

Deductive and inductive reasoning skills of high school students

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Introduction

Most of the studies about the effects of the academic formation on reasoning skills in USA and Canada have been carried out with undergraduates, graduates and professionals (Lehman, Lempert and Nisbett, 1988; Lehman and Nisbett, 1990; see Nisbett, 1993). These studies conclude that the academic specialization is manifested in differences in the styles and reasoning skills. However, what is the influence of training on high school students' reasoning? Can we find differences between the students' reasoning who followed specialities which are only different in some of the courses? Will deductive and inductive reasoning be in short, different as a function of the students follow up of a course of maths or one of biology instead of one course of linguistics or one of history?

Our study had two main objectives. The first objective was to assess differences in conditional, statistical and methodological reasoning, as well as in probability and covariation reasoning in last-year-high-school students that study different specialities. We had two different groups from the last course of high school education which had four different specialities each one. We expected that these differences would not be very extreme because the distances among the curricula would be based on some few particular courses received during the previous academic year. The second objective was to compare these groups with another non equivalent control group that studied two years below the last course of high school education. It was expected that the control group would have a worse performance than the other groups, because they had not received the same number of courses.

Method

Subjects were 345 students of both sexes, age range 16 to 20. Due to the reformation of the teaching in Spain, we could have students from two different education systems. So we obtained, on the one hand a sample from the last course of the high school education that had been imparting up to now (Course of University Orientation, COU) and on the other hand, another sample from the last course of the high school education in installation process (Reforms of the High School Education, REM). We also picked up a sample from the second course of the obligatory secondary education (ESO) as a non equivalent control group.

The tasks used by Lehman et al. (1988, 1990) were adapted and translated in this study. The tasks were conditional, statistical and methodological reasoning tasks. Other two tasks were also used to evaluate probability and covariation reasoning.

The realization of the tests was carried out in group during the regular schedule of teaching. Previously, the verbal IQ scores had been obtained thanks to the collaboration of the psychologists of the high school.

Results and Discussion

In the studied educational levels there were not many differences due to the followed different courses. There were differences in deductive reasoning (conditional reasoning) between COU and the control group, and between REM and the control group. The same happened between COU and the control group in statistical and methodological reasoning. However, there were not significant differences in probability and covariation reasoning.

In short, Spanish students of high school had a specially better performance in deductive reasoning tasks. This is consistent with the formal education that they have received. On the other hand, the fact of not finding differences in probability and covariation reasoning can be due to that these reasoning questions evaluate the outlines they are had before following courses in high schools education. However, the tasks Lehman and his collaborators have designed would measure the system of rules that has a different development depending on the received education (Nisbett, 1993).

The results of some specific tasks showed differences among some specialities of COU and REM. COU students who had a good performance in the covariation reasoning task, had a bad performance in the methodological reasoning task and vice versa. Students who had good answers to the covariation reasoning task had in common a course of history. Surprisingly, a math course did not have any effects in the different tested reasoning skills. A possible explanation of these results is that the study of history increase the use of the covariation reasoning. For example, the study of history intensify the search of multiple causes that explain an effect.

References

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