Knowledge-oriented argumentation in children

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ABSTRACT: This paper analyzes children's argumentative discussions centered on the resolution of cognitive tasks, starting from the hypothesis that children's interventions are more complex and complete than usually described in psychological research on argumentation skills. Our results can be viewed as a possibility to reconsider the usual school situations in which children's argumentative skills are assessed in order to better understand the social, relational and emotional conditions that support argumentation in children.

KEYWORDS: Children's argumentation, Communication, Implicit, Knowledge-oriented argumentation, Reasoning, Social interactions

1. STATE OF ART AND HYPOTHESES

The distinction between pragmatic (or practical) argumentation, i.e. argumentation oriented towards action, and knowledge-oriented argumentation, can be found as early as in Aristotle's Topica and it is confirmed by Cicero in his works on topics (see Rigotti and Greco, forthcoming). Despite this ancient distinction, it is true that there is no much research about knowledge-oriented argumentation in which children are involved, if we consider the panorama of current argumentation studies. Our paper intends to contribute to filling this gap. To this purpose, we will rely on current studies in psychology that deal with children's cognitive argumentation; on this basis, we will re-read adult-children discussions, which are normally studied in psychology, from the vantage point of argumentation, in order to analyze children's knowledge-oriented argumentation.

Argumentation has been studied by psychologists in a *developmental* perspective. In the 80s, studies led by Berkowitz, Oser and Althoff (1987) or Clark and Delia (1976) show that justification does neither appear spontaneously nor in a complex form in 6-8 years old children. In fact, arguments produced by these children correspond to very simple repetitions of a standpoint, while justifications are only presented when explicitly requested by an opponent. According to these authors, children from six to eight years old are reported to resolve their disputes by either physical or verbal power manipulations, but without recourse to argumentative discourse. More recently,

psychological research conducted by Kuhn (Kuhn, 1991; Kunh & Udell, 2003) and Golder (Golder, 1993, 1996; Golder & Coirier, 1996) mainly studied the argumentative abilities of children comparing them to those of adolescents and adults. These authors report that children's argumentative discourse is poor, with argumentation skills only gradually developing from childhood to adulthood.

Yet, contrarily to this developmental stream of research, other studies (Anderson et al, 1997; Orsolini & Pontecorvo, 1992; Pontecorvo & Arcidiacono, 2010; Stein and Albro, 2001; Stein & Miller, 1993), have observed three years old children who are already involved in conflictual interactions as well as four years old children who are able to understand and participate in disagreements in family discussions, thus demonstrating personal argumentative skills in these contexts. These observations regarding knowledge-oriented argumentation in pretty young children, which contradict previous results, are usually interpreted with the following hypotheses. First, it is assumed that the context in which children can produce argumentation should be always informal (family dinner, spontaneous conversations, etc.). Second, the issues and discussions are assumed to be related to values, moral judgment and pragmatic issues. Yet, the rationale behind these hypotheses is not clear; in other words, it is not said what the basis is for suggesting that informal situations would be more easy to deal with than formal ones, and that value-related and pragmatic questions would be more likely to be managed argumentatively than cognitive ones.

Besides, in psychological literature on argumentation, some degree of heterogeneity can be observed regarding the definitions of what a "good" (or developmentally more advanced) argument is, and how it should be analyzed. Most studies are quantitative (e.g. some have counted the number of reasons generated for an opinion; others have developed a taxonomy describing the nature of the reasons given, and counted the variety of the categories used or how complex are their inter-relations; etc.). These quantitative analyses only represent some possible ways to measure argumentative skills, yet without going into detail in a proper analysis of how children (together with adults) develop their argumentative discussions, what type of arguments they use and how these can be evaluated from the logical and communicative points of view.

This paper intends to respond to some of these open problems. We will present a study of argumentation in adult-children interactions by relying on two analytical models: on the one hand, our study is generally framed in a pragma-dialectical perspective (van Eemeren, 2009; van Eemeren & Grootendorst, 2004). On this basis, we will analytically reconstruct children's argumentation, including argumentation structures (Snoeck Henkemans 1997, 2000). On the other hand, we will integrate the Argumentum Model of Topics, proposed by Rigotti & Greco Morasso (2009, 2010), which is instrumental in reconstructing the inferential configuration of arguments, i.e. the relationship between arguments and their premises.

Starting from this theoretical framework, we hypothesize that: 1) argumentation is likely to occur not only in informal situations like family dinner, peer interactions, etc. but also in *formal* situations like a school (or medical interviews, and others); and it does not only occur in debates centered on moral values but also around *cognitive* tasks, as those that we are taking into account; 2) children's argumentation is probably more complex than expected by some of the authors mentioned above, and this not only in

informal settings, but also in formal ones; 3) the relational and institutional *context* is very important to understand how children's argumentation develops.

2. ARGUMENTATION CONTEXT

In this paper, we rely on data derived from a "Neo-Piagetian task". In this type of task, children are tested in order to assess their developmental level on cognitive concepts, for example on the concept of chance. There is a long tradition of studies using these tasks, which were originally designed in order to study children's conceptual reasoning. This allows us to assume the background of psychologists who, starting from Piaget, have been studying children's reasoning and to critically explore Piaget's hypotheses that children's reasoning is best tested when children are asked to provide arguments to back up their answers and not just assessed on verbal performances (Ducret, 2004; Piaget, 1926/2003; Vinh Bang, 1966). Furthermore, this also allows us to study specific dialogical settings as argumentation contexts, and explore their affordances for argumentation. The expected results will possibly suggest insights to revisit traditional test situations in order to create new settings which might more easily favor children's reasoning and argumentation.

The task we are considering here sets up a specific reasoning and argumentation context, which is worth briefly describing as for its main characteristics. First, these are not naturally or spontaneously occurring discussions. Children are asked to comment on tasks that have been pre-defined by an adult-researcher, who has an agenda in mind. Arguably, this is not exclusive of (neo)Piagetian tasks; rather, this is typical of many other adult-child interactions in formal settings, such as schools, exams, medical interviews, speech therapy, and so on. Secondly, in most cases, we have adapted the traditional Piagetian tasks. In fact, originally, Piagetian interviews consisted in conversations between *one* adult and *one* child. We have departed from this face-to-face interview model and chosen to work with little groups of children, because it is well known (Buchs, Butera, Mugny & Darnon, 2004; Carugati & Perret-Clermont, in press; Johnson & Johnson, 1994; Perret-Clermont, 1980) that peer interactions under certain circumstances can favor reasoning and argumentation, in particular when partners experience "socio-cognitive conflicts" i.e. the confrontation *hic et nunc* of different conflicting points of view that they feel the need to overcome. It has been observed that such socio-cognitive conflicts, under certain circumstances, are particularly likely to induce cognitive reorganizations and hence developmental progress (for a review: Perret-Clermont & Carugati, 2001: 8587). Thirdly, the task is intended as a cognitive task, children being tested on their *understanding of concepts*. Hence the researcher's expectations in these conversations normally favour knowledge-oriented argumentation. This does not mean, however, that pragmatic argumentation is excluded as we will see when dealing with our data (cf. section 4).

3. METHODOLOGY

We will now focus on an argumentative interaction between three children and an adult in which the complexity of children's argument is apparent. As mentioned in section 1, our theoretical approach to the analysis of data is informed by the integration of the pragma-dialectical perspective, which we assume as a general framework, and the Argumentum Model of Topics for the analysis of the inferential configuration of arguments. We will first present an *analytical reconstruction* of argumentation (van Eemeren & Grootendorst, 2004), by specifying the standpoint(s) emerging from the discussion, the parties who are participating in the discussion, and the arguments that are advanced. Following Snoeck Henkemans (1997, 2000), we will provide an overview of the argumentation structure in this excerpt of discussion.

As a second step, we will focus on one of the arguments emerged and provide a more focused analysis of its inferential configuration by means of the Argumentum Model of Topics (Rigotti & Greco Morasso, 2010). This will allow us discussing the implicit premises which children are relying on, both at the logical level and at the level of cultural and symbolic resources they are mobilizing in order to respond to the task they are being proposed.

The integration of these two theoretical models has been discussed in detail in Palmieri (2014) and applied in a number of previous works (see for example Greco Morasso, 2011). It allows integrating a general overview of an argumentative discussion, including the connections between different arguments. At the same time, it permits to focus on the most strategic arguments and elicit their principles of support as well as possible implicit premises.

4. COMPLEXITY OF CHILDREN'S ARGUMENTATION

4.1 Excerpt 1

At the moment of the discussion reported in the excerpt (Table 1), children have been discussing during more than 10 minutes. They have tried different strategies to find the tricked dice: roll the dice, knock them on the table, observe them, turn the dice, etc. They have noticed something that was totally unintended by the adult, i.e. that the yellow dice happens to be the only one with black spots (the others have white spots) and thereafter they have started considering that this yellow dice might be strange! They are now discussing the meaning of "black" and "white".

Table 1. Participants: adult-researcher; Anita (10,9 ans); Alan (11,8 ans); Antonin (10,11 ans)

298	Anita	il est bizarre le jaune	the yellow one is strange
299	Res.	pourquoi il est bizarre Anita?	why it is strange Anita?
300	Anita	parce qu'il ne fait pas comme les autres.	because it doesn't react like the others.
301	Res.	il ne fait pas comme les autres.	it doesn't react like the others.
302	Alan	il ne mérite pas le luxe	it does not deserve luxury
303	Res.	et toi Antonin?	and you Antonin?
304	Antonin	parce qu'il a des points noirs	because it has black spots

| 305	Alan	*((rire))*	*((laugh))*
306	Res.	et ça fait quoi d'avoir des points noirs?	and what are the consequences of having black spots?
307	Antonin	c'est ben le blanc, le blanc c'est bien. et le noir c'est mal	well, white, white is good. and black is evil
308	Alan	ouais souvent dans les films le noir c'est le mal et le blanc c'est le bien.	yeah often in movies black is evil and white is good.
309	Antonin	ouais comme le Yin et le Yang	yeah like Yin and Yang
310	Res.	ah. et le blanc il a quoi de bien?	ah. and what is good with white?
311	Alan	euh lequel celui-là? *((montre le dé rouge))*	erm which one this one? *((shows the red dice))*
312	Antonin	[euh le blanc c'est]	[erm the white it is]
313	Res.	[je ne sais pas tu dis dans les films le blanc c'est bien]	[I don't know you say in the movies the white is good]
314	Alan	je ne sais pas, souvent le noir ça représente le mal et le blanc ça représente le bien.	I don't know, often black represents the evil and white represents the good.
315	Antonin	ouais comme le rouge et le bleu.	yeah as red and blue.
316	Alan	*((rire))* mais euh *((rire))*	*((laught))* but erm *((laught))*
317	Res.	ah, [donc vous pensez]	ah, [so you think]
318	Alan	[ouais par exemple aux échecs] les blancs c'est les gentils vu qu'ils commencent et les noirs c'est les méchants.	[yeah for example in chess] whites are good because they start and blacks are nasty.
319	Res.	ah d'accord	ah ok
320	Antonin	dans quasi chaque jeu de société les noirs c'est les méchants	in almost every board game black are nasty
...			
378	Alan	c'est celui-là *((dé jaune))* parce qu'il est moche et il a toutes les raisons d'être un tricheur.	it is this one *((yellow dice))* because it is ugly and it has every reason to be a cheater.
...			
383	Antonin	C'est le plus bizarre *((dé jaune))* et il a des points noirs.	it is the strangest dice *((yellow dice))* and it has got black spots.

In turn 298, Anita adopts the standpoint that "*the yellow dice is strange*". "Strange" could mean, in this case, that if one has to suspect one dice, the yellow dice is the candidate to be suspected. At turn 304, Antonin mentions the different color (i.e. white and not black as the others) of the spots on the yellow dice. This could be interpreted as a support to Anita's point that the yellow dice is "strange". The researcher then asks children: "*and what are the consequences of having black spots?*" (turn 306) and later "*and what is good with white?*" (turn 310) in the hope that the children will put forward arguments in support of their standpoints, thus engaging in a full-fledged argumentative discussion. In

both these turns, the researcher acts as an *antagonist* in a (non-mixed) critical discussion, raising a question but without proposing an alternative standpoint. Her choice to act as an antagonist, and yet without explicitly contradicting the children, can be explained in connection with the specific features of this Piagetian dialogical setting, which has been purposefully designed in order to observe children's argumentation. The researcher's argumentative role is one of the aspects that we will have to consider in order to retrace the influence of context on the development of the argumentative discussion beforehand.

The researcher's questions get answered, as children engage in a complex discussion, in which they all act as protagonists while co-constructing arguments in support of the claim that "white is good and black is bad". As psychologists, following Zittoun (e.g. 2007), we know that people rely on cultural artifacts and symbolic resources when they face uncertainty and want to give meaning to the situation. Children seem to be using symbolic resources here to make sense of the present situation: they refer to cultural artifacts such as movies (turn 308), Yin and Yang (turn 309), chess (turn 318), board games (turn 320), in which black and white have specific symbolic meanings. Starting from Anita's suggestion that the yellow dice looks strange, Antonin and Alan co-construct a complex chain of arguments in support of this claim.

In the diagram in Figure 1, inspired by the pragma-dialectical analysis of an argumentation structure[1], we observe that children are able to provide a standpoint and to produce arguments to defend it, by constructing a complete and rich argumentative discourse.

Figure 1: Argumentation structure of Excerpt 1
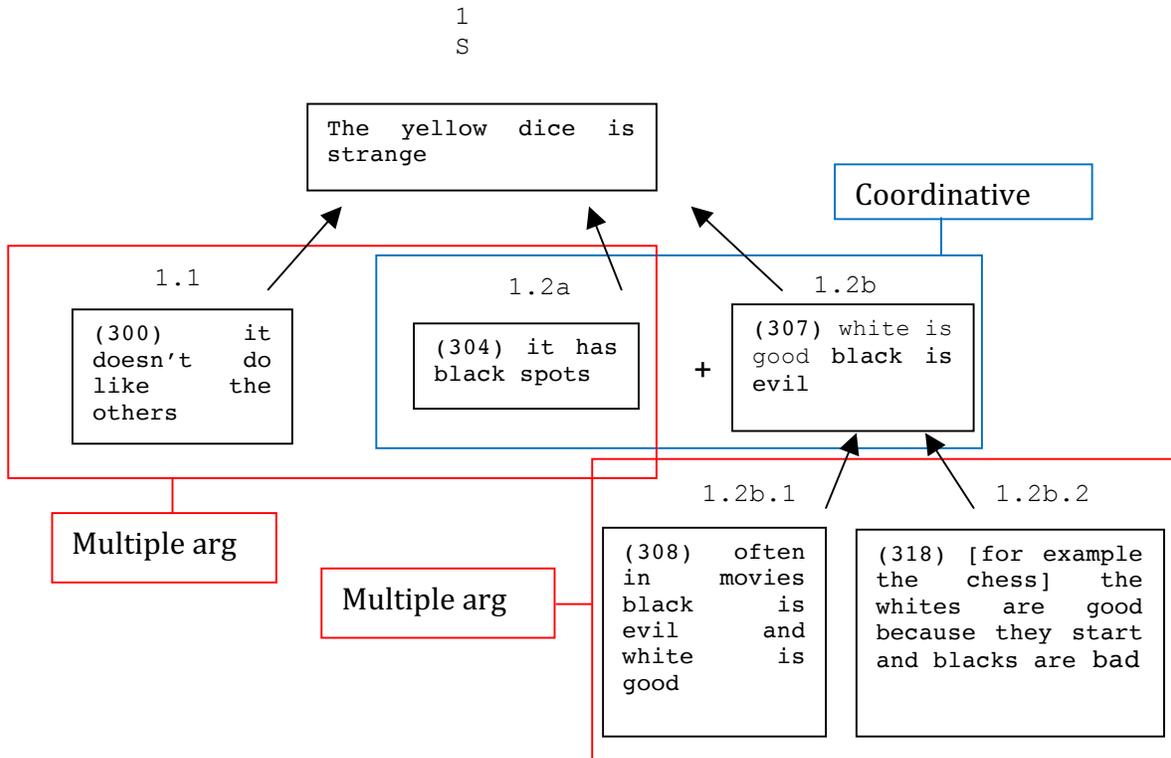
We will now focus on argument 1.2 (in both its components 1.2a and 1.2b), which could be considered the core of the children's argumentation, and analyse its inferential configuration by means of the Argumentum Model of Topics (AMT). This will enable us to precisely describe how this argument is connected to its standpoint. As anticipated in section 1, the AMT model allows distinguishing premises of *procedural* (logical) nature, from premises of "material" or cultural or contextual premises, while at the same time it allows understanding how such premises are interconnected in real arguments (Rigotti & Greco Morasso, 2010).

This is particularly important when studying children's argumentation, because it is important to understand the procedural premises which children use in their argumentation, while at the same time isolating explicit and implicit premises of a material nature, which give us a sort of access to their "worldview". In this sense, it is worth noting that an argument could be correct from a logical viewpoint, while still relying on material premises which could be discussed, or which are not immediately expected by the adults discussing with the children; eliciting what children's implicit premises are gives us access to their starting points. The case we are analysing is particularly representative in this respect.

Figure 2 presents an AMT-based analysis of argument 1.2 (a and b). As Palmieri (2014) makes clear, coordinative argumentation is analysed with a single inferential configuration. In our case, 1.2a and 1.2b are premises of one and the same argument, which relies on the "locus from effects to causes" as a principle of support.

2: AMT representation of argument 1.2a and 1.2b
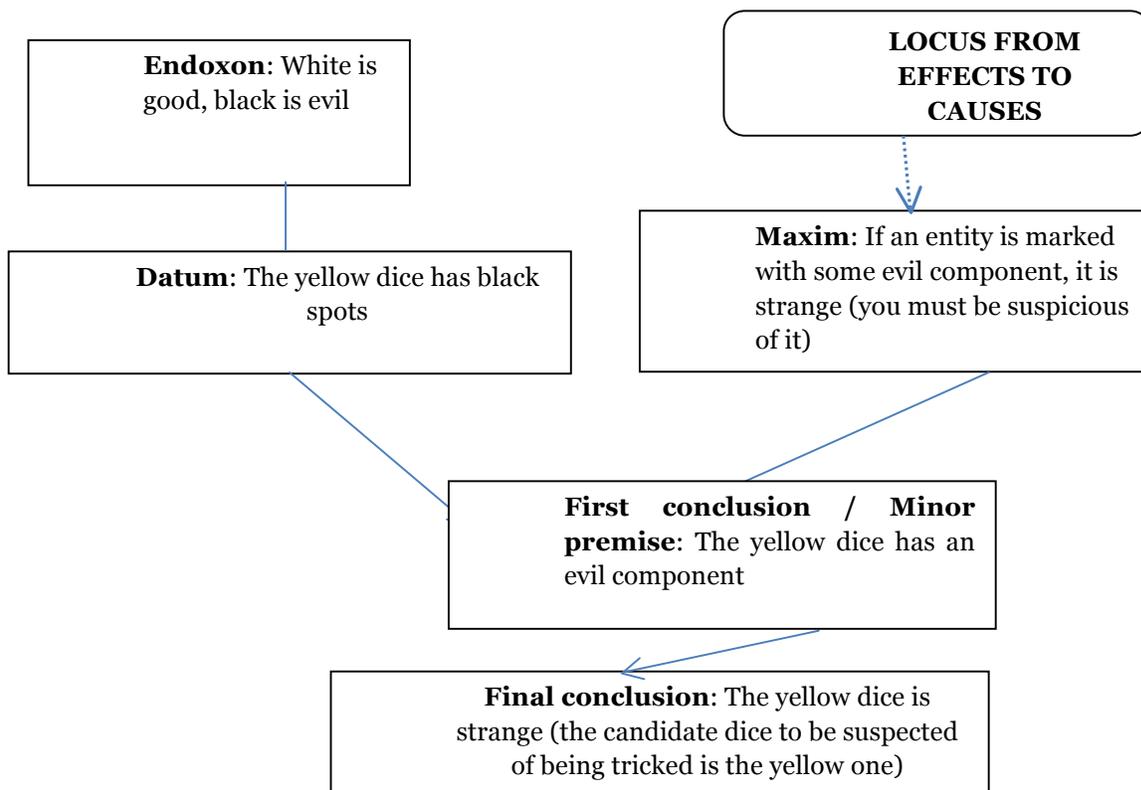
The locus from effects to causes establishes a connection between some data and their possible cause. Needless to say, this principle of reasoning plays an important role in medical discourse, as it is at the basis of diagnoses. Its logical hold, however, is limited by the fact that one and the same effect may be the result of different causes. An example in the medical domain could be that, if a child has red spots on his face, this could be chicken pox but it could also be the result of some other virus, or even the effect of an allergy, and so on. In order to get to a precise diagnosis, all causes but one should be excluded (and this is not always possible).

In argument 1.2, the locus from effects to causes is at work with the following maxim, which constitutes a procedural premise of this argument: "If an entity is marked with some evil component, it is strange", which means that you must be suspicious of it. Together with the minor premise "The yellow dice has an evil component", this brings to the final conclusion that "The yellow dice is strange", which means that the candidate dice to be suspected of being tricked is the yellow one. This latter is the standpoint that children are tentatively defending, as a working hypothesis to respond to the task they have been assigned.

It is evident, however, that the procedural component is not exhaustive of what happens in real life argumentation. In fact, the premise "The yellow dice has an evil component" is not derived from the procedural component; this is a piece of factual evidence that must be derived from "material" premises. These are represented, in Figure 2, on the left side of the diagram. Two premises of different nature constitute the material component of argumentation. First, an *endoxon*, i.e. a general premise representing common knowledge, or values that are shared by the interlocutors, which in this case can be formulated as: "White is good, black is evil". Not coincidentally, endoxa are often left implicit, as it is the case in our example, precisely because they are considered as taken for granted by the arguers. Second, the material component includes a *datum*, i.e. a premise derived from factual evidence emerging in the specific and concrete dialogical setting in which argumentation is being developed. Data are often explicit, as in this case: "The yellow dice has black spots". Taken together, these two material premises bring to the conclusion that the yellow dice has an evil component, which is then "exploited" to get to the final conclusion.

In this case, we see that the children's argument – and we can properly speak of a common argumentation, because the children are co-constructing it – is based, from the procedural point of view, on a maxim which is often used in everyday reasoning: "If an entity is marked with some evil component, you must be suspicious about it". Consider, for example, when you go to the supermarket to buy some fruit and you can pick up items yourself. You are about to choose some apples. You will identify the flawless, ideally perfect, apples, while leaving out the ones that have some signs that could be interpreted as effects of some undesirable cause (e.g. you won't pick an apple which has a brown spot because it might mean that it is old or rotten). To make a more complex example, if you need to choose someone to trust – say, a babysitter, or a financial advisor, or a colleague that you need to hire – you will be naturally inclined to exclude those who seem to have some "evil component" – for example, they appear too nervous; – because

this could be the effect of an "evil" cause. In sum, there are clues that attract our suspicion, even though this type of reasoning is a sort of cognitive shortcut, whose logical hold could certainly be discussed.

In the case of dice, children need to pick up the tricked one because they are asked to do so. However, they do not know where to start with. Based on the locus from effects to cause, children identify a clue for an "evil" component and ascribe this to the possibility for the yellow dice to have an "evil" cause.

If the procedural component of this argument, as said, could certainly be discussed in terms of logical hold, particularly interesting in this example is the material component of argumentation, which concerns the symbolic meaning of the black and white colours. In the children's view, black is evil and white is good – as they reason out moving from symbolic resources that are known to them. Needless to say, this endoxon could also be discussed, because its symbolic validity can certainly not be extended to all occurrences in which colours are manifested.

These limitations on the procedural and material components notwithstanding, it is interesting to see the *complexity* of the argumentation co-constructed by children in this case. It is also interesting to see how cultural and symbolic resources (i.e. the fact that *black is bad and white is good*, or resources like chess, movies, etc.) are adapted in situations that would probably not be expected by the researcher. Knowing the implicit premises which children start from is, in any case, an important preliminary step in order to help them engage in sounder argumentation.

4.2 Some notes on social and relational aspects in knowledge-oriented argumentation in children

What we have done here is analyzing what happened in this interaction from a cognitive point of view. Yet, we could also analyze the same interaction from a psychosocial point of view. By so doing, we could observe the importance of context, in particular social and relational processes within peers and adults' interactions, for the development of an argumentative discussion. When an interaction like this starts, there is almost always a moment of tension: children try to decipher the adult's expectations and those of their peers, in search of an understanding of what kind of social game they are asked to enter. Usually, children try to comply with what they think are the social expectations in this context. But at the same time, they usually try to find their own place, mark it by their own moves, develop their understanding of the issue and express it (Breux & Perret-Clermont, 2014). In children's perspective, the task they are faced with is not only that of elaborating a proper cognitive argumentation in order to solve a problem and check that the solution is reasonable; it is also a complex multidimensional social game that requires managing faces, rules of politeness, gender identities, and other agendas for self and others. As a consequence, the social situation is not fixed but dynamical. Adults' interventions (as well as peers) are not "neutral". They modify the context and are interpreted by the children who then modify their reasoning. Although the adult tries to understand the children's cognitive development being as "neutral" as possible when he or she asks questions and makes counter-suggestions, still she is interpreted by children as if she spoke from a position of authority. For this reason, it is very difficult for a

researcher in this dialogical setting to ask questions in order to provoke children's argumentation without being interpreted as an antagonist who somehow has an alternative standpoint in mind.

5. CONCLUSION

In this paper, we have analyzed data taken from adult-children conversations in the dialogical setting of a neo-Piagetian task. The analytic overview proposed on the basis of the pragma-dialectical approach has shown that children's argumentation is more complex than usually expected on the basis of previous psychological research about children's argumentative skills; it even includes different levels of subordinate argumentation, which children can co-construct while answering to a researcher's questions.

Moreover, the AMT analysis of one of the children's arguments shows that their command of argumentation is complete and sophisticated. In fact, even though the validity of some of the children's premises might be questioned, still the reasoning backing up their standpoints appears to be well-developed, especially in a difficult context like that of the tricked dice. This type of analysis sheds a new light on argumentation in context, by considering settings in which children are involved, as well as discussing the role of researchers' interventions whose intention (but is it really the case?) is to foster children's argumentation. Researchers are, in fact, not "neutral" but involved in the same argumentative discussion as the children and their role is crucial in shaping the discussion itself. The analysis of cognitive tasks, as the one we have considered, also significantly contributes to the analysis of knowledge-oriented argumentation.

Beside their argumentative relevance, these results bear important consequences for education as well. Educationalists often start from deficit hypotheses about children's competences and then presuppose that they have to teach them how to improve their argumentation skills. But, if we assume that the argumentative competence is already there, as it seems to emerge from our analysis, then the educator's role amounts to creating conditions for this competence to be used. In general, before judging children's argumentative skills, it might be necessary to study their contributions to argumentative discussions into detail, including procedural and material premises and the symbolic world of each of the protagonists. It would also be interesting to evaluate the meaning of the adult's interventions in argumentative terms. In this case, for example, we often had the adult acting as an antagonist in a critical discussion, i.e. raising doubts or asking questions, *but without explicitly presenting an alternative standpoint*, as it happens in non-mixed disputes

Yet, because of the asymmetry which is still present between adults and children, this role of antagonist who only raises questions and doubts is not easy to maintain for a researcher because his or her interventions tend to be interpreted by children as hinting to some contrary standpoint that the researcher does not explicitly express. For this reason, it is not easy for an adult in this setting to maintain the dispute as non-mixed, which poses a psycho-social problem typical of this type of adult-child discussion, whose

consequences on children's argumentation should be further investigated (Greco Morasso, Miserez-Caperos & Perret-Clermont, in press).

Children seem to be more competent than expected. But in children's eyes researchers probably seem to be very strange interlocutors, opposing them but never explicitly.

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