Published in In S. Oswald & D. Maillat (Eds), Argumentation and Inference:
Proceedings of the 2nd European Conference on Argumentation,
Fribourg 2017 (Vol. I), 147-167, 2018,
which should be used for any reference to this work

Analysing Implicit Premises Within Children's Argumentative Inferences

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This paper presents preliminary findings of the project "Analysing children's implicit argumentation". We propose to reconstruct implicit premises of children's arguments within adult-children discussions in different settings, using the Argumentum Model of Topics (AMT) for the reconstruction of the inferential configuration of arguments. We show that sources of misunderstandings are more often than not due to misalignments of implicit premises between adults and

children; these misalignments concern material premises rather than the inferential-procedural level.

KEYWORDS:
adult-children discussion, children's argumentation, implicit premises, inference, material premises, misunderstanding

1. INTRODUCTION

This paper intends to show that a careful reconstruction of children's inferences and of their *implicit premises* helps to understand children's contributions to dialogical argumentative activities. It also contributes to explain how children's interventions might prima facie appear as reasoning "mistakes" to researchers, when in fact they are not, if one considers the child's perspective. Some of these "mistakes" depend on implicit starting points that are not shared by the interlocutors.

Studies on argumentation in context largely concentrate on adults' argumentation and prevailingly, though not exclusively, on professional contexts, such as juridical argumentation or political argumentation (see criticism in Schwarz & Baker, 2017). Our contribution aims to bring forward current studies on theories of argumentation in context, taking into account adult-children discussions. Our aim is also to contribute to cognitive developmental psychology and education through a closer examination of the dialogue-based reasoning processes between children and adults.

Studies about children's argumentative skills are abundant in psychology and education. These studies are characterized by conflicting findings. On the one hand, several authors have demonstrated with qualitative as well as quantitative methods that children are able to engage in argumentation in educational settings (e.g. Kuhn, 1991; Kuhn & Udell, 2003; Psaltis & Duveen, 2006; Migdalek et al., 2014, Schwarz & Baker, 2017) as well as in informal family conversations (Völzing, 1982; Pontecorvo & Sterponi, 2006; Bova & Arcidiacono, 2013). On the other hand, the literature that examines educational contexts seems to indicate that having children engage in an argumentative discussion in the classroom is not at all easy (see the discussions in: Muller Mirza & Buty, 2015, Schwarz & Baker, 2017). Thus, if children seem to be able to produce argumentation in some settings, they also often seem to fall short of engaging in argumentative activities when asked to do so. Children's argumentative skills, however, can be enhanced by appropriate educational interventions and this becomes the subject of

studies on the design of argumentative situations in education (Andriessen & Schwarz, 2009).

This conflicting evidence invites a better definition of what we expect when we talk of children's argumentation; and a more nuanced understanding of children's contributions to argumentative discussions in more or less formalized settings. In order to advance in this direction, we have chosen to study *children's inferences and their implicit starting points*, understood within a framework of argumentation as a dialogical interaction. Such is the rationale behind the project "Analysing children's implicit argumentation: reconstruction of procedural and material premises" (henceforth: ArgImp), funded by the Swiss National Science Foundation (contracts n. 100019-156690 and 100019_156690/2, 2015-2018), to which the authors of this paper are collaborating[1]. This paper presents some of the preliminary findings of this project.

The remaining of this paper will be organised as follows. In section 2, we will discuss the role of implicit in children's argumentation and the theoretical instruments that are necessary in order to study it. Section 3 briefly outlines the different contexts in which our data on children's argumentation have been collected. Section 4 analyses examples of children's argumentation in which we intend to show how a careful reconstruction of implicit premises within inference is subservient to a better understanding of children's starting points and of their arguments altogether. These results are discussed in section 5. Finally, section 6 has the function of drawing some preliminary conclusions, as well as of situating the present paper in the context of our broader research line on this topic.

2. THEORETICAL STARTING POINTS OF THIS STUDY

Although a systematic reconstruction of children's inferences in argumentative discussions has not been done yet, some studies on children's argumentation clearly indicate that it is important to reconstruct implicit premises in order to understand the rationale behind children's arguments, including those that appear prima facie weird, wrong, or of a low developmental level. For instance, Hundeide (1992, p. 143-144) reports that Norwegian children reason much better on a Piagetian task when the premise of their discourse involves snowballs and not white and black abstract circles. He comments:

[1] Applicants of this project are Anne-Nelly Perret-Clermont, Sara Greco, Antonio Iannaccone and Andrea Rocci. Josephine Convertini and Rebecca Schär participate as PhD students and have collected the data analysed in this paper.

> The difficulty of a problem cannot be assessed from an analysis of the logical structure of the problem or question as such. We have instead to uncover the nesting of premises through microanalysis of message structure. Through this procedure it may be possible to identify alternative sequences of cognitive steps bound to different interpretive premises in relation to the 'same problem' (...) an attempt at portraying thinking from the 'insider's point of view' (Shotter, 1985).

Through an analysis of naturally occurring talk between children in the 4th grade at school, Anderson et al. (1997) convincingly show that children's arguments might seem elliptical but often are "as informative as they needed to be" (Anderson et al., 1997, p.138). In fact, apparently missing premises are actually supplied either by the preceding discussion or by general principles, both available to a cooperative listener.

These findings show that a careful reconstruction of inference should precede the evaluation of children's arguments. This reconstruction should go hand in hand with a pragmatic account of what is happening in the here-and-now of the interaction, including preceding discussions and the expectations set by the context. In fact, research in psychology has shown that children are likely to give quite different meaning to the same questions asked in teaching or testing situations depending on the events and narratives involved (Donaldson, 1978), the setting and the relational context (Light & Perret-Clermont, 1989, Iannaccone & Perret-Clermont, 1993). As a result, they perform cognitively quite differently - a matter known to skilled clinicians (Grossen, 2014). Other studies show that there is a great deal of information that adults leave implicit and take for granted, albeit it is not necessarily accessible to children. Elbers (2004) draws attention to the importance of the conversational asymmetry that might lead to neglect the children's perspective and underestimate their skills. If the child is considered as a partner in conversation rather than as an object of research, a different account of children's reasoning skills emerges (Pramling & Säljö, 2015; Mauritzson & Säljö, 2001).

On the basis of these considerations, in our research on children's argumentation, we have adopted a principle of *pragmatic and inferential integrity*. By pragmatic integrity, we mean that children's argumentative contributions should not be considered as "isolated" argumentative productions (or products) to be evaluated independently from the interaction with other children and adults and from the context in which the interaction takes place. On the opposite, children's arguments should

be seen as part of an ongoing *discussion*, which must be comprehensively taken into account in order to understand their inferences. In other words, we interpret argumentation from a dialogical viewpoint (Nonnon, 1996, 2015; Plantin, 1996). For this reason, we assume a general pragma-dialectical framework (van Eemeren & Grootendorst, 1984, 2004) to analyse adult-children and child-child discussions as *argumentative discussions*.

By inferential integrity, we mean that we intend to carefully reconstruct children's contributions to argumentative discussions from an inferential viewpoint. Independently from what the adults' expectations might be and how they react to children's interventions, we carefully reconstruct the arguments proposed by the children, including their implicit premises. Following Anderson et al. (1997), we assume that a careful reconstruction of implicit premises might shed light on what children are trying to do with their interventions and what types of starting points they take for granted.

Our analysis will be guided by the Argumentum Model of Topics (AMT, Rigotti and Greco Morasso, 2010) for the study of inference and the reconstruction of implicit premises[2]. The AMT offers the advantage to clearly distinguish different types of premises making up an argument scheme. A first component, called *inferential-procedural component*, represents the inferential principle on which the argument is based. The procedural component includes the locus, i.e. the relation that is at the origin of inference (e.g. cause to effect or effect to cause). Moreover, at the level of how inference is constructed, it includes the specific inferential rule (maxim) derived by the locus and used as an often implicit premise in argumentation (e.g. "if the cause is present, the effect will be present"). Real life arguments, however, are not only based on abstract inferential principles; they need to be grounded in a *material component*, made up of premises linked to the cultural and contextual background of the interlocutors. The AMT distinguishes these two types of premises and allows to explain how they interact in argumentation.

Distinguishing between inferential-procedural and material premises is particularly important in the context of the present research. On the one hand, in fact, this allows to understand where potential problems of children's arguments might lie, without confusing the logical form of their reasoning and the inferential starting points with the

[2] The fact that analysing implicit content might shed light on educational practices has also been noted by Macagno and Kostantinidou (2013), although these authors have analysed adolescents' discursive productions.

material-contextual premises. These latter represent the children's view on the considered issue, their knowledge and expectations.

We expect that a careful reconstruction of young children's implicit material premises will be important to understand their starting points and how they differ from an adult's expectations (and vice versa). The reconstruction of implicit starting points in this sense connects the reconstruction of inference with the reconstruction of the pragmatics of the conversation: in fact, some implicit premises might be explained not as missing parts of an argument but as parts that are left unsaid because they are considered common knowledge.

3. EMPIRICAL DATA

The data discussed in this paper have been collected within the ArgImp project in two different settings[3], which both involve adult-children argumentation. A first context is unstructured ('spontaneous') discussions in a family context. A second context is made of conversations taking place during semi-structured play activities in a kindergarten. Albeit different, these two settings share some common traits that make the two corpora homogeneous. First, they both include preschool children (from 2 to 6 years); second, the conversation often includes not only children but also adults. In the case of family discussions, the adults normally include one or both parents, other relatives and sometimes the researcher, who is asked by children to take part in the discussion or play with them. In the case of play activities, the children are interacting with the researcher who has proposed the task to them.

The data on everyday conversations in a family setting has been collected in 12 families in three different linguistic regions of Switzerland. No specific task was given to the families; they were free to choose what to do. In fact, our goal was to observe natural occurring discussion in the families' everyday life. Sometimes, the children asked the researcher to play with them. However, we noticed that the children did not see the presence of an extraneous person at the family place as intrusive: more often than not, they interpreted the researcher as a friend of their parents who was visiting them.

[3] Within the ArgImp project, we also had two further corpora available. First, we could benefit of a collection of interactions based on revised Piagetian interviews to children of different ages, collected by the University of Neuchâtel in over thirty years of research. Second, we had a collection of data concerning informal family discussions that we used as a pilot-study before starting the project. However, we are not primarily referring to these data in the present paper.

The data on semi-structured play activities have been collected in two different kindergartens, the first one located in the French speaking part of Switzerland and the second one in Italy. The researcher reached the children in their usual play room at the kindergarten. She introduced specific activities, which were intended to make them discuss and reason. Most of these activities were inspired by Piaget (1974) or from the foundation *La main à la pâte*[4]. They were activities of construction based on building blocks or other toys. Each activity included a semi-structured task for the children to complete. More details about the specific activities will be given in section 4.

Family conversations were audio recorded; play activities at the kindergarten were both audio recorded and video recorded. In both cases, the researchers were present during the interaction. The data have been transcribed according to a slightly adapted version of the notation system proposed by Traverso (1999). Because all the extracts analysed in this paper are in languages other than English, we provide the original text together with our own translation in section 4.

4. ANALYSIS: PRELIMINARY FINDINGS OF THE ARGIMP PROJECT

In this section, we will discuss the main findings obtained so far in the ArgImp project, concerning the analysis of children's partially implicit inferences as contributions to an argumentative discussion.

For reasons of space, we have chosen only three examples, which have an illustrative and representative function. They have been chosen in accordance with two main criteria. First, we have chosen representative cases, in the sense that the dynamics observed in these cases are also present in other examples found in our corpora. Second, we have included both naturally occurring family conversations and semi-structured play activities in the kindergarten in order to show that it is possible to retrace similar dynamics in different settings.

In line with Anderson et al. (1997), we found that children's arguments are often elliptic, because there are implicit premises and sometimes the standpoint is also implicit. In AMT terms, what is often made explicit is the *datum*, i.e. the factual material premise supporting the standpoint in the framework of an inferential configuration that is often largely implicit. This is not different from what happens with adults' conversations, in which a pragmatic principle implies that what is taken

[4] See http://www.fondation-lamap.org/en/international, last accessed 24. 09. 2017.

for granted is superfluous and should not be repeated, as this would go against a cooperative principle in conversation (Grice, 1975).

In particular, in AMT terms, we found that *maxims*, i.e. inferential-procedural starting points, are always left implicit. Material starting points such as endoxa might be made explicit by children if they are controversial (e.g. when they are challenged by adults), which confirms the findings by Anderson et al. (1997).

Moreover, in the ArgImp project, we found that often, in front of a child's inference that comes to the "wrong" conclusion (or to a conclusion that is interpreted as "wrong" by the adults who are taking part in the conversation), the reason for this is to be found in the material premises, and particularly in the *endoxa*. More often than not, in fact, the procedural-inferential starting points are applied correctly and are based on a principle of support that is acceptable. In contrast, the children's endoxa, sometimes, refer to a "worldview" that is partial or in the course of development, or simply is different from what the researcher or the adult was expecting.

A first illustration of this kind of result has been discussed in Greco (2016). In this work, the example is given of a child slightly older than two years, who maintains that the bottom part of an apple (remnants of calyx) is a bee *because it stings*. We know that this is not true; but what is interesting is to understand where the child's "mistake" lies. The principle (*locus from definition*) is correctly applied and we could agree with the definitional maxim stating that "If x has got the specific and exclusive characteristic of a species A, then x is an A". However, the endoxon, namely that "The specific and exclusive characteristic of the species 'bee' is 'stinging' (all that stings is a bee)" is based on a partial view of reality, probably depending on the child's limited experience of this subject. It is an endoxon that will be arguably revised over time. From a psychological perspective, it is very interesting to distinguish the child's reasoning (successfully making an inference) from his factual knowledge (about bees and insects).

This kind of dynamics is often present in our data and represents a central finding of the ArgImp project. We will now discuss three examples taken from the corpora introduced in section 3.

The first example is taken from the corpus of conversations in a family setting. The discussion was registered in the Swiss German speaking region of Switzerland in February 2016. The participants of this discussion are Levin, who is three years and two months old, and his mother. They talk about the researcher (R.) who visited them at their home. The conversation took place immediately after the researcher arrived at the families' home. The mother asks the researcher whether

she would like to have a cup of tea, since the mother and Levin were having tea and biscuits as the researcher arrived. During the preparation of the researcher's tea, Levin starts talking.

Turn	Speaker	Transcript	Our Translation
1	Levin	d R. wett äu ä chli tee (1.0)	R. also wants some tea (1.0)
2	Mother	m:hm	m:hm
3	Levin	die do=	these ones=
4	Mother	und no es Tuc ((keks)) chaschere äno geh	and a Tuc ((cookie)) you can give her one too
5	Levin	es↑	a↑
6	Mother	es Tuc (3.0)	a Tuc (3.0)
7	Levin	nid ade erwachsnig gschider	better not to adults
8	Mother	momol die sind ä für die erwachsnige	yes yes they are for adults too

Table 1 – The TUC® case. Participants: Levin 3:2 years, mother

Levin transforms this exchange into an argumentative discussion at turn 7, when he problematizes his mother's request to give a TUC® cookie to the researcher (turn 4).

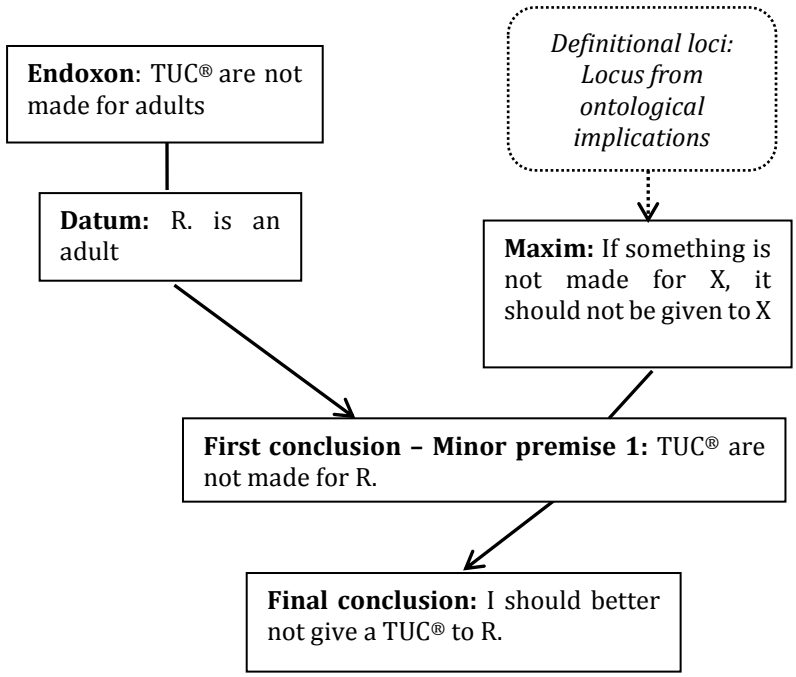

Figure 1 – AMT representation of the TUC® example (Levin's argumentation)

Figure 1 is a graphical representation of the AMT analysis of Levin's argumentation in extract 1. On the right, the procedural premises of this argument are represented. In this case, the argument is based on a locus from ontological implications (Rigotti and Greco, forth.) a relation between the nature of an entity (in this case, cookies) what this nature implies, namely the end for which this entity has been designed. In the AMT, the locus from ontological implications is part of the category of *definitional loci*. Some definitional procedures derive from the purpose of an object (e.g. when we say that a yoga mat is a type of mat designed for practicing yoga, we give a definition based on the goal of the yoga mat). The ontological implication on which this argument is built derives from this kind of functional definition.

The maxim, in this case, is formulated in a negative variant: "if something is not made for x, it should not be given to x". We have reconstructed this maxim, which is actually implicit. Speculatively, we could imagine that the child might have derived this maxim, indirectly, starting from cases in which he is denied access to things that are "not for children" – such as alcohol, just to mention an obvious example in the domain of food and beverages. In any case, this principle, per se, might be correctly applied, despite some limitations, in a series of everyday situations: think for example of cars, which are not meant for children to drive.

Whilst the maxim, thus, can be correctly applied at least in some domains, the material premises of this argument – in particular the endoxon – require a more nuanced appreciation. The datum "R is an adult" is not explicitly said by the child, arguably because it is visible to everybody in the here-and-now of the conversation. The endoxon is made explicit by the child as a reaction to his mother's request (turns 4 and 6): "[TUC® Cookies are] better not for adults". Apparently, this endoxon is not shared by the mother; although it is true that there are types of sweets and cakes that are *made especially* for children (in terms of marketing, packaging, etc.), for the mother this is not the case of TUC® cookies[5]. In this sense, example 1 is exemplary of a situation that we often find in our data: the child's argument appears "wrong" not because of a logical mistake but because an endoxon is different from what an adult would expect.

A similar dynamics is to be found in a different situation, taken from the corpus of semi-structured play activities and recorded in November 2016 in a kindergarten in Italy. The children are introduced to

[5] The mother might be aware that TUC® cookies as not advertised as children's cookies.

an activity, inspired by Piaget (1974), in which they have to play with LEGO®. In particular, the researcher has asked a couple of children (a 6 years old male and a 5 years old female) to build a bridge. She has explained that two friends are waiting on their cars on opposite edges of a lake; they want to meet and they need a bridge to do so. The two friends are LEGO® characters, a blue and a red one respectively. The former is taller than the latter. All the materials have been placed on a little table, around which children are free to move. The lake has been cut out from blue construction paper.

Extract 2 reproduces the final moments of the discussion. After the children have completed the task, the researcher asks them to explain what they have been doing. After some discussion on the task, one of the children (Max) makes a digression and talks about the LEGO® figures that they have been playing with (see table 2).

Turn	Speaker	Transcript	Our Translation
1	Max	questo qui ((prende in mano la sagoma lego di colore rosso, gli cade e lo riprende in mano e lo solleva)) questo qui è una femmina è un bimbo perché è più basso di lei (1.0)	this one ((takes the red lego figure into his hand, the figure falls down and he takes it into his hand again and lifts it up)) this one is a female a child because it's shorter than her (1.0)
2	Researcher	ah::	ah::
3	Max	questo qui ((indica il lego di colore rosso))	this one ((indicates the red lego figure))
4	Researcher	per l'altezza↑	because of the height↑
5	Max	um um ((suono usato in senso affermativo))	um um ((affirming))

Table 2 – The LEGO® example

Although the text is partially ambiguous, it is clear that Max is comparing two LEGO® figures. He makes a consideration based on the size of one of the two characters, which is smaller than the other one; and argues that therefore it must be "a female, a child", because "it's shorter than her". Two different interpretations are given – the LEGO® figure might be a female or a child (or both: a female child, this is not clear from the data)[6] because it is shorter than the other figure. In general, this is a

[6] In the following of the conversation, the researcher picks up one of these interpretations, namely that the character is a female; and the children confirm

definitional argument relying on size as an indicator of something else. At the level of endoxa, we would have: "children are smaller than adults", which is generally acceptable (up to a certain age, and with nuanced individual variations); or "female persons are smaller than males", which is not so obvious and not valid for each individual case. If the second interpretation is correct, then the child is adopting an endoxon that is not correctly describing all possible male-female combinations in terms of height. However, even if partial, this endoxon might come from the child's personal experience (e.g. his mother being shorter than his father?) or from children's books or other cultural representations. In any case, once again, although endoxa might be discussed, the inferential-procedural dynamics of the argument is correct, which tells us that children's arguments, at least in some cases, even when they appear as "bizarre" or come to a wrong conclusion, are not necessarily wrong altogether. A clue to further understand children's argumentative skills and their contributions to an argumentative discussion seems to lie in a nuanced and careful consideration of material premises.

The third example we have selected also comes from the corpus of semi-structured play activities and has been recorded in a kindergarten in Italy in November 2016. This example is particularly interesting, in our view, because it shows that sometimes a child's refusal to respond to the adult's task is due to a misalignment of implicit premises.

The task in this case is to build a tunnel with building blocks, in such a way that toy cars can drive through it. The children are sitting around a table on which four pictures representing tunnels, some LEGO® bricks and a red toy car are placed. At the beginning of the interaction (which we are not reporting in table 3), the researcher shows the pictures to the children; at some point, she talks about the red toy car. In previous interactions, the children referred to this same car as "Fireman Sam's car", alluding to an animated character that they probably know because of TV series[7]. Arguably, the red car "looks like" Sam's car because of its red colour; Sam and his fellow firemen, in fact, drive a red truck and a red car in the TV series. In this interaction, the adult researcher picks up this

it. However, we are not commenting on this part, because this confirmation has been guided by the researcher's interpretation.

[7] Fireman Sam is an animated comedy for children originally produced and broadcast in the UK; the series has been translated to Italian and broadcast in Italy since 2006. In the original story, Sam lives in the fictional village of Pontypandy (see https://en.wikipedia.org/wiki/Fireman_Sam, last visited September 2017).

interpretation, although she is not familiar with the world of fireman Sam. Therefore, whilst introducing this new task, she presents the red toy car as “Sam’s car” and the task as “building a tunnel for Sam’s city”.

Turn	Speaker	Transcript	Our Translation
1	Researcher	e ci sono le luci dentro il tunnel perché altrimenti (.) non si vede niente è buio no dentro il tunnel (.) se non ci sono le luci non riusciamo a vedere (.) allora visto che avete visto il tunnel io vi ho portato qua la macchinina di Sam il pompiere ((avvicina la macchinina ai bambini e Mia la prende in mano)) che la conoscete tutti e vi chiedo di costruire il suo tunnel ((prende la macchinina in mano)) allora il tunnel per essere utile	and there are lights in the tunnel because otherwise (.) you cannot see anything it's dark inside the tunnel is it (.) if there are no lights we won't be able to see (.) so since you have seen the tunnel I brought to you fireman Sam's car ((holds the car closer to the children and Mia takes it into her hands)) that you all know and I'll ask you to construct his tunnel ((takes the car into her hands)) so the tunnel to be useful
2	Mia	deve passare sotto	it must go under it
3	Researcher	deve passare [sotto	it must go [under it
4	Tom	[ma ma] ma ma ma ma la città di Sam il pompiere u un c'ha u un u un c'ha un tunnel	[but but] but but but but the city of fireman Sam does n no does n no not have a tunnel
5	Researcher	ed è per quello che noi lo facciamo perché non ce l'ha (.) è per quello che noi lo facciamo (.) vai siediti Tom ((la ricercatrice fa sedere Tom)) però bisogna stare bene attenti che la nostra macchina riesca a passare sotto il tunnel perché se non riesce a passarci il tunnel dobbiamo rifarlo eh quindi state bene attenti che riesca a passarci vi lascio le costruzioni qua ((avvicina le costruzioni a bambini)) e poi vengo a vedere il tunnel che avete fatto	and this is why we are making it because it does not have one (.) this is why we are making it (.) go sit down Tom ((makes Tom sit down)) but we need to pay attention that our car will be able to go under the tunnel because if it does not succeed going under the tunnel we need to remake it so therefore pay attention that it can go under it i let you the building blocks here ((puts the building blocks near the children)) and afterwards i come to see the tunnel you made

Table 3 – Fireman Sam

The discussion about how to solve the task begins at turns 2-3. However, in turn 4, one of the children (Tom) immediately reacts saying that Sam's city does not have a tunnel. The presentation of the task by the researcher is not necessarily argumentative; she presents the aim of the activity (constructing a tunnel) as "constructing his (i.e. Sam's) tunnel". Arguably, Tom interprets the adjective "suo" (his) in such a way that he understands "the tunnel that is in Sam's city". This is not literally what the adult has said but is a reasonable interpretation of her words. Tom, then, reinterprets the construction of the tunnel as a means to faithfully reproduce the city where Sam lives and works. From his reaction at turn 4, we might say that Tom interprets the presentation of the task by the researcher as a form of means-end argumentation. The researcher's argumentation according to Tom's interpretation can be reconstructed as in figure 2.

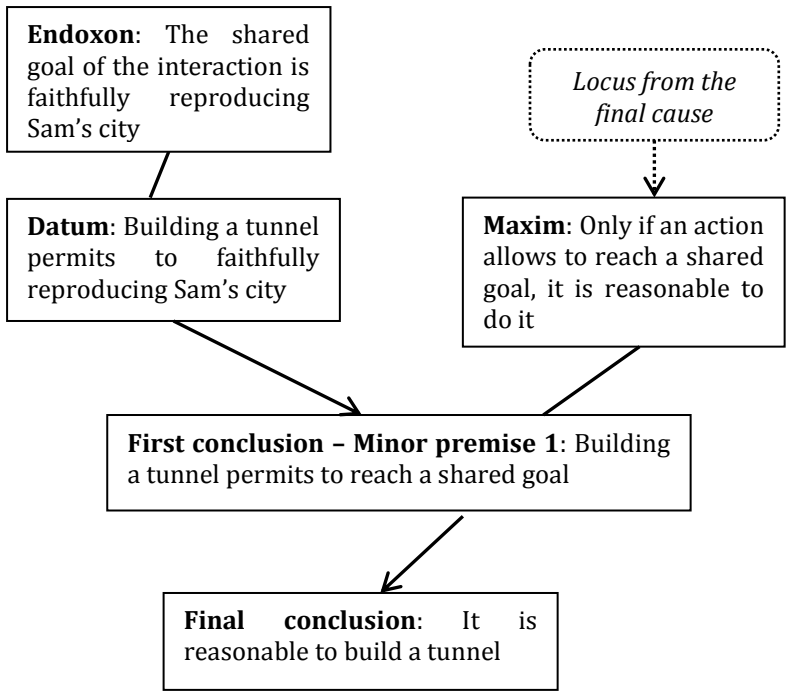

Figure 2 – AMT representation of Fireman Sam's example (researcher's argumentation according to Tom)

Tom's objection at turn 4 stems from the fact that he does not share the datum proposed (or allegedly proposed) by the adult: Sam's city does not have a tunnel. In this sense, because the child is more

knowledgeable than the adult about the details of Sam's world, there is an asymmetry of knowledge that is reversed (contrary to what one would expect): the child knows more than the adult. Consequently, in response to Tom's remark, the researcher reacts (turn 5) by rephrasing the goal of the interaction (endoxon). She says that they are building a tunnel precisely because Sam's city does not have one. In this way, the researcher modifies the endoxon: the goal is not faithfully reproducing Sam's city but completing it. This means that the researcher has understood Tom's objection and reacts in this way in order to correct the implicit material premise (endoxon) that Tom assumed was her premise.

5. DISCUSSION AND FURTHER OPENINGS

Two main aspects emerge from this analysis. A first aspect is that the reconstruction of children's inferences and, in particular, implicit premises, contributes to a nuanced understanding of children's argumentative skills. In particular, findings from the ArgImp project show that isolating material premises from procedural premises permits to identify possible sources of misunderstandings and arguments that come to a wrong conclusion. In the case of children's argumentation, we often note (as in examples 1 and 2) that arguments are correct from an inferential-procedural viewpoint (see also Convertini, in preparation), but they rely on endoxa that only partially reproduce adults' understandings of reality. Example 3 shows that adults' implicit endoxa are not always clear to the children. But more generally, it shows that it is not simply children's endoxa that are "weird" but adults' in some ways are also. In fact, there is a problem of perspectivation, and one should take into account that also adults' implicit starting points might be questioned (or difficult to understand) in conversation. This result is in line with findings by Pramling and Säljö (2015). In their study of Piagetian interviews, these authors show that taking into account the situatedness of the conversation (including adults' implicit starting points) might change the interpretation of children's argumentation. All this suggests that, in order to improve argumentation (for example in educational settings), a careful consideration of both adults' and children's implicit premises would be necessary; and without forgetting that these premises are likely to change while the child (and sometimes even the adult) deepens his or her understanding of the issue (Miserez Caperos, 2017).

From a viewpoint of children's argumentative skills, example 3 also shows that Tom was able to reconstruct a possible means-end argumentation allegedly proposed by the adult. He was able to assume

the endoxon that he thinks the adult has proposed and reason from that starting point.

A second aspect that emerges from example 3 concerns the fact that children (in this case, Tom) are able to discuss the meaningfulness of a task proposed by an adult. Although this is not the subject of the present paper, it deserves some discussion. In fact, Tom's reaction in turn 4 is indirectly criticizing (or questioning at the least) the adult's proposal. In this case, as it is visible in the following of extract 3, the adult does pick up the child's suggestion and modifies the goal of the activity following up on this criticism[8]. In other cases, however, we have shown that children's attempts to question an adult's proposal are not taken up by the adults participating in the interaction; for example, Greco, Mehmeti and Perret-Clermont (2017) show that when children question a discussion issue proposed by an adult, or try to open a new discussion issue, they might not be allowed to do so by the adult (for many reasons, including the possibility of an adult's lack of decentration). This kind of findings, which are emerging in the ArgImp project, brought us to consider more closely the notion of "discussion issue" in relation to the freedom rule of an argumentative discussion (van Eemeren and Grootendorst, 2004). In its original formulation, the *freedom rule* states that parties to an (ideal) argumentative discussion should be free to advance standpoints and arguments. We find, however, that one of the limitations that might be imposed to children is due to the fact that they are not free to open argumentative discussions by proposing new issues to the adults attention (or to challenge an adult's issue). When the issues proposed by children deviate from what is expected, or go against the adult's expectations, they are often "suffocated" or left apart in the adult-led discussion. We think that carefully observing how issues are raised or refused (not always argumentatively) and who is legitimate to do so might open new avenues for the study of children's argumentation in educational contexts (see Greco, Mehmeti & Perret-Clermont, 2017; Greco, 2016; Schär, in preparation). This also opens the debate on a reconsideration of the teacher's role in argumentative discussions: if "teaching" is understood only as a teacher-guided top down activity and "learning" as acquiring the knowledge that a teacher "has", then the promotion of discussions in classrooms might lead to conflicting

[8] This example suggests that a further step in this research could be the reconstruction of pragmatic inferences made by adults in order to reconstruct the meaning of children's arguments. In some cases, pragmatic inferences might break down and this would explain where adults do not understand children (and vice versa).

requirements for the students. This might explain also why sometimes it is so difficult to promote argumentation in the classroom (Schwarz and Baker, 2017). Instead, if the teacher's role is understood as that of a mediator (Greco, Mehmeti & Perret- Clermont, 2017) in a triangular relation with students and knowledge issues, then a space can open for critical discussion amongst the interlocutors. However, the characteristics of this space and the precise role of the teacher and the students deserve more research.

6. CONCLUSION

In this contribution, we have shown some exemplary findings of the ArgImp project, focusing on how the reconstruction of children's inferences within an adult-children discussion (in different settings) might contribute to the study of children's argumentation. The systematic analysis of a growing collection of episodes of children's argumentation shows that distinguishing between procedural and material premises (as allowed by the AMT) provides useful insights into what the problems might be in their interaction with adults. In particular, material premises explain possible misalignments between adults and children in terms of implicit starting points.

These findings contribute to the research stream on argumentation in context, by illuminating types of contextual settings that are still underinvestigated: namely, contexts in which very small children (under 6 years) participate to the discussion, including semi-structured play activities.

ACKNOWLEDGEMENTS: We are grateful to the Swiss National Science Foundation, which provided the funding for the ArgImp project, on which this paper is based (contract n. 100019-156690 and prolongation, contract n. 100019_156690/2, 2015-2018). We wish to thank E. Rigotti for his precious remarks on a previous version of our analysis.

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APPENDIX

i. Transcription signs

sign	*description*
↑	raising intonation
(( ))	nonverbal component
(1.0)	pause of 1 second
=	immediately following turn
An::d	lengthening of preceding vowel
(.)	micro pause
[ ]	interruption and overlapping

Commentary on Greco's et al. Analysing Implicit Premises within Children's Argumentative Inferences

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1. INTRODUCTION

Argument may be broadly defined as an inference with an intention. If viewed/analysed in a dialogical context, such intention needs to be considered in relation to a dialogue goal. The authors aim to "interpret argumentation from a dialogical viewpoint", thus it is expected that dialogue goals/intentions are taken into consideration.

This potential relationship between individual dialogue moves and commonly achieved goals has been extensively studied in the field of educational argumentation both in face-to-face (e.g. Nussbaum & Kardash, 2005; Felton, Garcia-Mila & Gilabert, 2009) and in computer-supported collaborative learning environments (e.g. Clark et al., 2007; Baker, 2016). The main problem that these studies face is that several coding schemes of dialogue moves exist, which reveals the lack of a commonly shared pragmatic model to analyse interaction/argumentation in context. Argumentation Theory (AT) could contribute to educational research in this sense, providing for example a top-down list of argumentation dialogue types meaningful in the educational context or even a top-down list of teachers and students dialogue moves that clearly relate to promoting argumentation dialogue in the classroom. Both goals are still unachieved.

2. SOME METHODOLOGICAL CONSIDERATIONS

What Greco et al. (this volume) propose is to use AMT (Argumentum Model of Topics), which is a structural analytical framework of arguments, to analyse and re-construct children's inferences, with a particular focus on *endoxa* that are for the authors types of inferential rules based on material components. According to the authors, it is these

endoxa we as researchers need to focus on if we want to better understand children's inferences and why sometimes they are not correctly understood or judged by adults.

Although an explicit definition of *endoxon* is not given by the authors, I assume they refer to the Aristotelian term. For Aristotle, *endoxa* are "these that are thought by everyone or the majority or the wisemen and by the ones who know and think everything or the majority or the most part of the things" (Topics, 100b, 21-23, my transl.). Put simpler, endoxa are the generally accepted opinions, but not the self-proven principles that are the *prota* and *alithi* (first and true), as for example are the mathematical axioms. In this sense, *endoxa* are products either of logical argumentation or they are just opinions (in the sense of Platonic *doxes*).

In any case endoxa are different than topoi or loci (maxims) and it is a good idea to distinguish them. It is also a good idea to consider that there is a structural connection between them, as it was first proposed by Abelard (see Macagno & Walton, 2006). Moreover, "keeping endoxon and maxim separated allows for sharper questions" (Rocci, 2017, p. 61). However, what for Rigotti and Greco (2010) is mainly a semantic question[1], for other scholars (e.g. Walton, 2007) it is a dialectical issue that takes into consideration all types of semantic relations between the premises[2]. It is this dialectical element that it is necessary when analysing arguments in dialogical contexts, especially in education where common knowledge cannot be taken for granted and knowledge construction is the aim of argumentative interactions (Baker, 2003).

In any dialogical context, we cannot presuppose that interlocutors share the same starting points, and even less in education, especially with young children. Then the goal of educators becomes the one of accompanying the less-knowledgeable into constructing more scientific, evidence-based theories that would replace or complete the existing intuitive theories, what educational scientists call conceptual change. The relation between argumentation and conceptual change has been broadly studied in education and with children in particular (e.g. Duschl & Osborne, 2002; Berland & McNeill, 2010; Venville & Dawson, 2010). Helping children make explicit their own theories about

[1] Which is perfectly fine but again we need a pragmatic model behind, such as Levinson's scalar implicatures (see Davis, 1998).

[2] Walton treats endoxa as premises, making their re-construction easy and accessible for many educational researchers (see for example Duschl, 2007; Macagno & Konstantinidou, 2013; Ibraim, Mendonça & Justi, 2013; Rapanta & Walton, 2016a, b).

phenomena, often intuitive, and having them re-construct or co-construct new theories, more scientific ones, has been the object of a vast literature in argumentation and education (e.g. von Aufschnaiter et al., 2008; Kuhn, 2010). Moreover, most of the studies proposed take into account the dialectical element of interaction proposing concrete ways of how children may produce better arguments, counter-arguments, and rebuttals (e.g. Kuhn & Udell, 2003; Erduran, Simon, & Osborne, 2004; Leitão, 2007).

3. PRE-SCHOOL CHILDREN ARGUMENTATION

Developmental research literature suggests that children by 3 years of age understand and generate the principle components of an argument (Stein & Albro, 2001), but their arguments are still not elaborated (Golder, 1992) or strategic (Felton & Kuhn, 2001). In this sense, I agree with Greco et al. (this volume) that the quality of children's arguments must not only be judged in terms of "logical" structure, as it is common to have apparently correct argument structures, but based on incomplete, insufficient or not-as-much acceptable knowledge. This is the case of "pseudoevidence" (Kuhn, 1991), personal or idiosyncratic arguments (Ceballos, Correa & Batista, 2002), or "paralogisms" (Rapanta & Walton, 2016a, b). In educational contexts, it is fairly easy to judge what type of prior knowledge used is not as much persuasive or adequate because it lacks certain scientific standards related to the disciplinary subject. Below an example of my current corpus data of a 12-year old arguing about whether Mediterranean diet should be recommendable or not:

> (1) On the one hand I agree with the statement (that Mediterranean diet is recommendable) because it contains, in percentages, the correct portions. On the other hand I do not agree because the portions are extremely reduced so most people who follow it are undoubtedly hungry. In short, this diet, in my opinion, should be practiced, but with more portions of everything. Example: I think that eating only one or two spoonfuls of rice in one meal is very little, should be the double.

In the above example, the 12-year old child gave an expert-like opinion regarding what the correct amount of food should be, but obviously she did not use any subject-related knowledge for her judgment. The argument may be strong from a structural point of view, but weak from a content point of view. Nonetheless, at a pre-school age,

which is the children's age in Greco et al.'s study, it is difficult to define what the expected or "correct" knowledge should be, which would subsequently define the quality of arguments as implied by the authors. Going deeper in each one of the presented examples, the first one is an example of practical reasoning in which the child concludes that he should not give the cookie to the researcher. The explicit premise that "it is better not to give this type of cookie to an adult" perfectly serves the goal of the child not to give the cookie (and subsequently keep it for him). Whether this premise (*endoxon* in Greco et al. analysis) is successful or not depends on the goals of the interlocutors. In the case of Levin (the child) the premise is highly relevant to his goal (if the cookie is not for adults, then he shouldn't give it), sufficient (the researcher is an adult), but maybe not totally acceptable, as he fails to answer the dialectical question "How do you know that (this cookie is not for adults)?", which is the basis of metacognitive development according to Kuhn (2000). In the case of Levin's mother, she just cancels Levin's premise by stating that "they are for adults too" imposing her own goal (offering the cookie) without any argumentation offered from her part. Thus, she doesn't support Levin in this argumentative effort, if his refusal to give the cookie was seen as such. For Stein & Miller (1991), children from the age of 3 have the ability to construct counter-arguments in the way that Levin did, but these arguments are not necessarily strategic from an argumentative point of view: they are mainly used to satisfy personal desires.

In the other two examples, we have two cases of arguments from analogy. In one case, Max (the child) claims that the Lego figure is a female (or a child) because it is shorter than the other Lego. Clearly, as the authors also state, this analogy is based on the child's personal experience confirming that females (or children) are shorter than males (or adults). In the other case, Tom (the child) continues the analogy previously co-constructed with the other children, as mentioned by the authors, in which the red toy car used as part of the task "was" Sam fireman's car (a cartoon's character). So, after the researcher's invitation to build a tunnel for fireman Sam's car, Tom counter-argues her by saying that "but the city of fireman Sam does not have a tunnel". The implicit claim would be "thus, we shouldn't construct a tunnel", which would go against the researcher's goal, requiring the children to complete the task. The researcher instead of responding to Tom's counter-argument, thus helping him develop his argumentative reasoning, she uses a weak rebuttal "because Sam's city doesn't have a tunnel, we need to make one", not replying directly to Tom's challenge (if we want to consider it as a challenge).

4. CONCLUSION

In summary, I believe that all the children's arguments presented in Greco et al. study are considerable efforts in terms of the quality of argumentative reasoning, based on developmental research literature (Stein & Miller, 1991; Stein & Albro, 1991; Golder, 1992). Maybe it is the adults' weakness in adequately responding to these arguments, or simply the difference in their intentions, that makes children's arguments look insufficient?

From a theory of mind point of view, analogical reasoning, present in two of the three examples in Greco et al. paper, enables children's early inferential sensitivity to some mental states associated with action (Malle, 2002). Thus, it would be interesting to see the relations of pre-school children's endoxa with theories of mind developed in the early years of life.

From an AT perspective, it would also be interesting to see the relation (in terms of contribution) between children's inferences and the dialogue goal, when this dialogue is authentic and not serving some specific researchers needs such as carrying concrete cognitive tasks, as in the last two examples mentioned in Greco et al.

Last but not least, from an argumentation and education point of view, any transfer of observations made at a pre-school age to formal education settings may be dangerous, if not meaningless. On the other hand, if the goal is to better understand how argumentation skills are developed in the early childhood and how we can support this process applying AT models and tools, research in this field is certainly promising.

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