' *Contemporary Studies in Sociology*, vol. 15, pg. 19-61.

Zohar, D, & Tenne-Gazit, O 2008, 'Transformational leadership and group interaction as climate antecedents: A social network analysis,' *Journal of Applied Psychology*, vol. 93, no. 4, pg. 744-757.