

AN EXPERIENCE OF GAME IN A MULTICULTURAL MILIEU AT INFANCY AND ELEMENTARY SCHOOL

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ABSTRACT

The present paper is inserted in an ampler project of research brought ahead inside the GRIM of Palermo and it is substantially contemplated on the cognitive process put in evidence by the students of different cultures (in particular Chinese and Italian) in the resolution of problematic situations developed ad hoc according to the investigation methodology of the Brousseau's theory of the situations.

Particularly, this article shows some differences and analogies occurring in the reasoning schemes used by pupils (infancy and elementary school) involved in various games, e.g. sudoku/magic box etc. These games were selected opportunely for to illustrate the correlation between the behaviors of the pupils in the problem solving and the historic/cultural development as well as the structure of the written Chinese language.

The problematic situation presented in this article has been analyzed, even though in a first approximation, both quantitative – by the analysis of the protocols, and the qualitative one – by the video recording of the experience in a classroom.

INTRODUCTION

The "multi-culturality" in class is in Italy a phenomenon that, even though rather new, is in wide expansion: the integration of foreign students in the Italian classes had, in the recent years, an increasing rate and has become no more an exception but, on the contrary, an inevitable reality. The nowadays situation requires therefore to consider and to reorganize the idea of education in accord with the new needs and resources, intervening in the trend of an *integration of differences*, a change and a mutual adaptation, an open trial correlated with the recognition and the acceptance identities and incorporated knowledge. (Canevaro 1983, 16).

The differences that could be detected in the class activities in this optic will turn into sources of enrichment for the whole class. In these relations the teacher has to play a more substantial role of a "mediator of knowledge".

In the specific case of Mathematics, a greater attention was paid in recent years to the problems of the didactics in a school multicultural milieu and these themes were included into several programs and described in many papers.

In this context becomes evident, that the starting point of any activity in front of the problems, which have arose out of the presence of cultural differences in class, has to be to specify as well as to put in evidence all moments that can be presented in cultural models of integration: the previous knowledge possessed by the pupil, his motivations, his expectations and abilities, his personal and intellectual characteristics; all that constitutes the necessary prerequisites of every correct pedagogic intervention. (Garcia Hoz-Guerriero-Di Nuovo-Zanniello 1997, 238-239)

- **Do the extra-European students, in the resolution of particular problems, put in evidence different resolution strategies reported to the effect of their origin culture (Natural Language, logical-argumentative schemes, algorithms, etc...)?**
- **Can the study of such differences help the understanding of the phenomenon of teaching/learning in multicultural situation?**

¹Supervisor Thesis Prof. Filippo Spagnolo. This work will be inserted in thesis's project on "Passaggio dal Pensiero Aritmetico al Pensiero Algebrico in ambienti multiculturali: il caso cinese".

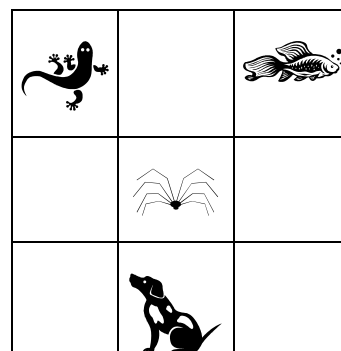
In this direction, the aim of the article is to try to show how is possible to underline, even though in a first approximation, through a series of experiences, of situations/games, some of the verifiable differences in the reasoning schemes of students coming from different socio-cultural environments: in the specific case Italians and Chinese.

In the work we refer to a particular situation/game experimented with Chinese children of infancy and elementary school and constructed beginning on the game of the *Sudoku/Magic box* opportunely simplified.

The game is referred to the *box/matrix* showed near.

It was presented in the class with other five different image cards of animals (to insert on it) and a series of rules for the composition/solution of it:

1. each animal cannot be in the same line or column of its enemy (we presented the enemy animals);
2. each animal has to appear in the square only one time;
3. each one of the students has to insert in the box, all of the nine possible different animals showed in the image cards;
4. the solution has to be only one.



The studied problematic situation could represent one of the game that is possible to use to investigate, in a first approximation, in a multicultural environment with Chinese students but not only, on some of the particular scheme of reasoning that, in our opinion, could result central in the analysis of a Mathematical context as for example the relationships between the “serial thought” and the “global thought” in the reading and the understanding of a mathematical problem (in particular an algebraic problem).

In the presentation of the article, the proposed game will be also exanimate in relationship to the results underlined previously in other works conducted within the GRIM and coordinated by the Professor F. Spagnolo (Spagnolo 2004, Rapa 2005; Ferdico 2006), on the cultural difference in scholastic and non-scholastic environment.

This work is placed so within a framework of a vaster plan of research confronted within the GRIM on the problematic of teaching/learning in multi-cultural milieu.

The picked data, even though to deepen, are analyzed both quantitatively, through the analysis of the protocols, that qualitatively with the analysis of cases. For the quantitative analysis we will use the software of inferential statistic Chic (Classification Hiérarchique Implicative et Cohésitive) and the factorial analysis survey S.P.S.S. (Statistical Package for Social Sciences).

The principal theoretical framework for the methodology of the study of the discussed experiences, is Brousseau's theory of the situations (Brousseau 1997).

To be able to interpret the comparative study between the Chinese thought and the European one in situations of teaching/learning in multicultural perspective, we referred to the studies of J. G. Gherghese (1987) and U. D'Ambrosio (2002).

METODOLOGY AND FIRST CONCLUSION

In the conducted experimental work were involved about 95 children (13 Chinese students) of inclusive age between three and twelve years old; the range of the age of the student was choice to investigate in a largest possible way to the different behavior and different verbalization of the pupils to the situation presented.

The experimentation was divided in two different phases:

1. administration of the situation/game to the children of the infancy School "Ferrara" of Palermo and to the children of the first two years of the Primary School "Costa G." of Palermo with the purpose to notice, through the quantitative and qualitative analysis (video of the experience in the classrooms), the behaviors put in action by the students and the adopted different strategies of the game and the recurrent reasoning of the Italian and Chinese students;
2. the administration of an half-structured interview (recorded on the Video) to two foreign (Chinese) students, inserted to the Sicilian scholastic context at the Elementary school, on the same situation/game.

The selected game was thought and constructed in relation to the our reflections on the previous conducted researches within the GRIM to the same context. We considered so some of the particular linguistics aspect of the structures of the Chinese written language: **tabular representation of the phonetic characters** (the matrix as mathematical reference (Needham 1981, 46)); the **possible interpretation of an ideogram as union of single elements (Western vision) or unitarian character (Chinese vision)** and also some **typical reasoning schemes showed in the previous experimentations with Chinese students**.

The game of *Sudoku/Magic Box* seem to confirm, even though in a first approximation, the results founded and discussed previously: a different kind of reasoning of the Chinese student to the Italian ones in term of the reading of the data of the situation/problem proposed, organization of these, "kind" of use of the language to describe the solution of it...

In this sense we could consider the constructed situation/game as a first good instrument of investigation. In particular, the collected data relative to the Chinese students, seem to confirm a concrete, pragmatic behavior of them, just showed in the works of Chemla (2001) and Spagnolo (2002). Behaviors strictly tied up to the procedure, to the algorithm through witch the students use each single case (each animal proposed in the game) not only as simple procedural description (each case as particular problem) but also as an index of the whole series of those, connected through the construction of an algorithm.

This kind of strategy is evident in the analysis of the video of the situation in relation to the phase of the organization of the data of the game; it not results marked through the adopted strategies of the Italians student.

About this, is also possible to underline other interesting aspects regarding the way to "read" the *box/matrix* and discuss it in its "solution".

The most evident difference regarding the diverse types of argumentation of the students of Chinese nationality and autochthonous (used during the game and at the end of it) are tied up to the fact that the Chinese students seem to use in prevalence, in this case also, a kind of pragmatic reasoning. In the game, in many cases, they try infact to show the truthfulness of a particular assertion with a sketch or particular "operation". The Italian students used instead to justify the adopted strategy, a kind of "local reasoning", with "theoretical" reference to the scheme of the situation. The chosen "theoretical" references, result to be more and more rigorous in the form, during the game.

From the analysis of the strategies adopted by the students (Italians and Chinese) in the resolution of the assignment, it is also possible to underline the ability of the Chinese children to read and therefore to interpret the *box/matrix* proposed in a holistic way, with a global vision of it. They show therefore attention to the particularity of each single case, each single card image presented in the game, reading the table, the showed situation, in a unitary vision.

They underlined immediately, as first step of the game, what was important for the solution of the game, the essential elements of the situation, those were the data meaningful for the problem.

Examples of question posed in the group of Chinese students were:

- ...We have one "non influence" animals that we can consider only at the end;
- ...We have animals that can be posed only in one part of the box.

If the Italian children prefers a strategy for attempts and errors, going to individualize, for first step, the single relationships among the various image cards (animals) in game and working on the box for lines or columns and only after in parallel, through lines and columns; the Chinese student, maybe just in virtue, as we just said, of the relationships that is possible to find between this kind of situation/game and some of the linguistic aspect of the Chinese written language (as we introduced previously we can refer to the type of writing and reading of an ideogram), underlines a more uninhibited attitude, working immediately parallelly on lines and columns and reading so the box in an unitary way.

Other interesting consideration in this context could be discuss analyzing the video of the experience in the classroom and in particular the interview to the two Chinese students. From this further qualitative analysis, evidently comes out how is different, in the two culture (Italian and Chinese), the meaning of the term “To think for cases”.

In this sense the proposed activities could permit some critical and more careful reflections on the possible correlation between Chinese language, whose characteristics induce to hold as a language entirely “abstract” (in the mathematical meaning) and with a complex syntax, Chinese thought and mathematical reasoning (logical-argumentative problematic) adopted by the students in class to solve a mathematical problem. In according infact with idea that exists a strong correlation among the Chinese language, at least on the written language and the mathematical thought (Spagnolo 2002) and so the behavior of the students in class to solve a mathematical problem, (to implicate, as Hok Wing and Bin (2002, 223-224) sustain, that the Chinese students furnish the tallest performances of the world in assignments that ask application mathematical abilities) we could consider this analyzed situation/problem as a starting point for future more specific and deepest researches in this context. Particular attention in this sense will be turned to the analysis of the *algebraic nature* of the written Chinese language and the correlation that it could have in the study of the difficulties showed in the passage from the Arithmetical thought to the Algebraic ones, from “To think for cases” to the formalization; problematic already enough documented and discussed in literature for what concerns the Western research.

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