Chapter 7
Positioning Children in Research and the Implications for Our Images of Their Competences

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Abstract This chapter illustrates and discusses how to produce valid knowledge about children's concepts in science (understanding, learning, development). The discussion presented revolves around a theoretical presentation of communication and re-analyses of empirical data from published research on children's reasoning and understanding. Through this analysis, the chapter examines how images of children's competences in research are produced. The chapter also examines children's understandings of the interview situation, showing how the 'same situation' is conceptualized differently by the interviewer and the child. In addition, the communicative framing and analysis process are critiqued in order to demonstrate how the research interview, as a common method of research into children's science understanding, needs to be reconceptualised as a social practice, where the collaborative unfolding and meaningful exchange between interviewer and child is foregrounded.

Keywords Interview process • Interview situation • Interview as collaborative social process

7.1 Introduction

In this chapter we will raise, illustrate and discuss an important matter in research – how to produce valid knowledge on children's concepts in science (understanding, learning, development). The discussion will revolve around a theoretical discussion on communication and re-analyses of empirical data from published research on children's reasoning and understanding. In Chap. 1 it was noted that the academic legacy of early childhood science education is grounded in constructivism. Consequently, in this chapter we will write extensively on Margaret Donaldson's famous and important book *Children's Minds* from 1978 in order to bring to the early childhood science education literature, historically important features critiqued in developmental psychology, that we believe shaped the need for new theories for informing contemporary directions in early childhood science education.

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We will also present to an international readership, Karsten Hundeide's book *Piaget i kritisk lys* [Piaget in a critical light] from 1977 that to large extent foreshadowed Donaldson's book, but because it was published in Norwegian has not been as well known internationally as the latter. Introduced are examples from more contemporary research and theorizing on how to conceptualise children's conceptualisation and reasoning about natural phenomena on the basis of interviews.

7.2 Studying and Producing Images of Children's Competences in Research

In many different developmental settings, what Aronsson and Hundeide (2002) refer to as 'examination questions', are commonly found. On the basis of children's responses to such questions, claims are made about their competence, level of development and/or understanding. Hence, how to interpret such data is of pivotal importance to a developmental science as well as to educational practices. In their study, Aronsson and Hundeide re-analysed children's responses to such questions in order to "delineate a type of logic that might explain children's 'immature' responses in terms of their sociability rather than in terms of their default qualities" (p. 174). Taking a dialogical perspective – based on the theoretical writings of Bakhtin and Vygotsky – Aronsson and Hundeide emphasise that testing needs to be understood as a "highly collaborative affair, involving mutual adjustments between experimenter and 'subject'" (p. 175), or interviewer and child. A dialogical perspective thus means to consider sense-making as a collaboratively evolving activity rather than as an expression of the child's thoughts as such, the latter referred to as a monological model of explanation. In developmental science, the critique against a monological perspective on children's reasoning was launched in the 1970s, particularly against Piagetian studies, by Karsten Hundeide (1977) and Margaret Donaldson (1978). In her famous book, *Children's Minds*, Donaldson reports studies where classic Piagetian tasks are reframed. As is well known, Donaldson looks particularly at problems concerning 'decentration', that is, the ability to see something from another's point of view. The inability to do so, commonly understood as 'egocentrism' was found to be integral to a Piagetian model of development. The well known test used by Piaget to study young children's (in)ability to decentre is the 'three-Mountains test' and this was undertaken with children aged under 7 years old and younger. We briefly summarise this work here as a reminder to the reader of what was foundational to science education in the early years, but also to Donaldson's critique. As Donaldson explains, the child is shown a three-dimensional model of mountains and asked to indicate on pictures how the mountains appear from various points of view where a doll is said to look at the mountains. Alternatively, the child is given cardboard mountains and asked to arrange them according to photographs (Donaldson, 1978). What Piaget found when presenting young children with these tasks was that "Children up to the age of around eight, or even nine, cannot as a rule do this successfully; and there is a powerful tendency among children below the age

of six or seven to choose the picture – or build the model – which represents their own point of view – exactly what they themselves see" (ibid., p. 19). What Donaldson and her colleagues did was to design situations where children's ability to decentre could be tested in a form that presumably made more sense to the children than the rather abstract situation used by Piaget. Presenting the child with a model of walls and a doll and asked to hide the doll from the policeman's view, and, in a more complex test, hide the doll from the views of two policemen, "The results were dramatic" (p. 22). Giving this task to 30 young children (3.6–5-years old), Donaldson writes, "90 per cent of their responses were correct. And even the ten youngest children, whose average age was only three years nine months, achieved a success rate of 88 per cent" (p. 22). Donaldson argues that this markedly different result from what is reported by Piaget, among other things, can be explained in terms of the fact that the alternative test "makes human sense" (p. 25). Children are generally familiar with playing hide-and-seek. Hence, the problem is presented in a form that children can relate to and have experiences of.

The importance of the child being able to relate to the problem presented to him or her was also pointed out and forcefully illustrated by Karsten Hundeide in his preceding book on critiquing and reframing the Piagetian model of development. In his book, Hundeide describe a number of empirical studies with children where either (i) the question is held constant (i.e., the same question is asked as used by Piaget) and the objects (or cards of some kind) are varied, or (ii) where the question is varied and the objects are held constant (i.e., the same objects as Piaget used, are used). Both forms of variation lead to results questioning Piaget's claims about the logical structures of children's thinking at the various stages of his developmental model. To give only one brief example of a study where the objects were constant and the mode of asking the question differed. Showing children in second grade a number of circles [i.e., what schooled persons would typically refer to as circles (see Luria, 1976); cf. our reasoning in Chapter 12 about the constitute nature of language], six in all, half of which were black and half of which were white (i.e., only a black outline, in succession from left to right from smallest to largest, resulting in every second one being white and every second one being black), two alternative questions were asked: "Kan du sette et kryss på den av de hvite rundingene som er nest minst?" [in English: "Could you put a cross on the second smallest white round one?], while the other group was asked: "Kan du sette et kryss på den av snøballene som er nest minst?" [in English: "Could you put a cross on the second smallest snowball?] (p. 49, italics omitted). It turned out that the children found the second question far easier than the first one. Snowballs where thus interpreted as being more meaningful as a category for these children than "hvite rundingene" [white round things]. This also testifies to the cultural nature of children's experiences. For these Norwegian children, 'snowball' is a meaningful category. But it would hardly be one for children growing up in some other parts of the world, which further strengthen Hundeide's reasoning, and thus, critique of Piaget's model of explanation as culturally biased.

In fact, as summarized by Hundeide (1977), subsequent cross-cultural research on Piagetian-type tasks has clarified that (i) children who have had much contact with Western culture succeed to a higher degree than children who do not have this

background, (ii), those who have attended Western schooling succeed to a higher degree than those who do not share this background, and (iii) those children who have grown up in a technology-intensive environment succeed to a higher degree than those raised in rural areas (ibid.). Consequently, Hundeide concludes, a child's intellectual development cannot be understood separate from the socio-cultural experiences that he or she has been allowed to make, the practices participated in (cf. Luria, 1976; Vygotsky, 1987). With this backdrop of critique in mind, we now turn to the interview situation in research for examining how knowledge about early childhood science education is constructed in a more contemporary context.

7.3 The Child's Understanding of the Interview Situation

In Sommer, Pramling Samuelsson, and Hundeide's (2010) book, *Child Perspectives and Children's Perspectives*, Karsten Hundeide's important work on how children perceive interview situations are described and theorized. His so-called 'reconstruction method' is presented. This method allows the child to retell, demonstrate and dramatise his or her experience of the interview. The following procedure is used. The child takes part in an interview, as common practice, carried out by a researcher in an experimental room. After the interview, the child's preschool teacher comes to the room to take him or her back to the other children. While walking back, she asks the child if he or she was given the reward for being so clever during the interview. Since the child has not received the reward, the preschool teacher and child return to the interview room to get it. In the room, all the objects used during the interview, such as bricks, still lay on the table. The child gets a small reward, for example, a piece of chocolate. The reconstruction procedure is now initiated:

> 1. While the child is eating the chocolate, the preschool teacher says, I have never participated in such an event before; maybe you could tell me what happened while you were here together with the man or woman? The child then gives a verbal description of what he or she experienced.
> 2. Then the preschool teacher goes further and comments: I see these bricks (from the Piagetian conservation experiments) are still lying there (pointing to the table), could you show me exactly what happened?
> 3. When that is finished, the preschool teacher says, Maybe we could try to play together what happened, you can be the man [or woman, i.e., the interviewer] and I will be the child – ok? (Sommer et al., 2010, p. 125)

In this way, the child could tell about, demonstrate and role-play his or her experience of what had taken place during the interview. Among other things, through this procedure, Hundeide was able to show that the children "indicated that they had been participating in a 'guessing game' and that 'they had answered all the questions correctly'", while "Other children produced fantasy stories linked to the bricks in the number conservation experiment – stories about the families that lived there, about the mother who went out shopping to the other 'block', etc." (ibid., p. 127). Faced with the Piagetian-type task of number conservation, one child (6-year-old

Anne), in the role of the interviewer (see above), spread out the bricks into a long row and asked the preschool teacher (in the role of the interviewee, see above), "Is this a snake?"

Preschool teacher:	"Whether it is a snake?"
Anne:	"Yes, it is a snake!"
Preschool teacher:	"Did he really ask you about that?"
Anne:	"Yes."
Preschool teacher:	"Why do you think he asked you this question?"
Anne:	"I don't know." (ibid., p. 126)

Apparently, child and interviewer had not established intersubjectivity (Rommetveit, 1974) in the interview situation, as to what is being asked of the child, in both senses of the term, that is, what the question posed is, on the one hand, and what activity is expected of the child, on the other. While the interviewer may perceive the interview, or take it for granted, as a test of formal, 'school-based' forms of knowing, the child may perceive the activity as a make-believe playful situation.

Not only does the analysis reveal why children's interview responses cannot be taken simply as windows on their intellectual capacities, it in fact also showed examples of so-called 'false positives', that is, that a child may arrive at the 'correct answer' from the wrong premises. The following example, in relation to the number conservation test, can illustrate this point:

Per:	"He asked me whether there lived the same number of people in this house as in the other house" (pointing)
Preschool teacher:	"What did you answer then?"
Per:	"I answered that there lived just as many persons in both blocks because they were of the same size." (Sommer et al., 2010, p. 128)

Hence, rather than focusing on the fact that there is an equal amount of blocks (houses) in the two rows, even though one of the rows is more spread out, the child 'solved the task' by understanding it in terms of people living in the houses (blocks). What Hundeide refers to as the 'meta-communicative framing' of the participants are critical to what they will perceive the point of the activity being, their role in it, and consequently what they consider to be relevant contributions (questions and answers). The 'same situation' is on many occasions very differently conceptualized by the interviewer and the child. What is studied in research interviews is not some 'free-flowing rationality'. Rather what this research illustrates is how reasoning is situated in practices, that is, that we always understand something from a certain perspective, relative to how we perceive the situation and our position (role) in it.

It should be emphasized that our intention with this reasoning is not to argue the case that interviewing should not be a legitimate method of studying children's development. We know a great deal about children's development from interviews. Rather, what we, and others (e.g., Aronsson & Hundeide, 2002; Säljö, 2000; Wallerstedt, Pramling, & Pramling Samuelsson, 2011), argue is that how we interpret such data need to be grounded in contemporary theorizing on the situated nature of human knowing and sense making – or alternatively phrased, the positioning of

children in research – as illustrated with reference to classic and more recent studies in this chapter where children's thinking in science is featured.

7.4 Communicative Framing and Analysis

Rommetveit (1985) has made the point that the Piagetian paradigm, or in other terms a monological model, in disregarding the social situation of testing can be seen as what he refers to as a 'negative rationality', that is, explaining children's thinking "in terms of default qualities, what is lacking in their thinking" (Aronsson & Hundeide, 2002, p. 175). This is particularly important to note when considering how knowledge in science has been constructed. This is a point we take up further elsewhere in this second section of the book where we review the literature across a range of cultural contexts. In contrast to constructivist framings in research, the aim of the reanalysis and reconceptualization made by Aronsson and Hundeide is to "move beyond negative rationality toward a description of children's relational rationality" (loc. cit.). In brief, from the latter perspective, "interview responses must be understood in terms *of participation patterns*" (p. 181, italics in original). This means, among other things, that participants in a dialogue tend to align with one another, rather than question the premises of a question or challenge the 'face' of the interviewer, even if the question is an absurd one (e.g., "Is milk bigger than water?", Donaldson, 1978, p. 72). An analytical consequence of this dialogic perspective on meaning is that the research interview, as a common method of research into children's science understanding, needs to be analysed as a social practice (Säljö, 2000). This means that what we have access to and can analyse in an interview is the collaborative unfolding of sense between interviewer and child. Rather than understanding what the child says as his or her thoughts, understanding or conception, the child's utterances need to be analysed as responses to the questions posed, not only as a factual statement but also as a social response. This moves the analytical frame from a constructivist to a cultural-historical perspective. As shown by Aronsson and Hundeide and others, children may at times go to great length to align with an interviewer in order to maintain the conversation, the activity. Contrasting what they refer to as children orienting towards a 'relational rationality' to a 'scientific rationality', as premised in research (based on a monological conception, see above), they argue that the former is guided by the principles of 'participation', 'mutual understanding' and 'alignment' while the latter is guided by an expectation of 'fact finding' and 'logical explanation'. These are markedly different rationalities for guiding actions and participating in an activity, in this case the research interview. As Aronsson and Hundeide argue, "Young children seem to care more about keeping social relations going than about logical consistency. There is thus a greater tolerance for contradictions in relational rationality, in that alignment concerns are more central than fact finding or logical explanations" (p. 183). Returning to the overarching theoretical framework of their analysis and discussion, Aronsson and Hundeide point out that "On a theoretical note, we have corroborated

and restated Vygotsky's point that the social level is a primary level in human action" (p. 184).

In a similar vein, Pramling (2006b) argued for the need to analyse the research interview as a social practice. Reanalysing empirical excerpts from one of Piaget's most famous and influential books, *The Child's Conception of the World* (Piaget, 1926/1951), how children speak figuratively and use meta-communicative markers were investigated. Building upon the important studies of Hundeide (1977, 1985), Donaldson (1978) and Aronsson and Hundeide (2002), Pramling (2006b) studied "the manners in which children provides perspectives on what they are saying", arguing that if children indicate that they use language non-literally (i.e., figuratively, metaphorically), "this would have serious implications for this line of research and the conclusions drawn about the children's understanding" (p. 454). There are many ways that people indicate in communication the tensious relationship between what they say and what they mean. In this case, what was analysed was certain verbal markers (Goatly, 1997), such as 'a kind of', 'similar to', 'as if', and 'like'. Simply put, such markers clarify that the speaker does not make a reality claim but that this is rather a manner of speaking, and should therefore not be taken (interpreted) literally. Consider the following as an example; a child is asked the very difficult question, "Do you know what it means to think of something?" (Piaget, 1926/1951, p. 37):

> TANN (8) thinks with his "*mind*". "What is the mind?–*It is someone who isn't like we are, who hasn't skin and hasn't bones, and who is like air which we can't see*". (p. 53)

Facing the communicative and cognitive challenge of clarifying what it means to think, the child speaks about it in terms of something more tangible; as if it were an agent ("it is someone" but "who isn't like we are"). The child also qualifies his reasoning, suggesting that it is "like" something (or someone) while at the same time it "isn't like" something else. The notion of thought is thus communicated about in terms of tentative similarities and differences to something other which is easier to talk about. Through his meta-communicative makers, the child clarifies that what he says should not be taken literally. It is a rather impressive undertaking of the child to qualify his speech in this manner. Disregarding the child's meta-markers, Piaget interprets the child's utterances as indicating the child identifying thought with air (Piaget, 1926/1951).

What the children are interviewed about in Piaget's study (1926/1951) is scientific phenomena, for instance where rain comes from. To give one example, from the chapter on 'the origins of child animism' of a 6-year-old child named Had (text in italics are the child's, text in quotes are the interviewer's and plain text is Piaget's own comments):

> HAD (6) "Can the sun do whatever it likes?–*Yes, because it's alone with the moon*–And the clouds?–*Yes, because they are alone with the other clouds*", etc. The meaning of these words is sufficiently clear from the following answer: "Can you do whatever you like?–*Yes, because my mother sometimes lets me*". (Piaget, 1926/1951, p. 227)

According to Piaget's own analysis of this excerpt, it illustrates how the child "endows all objects with freedom of movement for the reason that they are 'alone', that is to say that no one commands them nor supervises what they do" (loc. cit.). Hence, the child's answers are read as stand-alone claims about reality, how the child thinks something is. If instead interpreting this excerpt in a more dialogical manner (cf. Aronsson & Hundeide, 2002), the first thing to consider is what the child's answers are answers to. The initial question posed by the interviewer, "Can the sun do whatever it likes?" actually constitutes the sun as an agent capable of doing something, the question being whether it can *do* whatever *it likes*. Hence, already the initial question animates the phenomenon spoken about (the sun). As several theoreticians of language and communication have emphasized (e.g., Goffman, 1981; Rommetveit, 1974, 1985; Vološinov, 1929/1986; Wittgenstein, 1953), language does not simply represent reality, rather it is a device for structuring reality and constituting it in interesting and relevant ways for various communicative purposes. Of particular importance to our present discussion is the fact that the interviewer through his initial formulation actually communicatively frames (Goffman, 1974) the phenomenon in animistic terms. Already young children tend to be sensitive to such communicative features and align their speech accordingly (Aronsson & Hundeide, 2002). As seen in the excerpt, the child reasons in terms that are reasonable within the framework established by the interviewer's question, using 'because' as a kind of meta-signal that motivates how the phenomena in question could be spoken about in the suggested way (Pramling, 2006b). Simply put, our argument is that while the interviewer communicatively frames the issue to be talked about in animistic, as-if terms and the child sensitively aligns with and responds in a corresponding fashion, these two features of the interaction are not considered in Piaget's own analysis of the data. Instead, the child's expression is read as indicating a conception held, in this case, that the child thinks animistically. In alternative terms, we argue that the interviewer frames the issue in an as-if manner (as a way of speaking rather than making a claim about the nature of the phenomenon) and while the child responds accordingly, the child's answer is read as indicating an 'undeveloped' way of thinking, while the interviewer's analogous turn of phrase is not considered (or seen merely as a manner of speaking). In a way, the child is thus communicatively framed (in both the Goffmanian sense and in the normative sense of being tricked) by the interviewer into a position where it is unlikely that he or she will give what is considered a 'correct' response to the question (cf. Hundeide, 1977, for a similar and elaborate discussion). With the alternative perspective we have tried to illustrate with reference to Hundeide (1977), Donaldson (1978), Aronsson and Hundeide (2002) and Pramling (2006b), children appear communicatively sensitive and competent rather than cognitively 'insufficient' or 'undeveloped'. As theoretician of science, Norwood Hanson (1958/1981) emphasized in his classic study, *Patterns of Discovery*, there is no theory-neutral way of interpreting data; scientific observation is 'theory-laden'. Whether we take a Piagetian or a Vygotskian perspective when interpreting empirical data, such as interviews, we see different things and importantly we produce very different images of children's capabilities in research (Pramling, 2006a; Wallerstedt et al.,

2011). As researchers, it is important not to make ourselves blind to our own contributions to the knowledge we generate.

In this book we privilege a cultural-historical reading of early childhood science learning and teaching. As such, we believe that a cultural-historical framing of the interview context and the interview itself, is more productive than the traditional approaches used, such as, constructivist or children's science as presented in Chap. 1 and critiqued in this chapter. In the following three chapters, we investigate empirically how some important features of early childhood science education plays out in a concrete sense, focusing on how teachers and children manage issues of representation.

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