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GROUP WORK AND COGNITIVE STYLE A Discursive Investigation

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This article investigates the relationship between work-group members' cognitive style (as measured by Allinson and Hayes's Cognitive Style Index), the group's task and setting, and the way in which group members behave in the group. Behavior of a homogeneous analytic, a homogeneous intuitive, and a heterogeneous group was observed in a mechanistic setting and analyzed using discourse analysis. This study is discussed in light of a previous study in which homogeneous analytic and homogeneous intuitive groups worked in an organic setting. These two studies use different methodologies (quantitative approach versus qualitative-discursive). The benefits of methodological eclecticism are discussed.

Keywords: group work; teamwork; group processes; cognitive style; multiple paradigms

Although many studies have reported considerable improvement in organizational life since the introduction of teamwork, some organization theorists and organization managers have experienced difficulties in getting groups to work as effectively as theorists and organizations would expect (Sinclair, 1992; Schrage, 1995). This article addresses the possibility that the individual style in which members approach their work and the type of tasks that

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groups have to perform may be strongly linked to the overall group functioning (Gruenfeld & Lin, 1984; Leonard & Straus, 1997).

GROUP INTERACTION AND PROCESSES

The nature of group interactions that occur in a work group provides insight into how that group addresses its task more or less effectively. The interaction behavior of a group indicates the ways in which group members work together to complete the task successfully. In general, interaction patterns refer to how the group members pool their abilities in a collaborative context to reach the best decision (Hackman & Morris, 1975). Clinicians among others, provide evidence that decision making is a poor indicator of work and that the focus should be on the process by which the decision is reached rather than simply the decision itself (Bion, 1961; Janis, 1972; Turk & Salovey, 1988).

In elaborating the construct of group process, researchers have distinguished between task-oriented and social-oriented behavior (e.g., Bales, 1950; Bales, Cohen, & Williamson, 1979; Ellis & Fisher, 1994; Jaques, 1991; Littlepage, Cowart, & Kerr, 1989; Zaccaro, 1991; Zaccaro & Lowe, 1988). Ellis and Fisher (1994) identify the task dimension as “the relationship between group members and the work they are to perform—the work they have to do and how they go about doing it.” They refer to the social dimension as “the relationship of group members with one another—how they feel toward one another and about their membership in the group” (p. 22). In describing his system of categories (IPA), Bales (1950) identifies an area of task problems and an area of social-emotional problems. He acknowledges

The idealised interaction process would then be described as one of alternating emphasis on the two problems. An abstract way to describe this alternation is to regard the problems in the task area as primarily Adaptive-Instrumental in significance, while the problems in the social-emotional area are primarily Integrative-Expressive in significance. (pp. 9-10)

Bales recognizes this as a very generalized and abstract way of conceiving the problem-solving nature of social interaction, but he believes it to be one of great theoretical relevance.

Implicit in these positions is the recognition that the task and the social areas are not practically separated and alternated from each other. As Ellis and Fisher (1994) point out, the task and social dimensions of group process are inseparable and highly interdependent, despite the general tendency to separate them and see them in conflict with each other. "Although they may be separated theoretically, the task and social dimensions exert mutual and reciprocal influence on each other and are thus virtually inseparable in practice" (p. 51).

Napier and Gershenfeld (1984) address the issue of group interaction in terms of role type. Task roles are those that determine the group selection and definition of common goals and the working toward solution of those goals (Napier & Gershenfeld, 1984, p. 145), whereas socioemotional roles focus on the personal relationship between group members. Similarly, Jaques (1991) classifies group functions as *group-building and maintenance* roles and *group-task* roles. The former refers to those roles that contribute to building relationships and cohesiveness among members, and the latter to those that help the group do its work.

The concept of team role is central in the work of Belbin (1981, 1993). His classical study on team roles focuses on individual behavior in groups and is important also for its applied aspects. He originally identified eight key team roles (in 1993, he added the ninth role to the list) as a result of more than 9 years of research in which he studied 120 management teams involved in a management game. The role indicates the tendency in behavior of an individual within a group. Next to a primary role, Belbin recognizes the existence of a back-up role, which the individual should shift to if, for some reason, there is less group need for the primary role. Each role is determined by personal attributes and characteristics; in fact, Belbin's work was initially based on the classification of team members according to various personality types based on the work of Jung.

Belbin (1981) suggests that heterogeneity of roles/personal approaches is necessary for the team to perform well. Pure homogeneous teams, according to Belbin, have merits that give them advantages in particular situations. However, they are susceptible to particular weaknesses because the natural balancing qualities found in groups with different members are absent. Belbin acknowledges that it is important "to have in a team those people who possess strengths or characteristics which serve a need without duplicating those already there." He states that any shortcoming in performance by a team usually reflects the fault inherent in the team composition. "Team is a question of balance. What is needed is not well-balanced individuals but individuals who balance well with one another" (p. 77).

COGNITIVE STYLE

Cognitive style refers to individual differences in the way people approach the external environment. Witkin and Goodenough (1977) acknowledge that cognitive styles refer to individual differences in how people perceive, think, solve problems, learn, and relate to others and that they are concerned with the form rather than the content of activity. In wider terms, Miller (1987) defines cognitive style as a "broad disposition and higher-order meta-strategies that influence the individual's attempts to adjust to situational demands" (p. 253).

The concept of cognitive style has been investigated from many different perspectives, and a considerable number of dimensions have been reported in attempting to define the construct. Some examples include Witkin's field dependence/independence (Witkin, Goodenough, & Karp, 1967); Riding and Cheema's (1991) wholist/analytic; Kirton's (1976) adaptors/innovators and Allinson and Hayes's (1996) intuition/analysis. To resolve this lack of clarity among the numerous dimensions, it has been argued that the various cognitive style labels are based on similar underlying constructs (Kogan, 1983; Miller, 1987) and that these different concep-

tions should be integrated into one single model (Riding, Glass, & Douglas, 1993; Riding & Rayner, 1998). Allinson and Hayes (1996) attempted to do so and elaborated a measure of cognitive style that has been developed from 18 separate dimensions. They claim that the development of a strong instrument that is based on several dimensions (as is their Cognitive Style Index, CSI) can assess the superordinate construct to which the different dimensions refer. Allinson and Hayes represent this construct as one dimension, and the two extremes are labeled *intuition* and *analysis*. The authors also give a definition of the two extreme types and acknowledge, "Intuition refers to immediate judgement based on feeling and the adoption of a global perspective"; whereas "analysis refers to judgement based on mental reasoning and a focus on detail." Thus,

intuitivists tend to be relatively nonconformist, prefer an open-ended approach to problem solving, rely on random methods of exploration, remember spatial images most easily, and work best with ideas requiring overall assessment. Analysts tend to be more compliant, favour a structured approach to problem solving, depend on systematic methods of investigation, recall verbal material most readily and are especially comfortable with ideas requiring step by step analysis. (p. 122)

According to Allinson and Hayes (1996) and to previous studies reported in the literature (e.g., Kirton, 1976; Riding et al., 1993; Witkin et al., 1967), analytic individuals are serialistic and analytical in their cognitive behavior, self-controlled in their emotional behavior, and instrumentally oriented in their interpersonal behavior. Conversely, intuitive individuals are wholistic in their cognitive behavior, warm and spontaneous in their emotional behavior, and expressive in their interpersonal behavior (see also Gruenfeld & Lin, 1984). In a group situation, it is therefore expected that analytic individuals focus predominantly on task functions and roles, whereas intuitive individuals are more social-emotional oriented.

THE STUDY

The present study evolved from a previously reported examination of the relationship between individual cognitive style and group processes (task and social behavior) in the real work environment (see Armstrong & Priola, 2001). Groups of undergraduate computing and information technology students were engaged in an organic task in which they were expected to work on the design, development, building, documentation, and delivery of a computer-based system for a local organization. It was found that intuitive individuals and homogeneous intuitive teams initiate more socially oriented behaviors, as was hypothesized. However, there was no evidence that analytic individuals and homogeneous analytic teams are more likely to engage in task-oriented behaviors. Intuitive individuals and homogeneous intuitive teams were also found to initiate more task-oriented behaviors.

As acknowledged by Gruenfeld and Lin (1984), previous studies that have shown that analytics are task oriented whereas intuitives are expressive and socially oriented, are based on observation of behavior in a well-structured and mechanistic environment (generally a laboratory setting). Their study showed that in an organic setting, intuitive subjects "behaved in a responsive, task-oriented mode, while analytics behaved in a socio-emotional rebellious and resistant mode" (p. 721). Gruenfeld and Lin's study implies that a different capacity is required to interact in two different environments, such as the organic and the mechanistic. The nature of the team-work task, studied by Armstrong and Priola (2001), was organic and open ended. The present study is designed to explore the relationship between cognitive style and group behavior, where the task is essentially mechanistic.

COMPOSITION OF GROUPS

The sample was composed of 18 participants working in three groups composed of 6 members each. Participants were undergraduate students enrolled in three different degree courses in a university in the northeast of England. Their ages varied between 18 and

TABLE 1: Group Composition

<i>Group</i>	<i>Members</i>	<i>CSI Scores</i>	<i>Discipline of Study</i>
Analytic	6 participants (3 female/3 male)	Between 63 and 50	A, E, and T: business; AL: engineering; G: psychology; C: engineering
Heterogeneous	6 participants (3 female/ 3 male): 2 analytics (1 F/1 M), 2 bimodals (1 F/1 M), 2 intuitiv- ists (1 F/1 M)	Between 68 and 18	F and L: psychology; M, J, W, and P: business
Intuitivist	6 participants (3 female/ 3 male)	Between 18 and 23	M and P: business; J, C, CL, and K: psychology

NOTE: CSI = Cognitive Style Index

34 years, and they were all Europeans, excluding 2 who were Chinese but had grown up and had been educated in Britain. The subjects were chosen according to their cognitive style score, measured with the CSI (Allinson & Hayes, 1996), whose scores range from 0 to 76. A high score indicates an analytic style and a low score an intuitive style.¹ Although gender was not a feature of the research, an equal number of female and male participants were assigned to each group. Table 1 illustrates the composition of the groups.

PROBLEM-SOLVING TASK

Subjects were asked to solve a problem characterized by a list of hints, which, if processed systematically, should have led to the right solution. The task was a problem-solving exercise titled “Who is the engine driver?”² The exercise presented all the relevant facts of the matter, and groups had to agree on the solution. The problem asked group members to identify the names of the train driver, the train guard, and the ticket inspector—named Brown, White, and Green—and the names of three passengers—businessmen who are also named Mr. Brown, Mr. White, and Mr. Green. It had to be solved in 40 minutes and was denoted by strictly defined steps; it contained a set of constraints and clues to follow in order to provide the only correct solution.

DATA-COLLECTION STRATEGY

Groups were video-recorded while engaged in the problem-solving situation, which lasted for circa 40 minutes. Additionally, groups were interviewed at the completion of the task. The group interview, whose duration was approximately 15 minutes, was also video-recorded. Videos were subsequently transcribed using Sbisa's (1992) notation system, and the discourse analysis was applied to the entire corpus of data.

RESEARCH METHODOLOGY: DISCOURSE ANALYSIS

Discourse analysis has been chosen as a method for assigning meaning to communication occurring in a work group. It has been applied to transcriptions of group problem-solving and group interviews with the objective of identifying how, from the observation of the communication process, we can make inferences on the relationship between individual cognitive styles and group behavior.

Discursive research has traditionally left apart the study of individual differences because it focuses on realities that are socially constructed in the interaction of the parts involved in the discourse/communication. The next sections represent an attempt to implement the discourse analysis as an observation method within a multiparadigm approach to research (this "divergent" strategy to research applies qualitative methods of analysis to data gathered in a laboratory setting).

The approach of discourse analysis looks at discourse, and more generally at communication, not as a neutral transmitter of information, but rather as a social practice in which "ready-made resources" (common sense) and individual resources structure the ways we think and talk about the world (Potter & Wetherell, 1989). According to Banister, Burman, Parker, Taylor, and Tindall (1994), "Discourse analysis treats the social world as a text, or rather as a system of texts which can be systematically 'read' by a researcher to lay open the psychological processes that lie within them" (p. 92). Within the context of this study, the authors, through the analy-

sis of discourse, look at how the nature of our knowledge about cognitive style shapes the work groups' problem solving.

According to Fairclough (1992), there is not a set procedure for doing discourse analysis. In the present study, the authors have combined the analysis of the content and the form of the text with the identification and analysis of the organization of features present in the texts (see also Potter & Wetherell, 1987). The analysis therefore aims, first, to identify linguistic dispositions, which refer to ideas, terms, and themes organized around one or more key metaphors. Second, it aims to highlight the accounts and resources that group members use to explain or justify their behaviors.

In the sections that follow, extracts from three work groups and group interview situations (homogeneous intuitive group, homogeneous analytic group, and heterogeneous group) are presented and combined together to constitute the accounts to which they refer. For each group, a parallel analysis of accounting practices and text content was conducted. Accounts are then examined to observe the influence of cognitive style on group interactions. Language analysis is a complex activity that incorporates many types and techniques of analysis. The analysis of discourse simultaneously addresses questions of form and questions of meaning (Fairclough, 1992). In the discourse analysis that follows, the analysis of text (description and interpretation) is constantly alternated with the analysis of the particular discourse that is drawn upon by participants.

DISCOURSE ANALYSIS: GENERAL FINDINGS

From the coding phase, in which the whole corpus of data was scanned for particular topics and features, three different linguistic dispositions emerged in the three groups: the intuition disposition in the intuitive group; the analysis disposition in the analytic group, and the dissent disposition in the heterogeneous group. There was no evidence of the existence of one of these linguistic dispositions in more than one group.

It was found that both the analytic and the intuitive groups account for the group unity and cohesiveness existing between their members. The first group was characterized by intuition homogeneity (see Table 1). As it can be seen in the discourse analysis presented below, the group showed a particular approach to the task that the authors defined as intuitive, based on feeling rather than rationality. Also, group members often referred to their inability to apply the type of logical analysis that was required to solve the problem and failed in providing the right solution. Conversely, the second group was characterized by analytic homogeneity (see Table 1). As shown in the analysis that follows, the group immediately approached the problem implementing principles of logic. They seemed at ease with the task and found the correct solution within the given time. What characterized the heterogeneous group, compared with the two previous groups, was the display of strong disagreement between members. At some points during the exercise, participants seemed to have reached a solution, when suddenly they withdrew and renegotiated that conclusion. This process was repeated several times, and the conflict was particularly strong between two group members: *P* and *L*. At the end, the group provided the correct solution, but not all members were satisfied.

DISCOURSE ANALYSIS OF THE INTUITIVE GROUP³

The analysis starts with the identification of the different features that characterize what we called the intuition disposition. To do this, we should focus on accounts that make direct reference to intuition and the intuitivist explanation; this is intended as the modality in which decisions and judgments are based on feelings rather than on rational processes. Accounts are also examined looking at inconsistencies, which exist between the reasons proposed by group members for using intuition in a problem-solving situation.

Extract 1 (Intuitivist-Exercise)

1. *K*: is just (-) doesn't
2. *C*: he is (—) he is (—) definitely the guard then (—) Brown is definitely the guard
3. *K*: no::

4. C: right (—) oh gosh (-) it doesn't make sense (␣) what's wrong, (-) right ignore that he's not the guard (xxx) the ticket inspector (-) they can't both (␣) be the driver (-) I think that it isn't ticket inspector (-) isn't the driver (␣) he's the guard (-) but not ask me the explanation
5. CL: (xxx)
6. C: no:: (-) it's (␣) there is a theory behind (-) I used elimination (␣) I don't know why I came with (-) it's just like (—) I just think it is
7. CL: (xxx) Brown could be the guard (-) or the train driver then (-) we don't know which one (␣) it's fifty-fifty really

In E1, after *K* doubts about *C*'s proposal that Brown may be the guard, *C* goes on explaining why she thinks that Brown is the guard, saying that she has a "theory" and that she worked through elimination. However, because she cannot give a logical explanation, she says that she does not know how and why she reached that solution but "thinks" it is right. Her attempt to solve the incongruence is argumentatively weak (she just thinks he is) but rhetorically effective in persuading *CL*, who initially leaves the solution open to the two alternatives (E1, L7), but later in the exercise, she seems persuaded.

Extract 2 (Intuitivist-Exercise)

8. C: have we agreed that Brown is the guard?
9. CL: ((she moves her hands and her head meaning "so so"))
10. C: oh (-) I think he is
11. ((C, K, and CL laugh))
12. K: it sounds like a guard's name (-) doesn't it? ((she laughs))
13. CL: we have got Brown is the guard (-) we give it fifty-fifty chance (-) we could guess
14. K: why?
15. CL: because (-) we are never going to find it
16. K: ((she laughs)) we are never going to find it logically (-) so just (-) we might as well do it (-) as what we feel like
17. C: am:::
18. CL: I think (␣) o no:: (-) uhm:: (␣) no (-) it's wrong
19. K: what were you going to say?
20. CL: ((she shakes her head))
21. K: ((she laughs)) (␣) it could
22. CL: that Green was the ticket inspector
23. K: why?
24. CL: we don't know

In E2, the intuition disposition is present with different features. The first feature worth noting is that here participants are not trying to find a logical explanation for justifying their choices. *CL* suggests, “we could guess,” and *K*, “we might . . . do it as what we feel like,” using their feelings to give a solution because they “are never going to find it logically.” L15 and L16 are examples of extreme case formulations, Pomerantz’s (1986) phrase for statements where the very extreme possibility is stated. Extreme case formulations generally work to make a statement more rhetorically effective through the use of some form of exaggeration or overstatement. In this case, with “we are never going to find it” and “we are never going to find it logically,” *CL* and *K* refer to the extreme and negative possibility of finding the solution to the problem—in general in *CL*’s case, and in a logical way for *K*. In doing so, they give a reason for using their feelings to arrive at a solution to the problem.

Furthermore, in E2, L22-24, *CL* suggests that Green is the ticket inspector, admitting that she does not know why she said that and even not attempting to provide any sort of justification. An interesting point to note is the use of the plural pronoun *we* by *CL*, which could be interpreted in different ways. We can see it as the notion of belonging to the group, in other words, as an indicator of group identity. Earlier, during their meeting, the difficulty of applying logical reasoning to the problem has risen a few times. All group members are experiencing the same frustration, and *CL* simply feels the communalism of her own experience and recognizes that they are all collaborating together, even though she is not providing them with a new insight. In addition, we can see it as a way of withdrawing her responsibilities for her own statement and sharing them with the rest of the group. *CL* initially expresses her beliefs using “I think” (L18), but when asked why she thinks that, she uses the pronoun *we* as if the others were part of her way of thinking, as if they were sharing the same thoughts.

During the group exercise, the existence of the intuition disposition is shown in two dimensions. First, the intuition disposition is shown in its struggle to achieve and demonstrate its way of working in a sort of logical and explainable modality; this, however, cannot be achieved because of its nature. With regard to this, participants

stated “there is a theory behind, I used elimination, I don’t know why I came with, it’s just like, I just think it is” (E1, L6). Second, the intuition disposition is present in its feeling dimension (e.g., C: “it’s hard to explain, isn’t it?” CL replies: “I’ve just got a feeling”).

The same account is represented in the group interview, which followed the problem-solving exercise. The account is, however, linked to the particular resources that group members draw on to justify their failure in solving the problem. Examination of the interview transcript revealed another common or collective theme: the claim that group members’ problem-solving style did not coincide with the task characteristics. The form of talk is both descriptive (they describe themselves and the way in which they approach problems) and evaluative (they evaluate the demands of the task and justify the fact that they could not solve it).

During the interview, group members give justifications of their failure in solving the problem. They suggest that they tried to solve it logically, but it did not work, that they “have exhausted everything” and “have tried all the avenues that they could.” In describing their behavior, they imply that the reasons for not providing the correct solution cannot be attributed to group members but may lie in the assignment.

In fact, they suggest that while involved in the task solution, it was not important whether they could solve it; what mattered was the compatibilities between them and the task: “whether it clicked.” CL explicitly admits that they never established a way of working on the task: “we never did that,” “we could never.” As a defensive stance, she indirectly suggests once more and without committing group members that the cause of the incompatibility may lie in the characteristics of the task.

At this point, it appears necessary to make a reference to the notion of locus of control (Rotter, 1966).⁴ The notion refers to the dispositional or situational attribution of responsibility of events. In other words, individuals who believe that events that happen to them are contingent on their own action are considered to have an internal locus of control, whereas those people who believe that whatever happens is the result of fate, luck, or the actions of others have an external locus of control. It also appears clear to the reader

the resemblance that the notion has with Witkin's (1976) field-dependent-independent dimension—more specifically, the similarities between the external locus of control and the field-dependent (intuitivist), and the internal locus of control and the field-independent (analytic) types.

Referring back to the analysis, the external attribution of the group members can be seen as an approach to the environment that is external, field dependent, and intuitivist following Rotter's (1966), Witkin and Goodenough's (1977), and Allinson and Hayes's (1996) terminology.

Extract 3 (Intuitivist-Interview)

25. *M*: I just feel is a bit too (-) I think is a bit too biased for people who are analytical (-) it seems is more like a logical exercise
26. *CL*: into maths (-) yeah (-) I felt that (-) yeah
27. *M*: yeah
28. *Int.*: did you feel uncomfortable about that?
29. *M*: not really (-) I was looking and think (-) I was staring and then after a while
30. *CL*: nothing came
31. *C*: it was embarrassing when you are like *you don't know when to start+
32. *M*: *there were signs+ and then you think what happen next (-) you know
33. *Int.*: yes (-) you said (-) this is more for analytics or whatever
34. *M*: uhm
35. *Int.*: and don't you feel to be like that?
36. *M*: I mean
37. *CL*: partially (-) but not as much as for this
38. *M*: I think that the exercise should have been more (-) a bit between the two (-) I think this was more logical than:: (—) yeah more analytical
39. ((*K* and *CL* assert with their heads))
40. *M*: because as I said (-) I mean we went down the logical route and we got stacked (-) so we went down on the assumption route and we got stacked again
41. ((*K* and *CL* assert with their heads))
42. *M*: so we weren't exactly sure which was the route to take (—) I suppose I was a little bit uncomfortable but that was basically because I just couldn't get the answer (-) it wasn't coming immediately
43. *C*: you've got to have a system for working with things like that
44. *M*: uhm uhm

45. *C*: and I have got no way how to do it (-) we don't

There is ample evidence of the intuition disposition within the above extract. The task is seen to be “too biased for people who are analytical” (L25). This sentence indicates that the speaker (*M*) has already done some work to find a way of justifying their approach to the problem. The choice of the vocabulary used also confirms *M*'s authoritarian claim. As we can see in L25 and L38, in describing the exercise, *M* uses words such as “analytical” and “logical,” which seem to give him a higher status compared with the other group members whose vocabulary is much more common and simple.

The account of intuition is produced in the same extract with a different feature. What is interesting about these accounts is that participants appeal to a set of different resources to attribute the cause of their difficulties (in dealing with the problem and in getting the wrong answer) to other rather than themselves (e.g., task characteristics and incompatibilities between these and their problem-solving approach). Furthermore, group members confirm with their statements what has been reported in the literature, that intuitivist people are impulsive and quick in reaching conclusions. In L30 and L42, *CL* and *M* say “nothing came” and “it wasn't coming immediately” as the solution should come as an insight more than being the result of a systematic analysis of the problem.

Regarding this point, the last three lines of the extract are also very interesting. In L43, *C* affirms, and *M* agrees, that a “system” is required to work with such problems. Although she does not specifically mention which kind of system she refers to, it is however implicit that it is a system of analysis, and therefore an intuitive approach cannot be successfully applied to this kind of problem. In L45, *C* continues saying that she does not know the way to do it, shifting from the first person singular, used in the first part of the sentence, to the plural “we.” Here she accounts for her own difficulties, but she also commits the rest of the group to the same struggle in adapting to the problem.

Extract 4 (Intuitivist-Interview)

- 46. *C*: we all understood where each other was going on about the way
- 47. *K*: yeah
- 48. *C*: we got it wrong
- 49. *K*: yeah
- 50. *C*: we were all alike
- 51. *M*: you can say how the thought process work but it just seems to
- 52. *C*: we all have the same thought process

In the extract above, the account presented is only indirectly related to the intuition disposition. This extract is interesting because it provides yet more evidence of the homogeneity existing in the group, they are all well-tuned to each other, they “all understood where each other was going on” (L46). Later in the extract, *C* expresses the same idea of group unity as similarity between them: “we were all alike, we all have the same thought process” (L50 and L52).

DISCOURSE ANALYSIS OF THE ANALYTIC GROUP

In the first part of the analysis, group members are working to solve a problem. Accounts are identified with the aim of observing different possible themes and the diverse features in which group members deploy the same theme. In the second part, members are talking about their experience in the group; here, accounts are analyzed in the light of the construction of the different versions of the work group.

Throughout the transcripts of the work group, the approach that group members apply in solving the problem is clear. At the beginning of the meeting, they immediately get involved in the task and try to identify the facts of the problem. Below are some extracts that show the kind of precise analysis members are engaged in throughout the whole duration of the meeting.

Extract 5 (Analytic-Exercise)

- 1. *E*: ((he starts drawing)) so the information we have here is (-) Mr White that's the business man
- 2. *T*: uhm uhm
- 3. *E*: lives in Manchester (-) so Manchester is here (-) this is Mr White
- 4. *T*: uhm uhm

5. *E*: and the guard lives exactly halfway between London and Manchester
6. *A*: here
7. *E*: and here is London
8. *A*: halfway
9. *E*: that's the guard
10. ((*AL* starts writing))

In the extract above, the group starts collaborating in placing the various information they possess on the base of the drawing that *E* is doing after having examined the facts in detail. This is represented as a map of Britain, in which the characters of the exercise are located in the various cities where they live. This group effort is an indication of the starting point from where participants are approaching the problem. They are not only analyzing the data but also working to have an immediate perception, that is, the visual idea of the situation.

Extract 6 (Analytic-Exercise)

11. *E*: I think (-) the firm fact that we have so far is this one
12. *T*: uhm uhm
13. *E*: Mr Brown definitely is not inspector
14. *G*: yes we have
15. *E*: so we have to make assumptions () for example Brown definitely would be either the guard or the driver
16. *T*: uhm uhm
17. *G*: uhm uhm
18. *E*: 'cause we've got fifty percent
19. *T*: we'll have to focus on who Brown is (-) because we need to find out who the engine driver is
20. *E*: 'cause this person actually has the highest chance to be assign to the driver

An interesting feature present in the above extract regards the application of logical principles. In fact, in E6, *E* is engaged in a logical process in which from the certain facts (premises), he draws the possible conclusions of the problem. His argument takes the shape of logical reasoning following the rules of deductive arguments. The structure of the argument, given by the relations between the elements, is the following: If Brown is not the inspec-

tor, then he is either the guard or the driver; therefore, he is the one who has the highest probability (50%) of being the driver, compared with the other two (White and Green), who have a third of the total probability. *E*'s logical reasoning finds the consent of the rest of the group, who agree and seem to follow his argument easily.

Extract 7 (Analytic-Exercise)

21. *E*: yeah (-) point five (-) basically I think Mr (-) sorry Brown either the guard or the driver beats the ticket inspector OK? (-) so at least we know fifty percent and fifty percent OK? (-) so far that is what we know (-) and last piece of information I think should be also quite variable (-) sorry valuable (-) because the passenger whose name is the same as the guard OK? (-) so because we know Mr White lives in Manchester
22. *AL*: yeah
23. *E*: so here we can make sure that the one lives in London should be either Mr
24. *T*: so we know that guard isn't White
25. *AL*: Mr (-) the other one
26. *C*: the guard is not White
27. *AL*: Mr Green and Mr Brown
28. *E*: yes this information also shows that White shouldn't be the guard
29. *T*: so we know that the guard could be either Brown or Green (-) and the ticket inspector could be White or Green

As we have seen above in the previous extract and in E7, group members apply rules of logic to their problem solving. In fact they continue applying logical argument of the kind "if p then q." If the passenger whose name is the same as the guard lives in London and, Mr. White lives in Manchester (these are known facts), then White cannot be the guard. However, they are at a stage where they cannot provide only one alternative but the two possible options with two cases for each one. Through logical reasoning, the group has restricted the possible choices to either Brown or Green for the guard and either White or Green for the ticket inspector.

In the group interview, members do not focus on their approach to the problem, as it happened in the intuitive group. This was interpreted by the authors as the lack of reasons, by group members, for questioning their approach to the task because this was for them a

comfortable setting in which they achieved a successful outcome. However, their answers suggest certain dimensions on which their approach to problem solving can be assessed.

During the interview, group members admit that finding the solution to the problem was very important and that they were nervous about the result. This suggests how task/result-oriented the group was. They were there to accomplish a task, and finding the correct result was their only aim. This can also be seen throughout the exercise transcripts. All participants intervened only with responses related to the task, no other topics were brought into the group, even though the group was composed of three colleagues/friends (*A*, *E*, and *G*) and two other friends (*AL* and *C*).

The extract below shows a different interpretive focus from the previous one. Here participants are focused on their individual problem-solving type. It appears that group members initially have to work individually and go through the various steps of the problem-solving process on an individual basis. In a second phase, sharing their arguments with the others, they work together through the solution. The following extract provides group members' accounts on the way they have worked and confirms what was previously inferred.

Extract 8 (Analytic-Interview)

30. *C*: I can see at the beginning I tried to focus the thing on my own (-) just to understand what was the problem (-) how to solve it (-) and then he started to:::
31. ((they all laugh))
32. *C*: write on a piece of paper in the middle of the table (-) and we all looked at it and try to find what was (-) there were some different solutions and we tried to find out which one could be (-) which not (-) so probably at the beginning (-) I think (-) each one (-) each of us tried to understand the problem and then we started to really cooperate and find out the solution (-) this is the impression that I have (-) this is how I work (-) I first localize my mind then I work with the others
33. *E*: I think that was also what I did at the beginning (-) because was a bit confusing (-) a bit confusing when you go through the question and you can't say (-) really contribute with something to this group (-) that's how I feel

C's approach to any problem-solving situation (E8, L32: "this is how I work, I first localize my mind then I work with the others") is shared by *E*, who admits, in E8L33, that at the beginning he used the same strategy. Whereas *C* generalizes, implying that she has the same style regardless of the situation, *E* is more related to the specific problem and acknowledges that initially he had to work on his own because the exercise was confusing and he could not otherwise contribute to the group. Both *C*'s and *E*'s styles to problem solving confirm the belief that analytic individuals are self-centered and prefer individual work, though they maintain group cohesion and collaboration when working in groups (Kirton, 1976).

DISCOURSE ANALYSIS OF THE HETEROGENEOUS GROUP

What is interesting in the work-group processes of the heterogeneous group is the way group members propose, accept a possible solution, and then go back to the beginning, refusing the solution previously accepted. Throughout the transcript, it is possible to see how members' heterogeneity is displayed in the disagreement/conflict between those who want to check every detail and give the solution only when they feel confident about its correctness, and others who more easily accept the solution from their problem solving, even if they cannot demonstrate their full reasons.

These stretches of talk provide evidence of the existence of "dissent" among group members. In the passage below, the group seems to have reached the final conclusion. Members agree on the driver's identity as well as on the guard's and the ticket inspector's.

Extract 9 (Heterogeneous-Exercise)

1. *P*: put down Brown is the driver
2. *L*: uhm uhm
3. *P*: *who was the guard?+
4. *L*: *Green is the guard+ (-) Green is the guard and White is the ticket inspector (-) do you all agree with that?
5. *F*: yeah
6. *M*: yeah

However, one notable feature is concerned with the extent to which the conclusion is the certain and definite one. The following illustration, in fact, shows how the whole group challenges the initial agreement and, in doing so, renegotiates the conclusion. The dynamics of the group during the exercise were played around a sequence of agreements on the solution and renegotiation of these.

Extract 10 (Heterogeneous-Exercise)

7. *P*: there is no way to check that?
8. *L*: if (-) the only way would be if we can totally exclude the other two alternatives
9. *P*: uhm
10. *L*: we have already excluded this one that the guard is White and: (-) we totally excluded the possibility that Brown is the guard
11. *F*: not really (-) 'cause Brown could be the guard
12. *M*: or Green
13. *F*: Brown or Green be the guard
14. *M*: yeah
15. *L*: I think that you should try to take it out (-) this one (-) whether we can refuse this (-) *Brown is the guard+ () it's fine anyway
16. *M*: *that Brown was+ the guard
17. ((they stay quiet for circa 25 seconds reading and writing down on their own))
18. *W*: we can't (-) can you?
19. *P*: no

During the interview, group members also deploy a reference to the existing dissent, expressing concerns for their disagreement. The dissent discourse is also extended to the nature of group work, which may limit the participation of individual members who have to compromise their positions with the others. This “negative” aspect of heterogeneity is later presented under a positive light; groups composed of different individuals help in prompting the problem-solving process and legitimizing the solution.

Extract 11 (Heterogeneous-Interview)

20. *L*: I think you can't express yourself completely because you have to coordinate with the others (-) you have sometimes to compromise in order to move on with the task (—) and (-) and each one has his own rationale (-) you have to find the way to communicate so

In E11, *L* goes beyond the solution or any other fundamental aspect of group problem solving and attempts to give an explanation of their dissent and of the general dissatisfaction. Resources used by *L* refer to the “need for coordination,” “finding the right way of communication,” but also to “limitations to one’s individual potential” and “compromise.” He draws on these discourses to justify the group dissent. The dissent between members is emphasized by the use of the sentence, “Each one has his own rationale.” In particular, group work is talked about as something that is limitative for the individual’s possibilities of expression; this is caused by the fact that a group is composed of members who have different reasoning processes.

The following passage moves beyond the dissent discourse and illustrates the disagreement as differences in opinions. However, at the end of the meeting, these divergences had to converge in one.

Extract 12 (Heterogeneous-Interview)

21. *P*: we have all thought of different answers and then we worked the whole out after (-) after a while (-) didn’t we? (-) and then we all came down with one answer (-) so like everyone had their own opinion and then it all came down in a one (-) then there was three of us had the same answer (-) wasn’t there?
22. *F*: yeah
23. *W*: wasn’t the case that somebody said we’ve got the answer (-) we are right (-) oh we were going on (-) we were all (-) well you know
24. *P*: *yes this is+

The view provided by *P* moves the attention from the general problems of group work (as shown in E11) to the specific situation of their own group. The impression that *P* projects here is not of a group with conflicts but a group in which ordinary divergences existed and were managed to converge in one unanimous answer. The speaker suggests that initially they all had different solutions, and after a while they “worked the problem out.” The last part of *P*’s turn (E12, L21: “then there was three of us had the same answer”) is strikingly contradictory. The group was composed of six members, and if only three of them (*P* includes himself in this group) had the same answer, it means that the three remaining members had differ-

ent opinions. *W* (E12, L23) expresses a position that is much closer to the idea of conflict. Although his language is rather implicit and vague, his sentence suggests that the process of reaching an agreement was long and difficult (“we were going on”).

SUMMARY OF THE DISCOURSE ANALYSIS OF THE THREE GROUPS

Going through the transcripts and then the discourse analysis of the groups, an important element becomes evident: In the three groups (intuitive, analytic, and heterogeneous), behavior strongly differs with regard to the approach participants applied to the problem-solving situation. The first aspect that becomes apparent is the way in which group members’ discourses are constructed and modeled by the interaction between the individual style and the task. The approach of discourse analysis and the focus on both forms and meanings of a spoken text enabled us to see how the nature of problem-solving style (or cognitive style) interacts with the task to structure the situation in which the work groups accomplished their exercise.

In the analysis of the intuitivist group (problem solving as well as interview), we can see that members are faced with a complex and problematic dilemma of how to approach the task, the management of which has important implications for the solution of the problem. The group struggled in dealing with the task and gave the wrong solution; members had foresight to probe their approach and asked themselves whether there were “incompatibilities” between their way of approaching the problem and the nature of the problem itself. This issue did not seem to exist for the analytic group. Members, in fact, just got on with the task and provided the solution within the given time. Also, during the interview, the analytic group members did not specifically refer to their style in approaching the problem. They found themselves comfortable in that setting and, having successfully solved the problem, they did not have reasons for questioning their approach.

A further element of difference between the groups is concerned with the perception that members have of their group. Both the intuitivist and the analytic groups referred to the cooperation and the complementarities existing between members. In the intuitivist

group, a member recognized that they all were alike, that they all understood each other and had the same thought process. Analytic group members also acknowledged that the collaboration that existed between them was a means of satisfaction and the cause of their success in accomplishing the task. By way of contrast, disagreements and conflicts were experienced in the heterogeneous group, where members had to compromise to provide a final solution. They also acknowledged that this was because the group was composed of members who used different reasoning processes.

To summarize, we suggest that a central feature of the processes that take place in work groups and teams is concerned with the cognitive style of group members. In this case, the nature of behaviors that were initiated by group members to accomplish the task was, at least partially, a function of members' cognitive style. On the other hand, the environment in which groups had to do their work was organized as a fixed setting with a prescribed task characterized by an array of constraints that members could barely influence. This seemed to have favored one type of group (the analytic) compared with the other (the intuitivist).

DISCUSSION AND CONCLUSIONS

Focusing on the differences across the linguistic dispositions emerging in the three groups (intuitive, analytic, and heterogeneous), the study confirmed what is reported in the literature regarding the characteristics of intuitive and analytic individuals. According to previous research (e.g., Allinson & Hayes, 1996; Honey & Mumford, 1982; Witkin & Goodenough, 1977), analytic individuals prefer a more structured and logically oriented environment and find themselves comfortable in situations in which a gradual analysis is required. Intuitivist individuals, on the other hand, prefer a more open, unprompted, and ambiguous environment and find it difficult to adapt to a situation that requires a systematic examination. An important fact to keep in mind is that the mechanistic setting that characterized this study is the most commonly used in psychology research into cognitive style, which

tends to be experimental and laboratory oriented. This may account for the correspondence between the findings of this study and previous research reported in the literature.

The study showed that analytics are more concerned with a step-by-step analysis of the task, and implemented a logical reasoning process that led them to the correct solution of the problem within the given time. It also showed that intuitivists are more feeling-oriented rather than logical and rational. Using Burns and Stalker's (1961) terminology, we can say that analytic individuals are more mechanistic oriented, whereas intuitivists are more organic oriented. Thus, we can also say that analytics are more comfortable and work better in a structured and clearly defined environment, whereas intuitivists would perform better in a situation that requires the adjustment of individual tasks through interaction with others and nonprecise definition of obligations and rights.

The present study acquires a greater value when considered alongside the previous investigation by Armstrong and Priola (2001). This present investigation supports what is reported in the literature, but when considered in conjunction with the first study, it also challenges the view of constant and coherent behavior across situations. This does not imply that the observation of the behavior of analytics and intuitives, individuals and teams, in both settings favors a situationist explanation, but it highlights the importance of personality variables within different situations and suggests that the cognitive style may explain behavior even though the behavior varies from situation to situation (see also Gruenfeld & Lin, 1984).

To interpret these findings, we need to consider other aspects that may be involved in the group processes, rather than be limited to the simple and isolated relationship between the cognitive framework of the team members and their behavior in the group. The authors suggest that the relationship between individual differences and group processes cannot be explored as an isolated system. While performing a group task, individuals are certainly influenced by their cognitive style; however, in their ways of responding to the task, they are also affected by the characteristics of the task itself and the conditions of the setting (see also Gruenfeld & Lin, 1984). These aspects must be taken into consideration if the

researcher is to produce a valuable account of the research problem investigated.

Previously, research has acknowledged (e.g., Gruenfeld & Lin, 1984; Armstrong & Priola, 2001) that an organic setting influenced the conduct of the intuitivists, who focused on social but also on task behavior. It also influenced the behavior of the analytics, who could not easily engage with the vague task. In this study, it seems that the mechanistic and strictly defined task has also had an impact on the behavior of the intuitivists and analytics. The intuitivists could not relate to the task, neither could they find the right solution. They focused on maintaining the group cohesiveness and the group integrity against the external, hostile, and undecipherable setting (the exercise). The analytics comfortably and successfully implemented the logical thought process required by the kind of problem, which corresponded to their preferred problem-solving style.

A relevant aspect that characterized this study was the possibility of measuring group success or failure in solving the problem. Although the issue was not a major concern of the research, the results may have implications for practical applications of teamwork. Previous research (e.g., Frank & Davis, 1982) showed that analytics (field independent) performed significantly better when matched, whereas intuitives (field dependent) performed less well when matched than when mismatched. Although research into matched-mismatched cognitive style is limited to the observation of dyads within a mechanistic setting (the accomplishment of a prescribed problem-solving task), these findings are worthy of consideration and may assist in understanding the reasons for the failure of the intuitive group to give the correct solution to the mechanistic task. It may be that intuitive individuals are less efficient at synthesizing and integrating the information available, in this case in the form of clues, and that their holistic approach may have prevented them from considering alternative strategies.

Whereas the main research question focuses on the behavior of intuitive and analytic groups, an important aspect has been highlighted by the discourse analysis of the heterogeneous group. This, in fact, has confirmed an important issue concerned with group

conflict and has led to a stronger emphasis on the group polarization emerging from the analysis of the two homogeneous groups. In both situations, the exercise and the interview, the analysis of the heterogeneous group identified the existence of a strong disagreement between group members. This was concerned not only with the final solution of the problem but also with the various modalities that could have been implemented by the group to explore and address the problem. Group members themselves acknowledged this dissent during the interview, recognizing that the need for group coordination implies making compromise with the different individuals' positions. Group members admit their dissent, granting the employment of different rationales by different participants and thus acknowledging that the group was composed of members who had different reasoning processes.

The dissent within the heterogeneous group assumes a more powerful meaning when considered within a comparative view and in the light of the group polarization and unity existing in the two homogeneous groups. The recognition by group members of the diversity (in the case of the heterogeneous group) and similarity (in the case of the two homogeneous groups) in their thought processes is an important point that emphasizes and provides stronger legitimation to the importance of individual differences in group work.

Whereas it has been previously outlined that person and situation are interdependent in affecting behavior, it has also been recognized that often during the design of research projects, the complexity of reality cannot be fully embraced, as in the case of the present study. Rather than finding ways to overcome the problem, this has led researchers to a specialization, which has constrained the field of research to two separate areas of investigations. Within these opposed areas, some authors focus on personality issues and others prefer a more situationist approach. This study has highlighted an important research issue which is intrinsic within a limited framework of observation and the methods of gathering and analyzing data. This concerns the resources that a particular research design and the quantitative and qualitative methods provide in guiding toward the reasons for particular results.

In summary, within the framework of multimethods, multi-settings research, this study highlights the importance of personality variables within different settings and suggests that situational specificity of behavior is itself an aspect of personality. According to Magnuson and Endler (1977), the process of interaction between person and situation cannot be discussed as a cause-and-effect relationship, with persons and situations as the causal factors and behavior as the effect. Behavior in groups is an inseparable aspect of the person and her/his interaction with the setting, considered in its social characteristics and its task characteristics.

The present study, when viewed in conjunction with the previously published investigation by Armstrong and Priola (2001), demonstrates how methodological triangulation can enhance our understanding of the ways in which individuals participate in a work group. Methodological diversity may help the researcher reduce the limitations of the particular view through which the investigation is shaped with the adoption of a different view according to the different method. The authors strongly believe that no one method is superior to the others and that through breaking up monopolies, we can really expand our knowledge (Priola & Smith, 2001).

Armstrong and Priola's (2001) study, conducted in a natural setting and using a quantitative methodology, showed that intuitive individuals and intuitive teams participated with more social-oriented but also with more task-oriented behaviors, compared with analytic individuals and analytic teams. The process of reducing human interactions to numbers helped the researchers to identify the existing relationship between cognitive style and group processes, but it did not assist in understanding the relationship between group members and the task. The process of counting the frequency of behaviors has led to the concealing of the quality of the experience and the processes that influenced the behavior of group members.

This became evident in the study here reported, which examined the quality of group members' interactions and how members dealt with the specific setting. Additionally, through the discourse analysis of the group exercise and the interview, participants were

directly involved in the processes of understanding and explaining their experience.

NOTES

1. Psychometric properties of the Cognitive Style Index are reported in Allinson and Hayes (1996), Armstrong, Allinson, and Hayes (1997, 2003), Murphy, Kelleher, Doucette, and Young (1998), and Priola (2001).
2. The exercise was adapted from Night Shift Enterprises, *Advanced Group Work Exercises: A Resource for Youth Workers and Trainers*.
3. In the analysis, "E" refers to *extract* and "L" refers to *line*. Initials of the participants are underlined to avoid confusion with E and L.
4. Rotter's dimension of locus of control has been included by Furnham, Brewin, and O'Kelly (1994) in the general family of cognitive styles.

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