

UNDERSTANDING THE LEARNING PROCESS IN WORK GROUPS

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ABSTRACT

Drawing on theories of organizational learning, group learning, group dynamics and effectiveness, and using the system dynamics approach in three case studies of work groups, this paper seeks to improve our understanding of the factors influencing group learning and effectiveness in organizations. I propose that the relationship between group effectiveness and ineffectiveness is not symmetrical and is characterized by an amplification phenomenon. Groups that present a low level of learning tend to enter into a vicious cycle of low effectiveness or to stagnate, while groups that present a high level of learning are able to identify sources of ineffectiveness, manage limitations and implement the necessary changes to recover or to elevate their level of effectiveness. Regarding work groups as complex social systems, I suggest that the explanation of the level of learning and effectiveness of a group lies in the interrelations of structural, cognitive and behavioral factors in interpersonal contexts.

Key words: group learning, group dynamics, group effectiveness, leadership, organizational learning, system dynamics.

1. INTRODUCTION

Work groups have become a significant element of organizational effectiveness. To increase their efficiency, flexibility and responsiveness, organizations are relying more and more on work groups. Groups not only outperform individuals, especially when performance requires multiple skills and experiences, but also represent a superior means to support broad-based

changes necessary for high-performing organizations (Katzenbach & Smith, 1993). Groups can solve organizational problems of control and coordination, make decisions, and achieve results that otherwise could not be achieved by individuals working independently (McGregor, 1960).

This increasing reliance on work groups creates the need for them to be more creative, innovative and efficient. To accomplish these aims, groups must be able to continuously learn and improve. Learning enables groups to acquire new skills, improve processes, find new ways of working, and enhance their decision-making and problem-solving skills. Group learning is regarded in this study as a process of reflection and action, in which the ultimate result is the creation of knowledge and insights.

Drawing on theories of organizational learning, group learning, group dynamics and effectiveness, and using the feedback process approach of system dynamics, this paper seeks to improve our understanding of the factors influencing group learning and effectiveness in organizations. Improving our understanding of existing explanations for organizational phenomena helps bridge the theory-practice gap long discussed (Pfeffer, 1993; Sutton & Staw, 1995; Weick, 1989). The feedback process approach has been used in organizational theory to understand a large number of social processes including organizational failure (Hall, 1976), organizational learning (Senge, 1990), improvement programs (Sterman, Repenning & Kofman, 1997), and complex organizational processes (Weick, 1979). Although past studies on group learning have identified feedback relations inherent to the learning process (Crossan, Lane & White, 1999), only a few have used a systemic approach to model this phenomenon (Lizeo, 2000). By showing how proposed causal relationships generate patterns of behavior, dynamic models that capture non-linear, interdependent relationships, allow researchers to explore and interpret complex organizational theories (Sastry, 1995).

The objective of this paper is to investigate the conditions under which some groups become high-learning, highly-effective while others are caught into a cycle of low-learning, low-effectiveness. Like natural systems, social systems (e.g. groups) are subject to self-fulfilling spirals created by reinforcing feedback processes, in which the output amplifies itself leading to exponential growth or decay (Levinthal & March, 1993; Sterman, 2000) – e.g. population growth. Hackman (1990) suggests that work groups function as amplifiers

such that both effective and ineffective performance may be characterized as self-fulfilling phenomena.

This paper proposes that the relationship between group effectiveness and ineffectiveness is not symmetrical and is characterized by an amplification phenomenon. Groups that present a low level of learning tend to enter into a vicious cycle of low effectiveness or to stagnate, unable to alter their situation without adequate intervention. On the other hand, groups that present a high level of learning are able to identify sources of ineffectiveness, manage limitations and solve problems that come up along the course of their task execution, and then, implement the necessary modifications to recover or to elevate their level of effectiveness. In a study of group performance, Edmondson (1999) found that low-learning groups, even with structural support initially in place, were vulnerable to a self-sealing pattern, making it difficult for the group to escape the low-learning condition. Whereas, high-learning groups through proactive learning behaviors were able to overcome obstacles created by poor group design, low level of task interdependence, or lack of resources, and thus correct their situation or course of action. This paper argues that the asymmetry patterns of group ineffectiveness arise from infrequent learning behaviors, undetected errors and misperceptions. Competency traps, limits to growth and delays in the system are other factors predicted by this study to contribute to the asymmetrical phenomenon.

The paper is organized as follows: in the remainder of this section, I outline the problem towards which the modeling effort is directed and define group learning. Section two presents the main dynamic hypotheses of the study. In section three, using causal loop diagrams, I present three short case studies in order to explore the dynamic asymmetrical phenomenon in group learning and effectiveness. Section four offers reflections on the cases and implications for group learning and effectiveness, while section five contains concluding thoughts.

The Problem: Why do some work groups present a high level of learning and effectiveness while others are caught into a low level of learning and effectiveness?

Learning enables a group to find innovative approaches to problems, become more efficient over time, acquire new skills, and change norms and procedures in response to external circumstances (Ancona et al., 1996). Senge (1990, p.236) defines group learning as “the process of aligning and developing the capability of a group to create the results its members truly desire.” Ancona and her colleagues (1996) refer to group learning as the group’s ability to survive, improve and adapt to changing circumstances. Edmondson (1999) regards group learning as an ongoing process of reflection and action, characterized by activities such as asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes. For group learning to occur there must be a complete cycle of reflection and action.

Following Edmondson’s conceptualization (Edmondson, 1999), I define group learning as *a continuous process of reflection and action based on shared understandings and grounded in experience, resulting in the creation of knowledge and insights*. Together, group members reflect on the results of their actions (data on group progress) through reflective conversation based on dialogue and discussion. Group members then design an action plan which they use to make decisions and solve problems (experimentation). Their experiences create opportunities to monitor results and serve as guides to new experimentations, completing a cycle of group learning (figure 1).

Group interaction, reflection and action take place somewhere in some environment that includes both physical and social aspects, which can make a difference in how members behave and which affect the group’s shared beliefs and perceptions.

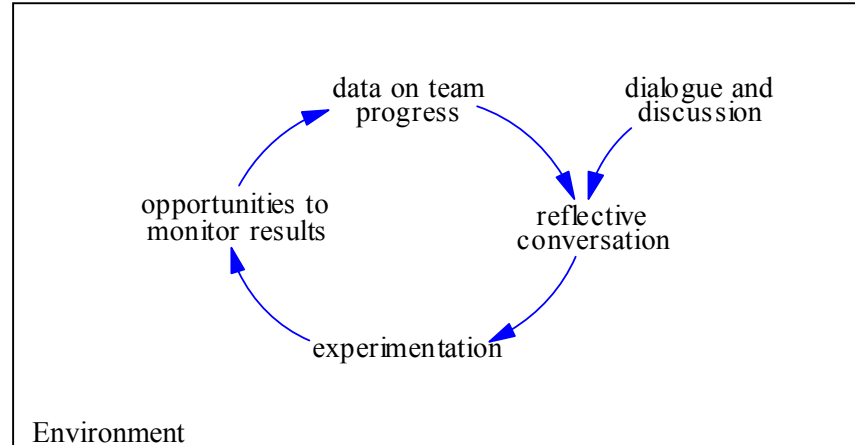


Figure 1: Group Learning Cycle – Reflection and Action

Incomplete cycles can occur when a group fails to reflect on its own actions, or when group members reflect but fail to implement changes following reflection. In either case, groups are unlikely to create new knowledge or new ways of working that could help the organization succeed in an uncertain or changing environment. Incomplete learning cycles possess implications for groups and hence organizations. The quality of collective reflection suffers and the ability to make sound decisions and to timely implement changes in response to the environment can be disturbed by interpersonal processes that occur within the context of work groups (Edmondson, 2002).

2. SOURCES OF EFFECTIVENESS (AND INEFFECTIVENESS) IN GROUPS

The learning process of a group is influenced by the shared perceptions of its members and by the group dynamics and functioning. Group learning requires that a group engage in learning behaviors, such as reflective conversation, experimentation, feedback seeking, and discussions of errors or unexpected outcomes. Learning behaviors have been studied individually by psychologists and management researchers and have shown to promote adaptation to changes and effective performance (Edmondson, 1999). To learn from experience, including from mistakes, groups must consciously reflect on what has occurred and on the results of their actions.

Research suggests that interpersonal factors influence the likelihood of people seeking feedback, discussing mistakes or conducting experiments (Argyris, 1982). Even in well-designed organizational structures, individuals in groups may fail to engage in learning-oriented activities as a result of individual perceptions and prevalent social norms (Edmondson, 1999). In situations of potential embarrassment or threat, individuals tend to present behaviors that help them preserve a positive social value (Goffman, 1955). Disagreement, conflict, negative feedback, admission of error, and request for help are examples of interpersonal facts that can threaten the social image of individuals. Thus, in the absence of a high degree of interpersonal skills (Argyris, 1993), group members are unlikely to openly confront error, disagreement, or any kind of feedback that lead to situations of embarrassment or threat. Furthermore, members of a group can be reluctant to disclose their own mistakes for fear of penalty even though they are sacrificing the opportunity of getting help to solve problems or correct mistakes. This body of work suggests a first hypothesis:

- H.1 The asymmetrical phenomenon arises from infrequent learning behaviors, undetected errors and individual perceptions that lead to self-protection and reluctance to take interpersonal risks.

For learning-oriented behaviors to take place it is necessary that group members feel safe and confident that they will not be retaliated for speaking up their ideas and discussing errors openly. Some individuals are highly sensitive to hierarchy and power and, by fear or deference, they become polite and indirect (Edmondson, 2002). Important issues, but somewhat risky, such as the validity of a new policy or the implementation of a new process, are not discussed in group meetings since questioning or substantial suggestion is likely to encounter opposition. Group members may engage in “abstract conversation” to avoid excessive personal risk (Argyris, 1993) and the possibility of offending those with power. In such circumstances, openness and quality of group reflection suffer in the presence of private concerns regarding power. Members’ perception of power and interpersonal risk at the group level must be low since the willingness to engage in learning-oriented activities is inversely related to group perceptions of interpersonal risk. The level of perceived power and interpersonal risk is a continuous variable, which differs across individuals and groups in

organizations in ways not explained by objective organizational conditions and structures (Edmondson, 1997). Therefore, when analyzing learning conditions, it is important to consider the effects of aggregating all group members' perceptions. The actions of one or more group members perceiving the situation as unsafe for carrying out learning behaviors can overwhelm proactive learning behaviors of the other group members. The high level of perceived power and interpersonal risk prevent group members from engaging in learning-oriented activities, affecting the group's ability to discuss results openly and adequately correct actions or implement new ones. Basing her work on these findings, Edmondson (1997) suggested a hypothesis that is revisited in this study:

- H.2 Groups that present lower aggregate level of perceived power and interpersonal risk will engage more frequently in learning-oriented activities than those that present higher aggregate level of perceived power and interpersonal risk.

These same dynamics that help groups to correct their course of action may well function as limits to growth (Senge, 1990; Sterman, 2000). In the learning-performance process, as a group learns, its performance will improve, but there are certain aspects, such as environmental factors, constraints in the organizational context (e.g. lack of resources, time constraints and technology) and member's perceptions, which may limit the engagement of the group in learning-oriented activities. Based on these arguments, this study suggests a third hypothesis:

- H.3 Limits to growth related to environmental and contextual aspects of work groups hinder their learning process.

Another factor that keeps groups into the cycle of ineffectiveness is their persistence in habitual routines, even in the face of external circumstances that require change. Routines in organizations (and groups) can cause change and learning initiatives to be problematic since the lessons of experience are generally drawn from a relatively small number of observations in the complex system of organizations. Besides, interpretations of experience come from features of individual inference and judgment, which can lead to biases or misinterpretations.

Learning barriers such as “competency traps” thus arise (Levitt & March, 1988). Competency traps occur when a high level of competence in a particular routine leads a group to favor the continuity of such a routine even if it is actually inferior to other alternatives available. In this case, perceived need for change may be low, hindering learning and keeping the group stagnated.

H.4 Competency traps contribute to keeping the group stagnated in a low level of learning and effectiveness.

Some results from learning activities may take time to appear, creating likely perceptions that there is no efficacy in the group’s actions. It may take time to perceive the performance of the group given measurement and reporting systems (Sterman, 2000). As it may take time to implement corrective actions after a discrepancy in the group performance is perceived because of the period required to make the decision. Time delays may be present between the implementation of a corrective action and its effect on the performance of the group. Significant time delays in the system can cause corrective actions to continue even when they are no longer necessary, thus forcing the system to adjust too much and triggering a new correction in the opposite direction.

H.5 Delays contribute to creating amplification pattern in the group performance and effectiveness.

In sum, several factors contribute to the asymmetrical differences in group learning and effectiveness. Even within the same organizational context – organizational culture, reward system, information systems and resources – groups may present distinct levels of effectiveness. The many interactions of structural, cognitive and behavioral factors in interpersonal contexts contribute to the complexity of the group as a social system and give rise to the asymmetrical phenomenon discussed above.

3. THE UNDERLYING CAUSES OF GROUP LEARNING AND EFFECTIVENESS

The following cases explore the asymmetrical dynamic phenomenon in learning and effectiveness among three groups observed under the same organizational setting. The cases also help explore the (dynamic) hypotheses stated in section two through the development of causal loop diagrams for each group studied. Qualitative research is a useful methodology for investigating phenomena that are not well understood. The data for the cases were drawn from a study conducted by Edmondson (2002) on the nature of learning in organizations. Edmondson conducted an exploratory study of learning processes in twelve organizational work groups engaged in activities ranging from strategic planning to hands-on manufacturing of products. From the sample provided by her study, I selected and reviewed three groups from which I developed three short case studies applying a system dynamics approach. The criteria for the selection were (1) availability of data that provided enough information for the causal loop diagrams and for comparisons among the groups, and (2) groups that presented differences in their quality of learning according to their level of reflection and action – reflection was identified through behaviors that fostered new insights about performance or group process (e.g. reflective conversation) and action was identified through behaviors that involved taking action to test or implement new ideas (e.g. experimentation). Group (effective) performance was used as a proxy to group effectiveness, in which performance is considered the degree to which the group output meets or exceeds organizational standards measured in terms of quality, quantity, timeliness, efficiency and innovation (Hackman, 1987).

The Organizational Setting – the groups are Beanstalk, Radar, and Storage (this paper kept the original group names provided in Edmondson’s study). Beanstalk and Radar are product development groups and Storage is a production group (group type did not influence the selection of the cases presented here, and no consistent patterns of learning and performance in regard to group type emerged in Edmondson’s study or in this paper).

The groups work in a leading manufacturing company of office furniture, with approximately 5,000 employees and a history of product and management innovation and financial success in the United States. Besides the organizational context, the groups share the

same environmental factors in which recent significant changes in the industry can threaten the company's market leadership. Corporate customers are becoming increasingly price sensitive, less willing to pay a premium for the high-end image of the company's product lines, and expecting more from consultative services. At the time of the study, a new CEO had been hired from the outside to facilitate a turnaround in order to meet customer's needs and keep the organization's leading position in the market.

Case 1: The Beanstalk Group

Beanstalk is composed of seven members – the group leader (a peer) and six members from different functions. The goal of the group is to develop a new line of products designed to extend and enhance an existing product line. Members have relative autonomy to develop their individual tasks, which present a high level of interdependence, requiring group members to work together and collaborate.

The observed learning process and performance improvement of the Beanstalk group is supported by a low level of power and perceived interpersonal risk shared among its members. Reflective conversation, or the open exchange of ideas and opinions, is a frequent activity of Beanstalk. The reflective conversation of group members have generated ideas, plans of action and experimentation, creating opportunities for group members to monitor the results of their actions and to gather data on the group's progress, which serve as basis for further group reflection. These dynamics are represented by the reinforcing loop *reflection and action* in the CLD (causal loop diagram) shown in figure 2.

The data on the group's progress are used to assess the group performance against pre-defined goals. When a gap between perceived performance and performance goals is observed, the group tends to investigate the reasons of this gap. To do so, group members seek feedback and help from the leader or people in other functions – senior management and customers – that can help them to solve problems, seeking to correct the course of the project. The group, then, takes corrective actions, which provide them with new data on how the group is doing. These dynamics are represented in the CLD by the balancing loop *performance* (figure 2).

Beanstalk's leader has a participative or democratic style according to the leader categorization developed by Lewin, Lippitt and White (1939), in which she behaves as a facilitator, encouraging dialogue and inputs from group members. A supportive leader, she collaborates to create a safe and trustful environment within the group and seeks to encourage group members to speak up their opinions and points of view. This supportive behavior of the leader contributes to decreasing the group's shared perception of power and interpersonal risk, fostering the group engagement in learning behaviors such as help and feedback seeking – dynamics represented by the balancing loop *leader influence (coaching)* in figure 2.

A low level of the group's perception of power and interpersonal risk enhances members' shared belief that the group is safe for speaking up and challenging one another's notions and ideas, facilitating the engagement of the group in dialogue and discussion. The practice of dialogue and discussion leads group members to reflect upon and improve its internal process, enhancing group collaboration and communication, and the group ability to deal with conflicts. Such dynamics are represented by the reinforcing loop *internal process* in figure 2.

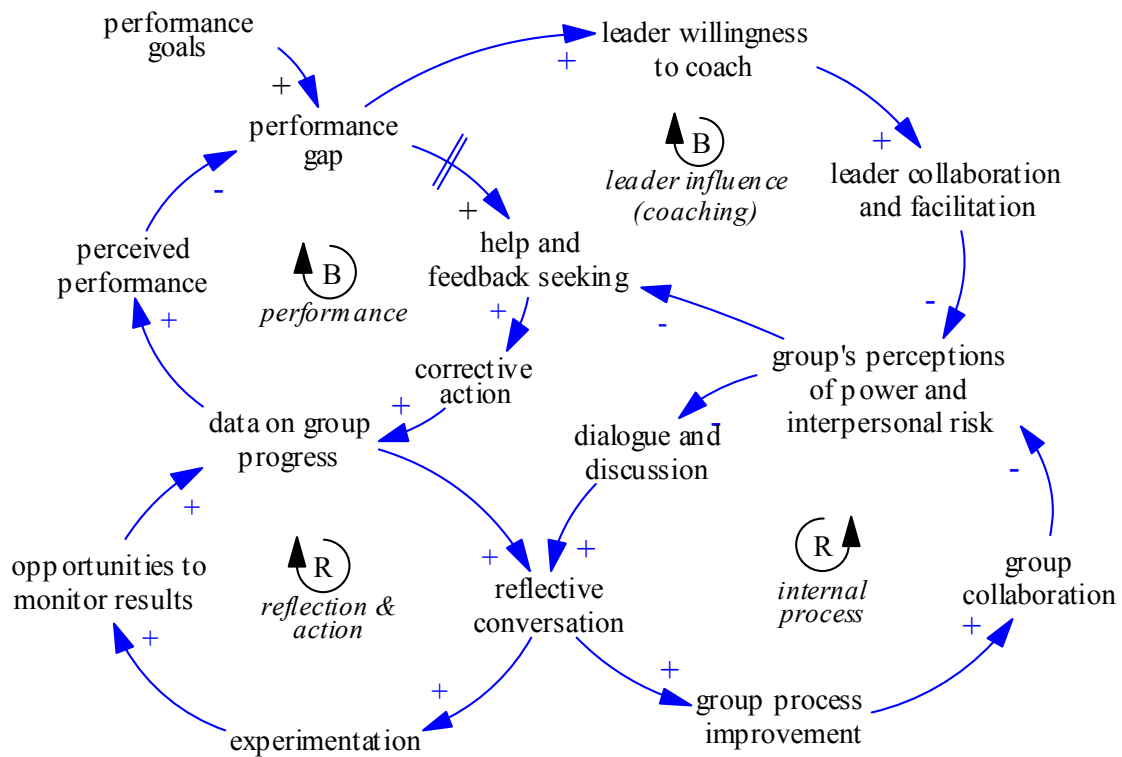


Figure 2: Beanstalk's CLD – Dynamics of Group Learning and Performance

Beanstalk presents self-correcting dynamics and performance improvement over time through a mix of balancing and reinforcing loops. As the group completes the cycle of reflection and action, it is able not only to learn but also to improve its tasks and internal processes. A lower level of perceived power and interpersonal risk is supported by the group collaboration as well as by the leader collaboration and facilitation.

Case 2: The Radar Group

Like Beanstalk, Radar, a product development group, is composed of seven members – the group leader (also a peer) and six members from different functions. Radar’s goal is to develop a product envisioned by senior management to augment an existing product line. The product development was relatively well defined by senior management, but with no inputs from group members, who for the most part believed that the project would not work. Although individual tasks present some level of interdependence, members have little autonomy to experiment with new ideas and new ways of carrying out their work.

This case shows a group that has some level of reflection (e.g. reflection on the project development and customer’s needs) but that does so individually. Some members of the group has developed negative attributions about each other’s motives and became concerned about getting punished by senior management. Consequently, they did not raise questions about the feasibility of the project and avoid discussing ideas openly or to offer any feedback that may be potentially negative. This has resulted in poor quality of reflection and, consequently, in time wasted in unproductive discussions. The existence of such an atmosphere has hampered the development of shared understanding about the situation of the group, limiting the opportunities the group has to monitor its results and gather data on its progress – data that could form the basis for the group process of reflection and action. These dynamics are represented by the reinforcing loop *reflection and action* in the CLD shown in figure 3.

Radar has presented a relatively low level of performance, which contributes to enlarge the group performance gap. An increased gap on performance should signal the group the need to seek help and feedback from the group leader and from others outside the group and to engage in other learning-oriented activities. This way, the group would be able to design and implement corrective action in order to improve results and close the performance gap. However, the fact that group members systematically avoid seeking help and feedback and discussing problems openly has led them to not obtain relevant information early enough to learn more about customer’s needs and to make decisions timely in the project development phase. This situation creates a significant delay, which has led the group to correct its course later than necessary, hindering group performance. Such dynamics are represented by the balancing loop *performance* (figure 3).

Radar's leader follows a somewhat autocratic style (Lewin, Lippitt & White, 1939), in which he holds on the role of spokesperson of the group and makes the decisions. According to a group member, the leader has a "boss" attitude, controlling the decision making process. Consequently, the group has perceived an unsafe environment for open communication, reinforcing the perception that power and influence are concentrated in the hands of the "leader-boss." Such a perception can explain the collective behavior of low disposition for dialogue and productive discussion and for help and feedback seeking, negatively influencing learning, performance and other aspects of group effectiveness. These dynamics are represented by the reinforcing loop *leader influence (control)* in figure 3.

This situation, a result of the group's perceptions of high level of power and interpersonal risk, has prevented the group from improving its own internal processes and hence from increasing its collaboration. These dynamics are represented by the reinforcing loop *internal process* in figure 3.

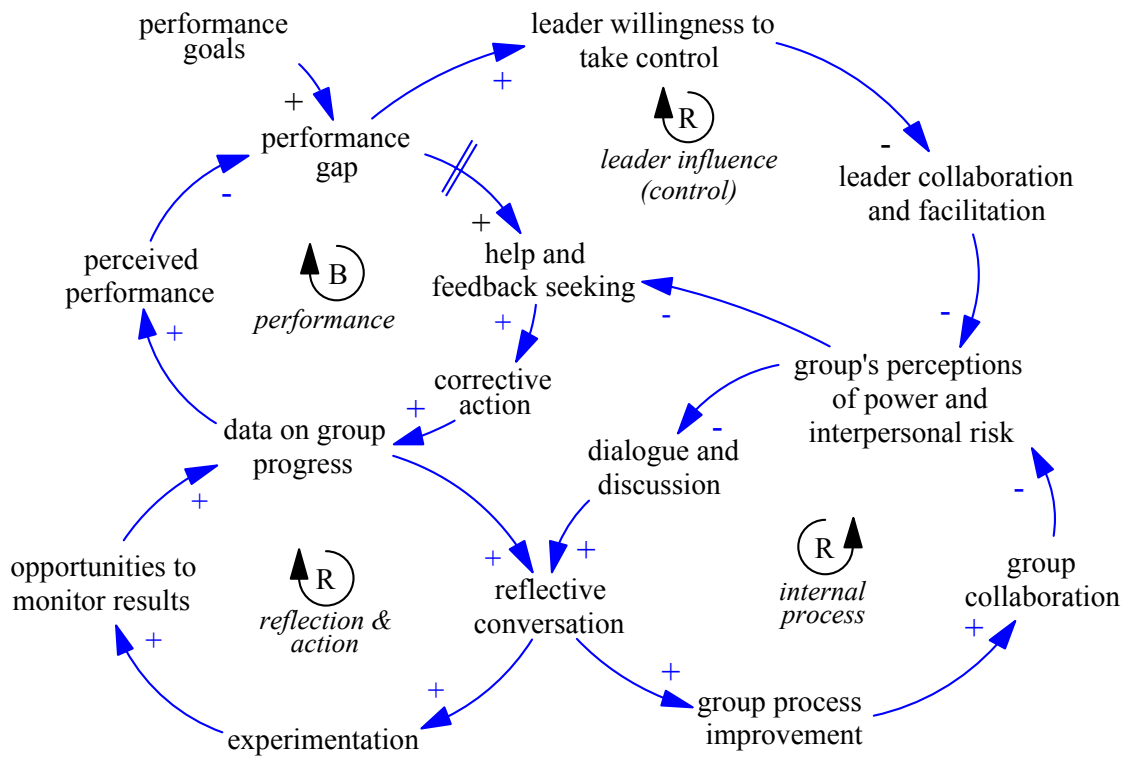


Figure 3: Radar's CLD – Dynamics of Group Learning and Performance

The Radar group presents one balancing loop, which does not have strength to overcome the dynamics of the three reinforcing loops that function in a vicious cycle. The delay between the time that the group perceives its performance to be lower and the time that the group takes action is too long (into the project development) to help counter the behavior of the system.

Case 3: The Storage Group

Storage, the production group, is composed of 26 members – a supervisor and 25 production workers, who work in the day shift. The group's goal is to manufacture storage and filing systems and its work is organized into specialized subtasks.

The Storage group presents dynamics that distinguish itself from the other two groups. When facing problems, as an observer reported (Edmondson, 2002), group members neither try to solve the problems nor do they seek help, they just sit there and do not work. Then, they group members get to work overtime on weekends to achieve the performance goals. Technical problems, however, accumulate since the group doesn't seek help from engineers or people from other functional areas that could assist them. The less inputs and help group members seek, the more problems accumulate, signaling a greater need for overtime – a situation that corroborates the group's norms and mental models towards overtime, but that cover the real sources of ineffectiveness, hindering any efforts of improvement. With overtime, though, group members can decrease the number of production error and technical problems, improving their perceived performance and contributing to close the performance gap. These dynamics are represented by the balancing loop *performance through overtime* in the group CLD in figure 4.

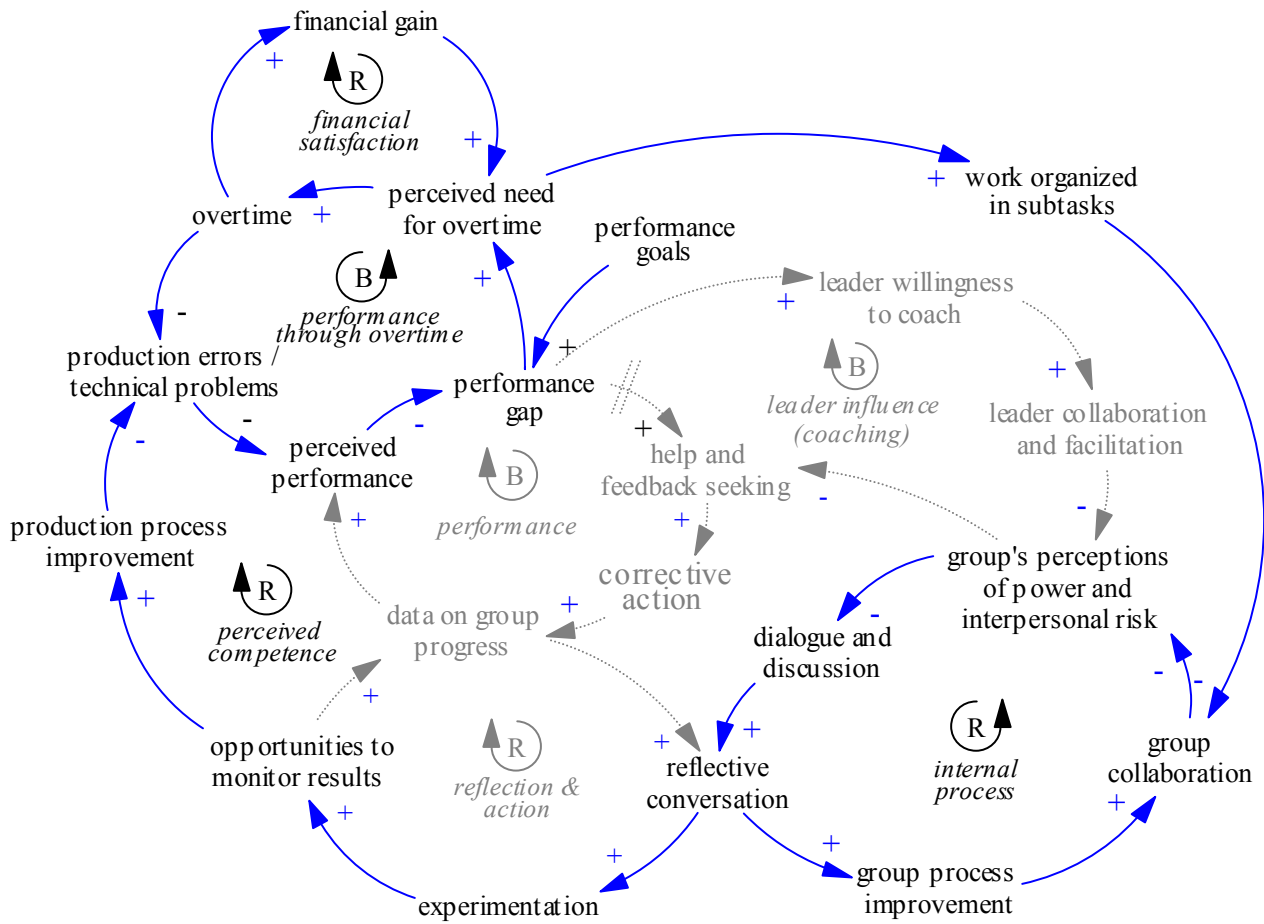
Overtime work not only helps Storage members reach production output but also provides them with financial gains – a reinforcing dynamic represented by the reinforcing loop *financial satisfaction* (figure 4).

The group seems to prefer to work through overtime to engage in learning-oriented activities, which would help them to increase their performance and achieve their goals within the normal working hours. Punctual increases in the group performance result from overtime work in the short run, confirming the group's perceived need for overtime. This need for overtime favors the distribution of the work in subtasks, which thwarts members' collaboration and hence group process improvement. The less group members collaborate, the higher they may perceive the level of interpersonal risk, which prevents them from engaging in learning-oriented behaviors such as dialogue and discussion. The Storage group also avoids the idea of participating in cross-functional training, restricting the opportunity for experimentation with new processes and hampering production process improvement, which,

in turn, contributes to the persistence of production errors and technical problems. As errors and problems increases, the need for overtime increases. These dynamics are represented by the reinforcing loop *internal process* in the CLD – figure 4.

The higher group members perceive the level of interpersonal risk, the less they will engage in dialogue and discussion, decreasing the opportunities for reflective conversation. Such a situation of little, if no, reflection hampers the ability of the group to improve its internal processes (e.g. communication, conflict resolution), contributing to maintain members working independently and collaborating less. As group collaboration decreases, the level of perceived interpersonal risk intensifies, closing a reinforcing loop *interpersonal process*, shown in figure 4.

The Storage group does not present any kind of reflective conversation. Neither does the group leader (or supervisor) try to facilitate dialogue and discussion, following a non-participative or a *laissez-faire* style (Lewin, Lippitt and White, 1939). In fact, Storage's leader does not participate or interfere in the group work, contributing to create an atmosphere of apathy within the group. The loops – *reflection and action*, *leader influence (coaching)* and *performance* – are represented in the CLD by punctuated gray lines because these structures are not part of the dynamics of this group.



Note: Gray links, variables and loops denote that the causal relations are not part of the dynamics of this group.

Figure 4: Storage’s CLD – Dynamics of Group Learning and Performance

Storage presents dynamics, through a set of reinforcing loops, which keeps the group in a vicious cycle of low learning, if any, low-performance state.

4. REFLECTING ON THE CASES

The causal loop diagrams drawn for each group help us understand the underlying causes of the dynamics of each group's internal processes, leader collaboration, learning (reflection and action) and performance. Next, this study contrasts the dynamics of the three groups, highlighting the factors that cause similar loops to produce distinct dynamics and contribute to the differences in learning and effectiveness among these groups.

Reflection and action – the same dynamics that contributes to Beanstalk's learning and improvement keeps Radar in a vicious cycle of low reflection, low action. This is so because of the high level of perceptions held by Radar group members about power and interpersonal risk, contributing to keep members from questioning ideas and speaking up. This situation prevents Radar members from engaging in productive conversation and discussing relevant aspects of their tasks, hindering the implementation of better solutions and improved product designs. The Storage group does not present such dynamics. It presents, in turn, the reinforcing loop *perceived competence*, which represents a belief that the group is competent, and does not need either training or help from others; they can “fix their problems their way.” Reflection and experimentation is not part of this group's day-to-day activities.

Performance – both Beanstalk and Radar present the same performance structure, in which group performance is guided by the group's progress towards completing its tasks adequately in order to achieve their pre-established group goals. Storage, on the other hand, presents a performance structure in which the work done in overtime has a key role in explaining the group functioning. One could claim that such a distinction arise from the difference in group type and group tasks. While Beanstalk's and Radar's organizational goal is to develop new products, requiring innovation (reflection) and change (action) of these two product development groups, Storage's organizational goal is to deliver the organization's products, which is more related to routine tasks. However, given the development of new products, the work of the Storage group may require continuous innovation and improvement in manufacturing processes and product quality, entailing in this case group learning – reflection and action. The extent to which group type and task type provide more or fewer opportunities for learning is not object of the present study. Such an issue can be investigated in details in future work.

Internal process – the internal processes of the three groups are represented by a reinforcing loop. However, each one has distinct dynamics. Beanstalk’s internal process is enhanced by learning-oriented activities (e.g. dialogue and discussion), which provide opportunities for group members to reflect on their own group functioning and improve group collaboration. Radar’s internal process suffers because of the group reluctance to discuss ideas openly, hindering the opportunities that the group has to reflect on their internal processes and improve them if necessary. The dynamics of Storage’s internal processes serve to reinforce the *status quo* – no need for dialogue, reflection or any kind of improvement.

Leader influence (coaching and control) – when Beanstalk’s performance suffers for some reason, the group leader experiences an increase in her willingness to coach the group, helping restore or improve the group performance. This pattern of behavior happens because of the balancing structure of the leader coaching loop that the group presents. The behavior of Radar’s leader when the group faces a decrease in its performance, however, is to take control over the group. The leader of Radar shows governing values related to what Argyris and Schön (1974) call “Model I theories-in-use”. The leader stays in control by advocating his views and not inquiring into group members’ views, generating defensiveness and self-fulfilling prophecies – such a behavior only contributes to reinforce the perceptions of the group about the leader (as autocratic) and the group atmosphere (as unsafe for risk taking). In the Storage case, the leader has little (if any) influence on group members and group internal process. Therefore, this group does not present any dynamics related to the variables that represent leader behaviors.

The causal loop diagram of the Storage group presents two reinforcing loops – *financial satisfaction and perceived competence* – and a balancing loop – *performance through overtime* – that are not common to the other two groups. These structures arise because of the group dynamics and shared beliefs about group goals, tasks and environment, and work in conjunction to keep the group in a vicious cycle. A balancing force that could take the group away from this situation – *leader influence (coaching)* – is not part of the structure of this group.

It might be the case that the dynamics presented by one group can be more prevalent than those presented by the others. For example, Beanstalk group may have a perceived

competence loop in its structure but such a loop is too weak to arise or to change the patterns of behavior in the group.

According to the causal loop diagrams, table 1 summarizes some of the variables that demonstrated to be relevant in the learning process of work groups and relates them to the hypotheses offered in the section two of this paper.

<i>Variable</i>	<i>level</i>	<i>Dynamic Result</i>	<i>level</i>	<i>Hypothesis</i>
Group's perceptions of power and interpersonal risk	↑	Atmosphere of safety and trust	↓	1 and 2
		Engagement in learning behaviors	↓	
Leader collaboration and facilitation	↑	Level of perceived interpersonal risk	↓	2
		Atmosphere of safety and trust	↑	
Perceived need for overtime	↑	Need to invest in learning behaviors	↓	3 and 4
		Time invested in routine processes and procedures	↑	
Time to perceive results (delays)	↑	Engagement in learning behaviors	↓	5

Note: ↑ - means an increase; ↓ - means a decrease

Table 1: Relationships of factors affecting learning and performance in groups

Implications for Learning and Effectiveness of Work Groups

The enthusiasm or apathy of a group in dedicating itself to learning oriented activities is positively related to group members' perception of power and interpersonal risk present in the group atmosphere. For individuals to participate in learning-oriented activities, they need to feel safe and comfortable and to expect that they will not be exposed to situations that threaten their self-esteem (Argyris & Schön, 1974). Group members need to perceive the possibility of analyzing data on group performance, seeking feedback, and discussing mistakes without losing their identity or integrity, thereby allowing them to admit disconfirming data rather than denying it (Schein, 1992). As group members increasingly engage in learning behaviors, they interact and collaborate more, giving rise to a sense of openness and trust within the group. In turn, the increasing openness and the interpersonal trust, including respect for competence, promote the development of trusting interpersonal relations of group members, fostering productive communication (McGrath, 1984), collaboration and cohesiveness. As members develop interpersonal relations the group tends to cohere more and develop a sense of safety (Kahn, 1990).

The leader of the group can promote group effectiveness by helping group members learn to work interdependently, building commitment to the group and its tasks, and coordinating the implementation of performance plans (Hackman, 1990). Group leader coaching is likely to influence group psycho-social traits once a supportive, non-defensive leader collaborates to create a safe and trustful environment within the group (Edmondson, 1999). A leader who is available to discuss ideas and help group members, who provides constructive feedback, and who are open to inputs tends to create an atmosphere of trust and safety. A leader, who acts in autocratic or punitive ways, creates an atmosphere in which group members will be reluctant to face the interpersonal risk involved in such learning behaviors as discussing errors and seeking feedback, as it was the case of the Radar group. Once the leader contributes to creating a safe and trustful environment, the level of perceived power and interpersonal risk of the group decreases and its members become more comfortable to engage in reflective conversation, experiment with new ideas and look for better ways to work together, hence improving group overall performance and effectiveness.

Any of the structures in the causal loop diagram of each group can present significant delays that can produce misperceptions and mistaken analysis on the system functioning. While some dynamics are easily observed in a short period of time, others can take considerable time to become noticeable. Time delays may be especially salient in the case of the implementation of an action and the perception of its effect on the system and to perceive the benefits of learning or to build trustful relations. Therefore, time is an important factor in the learning process and as such must be considered when analyzing or implementing initiatives of group learning.

It is important to notice that time availability is a relevant element to learning activities. In situations of scarcity of time and in the face of pressure to increase performance, groups may stop evaluating the results of previous actions, discussing problems, seeking feedback, or experimenting with new ideas. This type of attitude harms the group effectiveness, since continuous learning process helps groups to understand the environment, their situation, their customers' needs, and to improve their decision making process and group dynamics. If groups do not have enough time to explore and experiment, they can lose the opportunity to learn something new and will have to content themselves with the old thinking (Dixon, 1994).

5. CONCLUSIONS

Work groups are complex social systems (Lewin, 1948) and a systemic perspective is valuable in the study of group learning because the existing cause-and-effect relations in groups and organizations are complex and form causal structures that sometimes neutralize the influence of a variable on another, and sometimes amplify the effect of a variable on another (Weick, 1979). These relations offer significant explanations on the variations in the quality of learning and the level of effectiveness of groups in organizations.

The analysis developed in this paper showed the importance of studying group as an intact system that possesses specific characteristics resulting from particular dynamic interrelations of factors, such as group internal processes, leader behavior and perceptions

shared by group members, which affect the group over time. Psycho-social factors have a great impact on the quality of learning and level of effectiveness of work groups. In face-to-face situations, individuals make sense of their environment and use their understanding to make implicit decisions about what they (and the group) should do, how they should behave, and what they should say. Group member's attitudes affect the outcomes of the group and many times lead to interpersonal contexts that create barriers to learning. When power differences produce perceptions of interpersonal risk, interpretive leaning processes lead to self-protection strategies.

The causal loop diagrams, or modes of behavior, developed in this paper demonstrated to be powerful tools for exploring the conditions under which some groups fail to learn and improve overtime. They also can help managers, group leaders and group members to understand the situation in which the group finds itself and the underlying causes that generate the patterns of behavior observed in the group learning and performance. By understanding the causes of inefficiencies, stakeholders can implement corrective actions and help the group to improve not only its learning process but also its effectiveness.

A next step to advance this study is the construction of a simulation model in order to extend the understanding of the patterns of behaviors of the feedback structures identified. A simulation model will assist in the investigation of the relevance of each factor that influences the learning process and will allow the simulation of possible scenarios in relation to these factors and the circumstances of the group.

REFERENCES

- Ancona, D. G., Kochan, T., Scully, M., Van Maanen, J., Westeney, E. D. (1996). *Managing for the Future - Organizational Behavior and Processes*. Modules 3, 5, and 6. South-Western College Publishing.
- Argyris, C. (1982). *Reasoning, Learning and Action: Individual and Organizational*. San Francisco: Jossey-Bass.

- Argyris, C. (1993). *Knowledge for Action: A Guide to Overcoming Barriers to Organizational Change*. San Francisco: Jossey-Bass.
- Argyris, C. and Schön, D. (1974). *Theory in Practice*. San Francisco: Jossey-Bass.
- Crossan, M.M.; Lane, H.W.; White, R.E. (1999). An organizational learning framework: from intuition to institution. *Academy of Management Review*, v.24, n.3, p.522–537.
- Dixon, N.M. (1994). *The Organizational Learning Cycle: How We Can Learn Collectively*. London; New York: McGraw-Hill
- Edmondson, A.C. (1997). Asymmetrical amplification in social systems: the “poor get poorer” but the rich don’t get richer in work teams. Working paper, HBS.
- Edmondson, A.C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44, 350-383.
- Edmondson, A.C. (2002). The local and variegated nature of learning in organizations: a group-level perspective. *Organization Science*, Vol.13, No. 2, March-April, pp.128-146.
- Goffman, E. (1955). On face-work: an analysis of ritual elements in social interaction. *Psychiatry*, 81: 213-231.
- Hackman, J. R. (1987). The Design of Work Teams. In J. Lorsch (Ed.), *Handbook of Organizational Behavior*, 315-342. Englewood Cliffs, NJ: Prentice Hall.
- Hackman, J.R. (1990). *Groups that Work (and Those that Don't)*. CA: Jossey-Bass.
- Hall, R. (1976). A system pathology of an organization: the rise and fall of the old Saturday Evening Post. *Administrative Science Quarterly*, 21: 185-211.
- Kahn, W.A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33, 4, 692-724.
- Katzenbach, J.R. and Smith, D.K. (1993). *The Wisdom of Teams*. MA: Harvard Business School Press.
- Levinthal, D. and March, J.G. (1981). A model of adaptive organizational search. *Journal of Economic Behavior and Organizations*, (2) 307-333.

- Levitt, B. and March, J.G. (1988). Organizational learning. *Annual Review of Sociology*, 14, 319-340.
- Lewin, K. (1948). *Resolving Social Conflicts: Selected Papers on Group Dynamics*. New York: Harper and Row.
- Lewin, K.; Lippitt, R.; White, R.K. (1939). Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology*, v. 10, p.271-279.
- Lizeo, E. (2000). *The Influences of Learning Behavior on the Performance of Work Team – A System Dynamics Approach*. Master's Thesis, MIT. Cambridge, MA.
<http://theses.mit.edu/Dienst/UI/2.0/Composite/0018.mit.theses%2f2000-25/1?nsections=4>
- McGrath, J.E. (1984). *Groups: Interaction and Performance*. Englewood Cliffs, NJ: Prentice-Hall.
- McGregor, D.M. (1960) *The Human Side of Enterprise*. New York, McGraw-Hill.
- Pfeffer, J. (1993). Barriers to the advance of organizational science: paradigm development as a dependent variable. *Academy of Management Review*, 18, 599-620.
- Sastry, M.A. (1995). Time and Tide in Organizations – Simulating Change Processes in Adaptive, Punctuated, and Ecological Theories of Organizational Evolution. Ph.D. Dissertation. MIT, Cambridge, MA.
- Schein, E.H. (1992). *Organizational Culture and Leadership*. 2nd Ed. San Francisco, CA: Jossey Bass.
- Senge, P.M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. NY: Doubleday.
- Sterman, J.D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. IL: Irwin/McGraw Hill.
- Sterman, J.D, Repenning, N. and Kofman, F. (1997). unanticipated side effects of successful quality programs: exploring a paradox of organizational improvement. *Management Science*, 43, 503-521.
- Sutton, R.I. and Staw, B.M. (1995). What theory is not. *Administrative Science Quarterly*, v.40, p.371-384.

Weick, K.E. (1979). *The Social Psychology of Organizing*. 2nd Ed. New York: McGraw-Hill.

Weick, K.E. (1989). Theory construction as disciplined imagination. *Academy of Management Review*, 14, 516-531.