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REQUISITE VARIETY AND INTERCULTURAL TEAMS:
TO WHAT EXTENT IS ASHBY'S LAW USEFUL?

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Abstract

Requisite variety and intercultural teams: To what extent is Ashby's law useful?

The “Law of Requisite Variety” (LRV) is frequently evoked to explain the design, functioning and performance of intercultural teams. But to what extent does the law really enhance understanding in this particular field? The authors consider that LRV has rarely been questioned in-depth in management studies. The paper briefly details LRV in the cybernetics context before “translating” it to social systems, organizations and intercultural teams. Using a qualitative case-study method, the case of an intercultural team is analysed and questioned from the perspective of LRV. The results show that LRV superficially fits the composition of this team, but is unable to explain the human and social dynamics that evolve during the work process.

Key words: law of requisite variety, requisite variety, intercultural teams, complexity, diversity, systems, case study

Introduction

In the field of organization theory, the idea of ‘requisite variety’ is used as a key element in theoretical frameworks. Related to the business world in general, the cybernetic ‘law of requisite variety’ (LRV) (Ashby 1956) points out that the degree of a company’s relevant environmental complexity should be matched by a corresponding degree of internal complexity in order to survive in a competitive market (Lawrence and Lorsch 1967). This idea of “fit” between an organization and its environment is one of the most enduring ideas in the field of organization theory (Drazin and Van de Ven 1985). The term “requisite variety” is also mentioned in management literature. For example, Lane et al., (2004: 19) point out that in the context of globalisation, “the appropriate response to complexity is through the deliberate development of requisite variety”. Yet, the LRV is rarely discussed in-depth. The theoretical framework that authors refer to is not always clear and its basic assumptions are not elicited.

In the field of management, the LRV is often associated with team issues and diversity. “Teams are now seen as solutions to problems of external adaptation, responding to complexity by bringing together a variety of perspectives while responding to dynamic changes” (Schneider and Barsoux 2003: 217). Diversity (in terms of age, race, gender, education, professional background, personal experience, etc.) always exists in teams to a greater or lesser extent. Intercultural teams are a very striking example. They aim to match the diversity of the environment (see Weick and Van Orden 1990, Webber and Donahue 2001, Schneider and Barsoux 2003, Gluesing and Gibson 2004) and enhance global efficiency and local responsiveness (see Bartlett and Ghoshal 1989, Gluesing and Gibson 2004, Nonaka and Takeuchi 1995). Generally speaking, it is assumed that the idea of requisite variety helps explain why companies intentionally increase team diversity in response to complex global environments.

Research on intercultural teams attempts to understand their specific dynamics and to develop managerial recommendations, with many interesting insights having already been produced (Milliken and Martins 1996, Elron 1997, Thomas 1999, Randel 2003, Jackson et al. 2003). Transfers from other research fields such as sociology, and social and cognitive psychology have also contributed to structuring the field. But research is still in its early stages. Many questions persist without any clear answers. Scholars are thus exploring other fields which

might be helpful in the effort to build robust theoretical foundations. In this context, the LRV seems to offer a good framework for intercultural business issues (Lane et al. 2004).

Although the LRV was stated and validated as a law in cybernetics, it is generally used by analogy in the field of management. Whether the LRV is really transposable and useful in better understanding and managing diversity in teams has, however, rarely been explained or questioned in-depth. The aim of this research is to address these questions. The focus is on intercultural teams where diversity is a key issue.

We will proceed as follows. In section 1 we question whether the LRV can really be used when theorizing about the management of intercultural teams. In section 2 we explain our method and the case studied in this research. Section 3 presents the data and its interpretation. Discussion and conclusions are developed in section 4.

1. The law of requisite variety: from cybernetics to intercultural teams

1.1. Law of requisite variety as formulated in the field of cybernetics

The LRV was first stated by William Ashby in 1956. It can be explained in the following words: let D1 and D2 be two systems and V1 and V2 their respective varieties. The word *variety* will be used to designate either (i) the number of distinct elements included in a single system, or (ii) the number of possible states (S) it can assume. For instance, the variety of a simple electric system that can either assume states “on” or “off” equals 2. The LRV states that in order to control a system, its variety (i.e. the states it can assume) must be controlled. System D1 can only be fully controlled by system D2 under the condition that the latter’s variety (V2) is equal or superior to the former’s variety (V1). In other words, the number of distinct states that D2 can enter into must be at least equal to those of the system D1 ($D2 \geq D1$) (Ashby 1977: 130).

In publications that refer to Ashby’s work, the LRV is very often reduced to the three following ideas:

- Some of the states a system can assume are not desirable, thus it is necessary to control systems in order to avoid undesirable states and to elicit those which are desirable (Zeleny 1986: 269).

- Only variety can control, reduce, force down, or absorb variety (Beer 1974: 30, Ashby 1977: 135, Calori and Sarnin 1993: 87, Choo 1997: 30, Choo 1998: 263).
- In order to control a system whose variety is V , another system is required whose variety must be at least equivalent to V (Ashby 1956, Ashby 1977, Daft and Wiginton 1979, Weick 1979:188, Le Moigne 1990, Durand 1998). In other words, in order to control a system which can assume V states, another system is required that can assume at least each of the same V states, and eventually more.

1.2. From cybernetics to social systems

In cybernetics, a *system* is made up of communications between observers who co-participate by drawing distinctions and creating relations within the system. This contrasts sharply with the use of *system* in the structural-functional school of sociology, where it denotes a pattern of social acts in pursuit of individual and collective goals and is governed by the need of the “social system” to maintain its own structure¹. In more general terms, systems analysis defines a system as anything which works towards a finality in an active and evolutionary environment. It does so by carrying out an activity, by organizing, and by evolving, all without losing its identity (Le Moigne 1990).

The LRV has been widely applied to organization theory to explain how social systems might control complex tasks, and how they might control themselves. But “neither Wiener nor Ashby were experienced or even interested in dealing with social systems. It is only their later interpreters who made the arching leaps which the founders never cared to make” (Zeleny 1986: 270). Zeleny assumes that, because requisite variety is presented as a law, many scholars in the field of management and organization theory confer a universal value on it. He criticizes the opportunistic and sometimes abusive use of the LRV. But authors have not addressed whether a law from systems, as defined in cybernetics, is relevant for social systems as defined in sociology.

Indeed, the very idea of a law in social sciences makes little sense. In the modern conception of science, a law designates a general formula stating a correlation between physical phenomena, and confirmed by experiment. But social sciences are not concerned with

¹ Web dictionary of Cybernetics and Systems – http://pespmc1.vub.ac.be/ASC/SOCIAL_SYSTE.html

physical phenomena. By extension, a law designates a *sine qua non* condition, an essential and constant principle. In social sciences such essential, irrefutable conditions do not exist. The very idea of constancy does not really make sense as it might in physics and cybernetics. Thus, even if the principles of requisite variety could be transferred to the field of social sciences, it would be more appropriate to refer to it as a concept rather than a law. This approaches the concept of “fit” in contingency theory (Drazin and Van de Ven 1985). In management, requisite variety is used as an analogy rather than a law.

1.3. Organizations and intercultural teams are social systems

Emerging from systems theory, contingency theory defines organizations as systems which have to deal with specific contingencies that shape their structure, technology, and environment (Lawrence and Lorsch 1967). An organization is “an identifiable social entity pursuing multiple objectives through the coordinated activities and relations among members and objects. Such a social system is open-ended [existing in continuous interaction with its environment] and dependent for survival on other individuals and sub-systems in the larger entity – society” (Hunt 1972:4). Taking this idea further, the idea of national culture in which organizations are embedded was developed by Hofstede (1980) into a general theory of national culture as a contingency.

Workgroups and teams are organizational sub-entities. Workgroups (1) contain two or more members; (2) are intact social systems with clear boundaries, meaning that group members perceive themselves as a group and are recognized as such by others; (3) execute one or more measurable tasks. They “engage in multiple, interdependent functions, on multiple, concurrent projects, while partially nested within, and loosely coupled to, surrounding systems” (McGrath 1991:151). Teams are specific workgroups that have a high degree of “groupness” or member interdependence (Cohen and Bailey 1997).

Diversity is more frequently evoked in the context of organizations and teams than is variety. But whether they are similar concepts is not clearly stated in the literature. On the one hand, they generally pertain to “any mixture of items characterized by differences and similarities” (Thomas 1996:5). “Heterogeneity”, “variety” and “diversity” are sometimes cited in the literature without explicit distinction and they refer equally to differences between individuals with respect to characteristics or attributes (Milliken and Martins 1996, Ely and Thomas 2001, Jackson et al. 2003). On the other hand, diversity is assumed to include separation, disparity

and variety. Variety includes more specifically the “composition of differences in kind, source, or category of relevant knowledge or experience among unit members” (Harrison and Klein 2007: 1203). In line with the previous authors, the differences between diversity and variety will be distinguished in this research.

Intercultural teams are composed of members with different cultural origins. Culture refers to socialization within a group and is often reduced to ethnic or national origins (Kirchmeyer and Cohen 1992, Watson et al. 1993) with reference being made to the nation in which a person has spent the largest and most formative part of her/his life (Hambrick et al. 1998). But culture can also refer to socialization in any kind of social group: regional, religious, professional, or based on social class, (etc.) as long as these groups “collectively share certain norms, values or traditions that are different from those of other groups” (Cox 1993:6). Culture is a pattern of deeply rooted values and assumptions concerning societal functioning which is shared by an interacting group of people (Adler 2002, Maznevski et al. 2002). Such values concern broad preferential tendencies (Hofstede 1980). Cultural values not only affect perception, processing, and interpretation of information, they also shape individual behaviours (Hambrick et al. 1998). Thus, intercultural teams are assumed to have more intrinsic features of diversity than other sorts of teams.

Figure 1 illustrates the LRV in the context of intercultural teams. In order to perform a task, a team’s variety must fit its task’s variety. A team’s performance is evaluated within its organizational context, and the result of the teamwork will not be considered as satisfying if the definition of the task does not meet the organization’s requirements. The organization is part of the context where the task takes place and is defined.

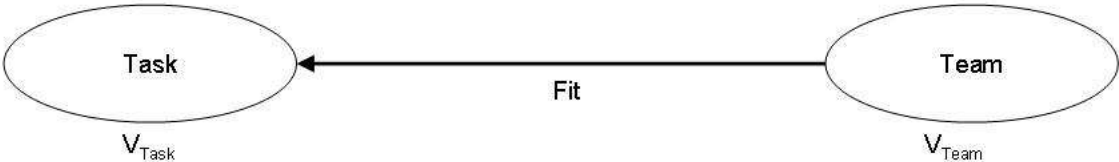


Figure 1 - Fit between task and team varieties

2. Method and presentation of the case study

This research is based on qualitative data collected and analysed within a single case study. The case was selected because of its appropriateness in regard to the research question: an intercultural team working together for several years confronted with a complex task. The team's configuration changed several times. Teamwork was fruitful at some moments, while results were very poor at others.

2.1. Presentation of the case study

The case studied in this article is that of an international team, named Global Way team (GWt), managing an enterprise resource planning (ERP) project in an industrial multinational group. To maintain anonymity the group will be called *Alpha*.

A multinational group

Alpha is a world-wide automotive industry supplier with headquarters in France, employing about 3,200 people. It is the leader in the European market and second world-wide. Alpha is highly international. It has subsidiaries in 20 countries on 4 continents (Europe, the Americas and Asia). The German subsidiary is the group's largest with over 1,350 employees, while about 700 people work in the French factories and offices.

Organizational adaptation to better "fit" the changes in the market environment

Up to 1995, Alpha had a very polycentric group structure with strong local adaptation. Cultural differences among subsidiaries were numerous. Customer relations were nearly always handled by local units. Interactions with foreign customers and members from other subsidiaries of the group were scarce. But Alpha's market environment changed during the late 1990s. Its customers, automotive companies, became increasingly global. Local handling was no longer adapted to customer needs. Greater international coordination of Alpha's activities and subsidiaries became vital. The group structure progressively changed as a result of new CEO leadership in 1998. The new CEO strongly believed in the importance of cultural diversity and local adaptation. He gradually modified the group structure into a matrix organization based on increased cooperation and coordination among subsidiaries.

The development of international teams

As a result of the new matrix organization, international teams were set up to develop cooperation and coordination between the subsidiaries. Two main categories of international teams were developed, the first category being horizontal and functional. All the directors from Alpha's subsidiaries with the same functional activities (e.g. marketing, quality control, etc.) met, on average, twice a year. Their degree of cooperation was not very intense: they exchanged experiences and opinions concerning their everyday work, discussed common problems, tried to homogenize work procedures between the different countries, but they had no concrete tasks to accomplish, and no control over performance. After the directors, coordinators were expected to encourage meetings and discussions within international teams, but they had no formal authority.

The second category was inter-functional. People from diverse functions and subsidiaries worked together on the same customer vehicle project. These teams were set up for short periods of time (a number of weeks), and during this period, teamwork was quite intense. The teams experienced extreme pressure to achievement specific goals. Their performance was evaluated by the customer.

The development of international teams substantially increased the number of interactions between members of different subsidiaries.

The Global Way team and the ERP project

The major international team (in terms of number of people concerned and duration of teamwork), named Global Way team (GWt), was set up in 2000 to design and implement an Enterprise Resource Planning system (ERP) to support global coordination and control of group activities. In 2002, more than 50 people were members of the GWt and teamwork continued until 2006. In this paper, we will analyse the case of this team in order to question the link between its cultural variety and the complexity of its task.

Despite the fact that by the end of 2006, the team had performed its task, the process and the results of the teamwork were not always satisfying. The team was greatly off target compared with the initial schedule and budget. Target specifications had to be changed. For a short time the ERP bore no relation with the managers' and end-users' requirements. Thus, the ERP project had a very negative impact on the relationship between the different subsidiaries, as well as on the organizational climate. As we will show in section 3, these negative teamwork outcomes were strongly linked to the question of variety.

2.2. Research design

Data collection

Thirty half-directive, in-depth interviews were conducted. Seventeen members from the French headquarters and subsidiary were interviewed, with nine members being interviewed from the German subsidiary and four from the Spanish. When possible, the interviews were conducted in the interviewee's mother language (e.g. French, German or English).

The aim of the interviews was to collect data on two main themes. The first theme was understanding Alpha's history, organization, strategy and structure. The second concerned GWt, its task, history, aims, processes, problems and achievements.

Data analysis

In this paper, we use a "narrative strategy" (Langley 1999) to report the evolution of the GWt and its task. This seems appropriate considering the richness of the collected data. Our aim is to question the 'fit' between the variety in the GWt and its task varieties at each phase of the process, in order to outline conditions under which the LRV can be useful for the study of intercultural teams.

The story of the GWt is told in a step by step manner. At each step of the narration, the concept of requisite variety is addressed. We question whether the LRV "fits" the team's experience, how much it helps in understanding team successes and failures, and conversely what it does not help to understand. Then, we formulate hypotheses concerning the use of the LRV in the context of intercultural teams.

A first step in a long-term research process

This exploratory research is a first step in a long-term process of knowledge creation. Two distinct theoretical backgrounds are combined (e.g. LRV and intercultural teams) and applied in the context of a case study. Further research is needed to extend the results that emerge from this research.

3. The Global Way team and its task: the story of multiple levels of variety

In this section, the GWt story is presented in five chronological phases. Some of them illustrate easy application of the LRV to intercultural teams; others show that the LRV is not sufficient to explain the team performance.

3.1. Phase 1: The balance between the varieties of a team and a task

Diversity inheritance...

Up until the 1980s, Alpha was a very polycentric group that fitted local markets. Strong local adaptation resulted in strong cultural differences and great diversity between subsidiaries which manifested in the following ways:

- Subsidiaries were essentially located in different countries, and managers and employees were exclusively “locals”, natives from the country.
- Subsidiaries had different customer portfolios, and customer relations were managed locally.
- Subsidiaries had different product offerings, and products were mainly manufactured locally.
- Subsidiaries had developed different routines and work processes to manage, plan and control local activity, and most of the time, work processes had been created and improved locally.
- Subsidiaries used different information systems (IS), and most of the time, IS had been designed, developed, implemented and adopted locally to fit local work processes and needs.

Alpha’s polycentric group structure was adapted to their activities as long as their customers, the automotive groups, were not highly international. Alpha’s organization enabled the group to efficiently address its customers’ diverse requirements. Alpha’s internal diversity fitted the market environment diversity.

Changing requirements

The automotive industry considerably changed during the 1980s and 1990s. It became more and more global, and finally, required suppliers to globalize too. Alpha’s organization no longer fitted new customer requirements: automotive company suppliers were expected to be able to provide identical products in all international markets. Moreover, through local handling of the orders of world-wide customers, Alpha’s subsidiaries sometimes acted as if they were competitors and not belonging to the same group. Deeper international coordination between activities and subsidiaries became vital.

Almost simultaneously, the French headquarters' IT department was considering the eventuality of the “year 2000 bug”. It was also worried whether the local IS, designed and implemented during the 1970s, would be adaptable to the Euro.

Time for change and the IS project

A new CEO was appointed in 1998. He considered the need for a new IS in France as a good way to make a first step towards globalisation, especially in regard to both the group structure and the French IS mis-fits.

Since the French site needed a new IS before 2000, it was decided that a pilot project would be conducted in France. This decision was a pragmatic one as the complexity of a global IS project was reduced to a smaller project. Popular thought at the time was that this approach would help more easily manage both the schedule and project budget. Although the pilot project was to take place in France, the overall IS project remained global. The long-term vision was that the French pilot project would be progressively rolled-out and simultaneously deployed in the nine foreign subsidiaries of the group.

French IT specialists recommended the introduction of an Enterprise Resource Planning (ERP) system. SAP was chosen because it was the only ERP that could integrate every language spoken in the Alpha Group, including Japanese. Apart from the language aspect, no cultural differences between subsidiaries were taken into consideration in the specifications.

GWt variety

During Spring 1998, the GWt was formed to undertake the ERP pilot project. Stakeholders were:

- The project leader, an IT specialist with knowledge of IS project management.
- Several heads of the functional departments concerned with the project who had overall knowledge of their departments' business, strategies, organization, objectives and norms. They provided preferences and directives, and tested preliminary versions.
- End-user experts from every functional department concerned with the project. They possessed knowledge of their working processes, functional languages, habits and routines. They provided necessary information to implement the ERP and also tested preliminary versions.
- IT specialists who were knowledgeable about ERP technology. They parameterised the ERP modules to fit manager and end-user requirements.

All the team members were French and most of them had long working experience in the French subsidiary. Thus, the fit between the team's variety and the ERP pilot project was good.

Pilot project initial success

The GWt worked nearly full-time on the project. It took them a year and a half to design, parameterise and deliver the ERP. The ten SAP modules were deployed simultaneously in the French subsidiary during a single week-end in October 1999. The pilot project was delivered on time. It fulfilled the initial schedule of conditions. The budget was respected. It was a good performance considering that typically, ERP projects experience delays, budgets are not respected, and initial requirements are partially abandoned during the process.

Return to the LRV

In the words of the LRV, this first phase of the process can be summed up in the following terms and are represented in figure 2:

1. In the long run, the task was to set up an ERP for a global group. But the task of the first step, was to set up the French IS pilot project. Organizational strategies, objectives, requirements, budget, schedule, and IT architecture, language and parameters were variables of the task’s variety.
2. The team was the social system responsible for the project, the design of the deliverables and fulfilment of specifications. Differences in expertise, functional areas and hierarchical levels between the team members were variables of the team’s internal variety. During the French IS pilot project phase, the team’s variety fitted the sub-task’s variety, and the team performed well.

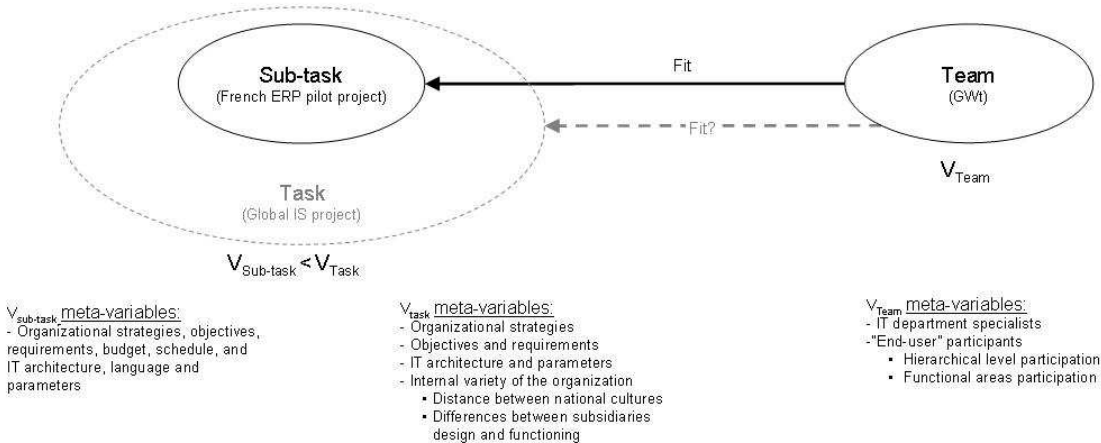


Figure 2 - Balance between team and task varieties during the French pilot project

This pilot project was just a first step towards the development of a group-wide international ERP. In the phases that followed, the balance between task and team variety was not maintained.

3.2. Phase 2: The broken balance

Knowledge capitalisation

At the beginning of 2000, a new subsidiary called Alpha Networks was created to capitalize experience, best-practices and feedback from members of the pilot project and its end-users. The creation of a legal corporate entity underlined the importance of the project and increased GWt independence from the French headquarters. Moreover, Alpha Networks would theoretically be able to improve knowledge capitalisation and coordinate the work of the GWt. A former IT specialist who participated in the pilot project was appointed head of Alpha Networks. Managers and end-user experts who took part in the pilot project had returned to their functional activities. Alpha Networks was an IT department peopled with French IT specialists.

Project replication

Alpha Network's mission was to deploy the French IS in the foreign subsidiaries and as the German subsidiary was the largest of these, it was the next implementation site. It was decided that the IS implemented in Germany should be at least 80% identical to the French version. Thus, the French ERP system was presented to the German executives. It was explained that the IS they would be using to manage their operations would be identical to the French version, aside from the language.

Outrage

The French manager of the GWt presented the ERP as an ordinary software program, and a virtual organization was presented, based on the French subsidiary model. Nobody in the first GWt had ever imagined that the German organization could be completely different from the French one. Nobody in France seemed to have anticipated that the ERP project could have a very strong effect on the German organization, its management methods, production systems and business flows. German executives were outraged. The ERP did not at all fit their local organization. Having always been independent and self directing within the corporate context, they felt completely misunderstood and frustrated. Discussions turned into open conflict. Finally the German executives simply refused to implement the ERP.

Return to the LRV

In the words of the LRV, this second phase of the process introduced significant differences as compared to phase 1.

1. The French pilot project was a sub-task with the global IS project being the task. In phase 2, the team faced a task with much greater variety. The ERP now had to fit both the French and German subsidiaries. The number of forms the task could take increased dramatically because of both national and inter-subsidiary cultural differences. The French pilot project deliverable (e.g. the ERP system) did not fit the new requirements.
2. GWt membership had significantly changed. It was essentially composed of IT specialists, whereas in phase 1 functional managers and end-user experts were also part of the team. Thus, its internal variety was much smaller and its attention focused on technology replication, adaptation and deployment, although the variety of the task to be carried out had increased. The team's variety did not fit the task's variety.

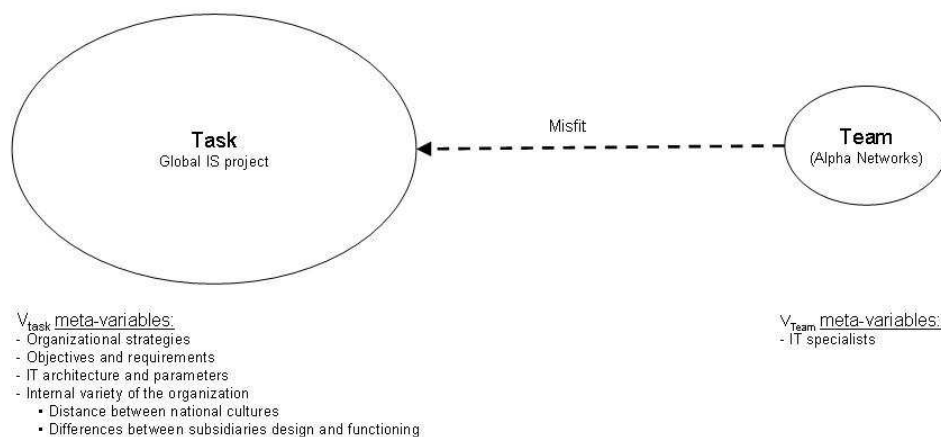


Figure 3 - The broken balance between team and task varieties

3.3. Phase 3: New project and new balance

Frustration and resignation

At the beginning of 2001, it became clear that the first ERP solution would not fit the foreign subsidiaries' requirements and adaptations would not be satisfactory. A fundamentally different ERP solution was needed for the group. GWt members were very frustrated. They felt helpless with regard to the problems. They saw no possibility of resolving the crisis and

did not want to restart the project. The head of Alpha Networks and half of the eight GWt members resigned.

New GWt and new tensions

A third ERP team was set up with both French and German members. A French engineer, who was not an IT specialist, was chosen to lead this new GWt that contained many fewer IT specialists. But tensions grew quickly within the team. The German members were not satisfied with the French leadership and considered that their points of view and ways of working were not adequately taken into consideration. A schism was perceivable within the team:

- From the French point of view, the Germans systematically criticized and undid the work that had been accomplished by the first GWt.
- The Germans felt that the French were unwilling to abandon “their” version of the ERP. They considered that the French members of GWt did not sufficiently take into account the procedures of the German subsidiary. Moreover, the Germans did not appreciate the “French” approach to teamwork as called for by the French team leader. Well-known stereotypes were brought up by both of the national subgroups, concerning precision of schedules and working hours and participative versus directive leadership styles..

Further changes

Given both the growing tensions between members of the GWt, and the poor results of the team, the leadership was changed yet again. Two project managers were appointed:

- An American woman who had worked at the French headquarters for several years. She became project head representing the “consultancy” side, meaning SAP.
- A German man who was former director of the German subsidiary IT department. He was appointed project head representing the “customer” side, being Alpha’s subsidiaries. He considered himself more a “businessman” than a “technician” as he was not an IT specialist.

They started developing a jointly defined system for team work. The GWt was divided into sub-teams composed of both German and French members. Each sub-team had as mission to find common solutions for specific aspects of the overall ERP project.

Return to the LRV

By the end of this third phase of the project, the need for requisite variety was considered for the first time. Managers were finally aware of the complexity of the task and of the organization. The challenge was larger than simply combining subsidiaries.

1. The task was recognized as more complex than an ordinary IT project; it was also a question of corporate strategy and organizational design. The degree of complexity was all the more significant, as the previous phases of the project had significantly damaged corporate climate and confidence between the German subsidiary and French headquarters.
2. The need for fit between team and task complexities was finally recognized. Team variety was assumed to be achieved thanks to three meta-variables: national diversity, “consultancy” (IT) and “end-user” distinction, and management methods.

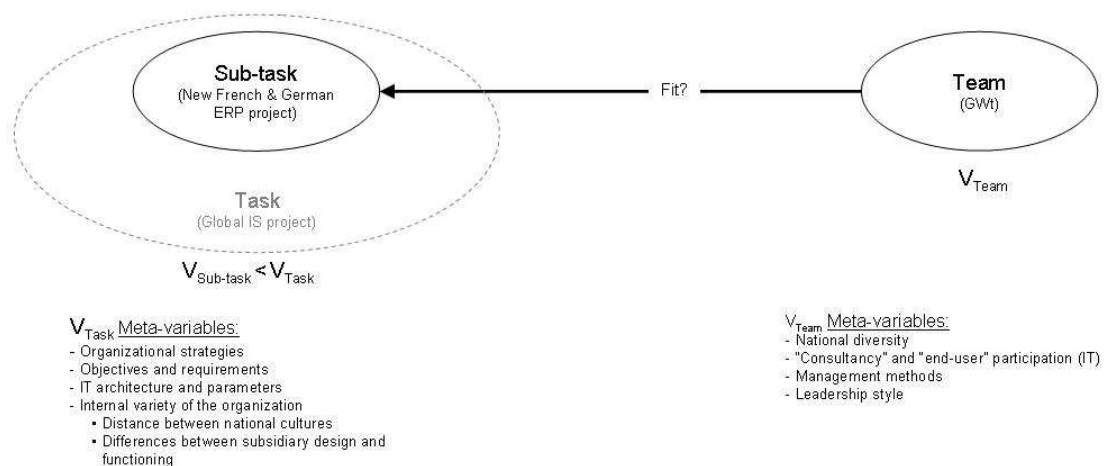


Figure 4 – Lack of performance despite the introduction of cultural variety in the team

3.4. Phase 4: Task and team enlargement

One more significant change

Alpha’s CEO, together with the GWt leaders, realized that the task had been underestimated. They wanted to avoid repeating the mistakes that had been previously made in the project. The final ERP solution had to not only fit the French and German organisations, but the whole group as well, with its subsidiaries in ten countries. This dramatically increased the task’s variety, but for the first time, the task was no longer reduced to sub-tasks. It was considered in its entirety.

Yet another “new” GWt

Thus, the GWt composition changed once again. The French and German project members were joined by “function leaders” from the Czech, Italian, Spanish and American subsidiaries. Individuals from the Japanese, Chinese and Brazilian subsidiaries were not included for geographical and cultural reasons. British members were not included because of the small size of the British subsidiary. Each “function leader”, regardless of his nationality, represented a specific SAP module, which often corresponded to one department (i.e. quality management) and one subsidiary in particular. At its height, 50 people were permanent members of the GWt. Work was organized on the basis of a “global template”. First, the GWt was asked to create a consensual virtual organization. Then it would design the future ERP to fit this commonly defined virtual organization.

More problems

Up until October 2001, teamwork had been very difficult. In France, the SAP pilot version had already been rolled-out. It was operational and people used it for daily work. For the French subsidiary, a new ERP project meant additional future changes in their work processes. Above all, it was thus far, impossible to reach a consensual vision of a virtual global organization and common working processes. Six month after the GWt had been yet again restructured, teamwork progressed very slowly. No agreement was found on any detail of the project. Differences between the function leaders’ points of view seemed irreconcilable. Difficulties were also due to the differences in size between the French and German subsidiaries on the one hand (about 1000 employees each), and the size of the other subsidiaries (fewer than 100 employees each). Internal organization, management, and work processes were very different. The representatives of the small subsidiaries feared that using and administering SAP would immobilise too large a percentage of the workforce as compared to the subsidiary’s size. The project was stopped once more. Almost three years after the beginning of the GWt, there was still no tangible progress that had been made.

Return to the LRV

Alpha’s leadership was now completely aware of variety requirements concerning the GWt:

1. Every subsidiary was now recognized as concerned with the project. The task was finally recognized as being highly complex, and its high variety was taken into consideration. Previous phases of the project significantly damaged corporate climate and trust between

foreign subsidiaries and the French headquarters. Thus, the task complexity was at its maximum.

2. Stakeholders of the GWt were representatives from every functional and hierarchical level of the organisation, and six out of the ten subsidiaries participated in the project. Thus, in theory, the fit between the varieties of the task and the team should have been good. But the team still performed poorly. Its variety was too big for consensus to be reached and tasks performed in a reasonable time.

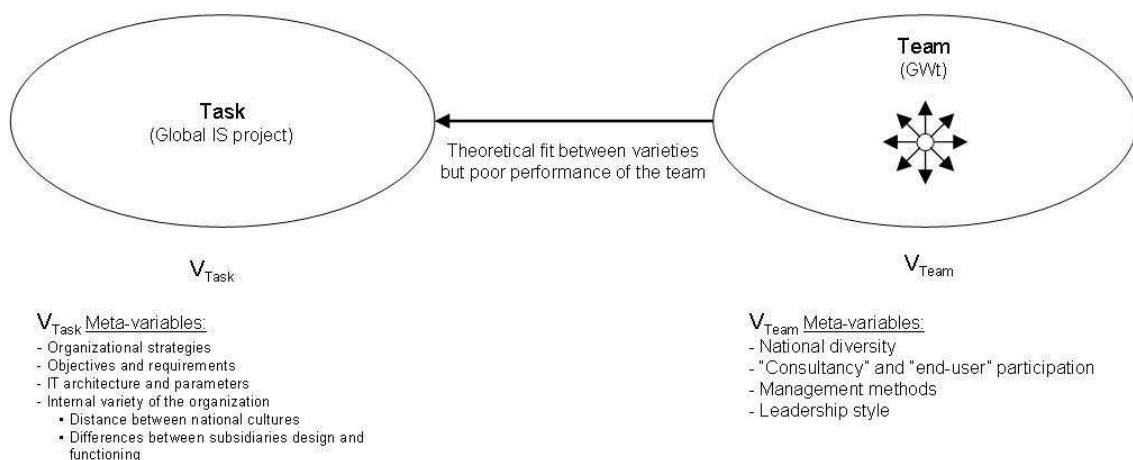


Figure 5 - Impossibility to manage an extremely varied team

This phase highlights that, in the field of intercultural team management, though requisite variety between task and team varieties might be a necessary condition, it alone is not a sufficient condition for performance.

3.5. Phase 5: Reduction of team and task varieties

One more task redefinition

At the end of 2001, the project was modified once again and its specifications reduced. The team was charged with the design of a common solution for the two “big” subsidiaries of the group (e.g. France and Germany). This extensive ERP solution would later be simplified and adapted to fit the “small” subsidiaries.

One more GWt

A new, fifth, GWt was set up with half French and half German employees as members. In other words, representatives from the Czech, Italian, Spanish and American subsidiaries were retired from the project.

The bi-national team members worked together full-time. They moved from France to Germany on a weekly basis (so that everyone could live with his or her family 9 out of 14 days). The bi-national direction played a linking role between the two cultural groups.

Results at last

By February 2002, the situation had radically improved. Team member satisfaction was high. They had gotten to know each other, had developed common ways of working, and managed to design solutions acceptable for both subsidiaries. Several modules of the ERP had already been designed.

At the end of 2002, the new SAP version was implemented in both the French and German subsidiaries. A simplified and adapted version was rolled-out in Italy in 2004, in Spain in 2005, and in the Czech Republic in 2006. The remaining subsidiaries (i.e. Great Britain, USA, Brazil, China, and Japan) would follow.

Return to the LRV

On the one hand, phases 1 and 5 seem to be quite similar. In both phases, the team and task varieties fit, and teamwork provided satisfying results. On the other hand, there are significant differences:

- In phase 5, team members and leaders were aware of the “true nature” of the task. They knew the difficulty of the task had been purposely reduced, in order to make the task doable in a reasonable time, but that in the long run, the ERP had to be deployed to all of the subsidiaries. As a consequence, the team tried, whenever possible, to find a solution that could be easily adapted to the smaller subsidiaries at a later time. In other words, the team attempted to find parsimonious solutions.
- In phase 1, the GWt had no international variety. But in phase 5, the two main nationalities (in terms of number of employees) were equally represented. Even though every subsidiary was not represented in phase 5, the GWt managed to design an ERP solution that was easy to adapt to every subsidiary of the group.

These results highlight that the team and task varieties do not necessarily need to exactly fit one another. However, it seems important that every type of required variety be represented in the team. The task, here, had a high level of variety because of its international nature; there had to be international variety in the team to master it, but not necessarily a very high level.

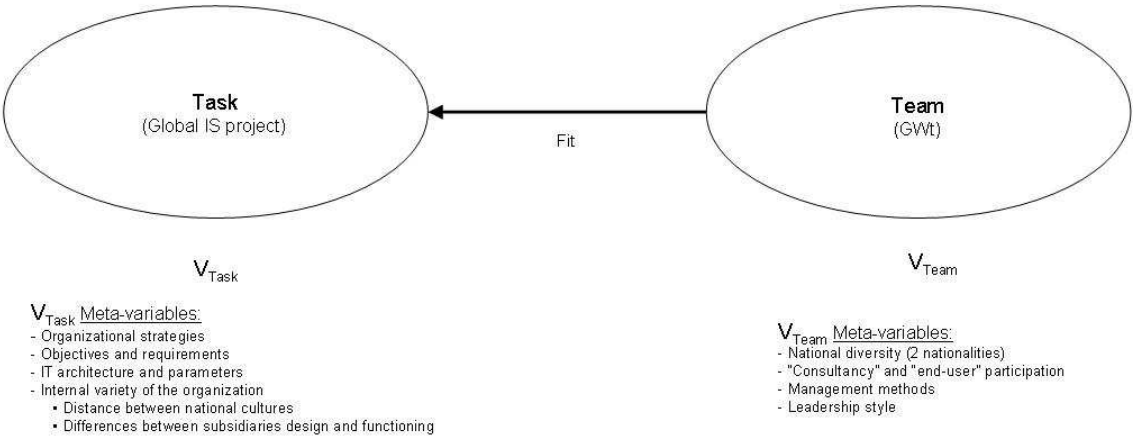


Figure 6 - Performance of the team after reduction of task and team varieties

4. Discussion and conclusion

The aim of this paper is to question whether the LRV can be useful in better understanding and managing intercultural teams. In several phases of the case study, the main tenants of the LRV contribute to explaining the performance of intercultural teams (see table 1):

Table 1 – Synthesis of main results

Phase		Group Variety / task variety	Team performance	LRV explains team outcomes	Intervening processes
1	French pilot project	Fit	+	+	The task was underestimated, the sub-task was well performed
2	A French project for a global group	Mis-fit	-	+	Task variety was increased
3	French leadership of a bi-cultural team	Fit	-	-	Leadership was not accepted, no commitment by foreign team members
4	A team including 6 nationalities	Fit	-	-	Impossible to manage a large and very varied team
5	French-German team	Fit	+	+	Reduction of task variety

- When team and task varieties fit, the performance of the team was quite good (see phases 1 and 5). But when team variety was clearly inferior to task variety, performance was very poor (see phase 2). This observation is consistent with the LRV. It suggests that if a team is composed of enough different people to imagine the variety of “states” its task might assume, then, the team should be able to perform the task.
- When team and task varieties had a poor fit, either team variety was amplified (see phase 3 and 4) or task variety was attenuated (see phase 5). This observation is consistent with previous theoretical propositions suggesting that in case of lack of fit between team and task varieties, “there are two general strategies, which may be combined: the first is to amplify variety in an organization or a team, and the second is to attenuate variety from the task environment” (Choo, 1997: 30; 1998: 263).
- When there was no international variety within the team (see phase 1), the team was unable to understand the complexity of the task and master it. Incorporating international variety in the team contributed to amplifying its variety (see phase 3), and rendered it capable of imagining the different states the task might take.
- When team variety became too great, team management was very difficult, and teamwork progressed very slowly (phase 4). This result is consistent with previous research on intercultural teams; they are known to need more time than other teams to validate ideas, participants and procedures, to find a consensus and to set up joint actions (Adler, 2002).

The case study shows that the LRV delivers insights concerning the composition of a team with regard to the definition of the task it shall perform. More precisely, it stresses that a balance – a fit – must be sought between task variety and team variety. On the one hand, if the task variety is too high for the team to understand and manage it, the team might fail to achieve the task. On the other hand, if the team variety is too high, it can also have counterproductive effects that might result in failure.

Requisite variety appears as a condition for performance of the team, in the same way that it has been considered as a favourable condition for knowledge creation or sense-making in other contexts (Nonaka and Takeuchi 1995, Weick 1995). But the fulfilment of this initial condition does not guarantee successful team processes and/or outcomes.

4.1. Considerations concerning variety

The balance between team and task variety can be difficult to establish and maintain. In cybernetics, requisite variety is stated as a mathematical equilibrium between two distinct stable and calculable variables. But in social systems such as intercultural teams, variables of variety cannot be easily identified or calculated. They can also be very difficult to recognize, evaluate and anticipate.

- Team variety results from the differences in personal characteristics of the team members (Milliken and Martins 1996). But some of these characteristics may overlap and interact, and a general “measure” of team variety seems difficult to establish.
- Very few insights can be found in the literature concerning task variety. This knowledge gap raises great problems for applying the LRV.

To increase the transferability of the LRV to social systems and its actionability for management, further research is needed either to determine the components of variety in social settings (especially the components of task variety), or to set up a method to define variety in social settings.

4.2. Considerations concerning fit

Requisite team variety, considered as the sum of individual varieties, might not be a sufficient condition for balance. Discussing the constituents of variety draws the focus to the composition of teams. But the performance of a team is greatly determined by dynamic aspects like the capacity of the team to interact, to learn and to create knowledge. A team’s variety is not quantifiable. Managerial or leadership processes, as well as internal processes

linked to motivation, implication and communication might amplify or attenuate the team's variety.

Leadership and the variety of an intercultural team

In a business context, a team leader has the possibility of letting his team completely express its variety, the different points of view and ways of working or, on the contrary, he can attenuate its variety. This can be done by imposing routines on the team that do not take into account the different cultural preferences, or by not letting certain team members express their opinions. This is what happened in the beginning of phase 3 of the GWt, when a French engineer managed a bi-cultural team in a context of strong tensions between the French and the German "sides".

The LRV incompletely explains residual variety of complex systems. "Because social systems are organized systems and their 'components' are highly interdependent, their variety can be reduced by discovering or imposing constraints; also, for the same reasons, by increasing their interdependence" (Zeleny, 1986 : 270). More complex control phenomena emerge that guide interactions and influence the system's residual variety.

The external control exerted on a social system can reduce its variety by forcing it to take only some of the states it could theoretically or potentially assume (Zeleny, 1986). In organizational contexts, control is exerted by the team manager and the organization's requirements. Non-participative leadership styles do not permit the group to express its variety. Intercultural teams can attempt to produce new ideas thanks to cultural variety, but if managers impose routines based only on their own cultural preferences, cultural variety is likely to be reduced.

Commitment of team members

Even if the team leader has a participative leadership style, team members can decide not to really engage themselves in the teamwork, for reasons including lack of motivation or a willingness to make the team fail. This attitude of non-commitment can also be a way of opposing the team leader. During the first half of the third phase, these phenomena occurred and as a result reduced the GWt's variety. As a consequence, the variety became insufficient for the team to master a complex task.

Maloney and Zellmer-Bruhn (2006) state that effective global teams need to find a balance between self-verification and social integration. Self-verification means that team members recognize the deliberate heterogeneity of the team and acknowledge its presence. This implies

that team members share their unique perspectives, and without team member commitment to the team, this may not happen.

4.3. Managerial implications

Some helpful insights can already be drawn from the above propositions. The following “check list” might provide additional guidance for managers of intercultural teams.

Evaluating task complexity

This evaluation is of great importance and can sometimes be very difficult. A task can reveal itself as being much more complex than was initially perceived. If the complexity of the task is underestimated, there is a big risk of creating a team whose variety is too low, and that will as a result, perform poorly. If on the other hand the task is too complex, the team variety appropriate for performing the task may be so high that the team becomes impossible to manage. In this case, it can be helpful to divide the task into sub-tasks, but then the team is not confronted by the task in its entirety.

Defining team composition

Regarding the complexity of the task, the variety of the team should neither be too low nor too high. In intercultural environments, one could assume that the team should include members from as many cultural origins as countries that are concerned by the task. But in many cases, the size and complexity of the team becomes too cumbersome to be managed. If all the cultures concerned by the task cannot be represented in the team, at least some cultural variety should be maintained.

Managing the team

Management should be particularly attentive to the expression of the team’s variety. Participative leadership styles should be practiced when possible, given the national cultures of team members. The team leader might be better accepted by the team members if he/she is not seen as representing only one of the cultures composing the group.

4.4. Limits and avenues for future research

This research has shown that team dynamics and those processes linked to team leadership and commitment may harm the balance between a team and its task variety. Group interaction theories might be helpful in identifying other such processes and in deepening the

understanding of those discussed here.

More case studies would be helpful in order to deepen the understanding of requisite variety of a team. Further case studies might examine teams working on different sorts of tasks. Here, the main aspect of variety is intercultural; further research projects could focus more strongly on other types of variety such as task complexity. But the literature does not permit us to specify task variety, and the insights from the case study of the GWt are embedded within the specific task and organizational context. Managerial recommendations issuing from this study concerning requisite variety would be more precise if the variety of the task and the variety of the team could be measured with greater accuracy. By analogy with risk analysis, where risk typologies and cartographies help in risk evaluation and management, a method for the evaluation of task variety variables are likely to be helpful in evaluating team and workgroup requisite variety and will assist in more effectively fitting the team to the task.

References

- Adler, N. (2002) *International dimensions of organizational behavior*. South-Western, Cincinnati.
- Ashby, W. R. (1956) *Introduction to cybernetics*. Chapman and Hall, London.
- Ashby, W. R. (1977) Variety, constraint, and the Law of Requisite Variety. in Buckley, W. and Rapoport, A. *Modern systems research for the behavioral scientist*. Aldine Publishing Company, Chicago, 129-136.
- Bartlett, C. A. and Ghoshal, S. (1989) *Managing across Borders: The Transnational Solution*. Harvard Business School Press, Boston, MA.
- Beer, S. (1974) *Designing Freedom*. CBC Publications, Ontario.
- Calori, R. and Sarnin, P. (1993) Les facteurs de complexité des schémas cognitifs des dirigeants. *Revue Française de Gestion*, 93. 86-94
- Choo, C. W. (1997) *Information management for the intelligent organization: the art of scanning the environment*. Information Today, Medford, NJ.
- Choo, C. W. (1998) *The knowing organization: how organizations use information to construct meaning, create knowledge, and make decisions*. Oxford University Press, New York.
- Cohen, S. G. and Bailey, D. E. (1997) What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suite. *Journal of Management*, 23, 3. 239-290

- Cox, T. H. (1993) *Cultural diversity in organizations. Theory, research and practice*. Berrett-Koehler, San Francisco.
- Daft, R. L. and Wiginton, J. C. (1979) Language and organization. *Academy of Management Review*, **4**, 2. 179-191
- Drazin, R. and Van de Ven, A. H. (1985) Alternative Forms of Fit in Contingency Theory. *Administrative Science Quarterly*, **30**, 4. 514-539
- Durand, D. (1998) *La systémique*. PUF, Paris.
- Elron, E. (1997) Top Management Teams within Multinational Corporations: Effects of Cultural Heterogeneity. *Leadership Quarterly*, **8**, 4. 393-412
- Ely, R. J. and Thomas, D. A. (2001) Cultural Diversity at Work: The Effects of Diversity Perspectives on Work Group Processes and Outcomes. *Administrative Science Quarterly*, **46**, 229-273
- Glaser, B. G. (1978) *Theoretical Sensivity. Advances in the Methodology of Grounded Theory*. The Sociology Press, Mill Valley.
- Gluesing, J. C. and Gibson, C. (2004) Designing and forming global teams. in Lane, H. C., Maznevski, M. L., Mendenhall, M. and McNett, J. *The Blackwell Handbood of Global Management: A guide to managing complexity*. Blackwell Publishing, Oxford, 199-226.
- Hambrick, D. C., Canney Davison, S., Snell, S. A. and Snow, C. C. (1998) When groups consist of multiple nationalities: towards a new understanding of the implications. *Organization Studies*, **19**, 181-205
- Harrison, D. A. and Klein, K. J. (2007) What's The Difference? Diversity Constructs as Seperation, Variety or Disparity in Organizations. *Academy of Management Review*, **32**, 4. 1199-1229
- Hofstede, G. (1980) *Culture's consequences: International differences in work related values*. Sage, London.
- Hunt, J. W. (1972) *The restless organization*. Wiley and Sons Australasia, Sydney.
- Jackson, S., Joshi, A. and Erhardt, N. L. (2003) Recent Research on Team and Organizational Diversity: SWOT Analysis and Implications. *Journal of Management*, **29**, 6. 801-830
- Kirchmeyer, C. and Cohen, A. (1992) Multicultural Groups. *Group & Organization Management*, **17**, 2. 153-170
- Lane, H. W., Maznevski, M. L., Mendenhall, M. and McNett, J. (2005) *Handbook of Global Management. A Guide to Managing Complexity*. Blackwell, Oxford.
- Langley, A. (1999) Strategies for Theorizing from Process Data. *Academy of Management Review*, **24**, 4. 691-710

- Lawrence, D. and Lorsch, J. (1967) *Organization and environment*. Harvard University Press, Boston, MA.
- Le Moigne, J.-L. (1990) *La modélisation des systèmes complexes*. Dunod, Paris.
- Maloney, M. M. and Zellmer-Bruhn, M. (2006) Building Bridges, Windows and Cultures: Mediating Mechanisms between Team Heterogeneity and Performance in Global Teams. *Management International Review*, **46**, 6. 697-720
- Maznevski, M. L., Distefano, J. J., Gomez, C. B., Noorderhaven, N. G. and Wu, P. C. (2002) Cultural dimensions at the individual level of analysis. The cultural orientations framework. *International Journal of Cross-Cultural Management*, **2**, 3. 275-295
- McGrath, J. E. and Altermatt, T. W. (2001) Observation and Analysis of Group Interaction over Time: Some Methodological and Strategic Choices. in Hogg, M. A. and Tindale, R. S. *Blackwell Handbook of Social Psychology*. Blackwell Publishers, Malden, 525-556.
- Milliken, F. J. and Martins, L. L. (1996) Searching for Common Threads: Understanding the Multiple Effects of Diversity in Organizational Groups. *Academy of Management Review*, **21**, 2. 402-433
- Nonaka, I. and Takeuchi, H. (1995) *The knowledge creating company: how Japanese companies create the dynamics of innovation*. Oxford University Press, New York.
- Randel, A. (2003) The salience of culture in multinational teams and its relation to team citizenship behaviour. *International Journal of Cross-Cultural Management*, **3**, 1. 27-44
- Schneider, S. and Barsoux, J.-L. (2003) *Management interculturel*. Pearson, Paris.
- Strauss, A. and Corbin, J. (1994) Grounded Theory Methodology. in Denzin, N. K. and Lincoln, Y. S. *Handbook of Qualitative Research*. Sage, Thousand Oaks, CA, 273-285.
- Thomas, A. (1996) *Psychologie interkulturellen Handelns*. Hogrefe
- Thomas, D. C. (1999) Cultural diversity and work group effectiveness. An experimental study. *Journal of Cross-Cultural Psychology*, **30**, 2. 242-263
- Watson, W. E., Kumar, K. and Michaelsen, L. K. (1993) Cultural diversity's impact on interaction process and performance: Comparing homogeneous and diverse task groups. *Academy of Management Journal*, **36**, 3. 590-602
- Webber, S. S. and Donahue, L. M. (2001) Impact of highly and less job-related diversity on work group cohesion and performance: A meta-analysis. *Journal of Management*, **27**, 2. 141-162
- Weick, K. E. (1979) *The social psychology of organizing*. Addison Wesley, Reading, M.A.
- Weick, K. E. and Van Orden, P. W. (1990) Organizing on a global scale: A research and teaching agenda. *Human Resource Management*, **29**, 1. 49-61

Weick, K. E. (1995) Sensemaking in organizations. Sage, London.

Zeleny, M. (1986) The law of requisite variety: is it applicable to human systems? *Human Systems Management*, **6**, 4. 269-271