

## CONSERVATION OR CONVERSATION: A TEST OF THE REPEATED QUESTION HYPOTHESIS<sup>1</sup>

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*The main goal of the paper is to reanalyze the results of previous studies on the repeated question effect in the conservation task, and to create a more direct test of the repeated question (RQ) hypothesis (repeating of question in the conservation task may mislead concrete-operational children to give the wrong answer since they interpret the repeating as an implicit sign that their first answer is wrong). Reanalysis of previous studies shows that some original conclusions need to be modified, and that a more direct test of the RQ hypothesis is needed. Each participant (N=58, mean age 7;10) was tested by two tasks (conservation of liquid), a standard and modified version. In the modified task, liquid was poured into the same glass, so that the child's answer was not under influence of his or her level of cognitive development, but only by the repeated question (child who was misled by the RQ would give a wrong answer). According to the RQ hypothesis, children who change their answer on the modified task also need to change their answer on the standard task. Moreover, children who resist the RQ on the standard task do not need to change their answer on the modified task. Results show a different pattern than expected by the RQ hypothesis.*

**Key words:** *Piaget, cognitive development, conservation, conversation, repeated question*

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## INTRODUCTION

According to Piaget the conservation task is a reliable indicator of cognitive functioning (Piaget & Sezminska, 1941; Piaget & Inhelder, 1959; Piaget, 1995). If the child solves the conservation tasks then (s)he is at the concrete-operational stage (CO) of cognitive development, and vice versa. The conservation of liquid quantity (figure 1) can be used as an example of the standard procedure for testing conservation. Two identical glasses (A and B) containing an equal amount of liquid are presented to the child. The experimenter asks whether the two glasses contain the same amount of liquid, or if one contains more and the other one less. After the child confirms that glasses contain an equal amount of liquid, the liquid from one glass is poured (transformation) into a glass (B1) of different dimensions (for example, thinner and higher). Then, the child is asked again whether the two glasses contain the same amount of liquid, or if one contains more and the other one less. The child is also asked to explain his/her answer. According to Piaget, if the child claims that the glasses A and B1 contain the same amount of liquid, and explains the answer by (a) identity, (b) inversion, or (c) reciprocity, then it can be concluded that the child is at the CO stage.

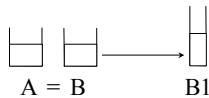
*Figure 1. The standard conservation task (liquid quantity)*

I Starting relation



Do the two glasses contain an equal amount of liquid, or does one contain more, and the other one less?

II Transformation



Appearance ≠ Reality

III Ending relation



Do the two glasses contain an equal amount of liquid, or does one contain more, and the other one less?

The validity of the conservation task has been criticized widely. Bryant & Trabasso (1971) implied that children's failure can be determined by memory constraints and not by quality of reasoning, Bruner, Olver & Greenfield (1966) showed that perceptual overloading can also be responsible for failure, Porpodas

(1987) found that the discussion between the experimenter and the child during the transformation phase interferes with children's reasoning, Elbers, Wiegersma, Brand & Vroon (1991) pointed out the strategy of giving the answer (children try to avoid repetition of the same response), Donaldson (1978) suggested there was influence of children's familiarity with the content (material) of the concrete-operation tasks etc. There are also several studies concerned with the role of transformation: with the transformation done by the experimenter or the child (Greenfield, 1966), performed voluntarily by the experimenter or incidentally by "naughty teddy" (McGarrigle & Donaldson 1974/1975), or embedding the transformation and the subsequent question in some natural ongoing interaction (Light et al., 1979; Miller, 1982). Roazzi & Bryant (1997) showed that children had done better when they measured the quantities than when they simply made perceptual comparisons. Likewise, the demand for justification of the child's answer was questioned implying it might underestimate the child's reasoning (e.g. Brainerd, 1973, 1974). In addition, some authors challenged the validity of the conservation task by implying that the different social factors are in correspondence with children's performance: the social class the child belongs to (e.g. Perret-Clermont, 1980; Doise, Mugny & Perret-Clermont, 1981; Roazzi & Bryant, 1997), the institutional context the testing is done in (e.g. Schubauer-Leoni, Bell, Grossen & Perret-Clermont, 1989; Elbers, 1986), social marking (e.g. Doise, Mugny & Perez, 1998), etc. Moreover, studies of the microprocess or (co)construction of conservation suggest that cognitive and social competencies (social relations, social interaction and communication) are interwoven, and at the same time embedded in the specific cultural-social-institutional context, so it is hard to study them independently (e.g. Schubauer-Leoni, Perret-Clermont & Grossen, 1992; Marro Clément, 1999). Although some of these findings were not repeated in the following studies (see Miller, 1982; Eames, Shorrock & Tomlinson, 1990), the global impression is that the relationship between the conservation task and the quality of reasoning is not at all as simple as Piaget's theory assumed.

## **Conservation or Conversation?**

An alternative explanation of children's performance in the conservation task is the conversation between the child and the experimenter. It is suggested (e.g. Rommetveit, 1976; Light & Perret-Clermont, 1989; Siegal, 1991) that the children's performance is determined not only by the cognitive factor, but also by conversation and communication rules, language comprehension, the child's interpretation of experimenter's intentions, the power relation between adults and children etc. The conversation factors may influence children to give pre-operational (PO) answers although they are at the CO stage of cognitive development.

To explain this possibility, Siegal (1991) assumes that children have rich implicit, but poor explicit CO knowledge. The implicit knowledge is context

bounded, and its use is dependent on familiarity of context, i.e. the child can solve a task in a familiar context. Since the standard conservation task is a strange and unfamiliar context for children, they cannot apply their implicit CO knowledge. Consequently, the researcher could make a wrong, false negative conclusion about the cognitive level of the child, i.e. to classify a CO child as PO one. Thus, instead of a conceptual limitation, the children's incorrect answers may reflect some characteristics of testing communication (uncertainty, misinterpretation of meaning or purpose of the question, desire to give attention-seeking answers or simply a wish to end the conversation). Therefore, according to Siegal, the conservation task is not only a cognitive task, but also a social one.

### **The repeated question as a critical factor of children's performance**

Several authors (e.g. Rose & Blank, 1974; Samuel & Bryant, 1984; Porpodas, 1987; Siegal, 1991) pointed out the fact that the same question is being repeated in the standard conservation task. At the beginning of the procedure, the experimenter asks the child if there is the same amount of liquid in the two glasses or whether one has more or less liquid. After that, the liquid is poured into a different glass and the experimenter repeats the same question. The meaning of the first question is to define the starting relation regarding the amount of liquid in the glasses, and the meaning of the second one is to test again whether the child understands that there *must be* the same amount of liquid in both glasses.

The repeated question (RQ) may mislead CO children into giving the wrong answer. It is widely known that sometimes adults repeat a question when the child gives a wrong answer (Mishler, 1972, as cited in Elbers, 1986; Walkerdine, 1982; Kaye, 1982). It is an implicit communicative sign that the first answer is wrong, or that the child should think again to find a better answer. It happens in school as well as in the family context. Since this kind of experience is a part of everyday communication with adults, children may see the RQ in the standard conservation task as an implicit sign that their first answer was wrong. Therefore, even the child who is at the CO stage may be misled into saying that after the transformation, the two glasses do not contain the same amount of liquid. In this case, the wrong answer would not be affected by his/her inability to conserve the quantity of liquid, but by an interpretation of the meaning of the RQ.

#### *Studies of the effect of the repeated question*

**Rose & Blank (1974).** The first research study of the effect of the RQ on children's performance was done by Rose & Blank. They stressed the fact that "in the normal (nonexperimental) course of events, however, one would never pose an

identical question twice if a *significant change* (italics added) had not occurred" (1974, p. 499).

They tested possible effects of the RQ by comparing children's performance on two versions of the conservation of number task: one-question vs. two-question version. It was assumed that the repeated question was the only difference between these two procedures. Actually, three procedures were used: (1) the *standard* (presentation of two arrays of disks, first question, transformation, second question), (2) the *one question* (presentation of two arrays of disks, transformation, question), and (3) the *fixed array* (presentation of two arrays in an order typical for post-transformation state, question).

Comparison between the standard and the one-question procedures was aimed at testing the RQ hypothesis, and the comparison between the one-question and the fixed array procedures was supposed to test whether children took the transformation into consideration. This is important because children being tested with the one-question procedure could focus solely on the perceptual configuration of two arrays. In this case, children's performance would not be a sign of conservation thinking.

Three groups of children with 28 first graders each (mean age: 6;3) were tested with one of the three procedures. Each child was tested with four tasks: two tasks consisted of equal arrays (5 and 5, 6 and 6), and two had unequal arrays (4 and 6, 5 and 7). It should be noted that the children were not asked for justification of their answers.

Reported results suggested that the one-question procedure was easier than both other procedures, and that inequality tasks were easier than equality ones. The findings were interpreted as evidence for the hypothesis that the child "interprets the request for a second judgment as a signal to change his response" (p. 500).

Although the results seem very suggestive, three pieces of methodological information are missing, which represents a constraint for the evaluation of this study. First, there is no information about the strategy used to divide children into three groups. It could be supposed that random distribution was used, but this is not reported. Second, at the end of the task the children were asked "whether the two rows have the same number of disks", but it is not clear what had been accepted as a correct answer, especially in the tasks with unequal arrays: was it enough for the child to answer "different" or could the child just point towards the row with more disks? In case the answer "different" was sufficient, this would have been at least one source of the difference between equality and inequality tasks. Third, it is not reported what the pre-transformational arrays were and what kind of transformations were used in the standard and the one-question tasks.

Having these in mind, what can be concluded from the results of the study? Could we conclude that the one-question procedure is easier than the standard one because of the misleading effect of the RQ? We should note that in 30% of tasks with an equal number of disks, the children were not misled with the RQ in the standard procedure. This means that being misled would not necessarily happen each time. In addition, 42% of children gave a wrong answer on the one-question

tasks with an equal number of disks. If we accept that this task measures real competence of children contrary to the standard procedure (assuming that children were randomly ascribed to groups), this means that the same percentage (42%) of children tested by the standard procedure did not understand conservation of number. Therefore, 30% of children understood conservation of number in such a firm way that the RQ did not mislead them, and 42% of children had no understanding of the conservation of number. This means there were about 28% of children who might have been misled by the RQ. *Thus, the RQ can mislead some, but it cannot be an explanation for all the children in the study.*

**Neilson, Dockrell & McKechnie (1983).** The study was aimed at testing the results of the study of Rose & Blank (1974). It tested whether the RQ was by itself sufficient to mislead children. It also tested the generality of results regarding other conservation tasks and age groups.

*The first experiment* dealt with the conservation of number and length tasks. Children were randomly assigned to three groups (32 children in each, age range: 5;9 - 6;7, mean: 6;3). The first one was tested with the standard procedure. The second group was tested with the following procedure: pre-transformational array, question, repetition of the question. The same procedure was used for the third group, which was presented only with the post-transformational array. The second and third groups were used to test whether the repetition of the question itself could induce children to change their answer. Each child was given four tasks: two conservation of number tasks (one with equal number and one with unequal number arrays: 4-4, and 5-4 elements) and two conservation of length tasks (one with equal length and one with unequal length string). Half of the children in each group were asked to justify their answers.

The results showed that a small number of children in the second and third group changed their answers after the question was repeated: no one changed the answer in the conservation of number with equal arrays, and the biggest proportion of changed answers was found in the conservation of length with equal lengths - 4 out of 32 (12.5%). With regard to justification, in the conservation of number task, most of the children (70%) used counting (" 'cos there's four there and four there"). Children who were tested with the standard task showed a somewhat different pattern of data. About half of them (47% in the conservation of number task, and 56% in the conservation of length task) changed their answer after transformation, i.e. gave a PO answer. Children who did not change their answers (i.e. gave a CO answer) mostly used counting in the conservation of number task (54% justified by the counting, and 31% by the logical criterion), and had the biggest amount of logical justifications in the conservation of length task (53% used a logical criterion, and 33% used a perceptual argument). Based on the results of the second and third groups, the authors concluded that "the repetition of the conservation question *per se* is insufficient to induce a change of judgment in the child" (p. 167).

However, they were aware of the important differences between procedures they used and the standard procedure. The transformation as a key component of the conservation task was not present in the second and third tasks. On the one hand, it

seems that the RQ without transformation could be the best test of its effect since this procedure is the most similar to the prototype of the RQ in the everyday life (for example, when the teacher repeats the same question after the child's answer). In this case, the result was contrary to everyday experience. On the other hand, if we are interested specifically in the misleading effects of the RQ *in the context of the standard conservation task* the very structure of the task should be maintained. Since the structure of the second and third tasks were different from the standard one in an important aspect, it is very hard to make a conclusion about the effect of the RQ within the standard procedure, based on these results.

*The second experiment* tested the generality of the Rose & Blank (1974) results. There were five groups of children (each consisted of 32 children). Three groups were tested with the same procedures used in Rose & Blank's experiment (the standard, the one-question, the fixed array), but instead of the conservation of number task, the children were tested with the conservation of liquid and weight tasks. The fourth and fifth groups were tested with the conservation of number and liquid tasks, but the former was tested with the one-question procedure and was given the fixed array procedure later. Similarly to the Experiment 1, the children were randomly ascribed to groups, and each child (N=160, age range: 5;9 - 6;8, mean: 6;3) was given four tasks (two conservation tasks x equal/unequal amounts). The results are shown in table 1.

**Table 1. The number of children (out of 64) who solved correctly conservation tasks (Neilson, Dockrell & McKechnie, 1983)**

Conservation task	Procedure						1 tail test	
	Standard		One question		Fixed array		Standard vs. 1Q	1Q vs. fixed
	f	%	f	%	f	%	p	p
Exp. 2 Number	34 <sup>a</sup>		57	89	56	88	<b>.00</b>	.43
Length	28 <sup>a</sup>	53 <sup>a</sup> 44 <sup>a</sup>	39	61	16	25	<b>.03</b>	<b>.00</b>
Weight	36	56	38	59	35	55	.37	.32
Liquid	15	23	24	38	17	27	<b>.03</b>	.09
Exp. 3 Number	17	27	21	33	24	38	.23	.28
Length	12	19	21	33	14	22	<b>.04</b>	.08

<sup>a</sup> These data were taken from the Experiment 1

Neilson, Dockrell & McKechnie concluded that the difference between the standard and the one-question procedures is significant only in the case of the conservation of number tasks, which means that Rose & Blank's findings cannot be generalized (they are specific for the conservation of number task). However, this conclusion is not correct because they used the two tail test while the one tail test

would have been appropriate.<sup>3</sup> When these results are reanalyzed a different conclusion is drawn (see Table 1, last two columns). The findings concerning the difference between the standard and the one-question procedure are repeated in all cases except in the conservation of weight task. Contrary to that, the finding concerning the difference between the one-question and the fixed array procedure is confirmed only in the conservation of length task. Moreover, the analysis of justification in the conservation of number task suggests that the children used more counting in the one-question (41%) and the fixed array procedure (56%) than in the standard procedure (22%). Reanalysis of differences showed that none of these were statistically significant.

In the *third experiment*, younger children were examined (N=96, age range: 4;0 - 5;2, mean: 4;7). They were randomly divided into three groups. All children were tested with the conservation of number and length task, but each group was tested with one of the three procedures used by Rose & Blank (1974): the standard, the one-question, and the fixed array. After reanalysis of data, it is shown that the one-question procedure was easier than the standard only in the case of the conservation of length task. None of the differences between the one-question and the fixed array procedures were significant.

**Samuel & Bryant (1984)** also tested the generality of the Rose & Blank study with children of different ages (5, 6, 7 and 8 years old). Every group was divided into 3 subgroups, and each underwent only one of the three procedures: the standard, the one question, and the fixed array. Three conservation tasks were used: number, weight, and volume. Each child was tested with four items from each of these conservation tasks: two with equal and two with unequal quantities (total: 12 tasks). The mean errors are presented in table 2. The authors reported results of ANOVA showing that all the main effects were statistically significant, but the interaction effects were not. The most important finding was the significant main effect of the procedure, specifically the one-question procedure with transformation, which was significantly easier than the other two procedures. Samuel & Bryant concluded that "the consistent superiority of the one-question condition leads inexorably to one conclusion. Children who fail the traditional conservation task often do understand the principle of invariance and make their mistakes for a quite extraneous reason. They produce the wrong answer because the experimenter's repetition of the same question about the same material makes them think that they must change their answer the second time." (p. 318).

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<sup>3</sup> The hypothesis of Rose & Blank (1974) claims that the one-question procedure is easier than the standard one, not that there is a difference between these two procedures.



**Table 2. Mean of errors (out of 4) for four age groups, three conservation tasks, and three procedures accompanied with one-tail t-tests (Samuel & Bryant, 1984)**

Age yr.	Conservation task	Procedure						1 tail t-test	
		Standard		One question		Fixed array		Standard vs. 1Q	1Q vs. fixed
		M	SD	M	SD	M	SD	p	p
5	Weight	2.76	1.11	2.10	1.44	2.52	0.91	<b>.05</b>	.13
	Number	2.52	1.62	2.10	1.54	2.62	1.46	.19	.13
	Volume	3.24	1.19	3.05	1.29	3.29	0.82	.31	.24
6	Weight	1.57	1.25	1.29	1.35	2.14	1.08	.24	<b>.01</b>
	Number	1.81	1.47	1.38	1.76	1.48	1.37	.20	.43
	Volume	2.29	1.70	1.67	1.52	2.76	1.23	.11	<b>.01</b>
7	Weight	0.95	1.43	1.00	1.41	1.29	0.98	.46	.23
	Number	1.14	1.42	0.38	0.84	1.43	1.62	<b>.02</b>	<b>.01</b>
	Volume	1.14	1.58	1.00	1.41	2.24	1.15	.38	<b>.00</b>
8	Weight	0.67	1.32	0.38	0.84	0.90	0.87	.20	<b>.03</b>
	Number	0.43	0.79	0.24	0.61	0.62	0.84	.19	<b>.05</b>
	Volume	0.57	1.22	0.67	1.32	1.71	1.31	.40	<b>.01</b>

However, a closer examination of the data presented in table 2 suggests a somewhat different conclusion. The ANOVA test suggests that there is at least one statistically significant t-test, but it is necessary to make an additional t-test analysis to find out which difference(s) in the mean errors are significant. Following this, a t-test analysis of mean errors was made<sup>4</sup> (since the hypothesis based on the previous research was that the one-question procedure was easier than the standard one, a one tail t-test was done). The analysis shows that there are only two statistically significant differences between the standard and one- question procedure: the conservation of number task for 7 year-olds, and the conservation of weight for 5 year-olds. On the other hand, there are 7 out of 12 significant differences between two versions of one-question procedures. Therefore, it is hard to conclude that the research repeated the findings of Rose & Blank study (1974). It is also hard to say that the finding is general regarding different age groups and different conservation tasks.

**Porpodas (1987)** questioned whether the same results found in the Samuel & Bryant (1984) study could be repeated with Greece children. The design of the experiment was very similar to the one in Samuel & Bryant (1984). There were three groups of children (first and second grade of primary school), and each was tested with one of the three procedures: the standard, the one-question, and the fixed

<sup>4</sup> It should be noted that the additional t-test analysis is made based on the data presented in the original article (Samuel & Bryant, 1984), and not with raw data.

array. Each child was tested with the conservation of number and the conservation of volume task (four tasks each: two with equal and two with unequal quantities). The results (presented in table 3) show again that no clear conclusion about relative difficulties of the standard and one-question procedure can be drawn.

**Table 3. Mean of errors (out of 4) for two age groups, two conservation tasks, and three procedures accompanied with one-tail t-tests (Porpodas, 1987)**

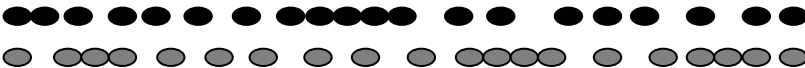
Age yr.	Conservation task	Procedure						1 tail t-test	
		Standard		One question		Fixed array		Standard vs. 1Q	1Q vs. fixed
		M	SD	M	SD	M	SD	p	p
6	Number	2.06	1.80	1.19	1.60	2.30	1.55	<b>.02</b>	<b>.00</b>
	Volume	2.68	1.85	2.26	1.93	2.90	1.42	.19	.07
7	Number	1.03	1.49	1.06	1.34	1.03	1.32	.46	.46
	Volume	1.94	1.94	1.13	1.54	1.74	1.63	<b>.04</b>	.07

Miller (1977) also compared one and two-question procedures with respect to the conservation of number and the conservation of liquid quantity. In addition, children were asked to give a justification of their judgments. The percentage of correct judgments for the one-question conservation of number was .47 (with justification: .44), and .44 and .34 respectfully for the two-question procedure . In the case of the conservation of liquid, the percentages were .34 (with justification: .31) for the one-question procedure, and .44 and .38 for the two-question procedure. None of the differences were statistically significant. This means that the study did not replicate the results of Rose & Blank (1974), while also suggesting there is no difference between with- and without-justification procedures.

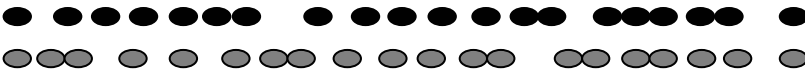
Siegel, Waters & Dinwiddy (1988) research dealt with the conservation of number task. Children aged 4, 5, and 6 were tested with both the one-question and the standard procedure (the order was balanced). Two arrays of buttons (Figure 2) were used; each consisted of 20 buttons of specific color (red or blue).

**Figure 2. An illustration of pre-transformational and post-transformational arrays used in Siegal, Waters & Dinwiddy (1988)**

Pre-transformational array



Post-transformational array



In the standard procedure, the pre-transformational array was presented to the child. The task was to "point at the row which had more buttons". A button of the same color as the pointed array was given to the child to hold in her/his hand. After that, the experimenter rearranged the rows as shown in figure 2, and the child was asked again to "point at the row which had more buttons". In the pre-transformation phase of the one-question procedure, the child was asked to "think about which row had more buttons". The child did not give the experimenter her/his answer, but would take a button (out of sight of the experimenter) which was the same color as the row with more buttons. The result showed that children produced significantly more consistent (CO) answers with the one-question (63% vs. 43%). An advantage of this study was that the same children were tested with both procedures. Unfortunately, results on cross-tabulation of their answers were not reported. This would have been significant since an implication of the RQ hypothesis is that no child would succeed on standard, and fail on the one-question procedure (see more below).

In order to test whether children interpret the RQ as an implicit sign that the previous answer should be changed, another experiment was carried out. Children (4, 5, and 6 years old) had been presented video records of puppets tested by the one question and standard procedure, and they were then asked to explain why the puppet had given a certain answer (external cause, i.e. "just to please the grown up", or internal cause, i.e. "the way the puppet really thought was true"), and to indicate certainty of choice ("not sure at all", "half sure", and "very sure"). The results showed that 69% PO answers in the standard procedure, and 44% in the one-question procedure were explained by an external cause. In addition, taking the level of certainty into consideration, the explanation of PO answers in the one-question procedure was mostly "internal, not at all sure". In the standard procedure, the answers were divided between "external, not at all sure" and "external, half sure". On the other hand, CO answers in both procedures were explained mostly by an internal cause (between "internal, half sure" and "internal, not sure at all").

### *Conclusion about existing research*

As a summary, two points should be stressed.

First, after close reanalysis of existing results we can conclude that the difference between the standard and one-question procedure is not so clear. The difference was found in some cases, but not in others. Moreover, in the second Porpodas study the standard task was even easier than the one-question task.

Second, the fact that the one-question procedure is easier is interpreted as evidence that children interpret the RQ as a sign that their first claim was wrong. Considering the fact that in all studies *different groups* of children were tested by different procedures, it is not possible to draw this conclusion *directly* from the results. In order to test the RQ hypothesis directly, it is necessary to measure the

sensitivity of children to the RQ as well as to show that sensitive, but not insensitive children, change their answer when they are tested by the standard procedure. It calls for the task to be a within group, and not a between group variable.

### A new way to test the RQ hypothesis more directly

The main goal of the study is to test the RQ hypothesis in a more direct way. It assumes that children's behavior on the standard conservation task is determined by both cognitive and social factors (the RQ), contrary to Piaget who assumed just the cognitive factor. An empirical test of the RQ hypothesis is based on a study of RQ influence in the case when the cognitive factor is controlled.

In order to control the cognitive factor, a modified version of conservation task is designed. In the modified version of the conservation task, the liquid (MT) is poured into a glass with *the same dimensions*, contrary to the standard task (ST) where the liquid is poured into a glass with different dimensions (see figure 1 and 3). In the ST liquid is poured into a glass with different dimensions to create a difference between appearance and reality, and thereby cause different answers between CO and PO children. In the MT the liquid is poured into a glass with same dimensions in order to suspend the difference between appearance and reality. This means that both CO and PO children would behave in the same way regardless of their cognitive level. In this way, the MT controls the cognitive factor .

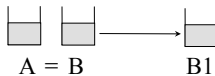
*Figure 3. Modified procedure of the conservation task (liquid quantity)*

I Starting relation



Do the two glasses contain an equal amount of liquid, or does one contain more, and the other one less?

II Transformation



Appearance = Reality

III Ending relation



Do the two glasses contain an equal amount of liquid, or does one contain more, and the other one less?

How are children likely to behave on the MT? If children's behavior is influenced only by the cognitive factor, as Piaget claims, then both CO and PO should give the correct answer (PO should give the correct answer because of correspondence between appearance and reality). Contrary to Piaget, the RQ hypothesis assumes both cognitive and social factors. Since the cognitive factor is controlled in the MT, children can change their answer only due to repetition of the question. Therefore, children who change their answer on the MT could be classified as "sensitive to the RQ", i.e. children who are misled by the RQ.

How could the MT help to test the RQ hypothesis directly? First, if the MT "measures" children's sensitivity to the RQ, and if the RQ can mislead children on the ST, then there should be no children who change their answer on the MT and pass the ST successfully. In other words, the child who would be misled by the RQ in the MT should also be misled in the ST, which means that the child has to give a wrong answer in the ST (table 4). Second, if the RQ factor influences children's answers on both MT and ST then it would be necessary to get a positive correlation between these two tasks.

**Table 4. The possible categories of answers on the standard and the MT according to the RQ hypothesis**

Answers on the standard task	Answers on the modified task	
	Changes answer (sensitive to the RQ)	Doesn't change answer (not sensitive to the RQ)
Different amount of liquid	possible	possible
Same amount of liquid	<b>not possible</b>	possible

## METHOD

### Participants

58 middle class urban children (26 boys, and 32 girls) who attend first grade of primary school (age range: 7;1-8;5, M=7;11).

### Variable

*Sensitivity to repetition of the question estimated by the modified task* - two levels: (a) sensitive child (child who changed the answer after the transformation),

and (b) non-sensitive child (child who gave the same answer before and after the transformation).

*Level of cognitive development* estimated by the ST - two levels: (a) PO child (claims that the amount of liquid is different after the transformation), and (b) CO child (claims that the amount of liquid is the same after the transformation and gives an appropriate explanation).

## Procedure

Each child is tested individually by both ST and MT. The order of task presentation is balanced.

## RESULTS

The results show that 24 (40.4%) children had changed their answer on the MT, i.e. they are sensitive to the RQ.<sup>5</sup> The standard task was completed by 57 children - 36 of them (63.2%) were classified into the PO group, and 21 (36.8%) into the CO group (correspondence table is presented in table 5).

*Table 5. Crosstabulation of children's performance on the ST and MT*

Standard task	Modified task		Total
	Sensitive on the RQ	Not sensitive on the RQ	
PO	<b>16</b> 44.4% 69.6%	<b>20</b> 55.6% 58.8%	<b>36</b> 63.2%
CO	<b>7</b> 33.3% 30.4%	<b>14</b> 66.7% 41.2%	<b>21</b> 36.8%
Total	<b>23</b> 40.4%	<b>34</b> 59.6%	<b>57</b>

$\chi^2=0.68$ ,  $df=1$ ,  $p=0.41$

There is no statistically significant correlation between answers on the ST and MT. This means that there is no difference between children who are and who are not "sensitive" to the RQ with respect to their performance on the ST (in both groups

<sup>5</sup> Half of those (12 children), who changed the answer, said that the glass A contained more liquid than the glass B1, and the other half told the opposite.

about 37% of children solved the ST). Thus, there were children who gave the correct answer on the ST, despite of their sensitivity to the RQ.

## CONCLUSION

The results have shown the following: (a) some children changed their answers on the MT, and (b) there were children who changed their answer on the MT and solved the ST with no statistically significant correlation between these two tasks.

The first finding is in accordance with the RQ hypothesis since changing of the answer in the MT can be explained only by the repetition of question since the MT is designed in such a way so that the child's answer is independent of the level of cognitive development.

The second finding, however, is not in accordance with the RQ hypothesis. First, some children who are sensitive to the RQ succeeded in solving the ST, which is not possible according to the RQ hypothesis. Second, the fact that there is no correlation between ST and MT suggests that there is no common factor influencing the child's answer on both tasks. This means that if the RQ influences the child's answers on the MT, it does not influence the child's answers on the ST.

Why would the RQ influence the child's answers on the MT only? It seems that this finding can be explained by the context in which an adult repeats the question. If we consider the ST, we can see that an important change has happened between the two questions - the liquid is poured out from one glass into a different one, which might make the second question meaningful for children. Rose & Blank (1974) said that children expected "one would never ask the identical question twice if a *significant change* (italics added) had not occurred" (p. 499). In the ST, the child observes some change in the setting and because of that, the second question might not be taken as repetition of the same question. On the other hand, there is no such change in the MT, since liquid is poured into the same glass. Therefore, the second question can be treated as repetition of the first question, and the repetition might be interpreted as an implicit communication sign for children to change their answer. According to that, it could be concluded that the RQ hypothesis is confirmed for the MT, but not for the ST.

Taking into consideration the findings based on reanalysis of results of previous studies about the RQ showing that these results are vague, it can be concluded that the issue of the repeated question and its role in the conservation tasks is still open.

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## REZIME

### **KONZERVACIJA ILI KONVERZACIJA: TESTIRANJE HIPOTEZE O PONAVLJANJU PITANJA**

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Osnovna tema ovog rada je provera hipoteze kojom se tvrdi da ponavljanje pitanja u zadacima konzervacije može biti razlog da deca koja su inače dostigla konkretno-operacionalni stadijum daju pre-operacionalni odgovor. U zadacima konzervacije deca se prvo suočavaju sa dva objekta koji su jednaki po nekoj dimenziji (npr. dve iste čaše koje sadrže istu količinu vode) i treba da odgovore na pitanje da li su dva objekta isti po datoj dimenziji ili je jedan veći, odnosno manji (u pomenutom primeru: Da li u obe čaše ima isto vode ili u jednoj ima više, a u drugoj manje vode?). Kada dete potvrdi da su dva objekta identična u pogledu date dimenzije (u pomenutom primeru: količine vode), vrši se transformacija jednog od objekata, ali takva transformacija koja ne dovodi do promene transformisanog objekta u pogledu date dimenzije (u pomenutom primeru: presuti vodu iz jedne čaše u drugu čašu različitih dimenzija ne menja količinu tečnosti). Konačno dete treba da odgovori na pitanje koje je identično pitanju koje je postavljeno pre transformacije (Da li u obe čaše ima isto vode ili u jednoj ima više, a u drugoj manje vode?). Prema Pijažeu zadaci konzervacije su pouzdani indikator konkretno-operacionalnog mišljenja. Međutim, različiti autori su smatrali da deca mogu biti zbunjena ponavljanjem istog pitanja i da ta okolnost može da dovede do toga da deca koja već imaju sposobnost konkretno-operacionalnog mišljenja daju pre-operacionalni odgovor. U osnovi ove hipoteze je pretpostavka da su deca stekla naviku u okviru svakodnevne komunikacije da ponavljanje istog pitanja u kontekstu kada se ništa bitno nije promenilo predstavlja implicitni znak detetu da treba da promeni svoj prvobitni odgovor. Na osnovu ove pretpostavke deca bi razumela ponavljanje pitanja u zadatku konzervacije na isti način i to bi ih navelo da nakon transformacije umesto da izraze uverenje da u dve čaše ima ista količina vode (na šta ih navodi konkretno-operacionalno mišljenje) daju odgovor da u dve čaše ima različita količina vode (na šta ih navodi komunikacija sa eksperimentatorom, tj. ponavljanje istog pitanja).

U članku su prikazana dosadašnja istraživanja koja su imala za cilj proveru ove hipoteze. Pored toga, rezultati ovih istraživanja su ponovno analizirani što je dovelo do delimične revizije zaključaka koji su sami autori izveli na osnovu svojih

rezultata. Pregled i ponovna analiza rezultata dosadašnjih istraživanja naveli su nas na dva zaključka: (a) na osnovu postojećih nalaza ne može se doneti zaključak o tome da li ponavljanje pitanja zaista utiče na odgovore dece na zadacima konzervacije, i (b) u dosadašnjim istraživanjima efekat ponavljanja pitanja u zadacima konzervacije je ispitivan na indirekatan način (različite grupe ispitanika rešavale su različite verzije zadatka konzervacije) što ne omogućava izvođenje pouzdanih zaključaka i da je neophodno da se dizajnira istraživanje u kojem bi se ova hipoteza direktnije testirala.

Direktniji test hipoteze o ponavljanju pitanja omogućen je dizajniranjem modifikovane verzije zadatka konzervacije količine tečnosti. Modifikovani zadatak konzervacije se razlikovao od standardnog zadatka po tome što je tečnost iz jedne čaše presipana u čašu koja je bila identična čašama koje su korišćene pre transformacije. Na taj način i deca sa pre-operacionalnog i sa konkretno-operacionalnog stadijuma mogu dati tačan odgovor čime je izvršena kontrola kognitivnog faktora u zadatku konzervacije. Dakle, ukoliko bi dete promenilo svoj odgovor na modifikovanom zadatku to bi značilo da je dete osetljivo na ponavljanje pitanja što znači da ovaj zadatak ispituje osetljivost ispitanika na ponavljanje pitanja u zadatku konzervacije. Pored toga, u istraživanju koje je prikazano u okviru članka, isti ispitanici (58 učenika prvog razreda iz Beograda prosečnog uzrasta 7;11) su rešavali i modifikovani zadatak i standardni zadatak konzervacije tečnosti (balansiranim redosledom) čime je omogućeno da se ispita da li će deca koja su pokazala osetljivost na ponavljanje pitanja (promenila odgovor na modifikovanom zadatku) istovremeno dala pre-operacionalni odgovor na standardnom zadatku što bi moralo da se desi ukoliko je hipoteza o ponavljanju pitanja ispravna. Drugim rečima, implikacija hipoteze o ponavljanju pitanja je da treba da postoji korelacija između standardne i modifikovane verzije zadatka konzervacije.

Rezultati istraživanja nisu u skladu sa implikacijama koje slede iz hipoteze o ponavljanju pitanja. Prvo, postojali su ispitanici koji su menjali svoj odgovor na modifikovanom zadatku i istovremeno davali konkretno-operacionalni odgovor na standardnom zadatku. Drugo, nije postojala korelacija između odgovora dece na modifikovanom i standardnom zadatku konzervacije.

Dobijeni rezultati sugerišu da ponavljanje pitanja deluje u modifikovanom zadatku, ali ne i u standardnom zadatku konzervacije. Moguće je da u standardnom zadatku konzervacije ponavljanje pitanja deca doživljavaju kao smisleno s obzirom da se između dva pitanja nešto bitno promenilo u situaciji (tečnost je presuta u čašu koja je drugačijeg oblika) i da stoga deca nisu zbunjena ponovljenim pitanjem. Takođe, s obzirom da se nešto bitno desilo između dva pitanja deca ne doživljavaju drugo pitanje kao bezrazložno ponavljanje prvog pitanja pa samim tim ne postoje uslovi da deca drugo pitanje doživljavaju kao implicitni znak da je njihov prvobitni odgovor bio pogrešan.

***Ključne reči:*** *Piaget, kognitivni razvoj, konzervacija, konverzacija, ponovljena pitanja*