SHARED THINKING:

CONCEPT AND ASSESSMENT

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For some time now, the research team for "Cognitive Enrichment and Special Educational Needs" of the University of Seville (Spain) has been working on the study of thinking skills and their assessment and improvement (e.g. Aguilera, 1989, 1991, 1997; Aguilera & Mora, 1992,1993; Lera & Aguilera, 1992; Mora, 1986, 1988, 1991, 1998; Mora & Aguilera, 1992; Mora & Mora-Merchán, 1995). The work we hereby present is part of this line of research and has as a main objective the validation of an instrument for the assessment of thinking skills necessary for cognitive functioning and social adjustment.

Other authors (e.g. Imbernón, 1999, ERT, 1995) and ourselves (Aguilera, 2000b; Aguilera and García, 2000) have analysed the demands the information society places on the educational system and the contributions that have been made both in the contexts of educational and social intervention (for the first, see for example, Drucker, 1993; Minc, 1994; Toffler, 1980,1990; Cabrerizo, 1986; European Commision, 1994; Castells, 1995; and for the second, Tedesco, 1995; Pérez, 1996; Delors, 1996). We have also commented on how the present educational system in Spain (MEC, 1990) incorporates elements that intend to contribute to the education of future generations following present demands. The inclusion of procedural educational contents and the explicit formulation, as an educational principle, of the need for students to "learn to learn" and to "learn to think" are thus, in this sense, an interesting novelty.

If education in an information society had to be resumed under two coordinates, without doubt they should be those of the need to develop adequate thinking skills, specially the ability to take part in teamwork, and the development of certain attitudes and values. In this article we will centre on the first of these aspects in what has been called shared thinking or thinking in interaction (Aguilera, 1997, 2000a): we are considering thought not just as any form of response to reality,

but specifically as a cultural (i.e. a shared) response to it.

In the following pages we shall comment on the thinking skills that centre our interest, why they should be studied during interaction and the usefulness of their assessment. As we comment on our empirical work we shall present the instrument designed for the assessment of this form of cognition, the PAT (Procedure for the Assessment of Thinking in Interaction) (Aguilera, 2000a), and some results and conclusions obtained from its use in two studies, one longitudinal and another cross-sectional.

The thinking skills we are interested in

We are interested in the human being as a subject that processes information, and that thinks as he or she does so. One particularly human aspect specially interests us: the fact that thought itself can be the object of thinking. This is a level of processing superior to that of analysing data, texts, knowledge or even than intelligence (information capable of creating new information from that which already exists) (Aguilera, 1997, 2000b; Gago, 1995). We are referring to the metacognitive level: thinking that can perceive itself, thus leading to the appearance of social realities (heteroregulation), the possibility of self-regulation and the capability of comprehension and transformation, both of the environment and of the self. We are not so much interested in intelligence in itself, as much as the profit that can be obtained from it through adequate use of certain strategies, procedures and thinking skills. Intelligence is capable of solving problems, thinking creates them, invents them; intelligence is an aptitude (a potentiality), thinking is an act.

If we must respond to social demands in the information society, the thinking skills in which we should centre are those that allow us to learn to learn, that is, those that allow a person to perceive his or herself developing possibilities of self-regulation, self-comprehension and self-transformation in a certain context at the same time as he or she is capable of comprehending and transforming it. This is why we are interested in the thinking skills necessary to handle internal and external information in a manner that is adapted to the environment. We also believe that the cognitive tools necessary to understand and change the conditions of living, the day-to-day

situations, and to adapt to them should be taught, and in this we find another reason to be interested in them.

The thinking skills we are focusing on are therefore those that are useful in the solution of daily problems, within our own social context. We are not attempting to reduce the importance of skills needed to undertake specific tasks in the school setting, but to go further in identifying general abilities not necessarily linked to academic content and useful in highly ecological situations.

This way of conceiving thought has proven to be valid in intervention. Results obtained with the programme "Comprehending and Transforming" (Mora, 1991,1998) centred on self-regulation skills seem to confirm it. The skills were identified by external observers when they described what they thought were indicators of high level intellectual functioning, of improved cognition (using the expression of Nickerson, Perkins and Smith, 1987) that are not usually appreciated in standardized instruments, such as intelligence tests, which are usually employed to evaluate cognitive enrichment programmes. For this work we have used a group of thinking skills that respond to these characteristics and that have their roots in two different but, so we believe, converging conceptual and research traditions: metacognition and critical thinking.

In Contexts of Interaction

We are, in addition, interested in these thinking skills when they come into being in contexts of interaction, that is, when teams of people are facing problem solving. We understand thought not only as a response to reality, but as a collective, shared, cultural, response of human groups to the context's demands. It is not just "thinking about events and objects", but also "with others", or even "with myself" in a self-referring situation. We already pointed out above that our focus of interest is not on intelligence, but on what can be obtained from it. Now we can add that we are even less interested in intelligence understood as and individual asset. In any case we would be referring to what authors such as Costa and Lowery (1989) or Legree (1995) have called social intelligence, although expressions such as "shared thinking" or "thinking in interaction" seem more adequate. The former social "intelligence" is also used to name *individual* abilities for the solution

of interpersonal problem solving.

There are reasons to be interested in interpersonal interactions. In the first place, the problems we must face in a complicated society require the handling of a great deal of information, so complex that it would be very difficult for an individual alone to handle all the resources necessary to solve them without cooperation with others. Also, as Vygotsky (1979), Wertsch (1988) and Rogoff (1993), among others, have defended, the capability to think develops in a social milieu. It is social interaction that makes a person develop forms of reasoning adequate for their transforming adaptation to their environment. Different forms of social interaction, in diverse cultural contexts, will have different effects on development. Instead of the piagetian metaphor of the child scientist, Rogoff (1993) proposes the child apprentice, who learns while participating in problem solving tasks with the help of others with greater expertise. In her work, Rogoff assumes that human development is of a social nature and she emphasises the role of context as a unit of analysis, while rejecting any individual psychological phenomenon considered separately from its social context. In the second place, social interactions are a fundamental element in school learning models of undoubted interest, such as dialogic learning (Flecha, 1997,1999; Flecha and Tortajada, 1999). Finally, we believe there is no sense in stating that thinking is cultural and is construed in interaction and then proceeding to assess it individually. Concepts such as the zone of proximal development do not refer to individual aspects, but to a space that appears during interaction, a shared space of common cognition that is more that the addition of individual thinking.

The following are elements of the shared nature of thinking skills we are specifically interested in: intersubjectivity, interrelation between the actual (present) and that which is possible (future), the notions of appropriation, zone of proximal development, negotiation of meanings, scaffolding, situation definition, shared thinking, sociocognitive conflict, etc.

Neopiagetian research about the development of the formation of conscience and processes of regulation has also pointed out that social interaction situations are essential (e.g. Mugny and Doise, 1983; Perret-Clermont, 1984; Mugny, Paolis and Carugati, 1991; Perret-Clermont, Perret

and Bell, 1991). However, both these studies and those carried out within a Vygotskian framework have limited themselves to situations of sociocognitive conflict, either in dyadic or in asymmetric situations. We shall do so in situations that require collaboration among equals in teams of subjects similar to those formed in classrooms for cooperative work or in groups of friends. Our focus is on the cooperative work and social interaction in teams of school-age children that face problem solving together.

We know that not all thinking fits in the conceptualisation we are defending. The analysis of individual processes should probably continue to be a priority. But we do believe that the assessment of thinking skills is incomplete if individuals are not observed in interaction with others with higher, lower or equal cognitive level. On the other hand, the study of thinking skills in dyadic situations is complicated enough methodologically to discourage further broadening of the field. However, the risks of studying interaction among equals must be undertaken. It is easy to say so, of course, as a general recommendation, but this must also be done with specific situations and instruments that make it concrete and possible to evaluate. We are not sure whether to enter into such matters, and are conscious of the ease with which mistakes can be made when talking about social situations and thought separated from intelligence. However, the studies undertaken up to present in our research group encourage us to do so.

Assessment

We have just pointed out the our maximum interest is in the analysis of thinking processes and abilities that are activated in social problem solving in interaction (which is also social). The main point of departure is that maximum interest of the teaching of cognitive tools is the enrichment of thinking abilities that are applied to everyday (although not necessarily of the immediate context) problem solving, nearly always saturated of social factors. We can, however, ask ourselves the reason for this task we call assessment, why we claim our purpose to be the objective analysis of this form of thinking in order to evaluate it. The answer lies in the consideration that the teaching of thinking requires, among other things, the knowledge of the development of these abilities both in the normal and the less stimulated population. Both one and the other seem to be lacking in

current literature (Forns, 1993).

Most of the intervention programmes are evaluated using individual paper-and-pencil tasks (normally IQ tests), more centred on products than on thinking processes, and analysing expected effects, when unexpected ones are just as interesting or more. These procedures are, in addition, complicated for teachers to use in the assessment of present curricula.

In our own revision of the methods for the assessment of metacognitive and critical thinking skills (Aguilera, 1997), we have found that most instruments are inadequate for the evaluation of thinking skills in interaction. The critical thinking assessment procedures consist of individual written tasks, although they can be used as a pretext for team discussions. We believe, however, that ecological validity is best guaranteed with problems close to subjects' daily experiences. The metacognitive assessment instruments are also designed for individual application.

The assessment procedure we have adopted, as will be seen below, relies on observation. In this way we have access to spontaneous, direct information, present while subjects face the task, and under different modalities, such as verbal expressions (elaborated and semi-construed – expressions of developing thoughts), gestures or "eloquent" silences, and with different contents (communicative, or regulatory of self or other behaviour).

As we mentioned above, the objective is to determine the validity of an instrument for the assessment of shared thinking, the *"Procedure for the Assessment of Thinking in Interaction"* (PAT) (Aguilera, 2000a) in two studies, one cross-sectional and another longitudinal.

Method

Subjects

PAT has been used in our research, in a longitudinal and a cross-sectional study. In the first, data from subjects were taken on two occasions separated by a 26-month interval, and in the second, on one only occasion, data from three different age groups.

The sample for the longitudinal study was composed of 30 groups of six elementary and middle school students randomly chosen from their classes. Groups were selected in order to include two levels of social and cultural stimulation. Fifteen groups attended schools socially deprived zones and the other 15 from residential areas, all of them living in the city of Seville. The sample was also distributed among three age levels: Primary 2, Primary 5 and Primary 8.

The sample for the cross-sectional study was composed of six groups similar those of the other, with ages corresponding to Primary 4 and Primary 6.

Instruments

A procedure named PAT was developed for use in developmental research, the field of learning disabilities, the determination of special needs and the evaluation of cognitive intervention programmes, as well as the in the evaluation of procedural contents included in the Kindergarten, Primary and Secondary curricula.

It is composed of an assessment procedure and an observation instrument. The first consists of a series of problems each team of students must solve. There are nine problems of three different types, complexity and difficulty. Problems relative to institutional conflicts, interpersonal situations and logic puzzles were included. They were presented to each team, and student conversation video recorded and analysed. Table 1 shows an example of each of these situations.

INSERT TABLE 1 HERE

The observation instrument used for video analysis consists of a group of “improved cognition indicators”, i.e., general cognitive abilities to be assessed. Some correspond to metacognitive abilities, others to critical thinking skills, information management skills, and problem-solving and reasoning skills (see table 2)

INSERT TABLE 2 HERE

Procedure

Procedure was similar in both studies. Teams were randomly formed and selected: in each class students were randomly assigned to groups, and then three teams were randomly chosen in each one of them. The field protocol explicitly indicated that no pupil that did not want to participate should be included. The same document included instructions to be presented to the teams. These were taken out of the classrooms, one at a time in a predetermined order. They were taken to another hall prepared with a video camera, taking note of identification data of the teams and each of the students. Corresponding problems were then presented and children were allowed to discuss them. Adults in charge would then distance themselves from the group, without leaving the room. Each team had to solve a logic problem (type C1 from table 1), an interpersonal problem (type B2 from table 1) and an institutional problem (type A1 from table 1) in the longitudinal study. In the cross-sectional study only the institutional type problem was presented. In the longitudinal study, the situations assigned to each team was done in such a way that all them solved every situation, and that each team would not face the same problem in any of the two moments. Tasks were considered completed when the pupils said they had finished, when the situation had deteriorated to a point in which they were abandoning the task, or after a maximum period of 60 minutes. Once data collection was completed, recordings were coded for presence or absence of the cognition indicators in each minute.

Raven Progressive Matrices were used as an external indicator. This test was passed to all the class before the problems were presented to the teams. Academic performance indicators were also obtained.

Results

Cross-sectional study

Reliability was determined contrasting the coding of two experimented observers[1]. No significant differences were found in the coding, or in the instructions to each team or their gender composition.

No statistical differences in average time devoted to discussion of problems were found for same age groups among different stimulation levels. All second, fifth and eight year teams tended to spend similar times discussing the problems, irrespective of their socioeconomic status. Discussion time, however, does increase significantly with age: 2'5" is the average for second year pupils, 6'11" for fifth and 12'14" for eighth.

Data relative to frequency of thinking abilities indicators followed a similar pattern. There were no significant differences among scores obtained by teams of the same age level, average scores increased with age, and differences between deprived and stimulated subjects, although slightly favourable to these, were not significant (see figure 1). However, if items relative to metacognitive abilities are considered separately, differences between stimulated and deprived subjects, in the 13 and 14 year old level, were significant (see figure 2). Other reasoning abilities appeared in the three age groups considered and increased with age. Metacognitive abilities only appeared clearly in the 13 and over group, especially in the stimulated teams.

INSERT FIGURES 1 AND 2

In third place, a qualitative evaluation of three aspects (discussion process, decision-making and metacognitive control) was carried out.

The discussion process was different in the three age levels. Second year students began to talk immediately, did not express discrepant opinions or argued and seemed to be preoccupied with finding an answer quickly, in such a manner that when a group member proposed a solution it was immediately adopted by the team. Fifth year students also began to talk rapidly, although in

[1] The author of this article and Dr. Mora, to whom we express our gratitude.

some cases certain group members did not participate and devoted themselves to rereading the instructions. In some teams (not all of them), there are discrepant opinions, with no differences among SES levels. They are very interested in finding a solution (in a similar way to the second year groups), but every member seemed to have his/her own and opposed all others without giving them any consideration. Older students commenced in a similar fashion to the fifth year subjects (rapid in some cases, rereading in others). Alternative solutions did appear and there was a discussion that in certain moments consisted in considering pros and cons of other solutions. The main concern was still the final response (the product) and social consideration (receiving group approval). Sometimes contributions were valued and in others there were no replicas, depending on the prestige of the person forwarding the proposal. The discussion was ordered, with an appropriate turn taking.

The younger children reached decisions without examining the problem and often the conclusion had been reached while the examiner was explaining the situation. The group decision was the first presented. It was thus a quick decision, but in a way that could be considered very particular since it had not been negotiated. It was more a gregarious ascription to whatever was first said than a real agreement, with a certain social pressure against diverging opinions. Fifth year students arrived at their conclusions in a manner that was similar to their second year counterparts or through voting. Decisions were also reached here in the first moments. Reasons for adopting a certain conclusion were of diverse nature: the decision of a leader that was not discussed (since this was considered opposition), the first opinion offered, or the contribution that had been discussed most. With eighth graders the final decision was taken in agreement with others. What determined a certain selection was the imposition of one member, a backing by the leader, persistence and conviction shown during argumentation and in some cases the analysis of pros and cons.

Metacognitive control was the third aspect analysed from a qualitative point of view. Second year students maintained attention during the period of discussion, although this was of a fairly short duration, there was no control of impulsivity or self-regulation routines (planning, supervision or

review). They even forgot some of the demands of the task, which were left without response. Fifth graders displayed medium and low maintenance of attention (the longer they took to solve the task, the lower the attention). Certain impulsivity control and slight indices of self-regulation did appear, although they never included review of task solution once it was completed. Finally, attention and impulsivity control in eighth grade pupils was high. Automatic (not explicitly formulated) self-regulation routines appeared, contributing to a more structured activity.

Results of the longitudinal study

A random sample representative of the different duration video recordings (6/36) was analysed for reliability by different observers, all of them trained psychologists[2]. Average interobserver agreement was 90%, with a range of 86 to 99% by sessions and 72 to 100% by indicators. Three variables in which reliability was below 80% were reanalysed, and one of them was finally discarded with a reliability of 72%. With these data it can be concluded that PAT has adequate reliability.

In order to determine the developmental level of different groups, four indicators were used: Raven's Progressive Matrices test, academic performance, PAT scores and discussion time in PAT situations. Results show that although there is a certain variation among teams, they do not differ significantly in academic performance or on the test of Progressive Matrices. They do not differ, either, on the PAT scores and discussion time. This is true both when data is considered globally and for each of the 23 improved cognition indicators, on the one hand, and when considering each of the nine situations independently, each of the three type of situations or all together. Differences did not appear in either moment (1 or 2).

All three types of situations and the nine situations were compared. It must be remembered that we had designed three kinds of tasks, each of which was composed of three different problems. Were these types really different among each other? Were the three problems of each kind really

[2] I would like to thank Isabel García and Joaquín Mora-Merchán for their assistance in this point.

equivalent? Two reference indicators were taken to respond to this question: PAT scores and time of discussion. Results show that both variables are significantly different when considered among types, but not when situations of the same kind are compared (see table and figure 3). These results indicate that the three types of problems are really different and that those within each category are equivalent.

INSERT TABLE 3 AND FIGURE 3 HERE

Another issue relates to PAT's sensitivity to developmental changes between moments 1 and 2. Indicators in this case were once again discussion times in PAT situations and improved cognition indicators on PAT.

Results relative to discussion time show overall sample significant differences both in when situation types were considered jointly and separately. The differences between moments 1 and 2 were similar among the three situation types and the nine problems (see table and figure 4).

INSERT TABLE 4 AND FIGURE 4 HERE

Significant overall sample differences were found between moments 1 and 2 in PAT indicators, both considering situations jointly and by category. These differences are similar among situation types and particular problems (see table and figure 5). We can thus point out that the results of the cross-sectional study relative to developmental sensitivity of PAT are confirmed here.

INSERT TABLE 5 AND FIGURE 5 HERE

Finally, comparison among scores in each of the improved cognition indicators between moments 1 and 2 was carried out. We asked ourselves whether developmental change differed among thinking skills. Results show that although scores increase in all indicators, increments are not always significant (see figure and table 6).

INSERT TABLE 6 AND FIGURE 6 HERE

Discussion

Both the longitudinal and the cross-sectional studies indicate that the reliability of PAT is adequate, when adequate observer training is guaranteed. We do believe, however, that this aspect could be improved increasing category definition precision in those points that registered slight discrepancies, e.g., enriching definitions with examples. In order for its use to be generalised, training procedures should aspects relative both to observational methodology in general and to adequate interpretation of improved cognition indicators in particular.

Secondly, the design of three types of situations, each one composed of three equivalent problems, was confirmed by statistical analyses, with significant differences, both in discussion times and PAT scores among problem types, and non-significant differences within problem categories.

It is a useful instrument to assess thinking skills in interaction situations that informs of dialogue characteristics in logic, interpersonal and institutional problems in compulsory education subjects of different ages. In this sense:

a) It is sensitive to developmental changes in problem solving skills in interaction. With PAT we have identified some developmental patterns of problem solving, that could serve as a basis for further studies. This is true both for discussion time and cognitive indictor scores. Metacognitive abilities appear later than other problem solving. They do not seem to be present before the age of thirteen or over. However, we have not intended to develop a standardisation of the level of shared cognition for the

different ages. This is therefore, a pending study.

b) It is sensitive to differing levels of social and cultural stimulation. In the older age groups, metacognitive item scores differ significantly between high and low stimulation groups. These data are confirmed with the qualitative assessment: descriptions of 2nd and 5th grade groups are more similar among themselves than any of the 8th year ones. These dissimilarities are most evident in the metacognitive control groups.

We can, based on these results, therefore claim that intervention for the improvement of metacognitive abilities must thus be possible, since in our sample they appear not only as a consequence of age but also of social and cultural stimulation.

The use of this methodology, following the procedure already described, seems adequate for use in the assessment of thinking skills, both in educational and developmental research and in the design of educational curricula.

Other data obtained with PAT supports the following conclusions:

a) Both the time students take on solving a task and scores obtained are good indications of the level of cognitive development. Therefore, PAT is sensitive to developmental changes. Only in one team, composed of

students with learning disabilities, was this trend not appreciated. New studies would be needed to determine the applicability of PAT to this population.

b) Data obtained with PAT tends to discriminate more among teams than academic performance or scores on the Raven's Progressive Matrices test. High scores on one of these variables relates to high scores on the others, but differences among teams are greater on PAT, although interteam differences did not reach statistical significance due to the small size of the sample and the fact that they were specifically selected from equivalent age groups. Larger and more heterogeneous samples should be used to confirm these findings.

c) An unexpected result was the improvement of Raven test scores between moments 1 and 2. Distortion due to small sample size is the only explanation we can find for this result. Cognitive enrichment produced by one of the teachers that had participated in thinking skills programme training was a possible hypothesis. However, it was discarded since no significant differences among groups in moment 2 were found.

d) PAT scores and discussion times in logic problems were higher than those obtained with interpersonal and institutional problems. The explanation, we believe, is that in the logic problems there is immediate feedback on having obtained the correct solution. This would lead to students no being

satisfied with any answer, as happens in other problem types in which results depend only on the degree of complexity of students' thinking. However, differences between one and another type of situations were not significant, so it could be concluded that progress experimented by each group does not depend on the kind of situation.

e) Correlations of PAT scores and discussion times with Raven Progressive Matrices scores could discourage, for the sake of economy, the use of PAT. This could be so if all interest were centred on data relative to the products of intellectual functioning. But when we are interested in assessing processes and identifying specific thinking skills, we should define and observe them separately. Paper and pencil tests are not useful either when the thinking abilities we would like to assess are those that come into action in social interaction situations in cooperative teamwork. The correlations we have mentioned should thus be interpreted as a confirmation of the instrument's validity, rather than as an argument in favour of its irrelevance.

f) Finally, significant increments were not found in all ages in every PAT cognition score. These items could need improvement in their definition or simply be excluded from the instrument. However, this should not be attempted before discarding some possible explanatory hypotheses, such as an insufficient age span for differences to effectively appear, an insufficient social and cultural diversity in the sample, or the fact that some

of the cognitions evaluated do not appear thorough simple maturation, but need specific formal training for most children. Since research carried out by other members of our research group have found differences in these indicators among groups, it does not seem appropriate to exclude them without analysing more closely the reasons for a lack of replication of those results.

Finally, research pending could be detailed in the following manner: a) is PAT susceptible of use in ordinary educational assessment? which educational objectives can be evaluated using this procedure and which cannot? what does assessment in shools with the instrument entail for teachers and for the procedure itself? b) PAT should be tested for use in the evaluation of cognitive enrichment programmes, and c) its application should be explored with samples of a different nature to those used here, such as students with special educational needs, different age groups, teams with a controlled heterogeneity in cognitive development, social and cultural stimulation, academic performance, previous experience with similar tasks, etc.

As can be seen, what is left to explore is more than what has been achieved. More so if our contribution is compared to the context of social demands we commented on the beginning of this article. We do, however, hope to apply to ourselves what we stated before: all important tasks require the cooperative teamwork of closely knit groups. This is one of those tasks and we expect to continue with it in the research lines this study opens. We trust it will also stimulate

other teams that are involved in similar fields to share information of mutual interest.

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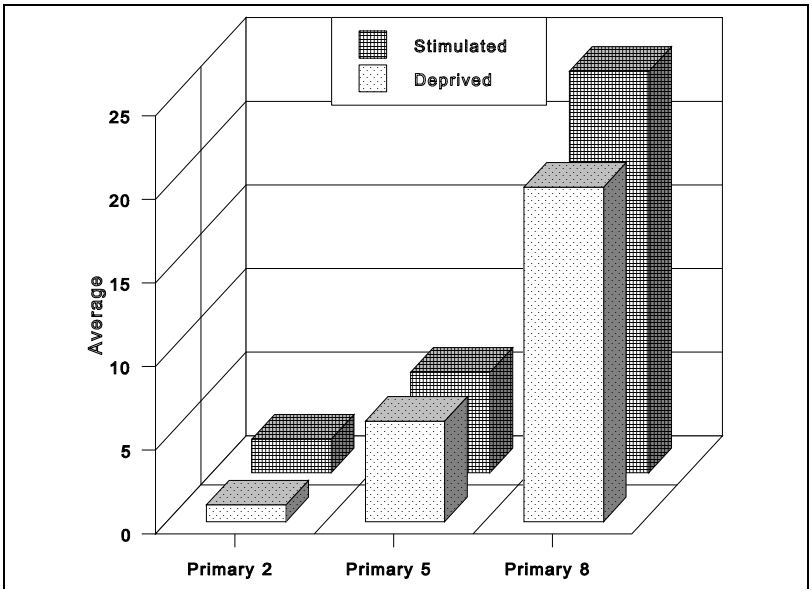
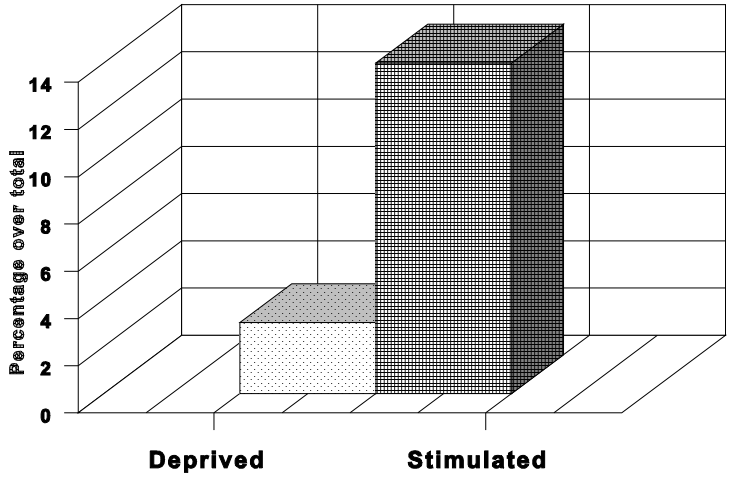
a.1 *In the neighbourhood where you live there is a bit of wasteland in which lots of children normally play. For some time now the neighbours have been asking the City Council to build a park there. However, an insurance company has bought the land and is going to build a block of offices. Most of the people still want a park.* ***What do you think could be done to get it? Discuss the problem until you reach an agreement about what should and could be done to get the park everyone wants.***
b.2. *Albert is a boy that entered our class at the beginning of this year, when he failed and had to repeat the course. He never seems to understand anything and fails most of the exams. He is always distracted, playing with toys or talking with his classmate. Although everyone laughs a lot at what he does, he has not got many friends, because he is always fighting with the others and, besides, getting together with him is a sure way of failing in class. Teachers are wondering what to do with him: throw him out of school, leave him until he finishes, or... anything else that could be a solution. The other kids in class don't seem to agree among themselves either about what to do.* ***What do you think should be done? Think about it and discuss it with the others until you reach an agreement or you are convinced it is impossible to do so.***
c.1 *A train covers the long distance that separates two European cities in seven days. A train leaves daily from the first town to the second, and another does so in the opposite direction. Let's suppose we catch the train. How many trains will we meet coming in the opposite direction? Some people on the train say it's seven, but the train driver, that has done the journey more than once now, says it is a few more.* ***Would you be able to say how many there will be? Think about it and discuss it until you reach an agreement or until you give up.***

Table 1.- Examples of the three types of problems found in the PAT.

01. Defining the problem spontaneously, explaining it more precisely and/or reformulating it.
02. Analysing reality. Decomposing it in parts.
03. Simplifying situations. Considering partial aspects as a solution strategy.
04. Contributions of new, relevant and pertinent information.
0.5 Argumentation, justification and/or reasoning opinions and decisions.
06. Formulating conclusions based on given information.
07. Formulating hypotheses as a point of departure for a line of reasoning.
08. Pointing our absurdities or contradictions in an argumentation.
09. Reformulating previously discussed points: reconsidering already closed aspects.
10. Exploring alternatives. Opening new lines of discussion
11. Non impulsive behaviour. Maintenance of a reflexive rhythm.
12. Planning of action: Pointing out objectives, stages towards success...
13. Applying earlier contributions to new situations.
14. Centring on processes. Pointing out strategies and procedures.
15. Revising, discussing, verifying own contributions.
16. Maintaining attention to continue implication in task.
17. Maintaining a critical and nonconformist cognitive attitude.
18. Self-referring conclusions relative to attitudes, mistakes...
19. Formulating general laws decontextualised and distanced relative to task.
20. Demand of a greater amount of information.
21. Precision in the demand and transmission of information.
22. Inclusion of conclusions in wider and more abstract reference systems .
23. Consideration of the point of view of others. Inclusion in an opinion of the contributions of others. Adopting the point of view of another person.

Table 2.- Improved cognition indicators in the observation instrument of the PAT.


Stimulated
Deprived
Average
25
20
15
10
5
0
Primary 2
Primary 5
Primary 8

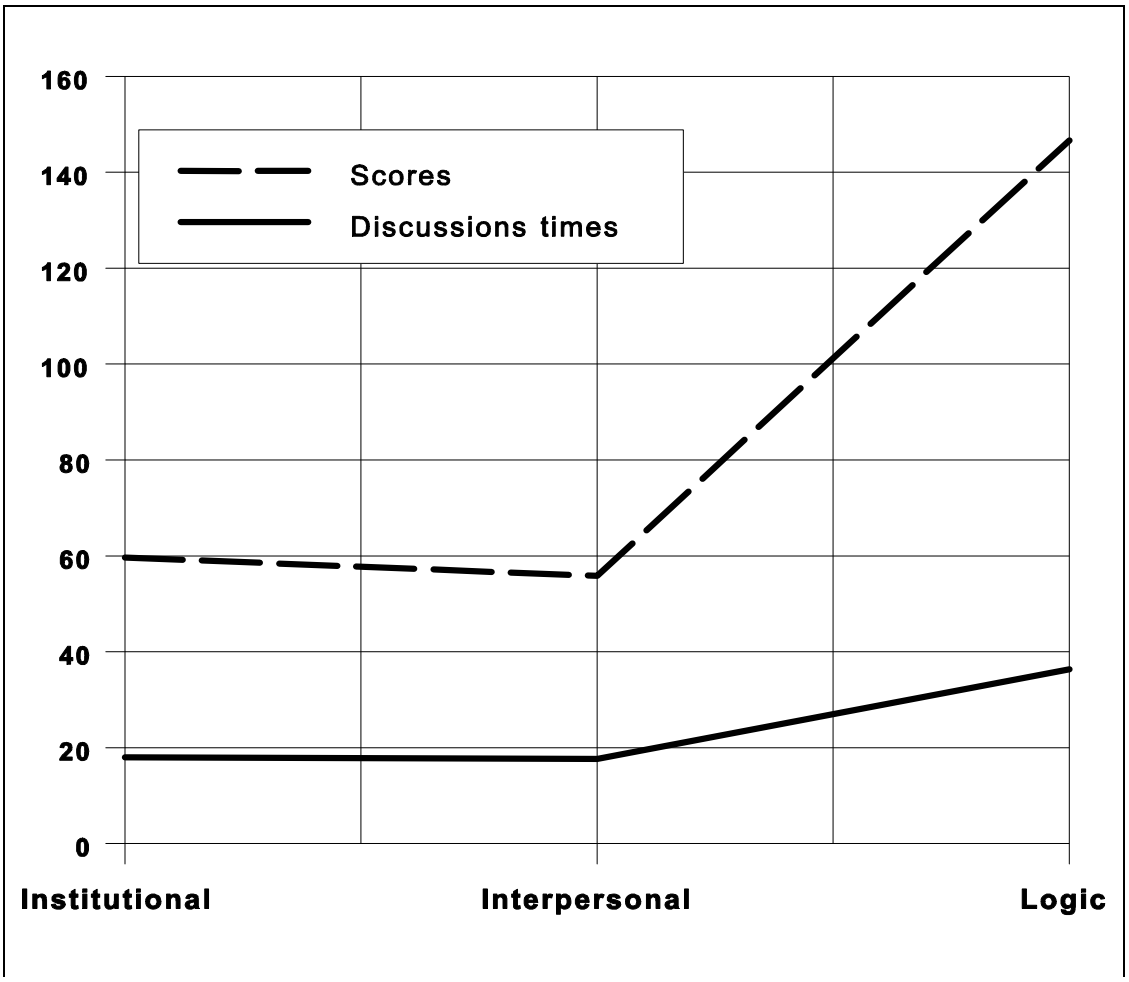

Percentage over total
0
2
4
6
8
10
12
14
Deprived
Stimulated

A/ PAT Scores	AVERAGE	SD	F	p
INSTITUTIONAL PROBLEMS	59,6667	38,438	16,3760**	0,0099
INTERPERSONAL PROBLEMS	55,8333	38,06		
LOGIC PROBLEMS	146,6667	67,263		

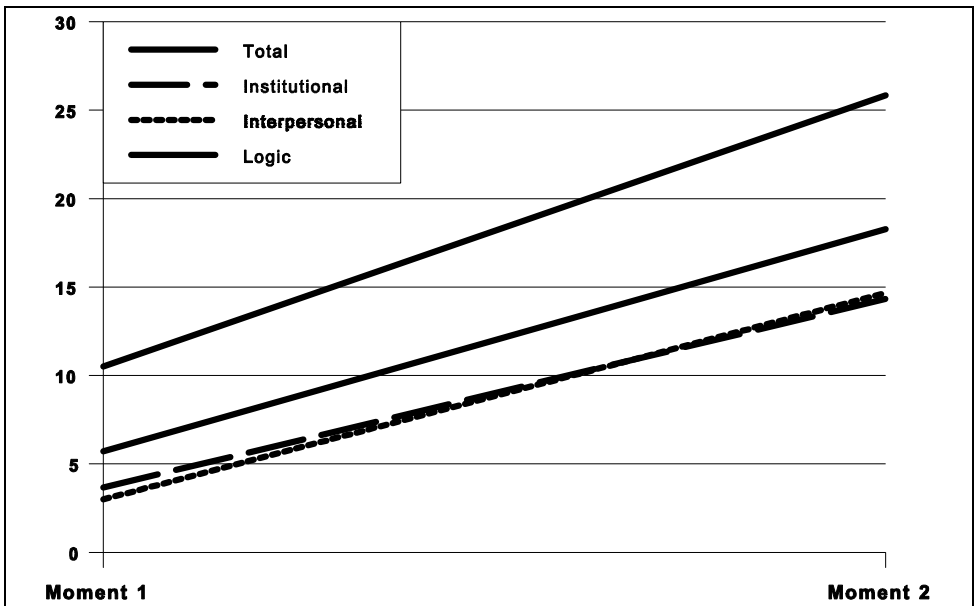
** p < 0,01

B/ PAT dialogue time	AVERAGE	SD	F	p
INSTITUTIONAL PROBLEMS	18	10,412	15,5018*	0,0161
INTERPERSONAL PROBLEMS	17,667	11,237		
LOGIC PROBLEMS	36,333	11,776		

* p < 0,05

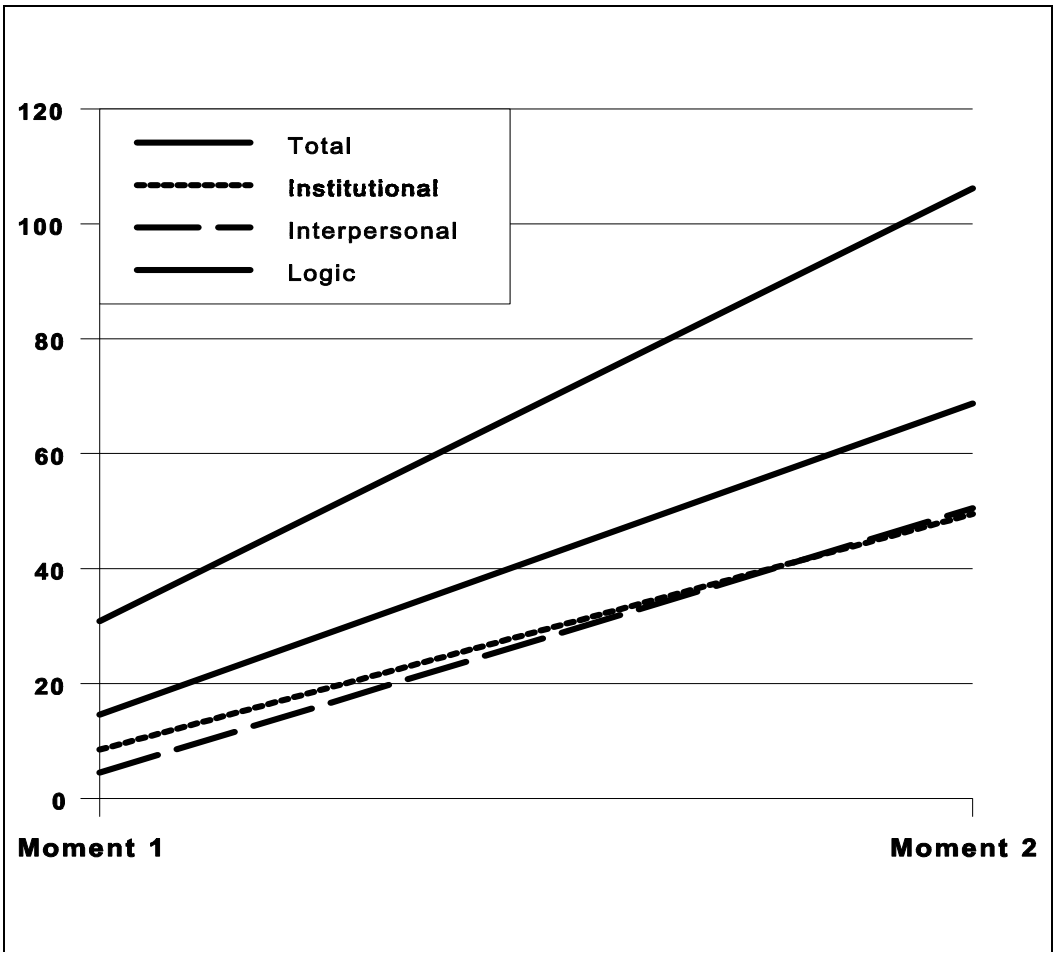

160
140
120
100
80
60
40
20
0
Scores
Discussions times
Institutional
Interpersonal
Logic

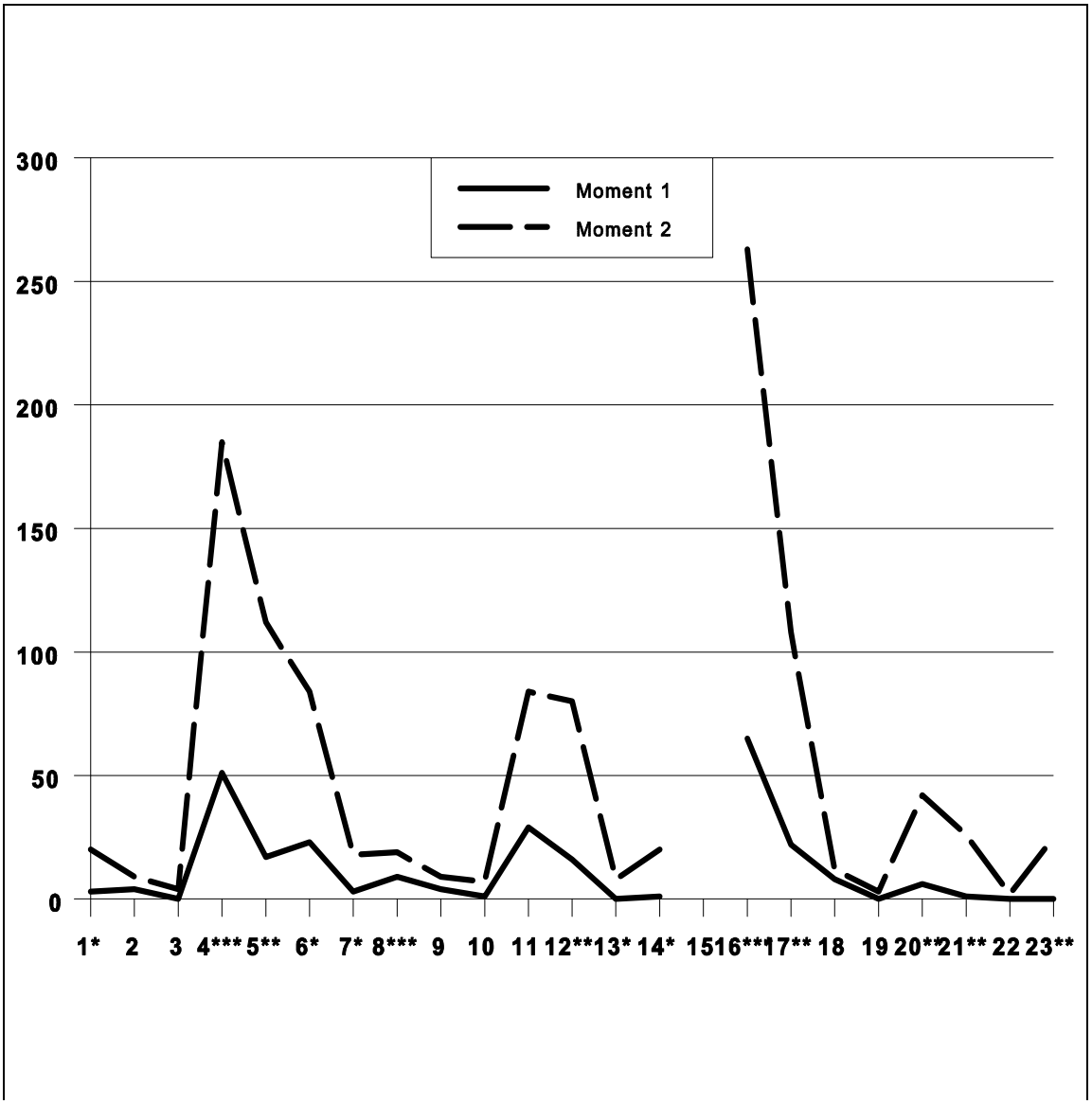
	MOMENT 1		M
	AVERAGE	SD.	AVER
INSTITUTIONAL	3,6667	3,7771	14,3
INTERPERSONAL	3	1,6733	14,6
LOGIC	10,5	9,1378	25,8
TOTAL	5,7222	6,4608	18,2



	MOMENT 1		MOMENT 2			
	AVERAGE	SD.	AVERAGE	SD.	F	p
INSTITUTIONAL	8,5	11,432	49,5	30,507	9,5025*	0,0116
INTERPERSONAL	4,5	0,8367	50,5	37,719	8,9195*	0,0137
LOGIC	30,833	24,359	106,1667	68,142	6,5023*	0,0289
TOTAL	14,611	18,85	68,7222	52,918	16,7016***	0

* $p < 0,05$
*** $p < 0,001$


120
100
80
60
40
20
0
Total
Institutional
Interpersonal
Logic
Moment 1
Moment 2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250
200
150
100
50
0
Moment 1
Moment 2
1* 2 3 4*** 5** 6* 7* 8*** 9 10 11 12** 13* 14* 15 16*** 17** 18 19 20** 21** 22 23**

SIGNIFICANT DIFERENCES	NON-SIGNIFICANT DIFFERENCES
01. Problem definition (*) 04. Contribution to discussion (***) 05. Reasoning opinions and decisions (**) 06. Formulating conclusions (*) 07. Formulating hypotheses (*) 08. Pointing out absurdities and contradictions (***) 12. Planning action (**) 13. Applying contribution to new situations (*) 14. Centring on processes and strategies (*) 16. Maintaining attention (***) 17. Critical and unconforming attitude (**) 20. Demanding more information (**) 21. Precision of information (**) 23. Considering points of view of others (**)	02. Analysing reality 03. Simplifying situations 09. Returning to prior topics 10. Exploring other alternatives 11. Non impulsive behaviour 18. Self-referring conclusions 19. Formulating general rules 22. Inclusion in general reference systems

*p<0.05
** p<0.01
***p<0.001

Table 6.- Differences between moments 1 and 2 on each improved cognition indicator.