Published in
Sinclaire-Harding, L., Miserez, C., Arcidiacono, F., & Perret-Clermont, A.-N. (2013). Argumentation in the Piagetian clinical interview: a step further in dialogism. In M. B. Ligorio & M. César (Eds.), The interplays between dialogical learning and dialogical self (pp. 53-82). Charlotte: Information Age Publisher ;
which should be used for any reference to this work

Argumentation in the Piagetian clinical interview: A step further in dialogism

Lysandra Sinclaire-Harding, Céline Miserez, Francesco Arcidiacono and Anne-Nelly Perret-Clermont[1]

University of Neuchâtel

Educators have long been concerned with how to encourage children to become independent and critical thinkers. These skills are fundamental for successful participation in social communities but are often limited to poor forms of reasoning or constrained by social and emotional factors that may prevent independent and creative thinking in school, family or professional life (Muller-Mirza & Perret-Clermont, 2009). In this chapter we will turn back to some aspects of the contribution of Piaget to the study of the development of independent thinking in children and revisit them in the light of dialogical perspectives. More precisely we will revisit the 'clinical' or 'critical' interview he employed in his investigations of children's cognitive competence. For Piaget, a child's argument is the sign of a child's thinking. In response to careful questioning, the child is prompted to provide reasoning and justification of concepts (such as the conservation of quantities). Piaget considered these as allowing access to the cognitive structures that support such thinking.

With his critical interview Piaget inspired generations of psychologists in their search to understand the developing mind of an autonomous reasoned thinker. Over the decades since its original conception, the critical interview evolved into an empirical method to assess the child's stage of cognitive development. We suggest that as a

[1] We thank the Swiss National Research Foundation for its support (contract no. PDFMP1-123102/1 to Anne-Nelly Perret-Clermont and Francesco Arcidiacono) as part of the Argupolis project (http://www.argupolis.net/). Authorship of this chapter was lead by Lysandra Sinclaire-Harding, with empirical and theoretical contributions from all the co-authors.

result of this evolution, the critical interview method has neglected to account for the presence of social or contextual factors in these conversations. We propose that the child's reasoning and argumentation cannot be cognitively isolated but must be considered as a co-construction between the child and the practices, objects, expectations and normative values of his[2] interlocutors and social context.

Through our re-visitation of this method, we hope to observe the socio-cognitive processes that may have been overlooked by Piaget and the subsequent reductionist evolution of his critical interview. In this study, we have taken steps to increase the likelihood that children enter into the discussion and we have confronted them, in the hope of stimulating contrasting opinions, or arguments. Throughout our observations and their subsequent analysis, we pay close attention to what we believe are the social dynamics in which the child's discourse is nested. In doing so, we not only discover the fledging signs of logical reasoning and argumentation in children, but we highlight the importance of creating educational opportunities to develop socially and culturally nourished, autonomous thinking.

Re-visiting the clinical interview

In his early work, Piaget sought a means by which he could empirically observe the structures of children's thinking through their judgments and reasoning (Shayer, 2008). In order to access their reasoning, Piaget would engage children in conversation and confront them with different points of view. The method granted special importance to counter-suggestions as invitations to defend answers, allowing

[2] In conformity with the practice in Piaget's writings, the masculine form will be used to designate both boys and girls. We are aware that gender is a relevant dimension in the type of processes discussed here (Psaltis & Duveen, 2006) but has not been examined in the data referred to in the present chapter.

him to assess the structure behind the child's reasoning and not just the conformity of the isolated responses to the adult's norms or expectations.

Piaget (1926) described the critical interview as a method, also an art of questioning, which "*aims at capturing what is hidden behind the immediate appearance of things. It analyzes down to its ultimate constituents the least little remark made by the young subjects"* (pp.13-14).

The critical interview method, used to identify the birth of knowledge in the child, consists of a dialogue between adult and child. Through questioning, the latter is encouraged to verbally express his reasoning process through arguments that support judgments (Bovet, 1974). Piaget's aim was that the observer could not only see how the child understands and responds, but also by what means he explains the statements he makes. Piaget suggested that the acquisition of scientific concepts, such as the conservation of quantities, requires action, reflection and decentration (the ability to consider the perspective of another). This capacity to consider the views of 'the other' he considered as one of the foundations to creative thinking, to building on the ideas of others and generating alternatives and hypotheses.

Evolution of the Piagetian Interview

In search of guidance for the methodological approach for our study, we returned to Piaget's early descriptions of the clinical interview (Piaget & Szeminska, 1941). Piaget, in fact, gave little by way of detailed description of his method. We find his original 'conversation' between adult and child to be both informal and exploratory. Indeed, it seems almost playful in contrast to the systematic tests of conservation that have subsequently been adapted for replicable, scientific measures of psychological constructs. We discovered considerable differences between Piaget's original

approach and the procedures reported in subsequent empirical studies.

Although, perhaps of anecdotal relevance to the present study but demonstrating the importance of collaborators in the development of a researcher's thinking, we speculate that this evolutionary journey began with one of Piaget's closest collaborators: Bärbel Inhelder, who may have been the first to use the conservation test as a diagnostic tool in her research on developmental stages and delays in young children (Inhelder, 1943). More than 20 years later, and after volumes of empirical investigations of conservation had been published, concern for improving consistency in task design and testing procedures resulted in the development of a psychometric scale of conservation called the Concept Assessment Kit (Goldschmidt & Bentler, 1968). What had initially been described as an 'interview,' was now an 'experiment,' 'children' became 'participants' and their verbal responses to transformations of volume, area, length and weight were given numerical values and rated on a scale. Thus providing "*a greater measure of consistency and statistical accuracy into the research on conservation*" (Goldschmidt & Bentler, 1968, p.788).

In what was perhaps a pivotal moment of departure from Piaget's original conception of the interview, Goldschmidt and Bentler separated the child's *behavior* (judgment of conservation or non-conservation) from their *explanation* (reasoning), suggesting that behavior is an equally adequate measure of assessing conservation. Yet Piaget would argue unequivocally that it is the comprehension or explanation of the child's reasoning that must be assessed and distinguished from a mere belief, in order to determine a child's level of mastery of the concept of conservation (Inhelder, Bovet, Sinclair & Smock, 1966).

McGarrigle and Donaldson (1975) suggest that procedures employed to assess conservation can underestimate the child's knowledge. Even when conversations

during the clinical interview are allowed to remain open and unpredictable, even if the experimenter can control the here and now of the interaction at every stage, defining the problem and deciding which objects and attributes of objects are going to be the focus for attention, the experimental manipulations are "*contrived for the purpose of engendering specific kinds of opportunities for cognitive changes with specific kind of individuals*" (Maynard, 2009, pp.315-316).

The clinical interview is a complex method to interact with children. Even Piaget recognized the difficulty in interviewing children: "*it is so hard not to talk too much when questioning a child… it is so hard not to be suggestive… the good experimenter must, unite two often incompatible qualities: he must know how to observe, to let the child talk freely, without ever checking or side-tracking his utterance and at the same time he must constantly be alert for something definitive*" (Piaget, 1929, p.9).

With such complexity and without clear, procedural instructions for the administration of his method, it is little wonder that psychologists have attempted to create a standardized test to investigate Piaget's theories. However, we believe that over several decades of evolution, the conversational and dialogical character of his method has been subsumed by reductionist psychology in search of behavioral and cognitive explanations. Piaget (1927, 1929) himself suggested the clinical interview was to be a qualitative description, rather than explained through numerical counts and standardized tests. This disparity between its original conception and subsequent empirical evolution, has lead some researchers to question whether psychologists can in fact claim to be assessing the same thinking processes that Piaget originally conceived (Bond & Tryphon, 2009).

Thus, we have returned to the critical interview, as we believed it was originally conceived: *"in chase of the ever-receding thought, drives it from cover, pursues it and*

tracks it down till it can seize it, dissect it and lay bare the secret of its composition" (Piaget, 1926, pp.13-14). As will be evident from our report, the focus of our attention is not on the child's judgment of conservation but on the arguments, explanation and reasoning he provides to support or re-enforce his judgment. In doing so, we respect Piaget's hypothesis about the logical structures of the child's thoughts and his statements as a sign of them. Whilst we may have had reasons to question this premise (Perret-Clermont, 1993), we have put these aside in order to distinguish between surface thinking and deeper thinking.

In contrast to Piaget however, and with the benefit of decades of research since he first justified his method, we will explore children's thinking, through a social and dialogical lens. We believe that reasoning and argumentation cannot be considered in a cognitive vacuum, free from past experience, conversations and context. Nor do we feel that social dialogue only occurs in the physical presence of another (Piaget, 1926). From this perspective, explained in more detail below, the beliefs and understandings of individuals are enriched by the internalised 'voices' of others (Bakhtin, 1930/1981). We explore examples, from our interviews, of how children display their thinking in connection to certain context and activity; between the child and his relationships to persons and objects in social life and in the school environment.

Dialogical interaction and the critical interview

Different studies (Hundeide, 1992; Light & Perret-Clermont, 1989; Rommetveit, 1985) have demonstrated how a socio-cognitive framework, attentive to communication processes, may contribute to the understanding of children's performance in Piagetian tasks. Assuming a dialogical conception of the interaction

during Piagetian interviews, the individual "conduct" constructed through discussion and social interactions, can be understood only in relation to the interlocutors and the activity context in which it occurs. The Piagetian interview implies a communicative interaction between three components: the subject, the interlocutor and the object of discourse. It is mediated by semiotic means, and each participant establishes a personal relationship with each of these elements (Chapman, 1991; Psaltis, Duveen & Perret-Clermont, 2009; Zittoun, Gillespie, Cornish & Psaltis, 2007).

Early research on acquiescence (Rose & Blank, 1974) and on children's understanding of Piagetian tasks when put in context via different narratives (Donaldson, 1978; Light, Buckingham & Robbins, 1979; Light, Gorsuch & Newmann, 1987), demonstrate how the child's role is not only to answer but also to consider the intention of the adult and to behave accordingly in a socially adequate way. The child tries to interpret the frame of the activity (Ginsburg, 1997) and differences between the interpretations of adult and child on the premise of the task are likely.

Pramling (2006) highlights the relevance of studying the meta-communicative elements during Piagetian interviews, through which children demonstrate their communicative competence alongside their efforts to be understood through the eyes of the adult. This suggestion is also present in a study conducted by Aronsson and Hundeide (2002) in which the concept of "*relational rationality*" indicates how the children's answers are built in a specific context that participants have to take into account. Piaget referred to logical structures that serve both as a means to assess the difficulty of the task and to interpret the psychological processes that are assumed to take place when the task is being solved. The difficulty of a task as experienced by the individual and how he copes with it in the particular situation, cannot be simply

reduced to an analysis of the logical structure of the problem. Through a detailed analysis of the participants' conversations, it may be possible to identify how the child's understanding of the task is bound by different interpretative premises in relation to the task itself and the co-construction during conversation (Marro Clément, 1999; Marro Clément, Trognon, & Perret-Clermont, 1999).

This exploratory and interpretative approach is one that is supported by the dialogical framework in which we widen our investigation beyond Piaget's narrow focus on the logics of children's thinking, in anticipation and acknowledgement of the alternative perspectives of others (Rommetveit, 2003). Furthermore, dialogical interpretations consider the meaning of the dialogue within the particular institutional setting; in this case the school and classroom, where interpretations of the task and surrounding conversations can be considered relative to the values and social practices of the cultural institution (Mercer, 2004).

A dialogical framework helps us to identify tensions between different spaces, temporalities, and identities of participants (Markova, Linell, Grossen, & Salazar Orvig, 2007), and become aware of the co-construction of meaning, the multivoicedness (Bakhtin, 1930/1981) of a communicative situation, and the context as an implicit constituent to the participant's conversation.

Participation in dialogue increases the need for specific kinds of knowledge and in particular, knowledge of an influence on others' thoughts and actions. Dialogue requires that we consider alternative perspectives, often diverse, multiple and complex (Bebbington, Brown, Frame & Thomson, 2007). As suggested by Wegerif (in this volume), in a dialogue the boundary between people engaged in conversation is not a demarcation line but an inclusive space within which the self and the other mutually construct and reconstruct each other.

The dialogical approach allows us to develop a deeper understanding of how humans interact and co-operate in social situations. To adopt a dialogical approach demands a consideration of these social situations as a plurality of perspectives, trajectories of discourse, and signs (Grossen, 2009). Furthermore, we are interested in the development of opportunities for individual participation "*in a dialogic process that continually shapes and reshapes the self and others*" (Barge & Little, 2002, p.383). According to this dialogical perspective, we can assume as object of the analysis the interaction as a whole: the context is thus perceived not as an external element, but is constructed by the active interpretation of participants (Tartas, Baucal & Perret-Clermont, 2010). Thus, in our goal to stimulate dialogue through critical interview discussions, we hope to better understand the socio-cognitive dynamics influencing these dialogues. Our hypothesis is that children's reasoning is not just a measure of their cognitive thinking but is constructed by social processes such as: the questions and expectations of the adult, the influence of peers, the cultural values and scripts of the institution and the child's individual, autonomous thinking.

Analytical Approach

As has been stated, we believe the exclusive attention to the logical structures of the child's thoughts and to his statements as a sign of them, led Piaget to underestimate the social and conversational dynamics involved in his method and particularly in this conservation of liquids task (Perret-Clermont, 1993; Arcidiacono & Perret-Clermont, 2009, 2010). Arguments in conversation are part of a co-construction of the specific setting (Greco, 2009; Perret-Clermont, 2006; Rigotti & Rocci, 2006). In every interaction, the speaker's identity is at stake, and many social elements need to be managed: emotions, vulnerability, status and expectations of the self and of others,

available semiotic means, goals of the activity, and so on. Thus, our challenge, in widening the lens (Zittoun & Perret-Clermont, 2009) to acknowledge these important emotional and social processes, is to both understand and consider how to manage the design of settings that can promote learning in such interactions.

In the course of our observations, we discovered the dialogues were often very limited. Our participants seemed reluctant to express their opinions and evidence of supportive reasoning was rarely present. Whilst we were conscious of developmental explanations that might suggest our participants may not have acquired the semiotic language or cognitive operations in which to engage in a scientific discussion of liquid conservation, we became aware of the socio-emotional tensions that suggest their developmental trajectory was not the only explanation for the reluctance of children to express their reasoning.

We have taken an inductive and reflective approach to analyzing our observations. As will be seen, we discover, from our analysis of his conversation, that the child is indeed an active thinker but that his previous experiences and conversations, his beliefs and concerns for the perspective and needs of others, are all present in his dialogue. In our search for a framework to help us analyze and understand the cognitive, social and emotional processes that might help us explain such influences, we turn to the perspective of Bakhtin.

Although the notions of external and internal dialog were introduced from his perspective of philosophy and literature, Bakhtin's description of the dialogic process of interaction has attracted psychologists interested in children's linguistic and cognitive development. Some interesting studies (for example Junefelt, 2007; Wertsch, 1991) have used a combination of Piagetian, Vygotskian & Bakhtinian perspectives to identify different dialogic voices in the utterances of young children.

Other studies (Fisher, 2007; Hardman & Delafield, 2010) have illustrated how socio-cultural context impacts dialogue in whole class teaching and learning where students have been trained in a 'community of inquiry.' A discussion of some of these methodological approaches used in psychology and dialogue can be found in Grossen (2010).

Our approach is perhaps closest to Bakhtin's (1930/1981, 1986) theoretical position of dialogues as a community of different and perhaps conflicting voices. Hermans brought together James' (1890) theory on the 'self' with Bakhtin's metaphor of multivoicedness, suggesting that people, as authors, occupy many positions in a multi-voiced self (Hermans, 2001a). As Bakhtin referred to the 'I' and 'other' as voices within the self, James similarly distinguishes between the relatively autonomous 'I': *self-as-knower*, and a collective social 'Me': *self-as-known*. In a stream of thought, as in a musical symphony, multiple voices accompany and oppose one another in dialogical ways.

Hermans and Kempen (1995) stress that, in order to arrive at a developmental theory of the dialogical self, it is necessary to combine a multiplicity of voices or 'positions.' On this advice and after in-depth analysis of our data, we believe we have identified a number of different dialogical *I* and *Me* voices, which we have collected into two categories. These we have tentatively named: a) *in-formed thinking* and b) *co-formed thinking*.

These categories arose from the interpretations from within our data, where a) we believe the child demonstrates an obligation to comply with relational and contextual expectations and norms (co-formed thinking), whilst b) simultaneously trying to voice his identity as own self and author: his ideas, creativity and knowledge (in-formed thinking). These we derived from an analysis of the explicit utterances, together with

associated gestures observable in our transcripts. We acknowledge the exploratory nature of our interpretations, which we hope will create a stimulus for future discussion and research.

Methodological Approach

In contrast to what might be expected from reading Piaget, in our initial interviews we found little evidence of critical discussion and argumentation. Children seemed reluctant to contradict and oppose the adult-experimenter or one another. Thus, we made a number of adaptations to increase the likelihood that children became active participants in the discussion. We begin the following section with a reminder of the liquid conservation task. We then describe the steps that we took to increase the likelihood that children enter into the dialogue, express their opinions and provide supportive reasoning. Instead of relying on face-to-face interviews between the adult and the child, similarly as Perret-Clermont (1980), we have organized a sharing activity.

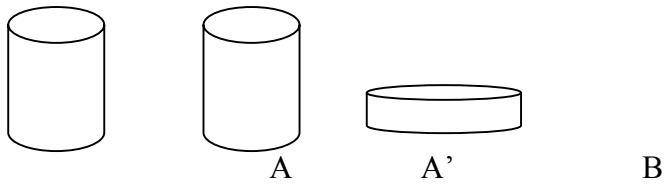
Procedure

In four different primary schools in Switzerland and England, we invited 104 children aged between 5 and 7 years, to participate in discussions of a liquid conservation task. Interviews were conducted by the experimenter, each one lasting no more than 20 minutes and were held in a separate room adjacent to the classroom. Dialogues were video- and voice- recorded to ensure students' reactions were captured. The experimenter and the children were seated at the same table. Children were introduced to a number of glasses or cups of different shapes (see Figure 1). At the beginning, two identical cups (A and A') were filled to the same level, and the child was asked

A A' C

Figure 1: set of glasses

whether each contained the same amount of juice. Once the child had agreed there was the same volume of juice in each (sometimes after adding a few additional drops), the content of one (cup A') was poured into a smaller, larger cup (C). The child was then asked whether the two cups (A and C) still contained the same quantity of liquid. In previous clinical interviews, we also used another taller and thinner cup (B). However during our initial trials, we found that the introduction of a fourth cup had a negative effect on the participant's contribution to the dialogue, perhaps due to the added complexity for children in this age group. To minimize this negative effect, in later trials we used only three cups (A, A' and C).



After a pilot study, we took the following steps to increase discussion and argumentation between participants:

1) the experimenter was introduced to the participants using first names. It was hoped that this would provide some disassociation from the classroom authority or teacher figure, with the intention of reducing the effect of relationship-asymmetry. In addition, the experimenter made every attempt to address each child by name when inviting them to contribute to the discussion;
2) children were grouped with their peers in dyads or triads;
3) children were invited to actively participate in the process of pouring and transferring liquid from one glass to another. It was anticipated that involving

the children in the physical transformation of the juice, contributed to their engagement and persistence with the task and may also have provoked or supported their thinking process;

4) in order to create a scene that is familiar and accessible to our young participants, we presented three soft toys that were each assigned to one of the three glasses (Light, Buckingham & Robbins, 1979; McGarrigle & Donaldson, 1975). The children were invited to imagine that the toys were at a birthday party drinking juice from the different glasses. The three toys expressed three different opinions, which also at times, encouraged children who were less likely to express their own opinion. In particular: soft toy opinion 1: *I have the same amount of juice in my cup as the others*; soft toy opinion 2: *I have more juice than the others*; soft toy opinion 3: *I have less juice than the others*;

5) a common teaching strategy in schools (and one that we believe is therefore familiar to the children) is that the teacher models - usually with the class's participation - a demonstration of the lesson's objective. We wanted to confront children with different perspectives. We used the initial stage of liquid equalization as an opportunity for children to experience each other's contrasting opinions and during this first stage of the discussion, we encouraged participants to agree or disagree on whether the volume of juice was equally shared between cups A and A'. In many trials, several minutes were spent coming to an agreement on whether the volume of liquid was equally shared. We felt this provided a 'lesson demonstration' of the type of dialogue we hoped children would enter, thus facilitating a transition towards a discussion of the next phase of the experimentation;

6) participants were given several opportunities to 'disagree:' first with the initial sharing of quantities and later, when the third container was presented. Furthermore, the experiment was repeated in order to provide the participants with several opportunities to observe and reflect on the transformations. The content of C was poured back into A' and the child was asked the same question concerning A and A.' By presenting several opportunities to argue, and each time, encouraging participants to express different opinions, it was hoped that the children may have been more ready to contribute to the dialogue.

Where necessary, interactions are transcribed[3] in both the original language and the English translation. The names of the children have been changed to ensure anonymity. The adult-experimenter is noted as 'Exp'.

Findings

Derived from the analysis of the dialogic voices within our data, we have grouped our findings into two categories: *In-formed thinking* and *Co-formed thinking*. Within each of these categories we identified recurring themes from our analysis, presented below, together with our theoretical justifications. Each theme is illustrated by examples from our transcripts.

In-formed thinking

We believe in-formed thinking can be expressed through a sense of personal identity, distinctness and volition (James, 1890). Piaget, Inhelder & Szeminska (1948/1973) spoke of autonomous thinking, which they defined as the ability to be self-governing,

[3] For transcription codes, refer to appendix 1.

to think for oneself and to decide between right and wrong, between truth and untruth, by relying on action in reality, evidence and reflection (Kamii, Clark, & Dominik, 1994). We consider the in-formed thinker to be the self-as-knower, the author that demonstrates what he can and wants to remember in response to reflections and emotions that subjectively guide what he cares to remember or take an interest in.

Authorship and initiative: Mead (1934) refers to a *"sense of freedom, of initiative*" (pp.177-178), which we believe guides in-formed thinking. We found an enthusiasm, among our participants, to express such ideas and initiative as well as claim their ownership. Often, such an utterance would begin with a linguistic marker such as "I think," used to express an individual's suggestion or opinion. Where this view point was contradictory to another, children would signal their disagreement with a "no" or a contradictory "yes but…" We suggest these linguistic antecedents signal the child's ownership of independent opinion or ideas. In particular, when the child is facing opposition from another, in demonstration of the freedom and initiative that Meade refers to above, is thus a representation of in-formed thinking.

To illustrate, we present two examples from our data of children offering a suggestion for how to share the juice equally amongst cups of different shapes and sizes.

Excerpt 1

181	Vincent	moi, je sais, il faut reverser un peu dans celui-là *((A))* et un peu dans celui-là *((A'))* aussi.	me, I know, we must tip a little in that one there *((A))* and a little in that one there *((A'))* as well.

Excerpt 2

129	Charlotte	stop. attends, je sais comment on peut regarder. euh, il faut prendre un peu moins que ça. *((égalise A, A' et C une fois encore))* c'est bon!	stop. wait, I know how we can see. err, we must take a little less from that. *((equalizes A, A' and C once again))* it's right!

In these examples we see Charlotte and Vincent proposing a solution to solving the problem of equalization across the different containers. Similarly, other children took the initiative to spontaneously incorporate vocabulary and concepts that suggested an ability to connect the present discussion to a previous context or experience. For example, participants often incorporated vocabulary (i.e.: 'measure,' 'test,' and 'ruler)' that most likely would have been introduced and explicitly taught in the classroom.

It is likely that in primary school, students will have been introduced to containers that allow for accurate measures of capacity using a volumetric scale and it is memories of such vocabulary that children may have retained and are able to recall and connect (even imperfectly) to the present discussion. In an alternative interpretation, we also acknowledge that these behaviors could be understood as co-formed: in such a school setting, children may draw on prior experience of their role as learners, keen to meet the adults' expectations that what has been taught previously and should be re-used in subsequent lessons even if they may not use the vocabulary appropriately.

Deci (1995) and Deci, Koestner and Ryan (2001) have emphasized the importance for children to have a sense of choice and volition, to behave in accordance with their

own interests and values. This is illustrated in the extract below, whereby Jack spontaneously initiates a discussion in which he identifies a relationship between the liquid containers used in our experiment and his experience of drinking from a flexible juice carton (perhaps it is useful to imagine a drinking carton with a straw).

Excerpt 3

73	Jack	it's just because that cup's wider *((gestures C))* and those cups *((gestures A and A'))* are smaller, there *((A and A'))* the juice gets squashed up. when I squash things to actually drink, *((demonstrates a holding and squeezing action with his hands))* it goes up. *((motions his pointed finger in an upward direction))*
74	Exp	when do you squash things to drink?
75	Jack	well, when I can't get them.
76	Exp	what do you use? what are you squashing?
77	Jack	errr (.) a Lucozade Sport (.) it's quite hard.
78	Exp	a Lucozade Sport. you squash it up and what happens?
79	Jack	it comes out. *((smiles))*

Jack describes, with active gestures to reinforce his explanation, how in order to get the remaining juice from the carton, he squashes the carton between his fingers and in response, the liquid moves upwards and out of the container. This vertical motion he likens to that of the narrow containers (A and A') and hence for him, reinforces the reasons for why it appears that there is more juice in these thinner cups. Such an autonomous and spontaneous recollection of a prior experience we propose, demonstrates Jack's in-formed thinking through his volitional reinterpretation of his own lived experience into the present context.

Curiosity and wonder: "*A child's curiosity is an astonishing source of energy*" (Deci, 1995, p. 18). We believe the in-formed thinker may display an impulsive response (Turner, 1999) to stimuli that attracts his attention. Given the age of our young participants, it is unsurprising that we frequently observed their impulsive, playful behaviour in our data. Children were found to initiate imaginative, pretend conversations between the soft toys involved in our experiment and at times became playfully preoccupied with the frequent repetition of liquid pouring from cup to cup, the response to which ranged from intent concentration in one interview, to shrieks of laughter in another.

It is suggested that a capacity for curiosity begins in wonder, spontaneous play and experimentation of ideas (Fisher, 2007; Hardman & Delafield, 2010). In the excerpt below, three participants have been discussing whether each of the cups (A, A' and C) have the same amount of juice. The largest cup (C) has been filled, almost to its capacity, much to the delight of the children, two of which take turns to wrap their hands around the cup as if to measure its capacity through their active gestures. Ben has watched this process and initiates the following exchange.

Excerpt 4

43	Rhona	there's so more than that much *((puts both hands around cup C))*
44	Ben	you've got big HANDS! *((laughs, then bends down to the level of the table as if to take a closer look at the hands through the cup))*
45	Rhona	do I?
46	Ben	if you look through there, look through there

((stands up to point to the side of the cup nearest to Rhona, then returns, seated, to his table level view))

It may be that Ben does not fully understand why Rhona's hands, seen through the glass and the liquid have appeared magnified, but in this moment he is full of wonder, curiosity and humour. Stepping in the footprints of Dewey (1916) and Claparède (1931), we suggest that this impulsive curiosity is the forethought for developing questioning and new thinking and we believe that there are strong connections between in-formed, autonomous thinking, using the child's natural and spontaneous curiosity, interests and creativity as fuel for inquiry and intellectual growth.

Withdrawal: As soon we enter a dialogue we make ourselves known to others. We found that during moments of the conversation where a difference of opinion was being discussed, many participants would withdraw from the discourse or refuse to contribute to the discussion. If children feel any vulnerability in their individual opinions, by withdrawing they may have somehow been able to protect their vulnerable independent ideas. It could be argued that individuals simply did not have a point of view about the task, were not motivated or perhaps did not fully understand the meaning of the discussion. However, we repeatedly observed individuals who by their behavior, appeared to strongly disagree with a claim but refused to provide supporting reasoning. Equally, we observed how some children may have adopted a playful frame from which they were able to securely enjoy the activity without experiencing a challenge to their thinking. Perhaps, in situations where the child exercises his right not to enter the discussion, he is in fact demonstrating the distinctness and independence of the in-formed thinker.

Mead (1934) explored the roles that children learn to take when they play. He suggested that through play, children learn to consider the roles of others. Through their early, invented games, children begin to imagine how someone else thinks and feels; they begin to anticipate how that person will act. Humour, games and imaginative pretending have been found to fundamentally contribute to knowledge generation (Whitebread, 2004). In exercising this desire to withdraw or playfully escape a conversation, we interpret this as in-formed thinking. Furthermore we agree that in-formed thinkers, should indeed be entitled not to speak, or indeed to at least request thinking time before being required to express their views and reasoning about problems that require challenging thinking. Providing opportunities to play, within the learning environment may support in-formed thinking and promote learning.

Isolated thinking: In a few examples we found a kind of independent thinking that was extreme in its isolation from the norms and expectations of the other participants and the adult-experimenter taking part in the activity. In one example a child repeatedly expressed his desire to drink the juice in the containers. This was illustrated by his repeated claim: "*I'm thirsty.*" He became only interested in drinking the juice and showed no desire to engage in the discussion with the group. When it became clear to him that he would be required to wait for a drink of juice, he detached himself from the discussion, got up and removed himself from the group. We believe we observed an independence of thought in some of our participants that perhaps demonstrated a difficulty in imagining the world through someone else's eyes and responding appropriately to others feelings. Although we have categorised this within our in-formed thinker category, in fact, we believe that children who find it difficult to

see the perspective of others may find it harder to further develop this autonomous informed thinking.

The co-formed thinker

James (1890) refers to the social self: *"a man has as many social selves as there are individuals who recognize him"* (p. 294). It seems that these different social selves are not isolated in themselves but can be linked through dialogical interpretations in the multivoiced self (Hermans, 2001b). Furthermore, social roles are interconnected to the expectations of the institutions they exist within (Turner, 1999). Mead (1934) speaks of the social self - the organized set of attitudes expected by the other, which an individual assumes. We define the co-formed thinker as one who tries to respond to expectations without critique, taking little responsibility, obedient or submissive and sometimes even unswervingly loyal to the obligations of the interlocutor, social group or institutional context. The co-formed thinker seems externally inspired, regulated or governed by the values, beliefs and ideas of others. He is thus not only concerned with but also dependent on how successfully (or not) he influences the judgment of others for his self-as-known. In our interviews, we experienced many examples of what we have termed 'co-formed thinking.'

Detatched opinion: Feeling judged in relation to values and social norms of their schools, classrooms and peer groups, children will attempt to influence these judgements (Goffman, 1967). We believe that we can see evidence of a vigilance in the children we interviewed, concerned with managing and defending their public self.

We observed children that expressed their judgments of conservation or non-conservation but avoided expressing explicit ownership of their thinking through the omission of antecedents such as 'I think'. For example: "*[…] c'est de la même taille, mais sauf il est plus grand le verre*" ("*[…] it is the same size, but except the glass is bigger*"). Without the linguistic marker of ownership and in contrast to what we described previously, it seems that somehow authorship is made implicit, and ideas are presented without confronting the opposing viewpoint and indeed are less personal. It is possible that children felt some discomfort in disagreement with their peers and in managing their reputation, or out of concern for how the other may react they somehow detach themselves from their statements. Equally, these utterances are perhaps examples of what children feel they *ought* to say, given the contextual expectations, co-formed thinking that is perhaps not truly indicative of their own volition.

Unstable judgements: We became aware of children who repeatedly changed their standpoint throughout the duration of the interview. Sometimes this was in response to questioning from the experimenter. As demonstrated by Rose (1973), a child who provides a first answer but then is asked by the experimenter to confirm his answer, may believe his response is being questioned and perhaps needs to be changed. The repeated question is "*an implicit communicative sign that the first answer is wrong, or that the child should think again to find a better answer*" (Baucal and Stepanović, 2006, p. 260). We suspect that in our desire to encourage the child to confirm and reinforce his reasoning with supporting arguments, we may have led the child to think that he had not met our expected response to initial questioning. We became aware of this during the course of our analysis, in observations of a girl who

demonstrated an unstable response to the experimenters repeated questions. Eventually she withdraws her contribution to the discussion: "*moi je pense les deux, ça m'est égal*" ("*I think both, it makes no difference to me*"). Somehow it seems she has lost sight of her own thinking and perhaps she realises she doesn't know whether there is the same amount of liquid in A and C. It seems her preference is to understand and respond co-operatively to the experimenters expectations for her answers to be 'correct' according to the perspective of the adult-authority in the room and perhaps, after this repeat questioning she eventually gives up her guesswork.

In another example of unstable judgement, a single participant can be observed taking turns to agree with each of the different opinions of two other children. By the end of the interview, Samuel changed his opinion four times. Each time, he switches his judgment after the contrary view of one of the other participants has been voiced, suggesting that he prefers to be in accord with his peers than in opposition. We suggest this type of co-formed thinking is one that is concerned with obedience to authority and regulated by others. Piaget (1932) describes this as "heteronomy," a characteristic that he considers typical of the pre-operational children at the heart of our study. Our concern is that the co-formed thinker is not able to demonstrate trust in, or take ownership of his own thinking.

Expressing authority: Bakhtin (1981) refers to the 'authoritative voice' demonstrated through an asymmetrical superior dialogue that may intend to exercise control over another inferior or novice. In one of our interviews, Emma and Elizabeth have been left alone to discuss whether there is a 'fair' or equal share of juice in all three cups. Elizabeth has made several attempts to convince Emma that each of the cups already

has an equal share and has reminded Emma of the process that they had already witnessed to establish this. However, Emma is still in disagreement.

Excerpt 5

56	Elizabeth	yeah! it will be fair (.) like last time like we just did (.) 'cos remember you said that wouldn't be enough (.) but when we poured it back in there *((C))* (.) it was the same wasn't it?
57	Emma	Yeah
58	Elizabeth	so do you think- do you think it will work?
59	Emma	*((audible deep breath))* no (.) I think that *((C))* got a little bit (.) and that *((A'))* got a big giant bit like that *((indicates the levels))*
	(3.0)	
60	Elizabeth	*((looks at the cups, then away and up to the window))*
61	Emma	what you think?
62	Elizabeth	well, we have to do it quite (.) *((looking towards the door where the experimenter is outside))* a bit more quickly now because err: we only have like three minutes left
63	Emma	yeah
64	Elizabeth	ok so (.) quickly

In turn 62, Elizabeth takes the role of timekeeper. In this move, she attempts to take leadership and organisation of the interaction (i.e. authority) through pointing out that there is a time limit on their discussion: "*[...] we only have like 3 minutes left.*" And again in turn 64: "*ok so (.) quickly.*" It seems that she has abandoned hope of convincing her partner through her explanations. She expresses her authority on these matters: and in doing so, she does not demonstrate any doubt that her own position

may be wrong. If she had done this and perhaps begun to consider the alternative perspective, could she have opened up a "thinking space" (Perret-Clermont, 2005) for Emma's reciprocal doubt of her own opinion, without which the learning opportunity may be lost? In her adopted role as 'manager' of the dialogue, she is able to apply an alternative time pressure - perhaps somewhat manipulative - to convince her partner to reach a consensus so that the discussion can be drawn to a close.

In a more overt demonstration of authority, we see Victor and Valentin in the example below:

Excerpt 6

108	Valentin	puis que ici *((C))* il y a un petit peu trop de sirop. il faut aller jusque là. *((indique sur le verre C où le niveau devrait être))*	and here *((C))* there is a little too much juice. we must go till here. *((indicates where the level should be in glass C))*
109	Victor	mais c'est la même chose. si je te dis.	but it is the same thing. if I tell you.
110	Monkey (Exp)	donc on aurait tous les deux la même chose à boire?	so you would have both the same thing to drink?
111	Victor	oui. parce que celui-là *((C))* il est maigre et celui-là *((A))* il est plus arrondi.	Yes. because that one *((C))* is thin and that one *((A))* it is more rounded.
112	Valentin	*((se couvre les yeux des mains))*	*((covers his eyes with his hands))*
113	Monkey (Exp)	ah comment il faut faire, Valentin?	ah what must be done, Valentin?

114	Valentin	mmh.	mmh.
115	Victor	c'est juste, je te dis.	it is right, I tell you.

Here, Victor seems sure of his thinking and in his attempts to convince Valentin, he tries to establish himself as the authority of the discussion: "*but (.) it is the same thing. if I tell you*" (turn 109) and: "*it is right, I tell you*" (turn 115).

Alexander (2005) suggests that the dominant discourse in classrooms is teacher-fronted, monological and traditional. Mortimer and Scott (2003) refer to the 'authoritative' approach in teaching dialogues. These authoritative approaches may be forms of dialogue that children have frequently experienced during their interactions with teachers or indeed in family situations. These examples from our participants may echo a form of authoritarian dialogue they have come to learn represents 'truth' or knowledge. Our concern is that co-formed thinking in young children may be reinforced by such authoritarian teaching dialogues and may discourage the student from seeking out new learning 'truths', and furthermore impair the students efforts to take responsibility for their own learning (Castle, 2004).

Social Resolution: Throughout our interviews, we frequently observed the distinction made by Pérez & Mugny (1996) and Buchs & al. (2008) between a "cognitive" and "social resolution." In our data, we observed a preference for 'resolving' disagreements through social means, which are often prioritized in favour of the continued discussions of competing reasoning (cognitive resolution).

Excerpt 7

50	Dominic	NO, because we need to put one *((more liquid))* in there *((A'))*

51	Samuel	no! in there *((A))*
52	Debbie	*((to experimenter))* what do you think?
53	Exp	what do I think?
54	Dominic	I really think *((we need to add more))* in that one, *((A'))* 'cos it is.
55	Samuel	I can see one drop higher. *((in A'))* If I go down- *((puts his head down to the level of the liquid))*
56	Exp	*((to Debbie and Samuel))* this one *((A'))* you think is higher?
57	Debbie	one drop for all! *((points at all the glasses))*

In the excerpt above, disagreement has sustained over several minutes. Debbie, who for the majority of the dialogue has opposed Dominic, can be observed, gradually through the course of the dialogue, refusing to answer the questions of the experimenter, perhaps a signal that she is withdrawing from the conversation. One can observe two attempts that she makes to resolve the discussion. The first (turn 52) is where she seeks to solicit the opinion of the experimenter asking: *"what do you think?"* It is suggested here that this is an appeal to the adult authority in the discussion, as a social solution for a final consensus and conclusion to the disagreement. In a further move (turn 57), after a sustained debate (only a portion of which is transcribed) between the two other boys regarding which glass should have more liquid added, she suggests that we "*put one drop* (of liquid) *in all.*" This is offered as a possible social solution again, by which the conflicting demands of all the participants could be avoided by having each partner "satisfied" with the granting of an equal drop to all.

We suggest that the co-formed thinker in such a critical discussion, may be likely to prefer a social resolution at the cost of seeking a cognitive resolution to the problem

under discussion. This type of thinking – to a less correct judgment, or to an opinion that is no better than one's own can be explained in terms of a desire for peer approval (Nelson & Aboud, 1985). We believe the children in this group, particularly in the case of Debbie, demonstrate their discomfort during sustained disagreement and may be seeking such approval from discussion partners. We suggest that in order for conversation to be interactive and dialogic, conflict and disagreement are likely to occur. In striving to reach a cognitive resolution through argumentative discussion, young people may well require an ability to manage the doubt and discomfort of such an experience. Our concern is how schools can teach students to recognize and manage these doubts during critical discussion. Not just to co-form their thinking in imitation and obedience of their teachers or peers with an uncritical trust of established knowledge. We would like to see knowledge taught as the debatable fruits of dialogical and empirical practices.

Managing emotions

In the critical interviews reported in this inquiry, we presented children with the opportunity to enter dialogues stimulated from opposing and conflicting opinions. Dewey (1938) identified the important role that educators have with empowering their students to become independent thinkers but raised concerns about the potential effects of controls in schools that can limit rather than promote the intellectual development of young people. We have seen evidence of a co-formed thinker who is at risk of loosing track of his own thinking through his concern for the needs and perspective of others. Equally, we have observed moments where in-formed thinkers have missed the opportunity to de-center and consider the needs and perspectives of others.

It should be emphasized that within the perspective of the dialogical approach, there are several possible interpretations for many of the examples we have provided above. We suggest that in-formed and co-formed thinking should be best understood along a continuum representing the autonomous, self-governed, in-formed thinker at one end of this scale, to the heteronymous, other-governed, co-thinker at the other. Whilst rare within the interviews we conducted, we are particularly interested in moments where the in-formed thinker meets and acknowledges the other's different point of view. In moments such as these, students engage in a collaborative thinking process and are able to demonstrate both independent, intimate thinking whilst managing to remain in contact with the "otherness" of a partner.

We believe that children have the opportunity to learn through such co-operative dialogues through becoming aware and open to other perspectives, whilst retaining a well-defined sense of creative, autonomous and in-formed thinking that may stimulate what Mead (1934) called the "I" the "*artist, the inventor, the scientist in his discovery*" (p. 214). We are concerned that this is not frequently found in classrooms. In the interviews we conducted, we found evidence of one child who we believe manages to display and sustain such a balance of openness and autonomy.

The two excerpts below are taken from our observation of two boys, Victor and Valentin. With particular focus on Valentin, we consider how he displays both co-formed and in-formed thinking, together with the tensions that arise from managing the emotion that may accompany these two types of thinking.

Victor has expressed strong reasoning and argument - he has been able to identify the different size and shape of the cups (turn 38 and 40) suggesting his belief that this gives the appearance of difference. Furthermore, he has reinforced his point (turn 53), by explaining the reversal of juice transfer from C to A. He has also tried to convince

Valentin, through taking an authority position as we saw earlier. Yet throughout the interaction, and in spite of Victor's efforts, Valentin maintains his disagreement and uncertainty.

Excerpt 8

34	Exp	tu penses qu'il a raison petit singe ou pas?	you think the little monkey is right or not?
35	Valentin	non.	no.
36	Exp	tu lui expliques pourquoi non?	can you explain to him why you say no?
37	Valentin	parce qu'il n'y a pas assez de sirop dans ce bocal ici *((montre du doigt le verre C))* et ici *((A))* il y en a trop. ici il y en a trop *((A))* et là *((C))* il n'y en a pas assez.	because there is not enough juice in the cup here *((pointing at glass C))* and here *((A))* there is too much. here there is too much *((A))* and there *((C))* is not enough.
38	Victor	non, non, c'est parce que celui-là *((C))* est plus gros que celui-là. *((A))*	no, no, because that one *((C))* is larger than that one. *((A))*
39	Valentin	mais non. *((baisse la tête et la cache dans son bras))*	but no. *((head down and hidden in his arm))*
40	Victor	oui, il est plus maigre.	yes, it is thinner.

This interaction is unique within our data as Valentin, whilst daring to continue his opposition (turns 35 and 37), simultaneously signals his awareness that his knowledge is vulnerable. He demonstrates this doubt through his non-verbal gesture (turn 39) and

by repeatedly asking Victor "*are you sure?*" (turns 56 and 58).

The non-verbal gesture is interesting. It occurs initially, when Valentin is faced, with Victor's contrasting opinion in turn 38: "*no, no, because that one (C) is larger than that one (A).*" Valentin responds with his own contradictory point of view: "*but no"* (turn 39). In what we have interpreted as a manifestation of his discomfort, Valentin then buries his head in arms folded on the table. A gesture that he repeats several times throughout the interview.

Excerpt 9

45	Monkey (Exp)	explique-moi?	explain to me?
46	Victor	parce que celui-là *((A))* il est maigre et celui-là *((C))* il est gros.	because that one *((A))* is thinner and that one *((C))* is bigger.
47	Monkey (exp)	tu es d'accord avec ce qu'il me dit?	do you agree with what he said?
48	Valentin	non.	no.
49	Victor	*((rire))*	*((laughs))*
50	Monkey (exp)	mais alors expliquez-moi tous les deux pourquoi vous pensez ça.	then explain to me why you both think that.
51	Victor	il faut de toute façon voir.	we must see anyway.
52	Monkey (Exp)	comment on peut voir?	how can we see?
53	Victor	il faut reverser *((C dans A'))* et on remet ça *((A'))* là-dedans. *((C))*	we must pour *((C into A'))* and put back that *((A'))* into there. *((C))*
54	Monkey	montre-moi. *((tend à*	show me. *((gives Victor*

	(Exp)	*Victor le verre A'))*	*cup A'))*
55	Victor	*((verse C dans A'))*	*((pour C into A'))*
56	Valentin	tu es sûr?	are you sure?
57	Victor	il faut être sûr sûr sûr. *((observe les verres A et A'))* et oui, c'est bien la même chose.	we have to be sure sure sure. *((observes the glasses A et A'))* and yes, it's the same thing.
58	Valentin	ah oui, il manque juste une petite goutte, mais bon. tu es sûr?	ah yes, but it lacks a little drop, but ok. are you sure?
59	Victor	c'est la même chose, c'est la même chose.	it is the same thing, it is the same thing.
60	Valentin	ah mais oui. je pense que c'est comme ça en fait.	ah but yes. I think it is like that in fact.

In turn 58 we see that Valentin realises he may have been mistaken: "*ah yes, but it lacks a little drop, but ok. are you sure?*" He signals his openness to changing his viewpoint, though he asks Victor to be sure, as if requesting that Victor provides proof of his convictions. This is perhaps the moment at which Valentin begins to accept the idea that his knowledge may need to be modified, the point he appears to reach in turn 60: "*ah but yes. I think it is like that in fact.*"

We speculate that Valentin is openly displaying the emotional artifacts of his vulnerability and doubt as he repeatedly hides his head in his arms. Despite this discomfort, he remains open. Both boys are engaged and participating throughout the interaction, at a level that was rarely observed across our corpus. We suggest that despite his discomfort and vulnerability, Valentin manages to remain open to the acquisition of new knowledge, whilst managing his negative emotional response. His words and accompanying behaviours we feel are represented in the following words

of Mikhail Bakhtin (1930/1981, p. 348): "*The importance of struggling with another's discourse, its influence on the history of an individual's coming to ideological consciousness, is enormous. One's own discourse and one's own voice, although born of another or dynamically stimulated by another, will sooner or later liberate themselves from the authority of the other's discourse.*"

As a result of a concern for complying with social expectations or to avoid the uncomfortable experience of making 'mistakes,' we have seen how hard it can be for children to 'let go' of their beliefs and open themselves up to the possibility that their thinking may require updating and re-constructing. We believe there is much we can learn from Valentin and wonder whether the new conclusion he reaches at the end of our conversation, is a sign of his coming to a new level of consciousness that Bakhtin refers to above. Certainly, Valentin has helped us to capture some of the tension that Bakhtin refers to. He not only experiences his emotion, he even seems prepared for others to see it. It is not easy for him, but despite his discomfort, or perhaps because of it, he remains open to learning.

Discussion

Independent, autonomous thinking was the dream of Piaget (1977): "*What is the goal of education? Are we forming children who are only capable of learning what is already known? Or should we try to develop creative and innovative minds capable of discovery from preschool age on, throughout life?*" At their best, people are curious and inspired. They are committed to learning and extending themselves; they are self-motivated. Theory and practice acknowledge however, that self-concepts are vulnerable and can easily be crushed and examples of adults and children who are apathetic, alienated and who reject growth are abundant (Ryan & Deci, 2000).

The challenge to researchers and educators is how to encourage the creativity and curiosity of individual thinking whilst developing the socialized awareness of the perspectives and needs of others (Giglio & Perret-Clermont, 2009), in order that they might offer the possibility to learn new concepts, ideas and vocabulary. If a child is more concerned with the views of others, does he develop independent and creative thinking? Furthermore, if children are too eager to accept the 'truth' as it is delivered by the teacher-authority, will they stop searching when such knowledge is delivered in classroom learning contexts? As we have seen, when a child's thinking is co-formed to an extreme, it is likely that he will escape the challenge of cognitive discussion and even freeze his thinking processes. These children may be able to experience and gain perspective from others and they may acquire valuable semiotic means but without the capacity to verbalize their in-formed thinking, new consciousness, creativity and understanding may be limited.

Children require an environment where they can rehearse both types of thinking, where they can be inspired through their natural sense of curiosity and wonder, to raise questions and manage the doubts and discomfort that may arrive in the process of reaching an understanding of the answers. Through dialogue, children are enabled socially as well as cognitively. In dialogue, young people learn to narrate, to explain, to instruct, to ask different types of questions, to listen to and build upon answers, to analyze and solve problems, to speculate and imagine, to discuss, to argue, to reason, to negotiate, to explore and to evaluate ideas (Hardman & Delafield, 2010). At times, reasoning and argumentation may feel uncomfortable and even contradictory in a school context which typically promotes helpfulness and co-operation in children through various kinds of rules and reinforced expectations based on authority, such as: be nice, be helpful, don't lie, share the pencils, don't fight and so on. In

demanding such social co-operation and conformation of our children, are we somehow suppressing their possibilities to develop in-formed, autonomous and creative thinking?

Do teachers themselves need to demonstrate in-formed, autonomous thinking in order for children to learn to be autonomous, in-formed thinkers? In-formed teachers will seek out the views of their peers and take these views into consideration. Likewise they will need to understand their students' view of the world (César & Kumpulainen, 2008). They need to be curious and innovative and open to doubt and to new learning. Exploring individual curiosity maybe difficult in a class of many and indeed, may hardly be accommodated within the demands of the timetable and curriculum deliverables. In the classroom, where a teacher is expected to impart information and established knowledge, within timely deadlines and in accordance with a pre-defined curriculum, managing vulnerability and discomfort may seem wholly inappropriate, time-consuming and out of place. However, we believe that teachers who reduce their pressure to impose knowledge through encouraging a more democratic and co-operative approach to classroom activities, can encourage children's in-formed thinking. And as we have learned from Valentin, both researchers and educators may need to accept that we may be wrong or that another perspective can be equally true or adapted in response to a different context. Despite our discomfort, we may need to learn to live with expressed doubts, in the confidence that children can and will learn in such moments.

Conclusion

Our study raises questions for the reductionist approach to measuring cognitive development in isolation. We have demonstrated that thinking doesn't just happen in

a vacuum. Within educational institutions children display tensions and emotional reasons to think and respond both as in-formed and co-formed thinkers and a great deal that lies in between. As Piaget and his disciples have claimed, we question whether a child's argumentation and reasoning can indeed provide an accurate guide for the measurement of cognitive development and if an isolation of cognitive processes from contextual elements is truly possible.

In our quest to better understand the experience of Valentin, who we draw attention to here as the unique subject within our corpus, we offer our exploratory thinking for others to question, discuss and debate. We acknowledge our doubts and questions, in the hope and expectation that if we remain open in dialogue to the suggestions of others, we may learn. We would like to know more about the ways by which children become capable of convincing themselves and others of their logical reasoning and argumentation. In our next steps we will try to understand how creativity and innovation can be inspired, encouraged and motivated in children who also manage to take account of other's perspectives and the expectations and norms of the social context.

References

Alexander, R. J. (2005, July). *Culture, dialogue and learning: Notes on an emerging pedagogy.* Keynote paper for the 2005 Conference of the international association for cognitive education and psychology, Durham, UK.

Arcidiacono, F., & Perret-Clermont, A.-N. (2009). Revisiting the piagetian test of conservation of quantities of liquid: argumentation within the adult-child interaction. *Cultural-Historical Psychology, 3*, 25-33.

Arcidiacono, F., & Perret-Clermont, A.-N. (2010). The co-construction of conversational moves in the context of piagetian interview: the case of the test of conservation of quantities of liquid. *Rassegna di Psicologia, 27*(2), 117-137.

Aronsson, K., & Hundeide, K. (2002). Relational rationality and children's interview responses. *Human Development, 45*(3), 174-186.

Bakhtin, M. (1930/1981). *The Dialogical Imagination. Four Essays*. Austin: University of Texas Press.

Bakhtin, M. (1986). *Speech genres and other late essays.* Austin: University of Texas Press.

Barge, K., & Little, M. (2002). Dialogical wisdom, communicative practice, and organizational life. *Communication Theory, 12*(4), 375-397.

Baucal, A., & Stepanovic, I. (2006). Conservation or conversation: A test of the repeated question hypothesis. *Psihologija, 39*(3), 257-275.

Bebbington, J., Brown, J., Frame, B., & Thomson, I. (2007). Theorizing engagement: the potential of a critical dialogic approach. *Accounting, Auditing & Accountability Journal, 20*(3), 356-381.

Bond, T., & Tryphon, A. (2009). Piaget and Method. In U. Müller, J.I.M. Carpendale, & L. Smith (Eds.), *The Cambridge Companion to Piaget* (pp. 171-199). Cambridge: Cambridge University Press.

Bovet, M. C. (1974). Cognitive processes among illiterate children and adults. In J. W. Berry & P. R. Dasen (Eds.), *Culture and cognition: Readings in cross-cultural psychology* (pp. 311-334). London: Methuen.

Buchs, C., Darnon, C., Quiamzade, A., Mugny, G., & Butera, F. (2008). Conflits et apprentissage. Régulation des conflits sociocognitifs et apprentissage. *Revue française de pédagogie, 163*, 105-125.

Castle, K. (2004). The Meaning of Autonomy in early childhood teacher education. *Journal of Early Childhood Teacher Education, 25*(1), 3-10.

César, M., & Kumpulainen, K. (Eds.). (2008). *Social Interaction in multicultural Settings*: Rotterdam: Sense Publishers.

Chapman, M. (1991). The epistemic triangle: operative and communicative components of cognitive competence. In M. Chandler & M. Chapman (Eds.), *Criteria for competence: controversies in the conceptualization and assessment of children's abilities* (pp. 209-228). Hillsdale: Erlbaum.

Claparède, E. (1931). *L'éducation fonctionnelle*. Neuchâtel & Paris: Delachaux & Niestlé.

Deci, E. L. (1995). *Why we do what we do*. New York: Penguin Books.

Deci, E. L., Koestner, R., & Ryan, R. (2001). Extrinsic rewards and intrinsic motivation: Reconsidered once again. *Review of Educational Research, 71*(1), 1-28.

Dewey, J. (1916). *Democracy and education: an introduction o the philosophy of education*. New-York: MacMillan.

Dewey, J. (1938). *Experience and education*. New York: Collier Books.

Donaldson, M. (1978). *Children's minds*. New York: Norton.

Fisher, R. (2007). Dialogic teaching: developing thinking and metacognition through philosophical discussion. *Early Child Development and Care, 177*(6-7), 615-631.

Giglio, M., & Perret-Clermont, A. N. (2009). L'acte créatif au coeur de l'apprentissage. *Enjeux pédagogiques,13*, 16-17.

Ginsburg, H. P. (1997). *Entering the Child's Mind. The clinical interview in psychological research and practice*. Cambridge: Cambridge University Press.

Goffman, E. (1967). *Interaction ritual: Essays on face-to-face behavior*. Garden City, NY: Anchor.

Goldschmidt, M. L., & Bentler P. M. (1968). The dimensions and measurement of conservation. *Child Development, 39*(3), 787-802.

Greco Morasso, S. (2009). *Argumentative and other communicative strategies of the mediation practic,.* PhD. Dissertation, University of Lugano, Lugano.

Grossen, M. (2009). Approche dialogique des processus de transmission-acquisition de savoirs. Une brève introduction. *Actualités Psychologiques, 7*, 1-32.

Grossen, M. (2010). Interaction analysis and psychology: A dialogical perspective. *Integrative Psychological & Behavioural Science, 44*, 1-22.

Hardman, M., & Delafield, B. (2010). Philosophy for children as dialogic teaching. In K. Littleton & C. Howe (Eds.), *Educational dialogues: understandong and promoting productive interaction* (pp. 149-164). London: Routledge.

Hermans, H. J. M. (2001a). The construction of a personal position repertoire: method and practice. *Culture & Psychology, 7*(3), 323-365.

Hermans, H. J. M. (2001b). The dialogical self: toward a theory of personal and cultural positioning. *Culture & Psychology, 7*(3), 243-281.

Hermans, H. J. M., & Kempen, H. J. G. (1995). *The dialogical self: meaning as movement*. San Diego: Academic Press.

Hundeide, K. (1992). The message structure of some Piagetian experiments. In A. H. Wold (Ed.), *The Dialogical Alternative. Towards a Theory of Language and Mind* (pp. 139-156). Oslo: Scandinavian University Press.

Inhelder, B. (1943). *Le diagnostic du raisonnement chez les débiles.* Neuchâtel; Paris: Delachaux et Niestlé.

Inhelder, B., Bovet, M., Sinclair, H., & Smock, C. D. (1966). On cognitive development. *American Psychologist, 21*, 160-164.

James, W. (1890). *The principles of psychology* (Vol. 1). London: Macmillan.

Junefelt, K. (2007). *Rethinking egocentric speech: towards a new hypothesis*. Nova Science Publishing: New York.

Kamii, C., Clark, F. B., & Dominick, A. (1994). The six national goals: A road to disappointment. *Phi Delta Kappan, 75*, 672-677.

Light, P., Buckingham, N., & Robbins, A. H. (1979). The conservation task as an interactional setting. *British Journal of Psychology, 49,* 304-310.

Light, P., Gorsuch, C., & Newmann, J. (1987). Why do you ask? Context and communication in the conservation task. *European Journal of Psychology of Education, 2*, 73-82.

Light, P., & Perret-Clermont, A.-N. (1989). Social context effects in learning and testing. In A. Gellatly, D. Rogers, & J.-A. Sloboda (Eds.), *Cognition and social worlds* (pp. 99-112). Oxford: Oxford University Press.

Markova, I., Linell, P., Grossen, M., & Salazar Orvig, A. (2007). *Dialogue in focus groups: Exploring socially shared knowledge*. London: Equinox.

Marro Clément, P. (1999). *L'objet en discussion: approche psychosociale et interlocutoire de résolution de problèmes,* PhD dissertation, Universités de Neuchâtel et Nancy II.

Marro Clément, P., Trognon, A., & Perret-Clermont, A.-N. (1999). Processus interlocutoires dans une tâche de conservation des liquides. In M. Gilly, J.-P-Roux, & A. Trognon (Eds.), *Apprendre dans l'interaction* (pp. 163-180). Nancy: Presses Universitaires de Nancy.

Maynard, A. E. (2009). Context and structure in social interaction and cognitive development. *Human Development, 52*, 313-319.

McGarrigle, J., & Donaldson, M. (1975). Conservation accidents. *Cognition, 3*, 341-350.

Mead, G. H. (1934). *Mind, self & society*. Chicago: University of Chicago Press.

Mercer, N. (2004). Speaking, listening and thinking together. In the series Teaching Texts: *what do leaders need to know about teaching?* Nottingham: National College for School Leadership.

Mortimer, E. F., & Scott, P. H. (2003). *Meaning Making in Secondary Science Classroom*. Royaume-Uni: Open University Press.

Muller Mirza, N., & Perret-Clermont, A. N. (Eds.). (2009). *Argumentation and education. Theorical foundations and practices*. New York: Springer.

Nelson, J., & Aboud, F. E. (1985). The resolution of social conflict between friends. *Child development, 56*, 1009-1017.

Pérez, J. A., & Mugny, G. (1996). The conflict Elaboration Theory of Social Influence. In E. H. Witte & J. H. Davis (Eds.), *Understanding group Behavior: (Vol. 2) Small Group Processess and Interpersonal Relations* (pp. 191-210). New Jersey: Lawrence Erlbaum Associates.

Perret-Clermont, A.-N. (1980). *Social interaction and cognitive development in children*. London: Academic Press.

Perret-Clermont, A.-N. (1993). What is it that develops? *Cognition and Instruction, 11*(3-4), 197-205.

Perret-Clermont, A.-N. (2005). Lo spazio per il pensare. In C. Pontecorvo (Ed.), *Discorso. Una proposta per l'autoformazione e apprendimento degli insegnanti* (pp. 21-34). Rome: Carocci Editore.

Perret-Clermont, A.-N. (2006). Comments on Rigotti & Rocci. *Studies in Communication Sciences, 6*(2), 181-188.

Piaget, J. (1926). *The language and thought of the child*. London: Routledge.

Piaget, J. (1927). *La causalité physique chez l'enfant*. Paris : Alcan.

Piaget, J. (1929). *The child's conception of the world*. London: Kegan.

Piaget, J. (1932). *Le jugement moral chez l'enfant*. Paris: Alcan.

Piaget, J. (1977). *L'Épistémologie génétique de Jean Piaget* [Swiss-French TV documentary 1977] Directed by Claude Goretta. Retrieved July 25, 2010, from http://www.youtube.com/watch?v=tGNzk8fHbtk&feature=related

Piaget, J., & Szeminska, A. (1941). *La genèse du nombre chez l'enfant*. Neuchâtel: Delachaux et Nietstlé.

Piaget, J., Inhelder, B., & Szeminska, A. (1948/1973). *La géométrie spontanée de l'enfant*. Paris: Presses universitaires de France.

Pramling, N. (2006). "The clouds are alive because they fly in the air as if they were birds:" A re-analysis of what children say and mean in clinical interviews in the work of Jean Piaget. *European Journal of Psychology of Education, 21*(4), 453-466.

Psaltis, C., & Duveen, G. (2006). Social relations and cognitive development: the influence of conversation type and representations of gender. *European Journal of Social Psychology, 36*, 407-430.

Psaltis, C., Duveen, G., & Perret-Clermont, A.-N. (2009). The social and the psychological: structure and context in intellectual development. *Human Development, 52,* 291-312.

Rigotti, E., & Rocci, A. (2006). Towards a definition of communication context. Foundations of interdisciplinary approanch to communication. *Studies in*

Communication Sciences, 6(2), 155-180.

Rommetveit, R. (1985). Language acquisition as increasing linguistic structuring of experience and symbolic behaviour control. In J. Wertsch (Ed.), *Culture, Communication and Cognition: Vygotskian Perspectives* (pp. 183-204). New York: Cambridge University Press.

Rommetveit, R. (2003). On the role of "psychology of the second person" in Studies of meaning, language, and mind. *Mind, Culture and Activity, 10*(3), 205-218

Rose, S. A. (1973). Acquiescence and conservation. *Child development, 44*, 811-814.

Rose, S. A., & Blank, M. (1974). The potency of context in children's cognition: an illustration through conversation. *Child Development, 45*, 499-502.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.

Shayer, M. (2008). Intelligence for education: As described by Piaget and measured by psychometrics, *British Journal of Educational Psychology, 78*(1), 1-29.

Tartas, V., Baucal, A., & Perret-Clermont, A. N. (2010). Can you think with me? In K. Littleton & C. Howe (Eds.), *The social and cognitive conditions and the fruits of learning.* (pp. 64-82). Oxon: Routledge.

Turner, R. (1999). The real self: From institution to impulse. In R. F. Baumeister (Ed) *The Self in Social Psychology* (pp. 989-1016). Philadelphia: Taylor & Frances.

Wegerif, R. (forthcoming). Learning to think as becoming dialogue: an ontologic-dialogic account of learning and teaching thinking in primary classroom. In M. César & M. B. Ligorio (Eds.), *The interplys between dialogical learning and dialogical self*. Information Age Publishing.

Wertsch, J. (1991). *Voices of the mind: A sociocultural approach to mental action*. Cambridge: Harvard University Press.

Whitebread, D. (2004). Teaching children to think, reason, solve problems and be creative. In D. Whitebread (Ed.), *The Psychology of Teaching and Learning in the Primary School* (pp. 140-164). London: Routledge Farmer.

Zittoun, T., Gillespie, A., Cornish, F., & Psaltis, C. (2007). The metaphor of the triangle in theories of human development. *Human Development, 50*, 208-229.

Zittoun, T., & Perret-Clermont, A. N. (2009). Four social psychological lenses for developmental psychology. *European Journal of Psychology of Education, 24*, 387-403.

Appendix 1: Transcription codes

.	falling intonation
?	rising intonation
!	exclaiming intonation
,	continuing intonation
:	prolonging of sounds
A	high tone (capital letter)
(.)	pause (2/10 second or less)
((abc))	segment added by the transcriber in order to clarify some elements of the situation