

## “Is there an equal (amount of) juice?” Exploring the repeated question effect in conservation through conversation

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**Abstract** The aim of this paper is to highlight and discuss advantages and constraints of different methods applied within the field of children's thinking studies, through the test of the repeated question hypothesis validity, using the conservation of liquid task. In our perspective, the Piagetian interview is an ecologically valid context for externalization and modification of children's thinking. We used an experimental procedure organized in standard and modified tasks, involving primary school children in Serbia. The results of quantitative and qualitative analyses show that the repeated question is not the unique cause of children's misleading in demonstrating to understand conservation. Other dimensions explain why children change their answers when they are tested by the two tasks we used, which offers an insight into the influence of research procedures on children's answers.

**Keywords** Conservation · Repeated question · Piagetian task · Dialogical thinking · Conversation · Conversation analysis

The main purpose of this paper is to reflect on different approaches of exploring children's thinking, as well as to study how students' understanding and learning of a key concept (conservation) can be shaped and transformed through assessment interview and peer conversations. Therefore, the study presented in this paper has two goals: (a) to offer a critical view on testing procedures by further exploration of the repeated question hypothesis

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which claims that children who understand conservation principle might be misled by the repetition of the same question in the standard conservation task and give a non-conservation answer and (b) to analyze how children's understanding of conservation can be constructed through joint peer discussions. In this study, we are going to combine experimental and qualitative methodologies to demonstrate how their meaningful coordination can be fruitful for studying the interplay between learning and social processes.

### Studying students' thinking and learning through peer conversation

Studies on thinking through dialogical activity within peer dyads and groups have been used typically for enquiry of cognitive, social, and other gains of social interaction, group work, project work, and other forms of group activities (Littleton and Howe 2010; Tartas et al. 2010; Olry-Louis and Soidet 2008; Trognon et al. 2008). On the other side, analyses of student dialogues over certain tasks can be used also as methodological tools for understanding how students think and learn, e.g., how students understand a task, which dimensions of the task are considered, which information is taken as relevant, how one can build arguments and come to a conclusion (Sorsana 2008; Tartas and Perret-Clermont 2008). Such use of students' dialogues was suggested by Vygotsky in his pivotal book "Myslenie i rec": "To study an internal process, it is necessary to externalize it experimentally, by connecting it with some outer activity; only then is objective functional analysis possible" (Vygotsky 1934/1962, p. 227).

Assuming that dialog during the Piagetian interview is an ecologically valid context for externalization of students' understanding and its transformation, in this paper, such approach is employed to inquire students' understanding of the concept of conservation (Piaget and Szeminska 1941) and how it can be shaped through conversation with peers. This is of great importance taking into account the need to consider the influence of procedures we use in exploration of children's thinking on the way children answer the tasks they are faced with.

### The conservation: Piaget's essentialist view and its validation

The conservation still attracts attention of researchers looking for the explanation, although, so far, only many different ones were formulated (e.g., Shultz 1998; Houdeé and Guichart 2001; Suda and Call 2006). About the same time when Vygotsky formulated the above-mentioned methodological assumption on studying interplay between internal and social processes, Piaget and his associates put on the stage the assumption that logical, operational thinking emerges in the children's thinking about their seventh birthday enabling them to overcome constraints of the previous egocentric thinking (Piaget and Szeminska 1941). This is an attractive image of internal cognitive revolution in children's thinking and learning—before the "cognitive revolution" the child is not able to coordinate different perspectives and aspects of phenomena. Only after is the child able to do that. The conservation task plays a pivotal role in such *essentialist* conception since it is defined as a reliable and valid marker of such revolutionary change happening at the level of internal cognitive structures enabling children to understand and learn new ideas in and out of school.

The strong validity of the conservation task has been criticized widely in previous decades showing that the child's answers on the conservation task might be a result of different cognitive, non-cognitive, and contextual factors other than (pre)operational thinking—

perceptual overload, framing of the conservation task, who performs the transformation, whether the conservation task is embedded in some natural ongoing interaction, inability of the child to understand the mind of experimenter, what term is used in conservation questions (more or fair), lack of ability to verbalize justifications, social background of the child, the institutional context, social marking (Bruner et al. 1966; McGarrigle and Donaldson 1975; Doise et al. 1976; Donaldson 1978; Perret-Clermont 1980; Elbers 1986; Light et al. 1987; Schubauer-Leoni et al. 1989; Siegal 1991b; Roazzi and Bryant 1997; Doise et al. 1998; Psaltis and Duveen 2007; Arcidiacono and Perret-Clermont 2009). Although some of these findings were not considered in other studies (see Miller 1982; Eames et al. 1992), it can be concluded that relationship between the conservation task and the quality of reasoning is far more complex than it was assumed by the Piaget's theory.

### **Conservation or conversation, the question is now**

An alternative interpretation of the children's performance in the conservation task puts stress on structures, contents, and dynamics of conversations between the child and the experimenter. It is suggested that the child's answers in the conservation task are shaped by the kind of conversation the child is involved in (communication rules, language comprehension, child's interpretation of experimenter's intentions, power relation between adults and children) and not only by the cognitive structures/competences at all (Rommetveit 1976; Light and Perret-Clermont 1989; Elbers et al. 1991; Schubauer-Leoni et al. 1992; Winer and McGlone 1993; Marro Clément 1999). Children might have quite different understanding of the experimental setting and experimenter's intentions due to at least two reasons. Firstly, children are still developing necessary conversational competences for coping effectively with demanding communication exchanges failing to meet the Grice's maxims—quality, quantity, relevance, and clarity (Grice 1975)—as it might be the case within experimental settings. A second reason might be the children's previous experience in communication with adults (Beal 1988; Beal and Belgrad 1990). Accordingly, when unknown adults using restricted and specific jargon of the experimental discourse interview children about the conservation, children could make different meanings and strive to different goals than the experimenter. It could lead to a misunderstanding between children and the adult failing to meet presumptions of the experiment and conditions for making conclusions. Consequently, the conversation may (mis)lead the child toward claiming inequality in the conservation task although he/she might understand the equality of quantities. Therefore, the issue is born: conservation or conversation?

Siegal's work (1991a) can be used as an illustration of such approach. He made a distinction between implicit and explicit knowledge assuming that children could have a rich implicit but rather poor explicit knowledge on conservation. The implicit knowledge is developed and embedded within the context of everyday activities. It is a context-bound knowledge which use is related to and relayed on the context, so its locus of control is external one (Rotter 1990). In the case of understanding of conservation principle, it means that the child can understand implicitly, within the course of everyday activities, that a certain quality of an object is not changed in spite of changes of other characteristics. However, since, in the conservation task, the experimenter asks children to demonstrate such understanding in an unfamiliar context, they could not be able to use and apply their implicit understanding of conservation. Therefore, instead of a conceptual limitation, the lack of conservation principle in children's discourse may reflect contextual and communicative characteristics, so the conservation task is not only a cognitive task but also a conversational one.

## The repeated question hypothesis: a usual conversational suspect

Several authors (e.g., Rose and Blank 1974; Samuel and Bryant 1984; Porpodas 1987; Siegal 1991a) singled out a specific aspect of conversational patterns within the Piaget's classic procedure of liquid's conservation task. It is the fact that the same question is supposed to be repeated twice in the standard task. At the beginning of the procedure, the experimenter asks the child if there is the same amount of liquid in two glasses. Then, the liquid is poured in a glass with different shape, and the experimenter repeats the same question about the amount of liquid in the glasses. From the perspective of the experimenter and of the Piaget's theory, the function of the first question is to define the starting relation regard to the amount of liquid in two glasses, and the function of the second one is to test whether the child understands that there *must be* again the same amount of liquid in both glasses.

According to the repeated question (RQ) hypothesis, the fact that the same question is repeated may mislead concrete–operational children to fail to demonstrate their understanding of conservation. How it might happen? It is widely known that sometimes adults repeat a question when the child gives a wrong answer (Mishler 1972; Walkerdine 1982). The repeated question is an implicit communicative sign that the first answer was wrong, and the child needs to change it. For example, if parents ask the child “Did you wash your hands?” and he/she says “Yes”, in the case that parents noticed that this is not true, they could repeat the same question sending an implicit message “I know you did not wash your hand, you need to change your answer and wash your hands.” It happens in the family context as well as in the school context. Following such experience, children may understand the repeated question in the conservation task as an implicit sign that they should change their first answer. The repetition could be strongly related to an understanding of repair for a previous intervention, because the process of repair (Schegloff et al. 1977) operates not only at the level of codification and de-codification of linguistic signs but also with respect to the inferential process that is constructed by the participants' interpretations of interactional events (Maroni and Arcidiacono 2010). A repetition can be a marker or local indicator that accounts for a reformulation and a correction of a previous clause, because of the lack of alignment between speakers. In the case of the liquid conservation task, even the child who understands that the amount of liquid in two glasses is still equal after the transformation may be misled to say that the glasses do not contain the same amount of liquid. The repetition, in a way similar to repair sequences in ordinary conversation, could embody an attempt to have the child self-correct, providing him/her with an opportunity to fix the answer rather than to exhibit an understanding of the idiom (Marlaire and Maynard 1990).

Several experimental studies provided mixed evidences about the RQ hypothesis. In some cases, the “one question procedure” has proved as easier than the “two questions procedure” while, in the other studies, it has not been the case (Rose and Blank 1974; Miller 1977; Neilson et al. 1983; Samuel and Bryant 1984; Porpodas 1987; Siegal et al. 1988; Krstić and Baucal 2003; Baucal and Stepanović 2006). However, previous studies have used mostly experimental paradigms where children have been exposed to controlled interventions and researchers have formulated explanations based on the analysis of observable difference in children's responses across different conditions. In the best case, such research design allows only the formulation of hypotheses about the processes behind observable children's responses but *not insights into the process of children's understanding and thinking about the conservation task as well as the influence of the task structure on children's answers*. This is why in

this paper an experimental study will be extended with qualitative analysis of peer conversations about the conservation task.

## Method

### The study: goals and hypothesis

The main goal of our study is to test the validity of the RQ hypothesis and to identify different conversational patterns guiding children's thinking and discourse in the conservation task. We assume that the repeated question is not the unique cause of how conversation might shape children's understanding and learning of the concept of conservation.

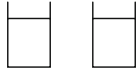
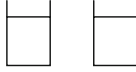
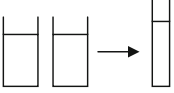
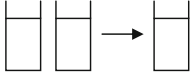
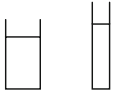

In order to overcome constraints of previous experimental studies, we paired children to solve together conservation tasks through dialogues. Inspired by the above-mentioned Vygotsky's methodological suggestion (Vygotsky 1934/1962) and by the research's tradition on dialogical thinking, we assume that it allows us to get a deeper insight into the "fabrication" (in the sense of Latour 1993) of children's understanding and learning of the conservation including the influence of research procedures on the way children answer the tasks they are faced with.

### Description of tasks

Two tasks have been used combining two procedures (see Fig. 1): the standard task of conservation of liquid (hereafter ST) inspired by the Piagetian original task and its adaptation (Perret-Clermont 1980) and a second one created through a modification of the ST (hereafter "modified task" or MT). The ST has been modified to make a task enabling the identification of children sensitivity to the repeated question. Both tasks implied three phases: initial, transformation, and final. In the initial phase, two identical glasses (A and A1) with the same quantity of liquid have been presented, and the child has been asked whether they each contained the same amount of liquid. Once the child has been established that this was the case, in the ST, the content of one glass (A1) has been poured into another taller and thinner glass (B). In the final phase, the child has been asked whether the two glasses (A and B) contained the same amount of liquid. Compared with the ST, in the second phase of the MT, the liquid has been poured into a different glass (A2) with same dimensions of the initial glass, so the transformation did not change the appearance. Since appearance and reality have been the same after the transformation, we assume that children's eventual claim that there were not the same amount of liquid indicate children's sensitivity to the repeated question and other aspects of the social context.

Children's answers in the ST have been classified into two categories following typical criteria for the conservation task: (a) conservers—claim equality of amount of liquid with appropriate justification, and (b) non-conservers—claim inequality of quantities. Children's answers in the MT have been classified also into two categories: (c) the child changes the answer after the transformation, indicating a potential effect of the repeated question or some other aspects of the social context, and (d) the child does not change the answer, indicating that the repeated question or some other social aspect did not mislead the child.

According to the RQ hypothesis, in the ST, the child might change answer in the final state due to cognitive (lack of operational thinking) or/and conversational reasons (e.g., the repeated question) while, in the MT, it can happen only because of conversational reasons. It follows: (1) children who change the answer in the MT cannot pass ST since they are

Phases	Standard task	Modified task	Question asked to children
Initial	 <p>A ? A1</p>	 <p>A ? A1</p>	Do the two glasses contain an equal amount of liquid, or does one contain more and the other less?
Transformation	 <p>A A1 B</p> <p>Appearance ≠ Reality</p>	 <p>A A1 A2</p> <p>Appearance = Reality</p>	
Final	 <p>A ? B</p>	 <p>A ? A2</p>	Do the two glasses contain an equal amount of liquid, or does one contain more and the other less?

**Fig. 1** The standard and modified tasks of liquid conservation

sensitive to the repeated question, and (2) there is an association between the two tasks since they share one factor together.

**Participants**

One hundred and four Grade 1 students have been involved in the study (50 girls and 54 boys)—7;2–8;3 years old (average age, 7 years, 8 months). Students have been selected from a suburban part of capital city of Serbia to ensure enough variability regarding to standard conservation task.

**Procedure**

The study, using the above-mentioned tasks, has been organized in two phases. In the first phase, students have been assessed individually by both ST and MT presented in a balanced order to test implications of the RQ hypothesis. In the second phase, 22 students (as a subset of the phase 1 sample) have been asked to discuss and solve together with a peer the conservation task (1 day after the first phase).

**Criteria and levels of analysis**

We have used two levels of analysis: a quantitative one to test two implications of the RQ hypothesis and a qualitative level to analyze some conversational sequences occurring during the two tasks of the experimental procedure. In particular, the quantitative analysis has been conducted using measures of association between the tasks and to account for the children’s performances on ST and MT according to different presentation’s orders of the

tasks. In the qualitative analysis, we have used the analytical methods of discourse and conversation analysis (see respectively, Antaki 1994; Edwards et al. 1992; Sacks et al. 1974; Psathas 1995).

These approaches study social phenomena as they occur spontaneously during interactions with the aim to identify and to describe the sequential patterns of discourse produced by the participants avoiding to make predictive assumptions regarding interactants' motivational, psychological, and sociological characteristics. These factors can only be invoked if the participants themselves are "*noticing, attending to, or orienting to*" them in the course of their interaction (Heritage 1995, p. 396). It is supposed that data have to be analyzed by assuming the participants' own perspective. This procedure is based on the identification of some relevant phenomena in the corpus of data, by building a *collection* of similar instances (Pontecorvo et al. 2001) that account for some relevant phenomena to be discussed as cases. In the present study, the data have been integrally transcribed (Jefferson 1985).<sup>1</sup> Two researchers reaching a high level of consent (agreement rate was 80 %) have revised all transcripts. As criteria of the qualitative analysis, we have firstly identified the adult's and child's interventions within the selected sequences, and then we have examined the relevant (informative) passages by going back to the video data.

## Results

### Quantitative analysis

Chi square test of results from the first phase has revealed a significant association between ST and MT ( $C=0.218$ ,  $\chi^2=5.187$ ,  $df=1$ ,  $p<0.05$ ) showing that those who change the answer in the MT (sensitive to the repeated question) tend to fail more in the ST, what indicates a misleading effect of the RQ or some other social aspect of the experimental design (see Table 1, "A"). It is important that the presentation's order of the two tasks moderates the association—association is significant only when the MT is presented first ( $C=.317$ ,  $\chi^2=5.032$ ,  $df=1$ ,  $p<0.05$ ) but not when the ST is presented first (compare Table 1, "A" and "B"). It means that MT had a *priming effect* on the ST but no other way around suggesting that students who had misleading experience first with the MT tend to become sensitive to the social aspects of the experimental situation in the ST and to claim a change in amount of liquid after the transformation—conditional probability of students failing ST given that they failed preceding MT is  $p=0.853$ , and conditional probability of student failing ST given that they passed preceding MT is  $p=0.562$  (see percentages for non-conservers in Table 1, "A"). Conversely, if students were exposed to the ST first, there is no association between tasks suggesting that their thinking about the conservation in the ST is not related to later thinking in the MT (see Table 1, "B"). Finally, the results also suggest that students tend to be more misled by the repeated question in MT when it is presented first—probability of student changing answer in MT although appearance of the amount of liquid is not changed after the transformation is 34/50 when MT is presented first and 24/54 when it comes after their experience about ST in which the repeated question is asked in the context of a visible change in appearance produced by pouring liquid into a glass of different shape (compare "change answer" total in Table 1, "A" and "B").

<sup>1</sup> See the Appendix A for the transcription symbols. For all participants, fictitious names replace real names in order to ensure anonymity in the presentation and in the analysis of the excerpts.

**Table 1** Cross-tabulation of children's performance on the ST and MT for both presentation orders (first MT, then ST as well as first ST, then MT) and for total sample

ST MT	A			B			C		
	MT-ST presentation order			ST-MT presentation order			Total for both presentation orders		
	Non-conserv	Conserv	Total	Non-conserv	Conserv	Total	Non-conserv	Conserv	Total
Changes answer	f	29	5	34	18	6	24	47	58
	% col	(76.3 %)	(41.7 %)	(68.0 %)	(48.6 %)	(35.3 %)	(44.4 %)	(62.7 %)	(55.8 %)
	% row	(85.3 %)	(14.7 %)		(75.0 %)	(25.0 %)		(81.0 %)	(19.0 %)
Does not change answer	f	9	7	16	19	11	30	28	46
	% col	(23.7 %)	(58.3 %)	(32.0 %)	(51.4 %)	(64.7 %)	(55.6 %)	(37.3 %)	(44.2 %)
	% row	(56.2 %)	(43.8 %)		(63.3 %)	(36.7 %)		(60.9 %)	(39.1 %)
Total	f	38	12	50	37	17	54	75	104
	% row	(76.0 %)	(24.0 %)	(100 %)	(68.5 %)	(31.5 %)	(100 %)	(72.1 %)	(100 %)

MT modified task, *f* frequencies, ST standard task, % col/row percentages per column or rows

The second finding is related to the implication of the RQ hypothesis. Students who demonstrate a sensitivity to the repeated question in the MT should not pass the ST. Results in Table 1 (bolded numbers) show that, contrary to the RQ hypothesis, there are cases indicating that some students can be misled by the repeated question in the MT but not in the ST. It might be a result of the fact that repeated questions have different meanings in the two tasks as suggested before (Baucal and Stepanović 2006). In the MT, children can be misled by the fact that the same question is repeated when nothing is really changed after the transformation (the liquid is poured into the same glass) what breaks Grice's maxims (Grice 1975) and what might puzzle students to wonder why the question is repeated and to get into the kind of reasoning assumed by Siegler (1991a, b). However, the repeated question in the ST seems more justified because it is posed after pouring into a different glass changing the appearance of the amount of liquid.

It can be concluded that the RQ in the ST might really mislead children under some conditions (when the question is repeated when nothing important in communicative setting is changed) but also that children's understanding and thinking in the standard conservation task cannot be explained only by the RQ hypothesis.

For this reason, we propose an additional qualitative analysis in order to investigate other possible aspects of the social and cognitive context that might influence the children's change of the answer as well as how it might happen. As the goal of the study was to identify different patterns of conversation which could guide children's thinking around conversation task, for the second, interactional-phase children were paired in order to have three different categories of pairs—four pairs of children who were both non-conservers and changed their answer after the transformation in the MT; two pairs of children who were both conservers but changed their answer after the transformation in MT; five pairs including one child who was non-conserver and who changed the answer after the transformation in the MT, and another one who was conserver and did not change the answer after the transformation in the MT. The number of the pairs in each category reflects the observed distribution of children's answers during the first, individual phase (see Table 1). Children from each category were selected randomly and asked to discuss about their understanding of conservation tasks and to try to agree among themselves about a joint answer. All the interactions have been held (and video recorded) in a separate room adjacent to the children's classroom.

### Qualitative analysis

Earlier studies on testing behavior have analyzed the role of interaction in standardized surveys and how the social nature of the interview affects the data. In particular, Maynard and Schaeffer (2006) have shown how participants organize their interactive relations during survey interviews alternating a tension between following the rules of standardization and enacting their practices of competent social actors. The possibility to have standardized measurement can be combined with the consideration of the social, interactional aspects of the inquiry situation. As suggested by Suchman and Jordan (1990), the researcher has to allow "recipient-designed" questions in order to experience the inquiry as an organized occasion of talk-in-interaction. This implies to understand and to analyze surveys as they are enacted through the tacit knowledge of participants, acting between what is scripted for them to do and what the immediacy of the interaction suggests them to do (Antaki and Rapley 1996).

In order to analyze the RQ effect within the discursive and conversational setting of the experiment, we use a qualitative approach (Baucal et al. 2011) aiming at illustrating other possible aspects of social and cognitive contexts that might influence children's changing answers. Basically, we consider the situation we have observed as a socially organized setting

in which participants interactively construct the feature of testing and discussing around conservation. This kind of analysis of how actors co-produce social structure locally has been realized firstly through a selection of some conversational sequences occurring in the ST and MT. As participants' interventions are considered, not as isolated turns, but as parts of sequences that frame the ongoing observed activity, we believe that the sequence plays a main role in the understanding of the interaction between the experimenter and the child. In fact, it is only possible to consider each turn with respect to the previous and following turn: "*sequence [...] (is) another candidate type of unit, the practices of which can underline the production of clumps of talk. The organization of sequences is an organization of actions, actions accomplished through talk-in-interaction, which can provide to a spate of conduct coherence and order which is analytically distinct from the notion of topic*" (Schegloff 1990, p. 53).

The presentation of excerpts aims at making clear and easy the selection of sequences, avoiding the use of pre-established categories. In fact, each excerpt has been framed in its context of production, naming each part as a case that accounts for certain types of discursive activities. In this sense, the organization of action, cognition, and talk-in-interaction is framed within situated activity systems. As suggested by Schegloff (1992), the analysis has to show how in the events being examined participants are organizing their conduct in terms of participation's frameworks, in order to show the connection between the context and what happens in talk, when participants "*may draw inferences from each others' turns to reflexively shape their understanding of the ongoing social action*" (Arminen 2005, p. 48). The focus of the analysis is not talk in isolation but the multimodal practices used by participants in interaction to achieve courses of joint conducts. Actions embedded in meaning making tasks and activities can provide an understanding on how participants actively orient to particular semiotic resources and use them as constitutive features of the activity they are engaged in (Goodwin 2000a; Mondada 2006). Through this grounded-based procedure, we have identified four main cases that account for the range of conversational situations involving experimenter and children during the conservation task we have observed in which the intra-interactional or discourse senses of context are central. The first one concerns the RQ effect and the fact that children's answer can be influenced by the adult's repetition of the same question. The second category is related to the effect of the repetition of the task as a factor that can influence children's answers. In both cases, elements of the situation (the task) and of the setting (the questions) are invoked as relevant dimensions at a contextual level. The other two categories are focused on a more personal and relational level. In fact, they refer to the dimension of the social positioning and to the influence of the experimenter on the children's answers. Due to practical reasons, excerpts of conversational sequences are thus presented only for two categories in order to offer examples of some observed case.

### Category 1. The RQ effect

The RQ effect concerns the fact that, since the level of the liquid in the MT has not changed after the transformation, children's answers in the final state should not be influenced by their level of cognitive development but only by the fact that the same question was asked twice. We will offer in this section two examples of conversations between the experimenter and the children in which this effect emerges.

Excerpt 1. Participants: Ivan, boy (7;2), Milica, girl (8;1), experimenter. During the first phase, both children were non-conservers and changed their answer after the transformation in the MT. The excerpt below is a part of the dialogue held around the ST.

- ((The experimenter is pouring some juice into glasses in order to ask children if the amount of juice in the glasses A and A1 is the same))
- 16 Exp: All right (.) Now I'll add a little bit here ((pouring into A))  
(1.0)
- 17 Milica: Now it's the sa:[me
- 18 Exp: [and tell me now if it's the same or there is  
more or less somewhere=
- 19 Ivan: =we::ll as I can see it's the same
- 20 Milica:no no no
- 21 Ivan: let me see ((approaching A towards A1))
- 22 Milica:they are not, here I'll show you= ((taking glasses))
- 23 Ivan: =wait wait wait ((taking A; the girl is still holding both  
glasses))
- 24 Milica: this way () it's not (1.0) for one li:ne ((referring to the small  
difference in terms of level of juice)) this one is bigger  
((pointing at A1 and then at A))
- 25 Ivan: ((putting A in front of A1)) let me see ((putting back A next to  
A1)) (1.5) they are not the same ((looking at the experimenter))

Excerpt 1 concerns an example of how the repetition of the question by the experimenter can activate a process of change in the children's answer. At the beginning, after the action of pouring the liquid into the glass A, Milica expresses her opinion about the quantity of juice (turn 17 "now it's the same"). In turn 18, the experimenter overlaps her intervention repeating the same instruction ("tell me now if it's the same or there is more or less somewhere"). This adult's turn seems inappropriate since the girl has already answered the question. However, although Ivan claims that there is the same quantity in the two glasses (turn 19), Milica changes in turn 20 her previous answer and then tries to persuade Ivan to change his opinion (turn 22 "they are not, here I'll show you"). Her position is now totally divergent from her starting point. She acts taking and moving glasses in order to show with accuracy that "for one line" the glass A1 is bigger than the glass A (turn 24). The action of pointing at the glasses A and A1 while expressing her answer contributes to orient a different perspective in the partner's idea about the inequality of juice. The claim that one glass is bigger is assumed as the focus of the discussion and Ivan in his turn decides to manipulate the glasses too. In other words, Milica was working to secure the orientation of the partner and to design the utterance in detail for the addressee (Goodwin 1981). Within this framework, the result is that even Ivan changes his answer and claims that the glasses "are not the same" (turn 25). His action involving the glasses has the purpose to deconstruct (Robinson and Stivers 2001) the actual context. By putting back the glass A next to the glass A1, he is preparing the next action, the claim for inequality of quantities. During the sequence, the experimenter does not make any other intervention after his second

turn. The debate and the actions that produce the change of children's answer seem to be caused by the initial repetition of the question also because the adults have introduced no other elements. The moment in which the experimenter asks to tell "now" (turn 18) to give an answer is probably interpreted by Milica as the sign that something was wrong in her first answer (turn 17). In that sense, the repetition of the question can have an effect in producing a reformulation in the children's position with respect to their answers.

Another example in which the adults' repeated question influences the children's answers is present in the following excerpt. In particular, there is a double change of opinion in the children's answers after a multiple repetition of the same question by the experimenter.

Excerpt 2. Ana, girl (7;8), Maja, girl (7;5), experimenter. During the individual phase both children were non-conservers and changed their answer after the transformation in the MT. The excerpt 2 is a part of the talk around the ST.

*((The experimenter is pouring some juice into glasses in order to ask children if the amount of juice in the glasses A and A1 is the same))*

- 51 Exp: *((pouring juice into A1))* (4.0) and tell me if there is the same now, or there is more, or less somewhere?=  
 52 Ana: =m[m:::  
 53 Maja: [the same  
 54 Ana: the same.  
 55 Exp: the same? (1.0)  
 56 Maja: it is the same like just now (.) here it's le:ss *((pointing at A1))*  
 and here it's more *((pointing at A))*  
 57 Exp: and tell me if in those two glasses (.) is there an equal /amount of/ juice (0.5) or there is more or less in one? (1.0)  
*((children are looking at the glasses))* is there in those two glasses an equal /amount of/ juice for drinking or there is more or less somewhere?  
 58 Maja: (2.0) the same *((looking at the experimenter))*  
 59 Ana: the same *((looking at the experimenter and then at Maja))*

After the first question about the amount of liquid in the two glasses, children say that there is the same quantity (turns 53 and 54). When the experimenter asks in turn 55 if there is the same amount, after a pause, Maja affirms that "it is the same like just now" (turn 56). Then, after a hesitation, she continues her turn and she changes her position about the topic of discourse: "here it's less and here it's more" referring respectively to the glasses A1 and A. The action of pointing is performed as a way to proof her claim, as index function that contributes to define the topic boundaries. Talk and gestures mutually provide to elaborate the sequence

of action and an embodied participation framework constituted through mutual orientation between speaker and addressee. The action of pointing within the speech turn has also a connecting function by which the participant keeps holding her explanation event. In the next intervention (turn 57), the experimenter is again repeating the same question twice. The result of this intervention is the immediate change in the answer of Maja (turn 58 “*the same*”). This answer is followed by the agreement of Ana who repeated the same words of Maja, looking at the experimenter and then at the other girl (turn 59).

The function of RQ is, in the mind of the experimenter, to test whether the child understands that there must be again the same amount of liquid in both glasses, after the first similar question. Our examples illustrate how concrete–operational children can be misled by repeated question and fail to demonstrate understanding of conservation.

### Category 2. The repeated task effect

The testing situation is usually affected by various elements of the context. We intend to focus here on another possible dimension that can explain why children change their answers when they are tested by the two tasks we used. This possibility concerns the influence of the *repeated task effect*. In fact, to invite children to experience more than one time the same testing situation can imply that children’s answers should be also influenced by the fact that they recognize the previous experiences around the same task (Roux 2008). Specifically, we found cases in which children make reference to the previous task experience as useful arguments to explain the agreement they have reached. By the use of specific markers (such as “*again*”), children tend to re-contextualize the situation (Ochs 1990) and to validate their arguments in order to sustain their answers.

### Category 3. The social positioning

In multiparty conversations, the consideration of the mobilization of speakers’ positions is a useful “*attempts to articulate an alternative way of reading and understanding the dynamic of human relationships within a social constructivist paradigm*” (Murakami 2007, pp. 437–438). The social positioning includes the processes through which the interactants are located within conversations (Davies and Harré 1990). The act of positioning, intended not as a sign of fixed individual states of mind but as situated in discursive practices, concerns the assignment of functions to speakers in the discursive construction of the conversation (Harré and van Lagenhove 1999). In our corpus of data, we have found situations in which children position themselves as experts, aging to stand in an appropriate place with respect to other participants. Their statements are dynamic moves to a new orientation of the situation, because the shift of their positions also determinates a repositioning of the other participants.

### Category 4. The influence of the experimenter

During the task, children are usually invited to discuss together in order to reach a unique solution about the situation at stake. However, during their exchanges with the experimenter, they can be influenced (often implicitly) by various interventions of the adult. The idea to follow a standard script could imply, in the intention of the experimenter, an attitude that lead children to intend some interventions as suggestions or attempts to re-orient the discussion. The next excerpt concerns a situation in which the children seem to consider the adult’s turns as ways to produce the acceptable answer.

Excerpt 3. Participants: Aleksa, boy (8;0), Jelena, girl (7;6), experimenter. During the individual phase, both children were conservers and changed their answer after the transformation in the MT. The excerpt 3 is a part of children's talk around the MT.

*((The experimenter has invited children to discuss together about the amount of juice in the glasses A and A2))*

25 Exp: feel free to agree, you two (.) and talk loudly and when you agree call me to tell me

26 Jelena: I have the same this ( )

27 Aleksa: ok (5.0) *((pointing at the glasses))* now [how

28 Jelena: [in this one *((glass A2))* there is more

29 Aleksa: ok but how to explain that? *((looking at the experimenter))* (6.0)

30 Jelena: well, they *((the glasses))* are the same size (2.0)

31 Aleksa: ah ah yes (.) the glasses are the same (.) *((approaching the glasses))* it's just (.) that here *((pointing at A2))* you *((the experimenter))* (.) poured a little bit more juice

32 Exp: mhm yes and (.) what is your answer?=*((to the girl))*

33 Jelena: =mhm:: that here in this *((pointing at A2))* it has more

34 Exp: m:hm::

35 Aleksa: and I think that there is [equal /amount of juice/ in both

36 Exp: [and why (.) do you said?

37 Jelena: because the glasses are the same size (2.0)

38 Exp: ok, the glasses are the same size::: and what about the /amount of/ juice?

39 Aleksa: we::ll (4.0) but you see *((addressing to the girl and pointing at the level of the juice in the glasses))* (1.0) you see how (4.0) mhm with the juice? (5.0) mhm? (2.0) what do you think? *((addressing to the girl))* (7.0) and how do you think about the juice? *((addressing to the experimenter))*

40 Exp: well if there is an equal /amount of/ juice (.) equal /amount of juice/ (.) in both glasses or there is more somewhere=

41 Jelena: =in this one it's more= *((pointing at A2))*

42 Exp: =and why? (2.0)

- 43 Aleksa: because you poured more (2.0)
- 44 Exp: do you also agree? ((addressing to the girl))
- 45 Jelena: mhm:: N:: no
- 46 Exp: well agree you two (1.0) I need your common answer so you feel free to agree
- 47 Jelena: well then the only solution is that we haven't seen correctly a::nd tha::t in this ((pointing at A2)) was more and it's still more

In the first part of the excerpt, Jelena says that there is more juice in the glass A2 (turn 28). Aleksa confirms this opinion (turn 29 “ok”), although he asks the experimenter to clarify how to make an explanation. After a long pause (turn 29), the adult does not take the turn and the children try to construct an argument to explain the difference of liquid in the two containers (turns 30–31). Within this process, the production of the action is linked reflexively to its interpretation: It is a way to encompass the interactively organized process of public recognition of a meaningful intervention through the use of appropriate semiotic resources that are available. By approaching the glasses, Aleksa is claiming that they are the same while, in the second part of his turn, the action of pointing at a specific glass (A2) highlights the difference (“*here you poured a little bit more juice*”). When the experimenter asks the girl (turn 32 “*mhm yes and what is your answer?*”), she repeats the action of Aleksa (pointing at A2) to affirm that there is not the same amount of juice in the glasses because, although the glasses are the same, the experimenter has poured more in the glass A2. The intervention of Aleksa seems to be a display of a reflexive awareness for the constitution of the children’s claims. However, the next intervention of the experimenter (turn 34 “*mhm*”) can be interpreted as a statement that puts children into a doubting position about their claims. The turn is considered by children not as affirmative/confirmative of their previous answer but as a new request for a different answer. This adult’s intervention influences the children’s understanding of the situation. In turn 35, Aleksa provides a different answer (“*there is an equal amount of juice in both*”). As the script of the interview does not require this kind of suggestions, it could implicitly invite children to change their answer; on the contrary, it is supposed to open the possibility for children to decentrate themselves from the first perspective. The adult’s intervention in turn 36 (“*and why you said?*”) makes the answer accountable, although it can be misunderstood by the participants and interpreted as another request to find the acceptable answer. When Jelena, who is not the addressee of the local turn transition, tries to produce the reason of the previous answer (turn 37 “*because the glasses are the same size*”), the experimenter validates the girl’s statement (turn 38 “*ok, the glasses are the same size*”) and asks children to say something about the juice. This change of perspective (from the size of the glasses as the object of discourse to the amount of juice as the topic of the discussion) produces again an influence that makes difficult children’s understanding of the question, especially for Aleksa (turn 39 “*mhm with the juice? mhm? what do you think? and how do you think about the juice?*”) who firstly tries to show the

level of juice to the partner (pointing at the glasses) and then asks the adult. Both talk and gestures contribute to index and to construct the understanding in the participants' surround and indicate the framework within which children interact between them and the adult. In turn 40, the experimenter asks twice if there is an equal amount of juice in the glasses or if there is more somewhere. Immediately, the children (turns 41 and 43) jointly engage in providing the answer (Jelena says that in the glass A2 there is more juice) and the reason (Aleksa states that the experimenter has poured more juice in the glass A2). Within this sequence, in which children have properly taken their turns of conversation to sustain each other's claims, the intervention of the adult in turn 44 seems again to be inappropriate. Instead of being guided by the answers of the children (Bond and Tryphon 2009), who had already stated their positions, the experimenter tries to get the answers once again. The experimenter invites Jelena to declare if she agrees, but the question is perceived by the child as an implicit invitation to reconsider her position (turn 45 "*mhm no*"). Then, the adult invites children to agree without taking into account the reasons of the girl's disagreement. This intervention could be perceived as the sign that the adult's goal is to press children to agree (turn 46 "*I need your common answer so you feel free to agree*"). Finally, Jelena provides a solution using the first plural person (turn 47 "*we haven't seen correctly*"). This is the sign that she is speaking also in the name of Aleksa, including him in a polyphonic answer (Bakhtin 1981). This voice can be considered as "*an important resource for speakers to address contextual features of the interaction, tracking for their audience particular lines of interpretation not to be found in the first level of the construction of a message*" (Fatigante et al. 2004, p. 41).

The sequence presented above is an example of how the adult's interventions can influence the statements and the course of the children's reasoning during the interview. However, as shown by Arcidiacono and Perret-Clermont (2010), the experimenter's influence might be an inevitable condition of the situation, because within the frame of the interaction the adult might be induced to transgress the script also because of the child's reactions.

## Conclusion

The study presented in this paper has two goals: (a) to address advantages and constraints of methods applied in the field of children's thinking studies, by testing the validation of the repeated question hypothesis and (b) to analyze how children's understanding of conservation can be (re) constructed through joint peer discussion about conservation. In this study, we have been exploring the effect of the repeated question by using two versions (ST and MT) of the Piagetian task of conservation of liquid quantities. Contrary to previous results (Baucal and Stepanović 2006), this study reveals low but significant association between the two tasks, suggesting that there is some common factor that influence children's answers on both tasks. Based on the RQ hypothesis, this common factor is the fact that, as the same question is posed twice by the experimenter, it can mislead children to claim inequality of quantities. However, considering the task's presentation order, results reveal a significant association between the two tasks only if the MT is presented before the ST. In other words, the repetition of the question misleads children in the ST only if they are firstly faced with the very unusual situation in which the adult repeats question, although nothing has been changed. In fact, it happens after the children's claim about the equality of quantities of liquid, even perceptually the level of the juice keeps the same after "transformation."

The qualitative analysis allows the better insight in the ways children understand these two tasks. The structure of the situation shows that children understand the question “Is there an equal amount of juice?” in different ways which rarely fit to the RQ hypothesis. We have found other conversational, contextual, and relational elements that might lead children to claim the inequality (i.e., the repetition of the task, the interruption of children’s utterances, the change of the object of the discussion, the social positioning, and the intervention of the adult). Since in this paper we have just briefly introduced those dimensions, their influence should be the focus of further investigations which could allow us to have more detailed insights in the way the dynamics of conversation influence children’s interpretation of the adult’s requests during a task. In particular, as our data demonstrate, the different semiotic resources available to the participants have to be taken into account in order to describe the contextual configuration (Goodwin 2000b), the locally array of semiotic fields that participants demonstrably orient to. This praxeological perspective can contribute to highlight the idea that cognition is a reflexively situated process that encompasses both individual dimensions and interactional phenomena.

The findings of this study have also implication for different situations when student’s thinking and understanding is assessed through conversation with adult or peer discussion like it is frequently the case in educational contexts. The results from the experimental study and the qualitative analysis of peer dialogues over the conservation tasks show that students’ answers reflect not only their understanding but also different aspects of the social context in which they act and especially patterns of conversation in which students are engaged in. It means that teachers and other professionals who regularly assess students based on different forms of interaction with them need to become more aware of how students’ answers can be shaped by the situational and conversational context as well.

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## Appendix A

### Transcription symbols

.	falling intonation
?	rising intonation
,	continuing intonation
:	prolonging of sounds
–	stressed syllable
C	high tone (capital letter)
[	simultaneous or overlapping speech
=	contiguous utterances
(3.0)	pause (3 seconds)
(.)	pause (2/10 second or less)
( )	not possible to transcribe
(( ))	segment added by the transcriber to clarify elements of the situation
//	segment added by the transcriber to include parties of the sentence in the English version that were not present in the original Serbian version

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