Early childhood problem-solving interaction

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Young children's discourse during small-group work in primary school

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Chapter 1

General introduction

1.1 The importance of problem-solving interactions in early childhood education

This thesis reports on how young children interact with peers and their teachers while solving problems in peer interaction in early childhood education. Early childhood education is an important context for the lives of children. There is consensus that young children's experiences in early childhood education (from preschool to grade 3 classrooms) contribute to positive long-term effects on future academic, social and language learning (e.g., Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Hamre & Pianta, 2001; Landesman Ramey & Ramey, 1999; Stuhlman & Pianta, 2009). Research has shown that children's daily interactions with teachers and peers belong to the most influential factors in that respect (Bronfenbrenner & Morris, 1998; Deunk, 2009; Leseman & Veen, 2016; Mascareño Lara, 2014; Pianta, 2006; Tavecchio, 2008). Stuhlman and Pianta (2009) argue that sensitive and responsive teachers and teacher feedback during problem solving are important indicators of qualitative and profitable interactions. Although some programs have worked on improving these kinds of interactions (Weiland, Ulvestad, Sachs, & Yoshikawa, 2013), Pianta, Downer and Hamre (2016) argue that most teachers in early childhood education have difficulties designing challenges that elicit children's problem solving with other peers or with the teacher. In this thesis, peer interaction in which children discuss problems is also referred to as small-group work to make a clear distinction from situations in which children jointly establish (free) play.

It is remarkable that small-group work in which children solve problems is still rarely organized in early childhood classrooms (Hamre & Pianta, 2007), because problem solving is one of the most important goals of education. Jonassen (2011, xvii), for instance, argues that it is 'the most authentic and therefore the most relevant learning activity', since people continually encounter problems during everyday life. Furthermore, problem solving is essential to develop new tools and technologies (Jonassen, 2000; Lave, 1988; Siegler & Alibali, 2005). Moreover, problem solving is strongly related to (other) aspects of learning, such as inferencing, reasoning, analysis and synthesis, decision making, abstraction, generalization and thinking (Mayer, 2013; Robertson, 2017).

Psychologists such as Gagné (1985) positioned problem solving as an individual higher-order thinking skill that can be applied in different situations by participating in problem-solving activities. However, problem solving is above all a social activity, mediated through dialogue, as it is perceived in the socio-cultural paradigm. This perspective is inspired by Vygotksy (1978; 1962), who perceived dialogue as the intermediary between social and individual thinking in the learning process of individuals becoming participants in cultural activities. According to him, a dialogue should be established in the zone of proximal development (ZPD) to establish a next step in problem solving. He defined the ZPD as 'The distance between the actual developmental level as determined by independent problem solving and the

level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers' (Vygotsky, 1978, p. 86). As a consequence, problem-solving interactions are perceived as jointly constructed entities.

Young children are found to be skilled in discussing problems with peers when solving them. Evolutionary psychologists, for instance, show that preschool and kindergarten children can meet the essential conditions for joint problem solving, such as the joint establishment of a mutual understanding of the task, the final product, and the process to complete the joint goal (Ashley & Tomasello, 1998; Brownell, Ramani, & Zerwas, 2006; Cooper, 1980; Eckerman & Peterman, 2001; Tomasello, 2009; Warneken, Chen, & Tomasello, 2006). Moreover, detailed investigations show that 2- to 7-year-old children demonstrate to be competent and active participants in play interactions among peers. Ethnographic, discourse analytic and conversation analytic studies display the variety and complexity of young children's initiating and responsive practices when co-constructing social and moral order verbally during speech activities such as fantasy play, narratives, disputes and arguments (Berenst & Mazeland, 2000; Corsaro, 2005; Danby & Theobald, 2012; Goodwin, 1990; Kyratzis, 2004; Van der Schaaf, 2016). Due to the complex and varied ways that children participate actively in such interactions during play time, episodes of play are found to contribute positively to children's social and moral development (Deunk, Berenst, & De Glopper, 2008; Pellegrini, 2009; Theobald, 2009).

Although it is widely recognized that play-time interactions with peers are essential to young children's cognitive development as well (Nicolopoulou, 1993; Piaget, 1932; Rogoff, 1998; Tudge & Rogoff, 1989; Vygotsky, 1978), research on the cognitive benefits of problem-solving interactions among young children during small-group work presents a more inconsistent picture. In contrast to the outcomes of experiments on problem solving among primary school children, experimental investigations show that preschool and kindergarten children's skills and abilities do not necessarily enhance when solving problems with peers and that problem solving in dyads is no more beneficial than individual problem solving (Gauvain & Rogoff, 1989; Perlmutter, Behrend, Kuo, & Muller, 1989). In this thesis, we refer with young children to children of 4-7 years-old, with very young children to children of 2-4 years-old, and with primary school children to children of 6 and 6+ years-old (in grade 1 and higher grades). The inconsistency in the positive effects of small-group work among (very) young children may be explained by the fact that experimental studies suppress the ways that children may deal with problems when they have degrees of freedom to influence problem solving, as Ramani and Brownell (2014) suggest. Moreover, in general, experimental studies on small-group work disproportionately focus on science lessons and, in the analysis of the discourse, on the ways that children discuss competing positions, as pointed out by Howe and Abedin (2013). As a consequence, it is still unclear how young children solve problems in small groups

in more naturalistic early childhood settings.

Another issue that needs clarification is how the teacher may construe his or her role while the children are working in small groups. It is widely recognized that the teacher plays an important role in stimulating children's group discourse before, after and during episodes of small-group work (Dawes, Mercer, & Wegerif, 2000; Hofmann & Mercer, 2016). However, in contrast to the episodes that precede and follow the peer interaction, less research has been carried out on the episodes during small-group work, as pointed out by Webb (2009). The few studies on this subject demonstrate that the teacher may influence the extent to which children participate in the problem solving (Chiu, 2004; Dekker & Elshout-Mohr, 2004; Meloth & Deering, 1999). However, these studies were only carried out in primary and secondary education settings. Moreover, these studies only focused on teacher practices. By doing so, they neglected the ways that groups of pupils and teachers jointly establish their problem-solving activities and how these ways influence the continuation of problem solving during teacher interventions. As a consequence, it remains unclear how small-group problem-solving interactions are accomplished between a group of young children and an intervening teacher.

The aim of this thesis is therefore to improve our understanding of the ways in which problem-solving interactions (between peers either in the absence or presence of the teacher) are constructed during small-group work in early childhood education. This is important not only because of the potential cognitive benefits of problem solving, as noted above, but also because theorists argue that problem solving with others should be an important focus point in education. Bereiter (2002), for instance, considers dialogue with others essential to solving all sorts of problems that future societies will face. However, in contrast to Vygotsky, who considers learning a process in which an individual becomes more capable of participating in cultural activities, Bereiter and Scardamalia (2002; 2006) regard learning as building distributed knowledge, a process in which participants create new knowledge together as a solution to a problem. Although they do not address how knowledge-building interactions are or should be constructed, Bereiter and Scardamalia argue that children from a young age should be given the opportunity in education to learn how to solve problems in interactions with others to develop into social knowledge workers who are able to jointly create new knowledge as a solution to all sorts of problems (Bereiter, 2002; Scardamalia & Bereiter, 2006).

1.2 Peer interaction in early childhood education

Compared to research on whole-group classroom interaction, less research has been done on small-group work in the early childhood classroom (Howe & Abedin, 2013; Mercer & Dawes, 2014). Tht is rather remarkable, since Piaget already maintained that interaction between (very) young children is an important source of cognitive development. According to him (Piaget, 1923; 1926), reciprocal relations between

equal peers may initiate more problems, which he defined as cognitive conflicts, and may enhance children's active participation in explorations to overcome such conflicts, especially in comparison to asymmetrical interactions with adults. Ample empirical research shows that young children may participate actively in problem-solving interactions, underscoring Piaget's idea that young children's active problem solving among peers may enhance their learning and development.

For instance, it is widely accepted that the extent to which peer interaction in which small groups of children solve problems is beneficial to cognitive development is highly dependent on the nature of the group discourse. Experimental research shows that cognitive benefits are related to the extent to which children give and receive help, share knowledge, elaborate on each other's ideas, and support their own ideas and standpoints, and to whether children recognize and resolve contradictions between their own and other children's perspectives (e.g., Bossert, 1988; Howe et al., 2007; Howe, 2014; N. M. Webb & Palincsar, 1996). Moreover, Mercer and his colleagues demonstrate that when children use higher levels of reasoning in their group work, both their social and their individual cognitive problem-solving skills improve (Dawes et al., 2000; Mercer, Wegerif, & Dawes, 1999; Mercer & Littleton, 2007; T'Sas, 2018; Wegerif, Mercer, & Dawes, 1999). Interestingly, the latter findings are not only reported for primary school children but also for young children (Littleton et al., 2005).

In their analysis of children's group discourse during an intervention program to enhance children's joint reasoning, Mercer and colleagues distinguish three broad types of interactions, in which an important distinguishing feature is whether the children are reasoning. Although their distinction is helpful in understanding the relationship between children's group discourse and the effects of small-group work, it is questionable to what extent the distinction is complete and whether the features correctly distinguish the types of talk. Research by Rojas-Drummond and colleagues (2006), for instance, shows that children may become better problem solvers even without using more reasoning in their talk, suggesting that whether children need to reason in small groups may be task dependent. Based on their findings, they propose to adjust and refine Mercer and colleagues' three-part distinction. Additionally, Herrlitz-Biro, Elbers and De Haan (2013) demonstrate that the nature of children's contributions to reasoning discourse is dependent on the task and on the position in the interaction in which the contributions are delivered. These studies lead us to conclude that more detailed research is needed before distinguishing more or less effective types of talk.

The next issue concerns the methodology of the research needed. So far, most of the studies conducted on problem solving and reasoning during peer interaction have been based on deductive (and sometimes inductive) analytical categories that have emerged from the analyst's perspective. By doing so, these investigations have neglected the joint nature and sequential organization of problem-solving interactions

and reasoning during small-group work. This thesis follows an approach that accounts for these issues: Conversation Analysis (CA). CA (Ten Have, 2007) starts from the participant's perspective and is pre-eminently suitable for analyses that aim to unravel how participants jointly establish problem-solving interactions and how they reason together.

Research focusing on problem solving among adults indicates that such a detailed analytical approach may reveal interesting details of these problem-solving interactions. CA investigations into problem solving and reasoning in different institutional contexts, such as in business meetings (Huisman, 2000; Meier, 1997), educational settings (Van Kruiningen, 2010) or medical encounters (Robinson, 2003; Stivers, 2002), demonstrate that practices in the problem-solving interaction, such as in the construction of the problem, influence the continuation of the interaction. For instance, problem-solving interactions during business meetings do not continue in a linear way. It was found that problems and solutions are not always explicitly suggested, and problems can be explored more in-depth before solutions are discussed (e.g., Boden, 1994; Huisman, 2000; Meier, 1997; Van Kruiningen, 2010). Additionally, Huisman (2000; 2001) demonstrates that a problem description in combination with an (implicit) assessment of a state of affairs jointly construct a problem. Furthermore, she found that descriptions and assessments of states of affairs continually alternate, implying that solutions are established by these practices as well (Huisman, 2000).

Less CA research has been conducted on small-group work in early childhood education and primary education, especially when small-group work or peer interaction concerns the solving of problems that are substantive or content specific. For multicultural secondary education classrooms, Deen and Zuidema (2008) show, by focusing on co-operation and forms of exclusion, how children discuss mathematical tasks. Co-operation may be established through open information-seeking questions by one of the children, leading to a critical and constructive continuation in which each other's ideas are discussed. However, in many instances, children appear not to be critical of the content and the form of each other's utterances. Moreover, the authors describe that discussions may also result in both the social and cognitive exclusion of children. Another CA paper focuses not on solving problems but on how three 7-year-old children reading a book together constitute a topic and how this topic evolves over time in one lesson. Melander and Sahlstrom (2009) describe how the children first discuss the size of a blue whale in relationship to the book, resulting in a discussion in which they compare its size to objects in their local and abstract environment.

As noted above, an important feature of peer interaction in the research of Mercer and colleagues (1999; 1999) that is supposed to contribute to learning is the level and the extent to which children reason together. In CA research, this has not been investigated in the context of peer interaction during small-group work. Instead, the practices of young children's reasoning have been especially studied

in the context of disputes during play time (e.g., Church, 2009; Van der Schaaf, 2016), demonstrating that there are specific patterns in dispute sequences and that particular accounting practices (i.e. type of accounts) highly influence the course of these disputes. Church (2009), for instance, shows that the propositional content of an account plays a major role in the continuation of young children's dispute. She found that more objective and factual accounts lead to sequence termination in the next turn, while more subjective and personal accounts result in sequence expansion.

Hence, CA studies on both problem solving and reasoning in settings different from that of this thesis demonstrate that these interactions must be understood from a sequential perspective. Therefore, it is our belief that a sequential analysis grounded in CA may enable us to enhance our insights into the ways that young children in early childhood education construct problem-solving interactions and reason during small-group work.

1.3 Peer interaction and the role of the teacher

More detailed and interactional research is needed not only on (young) children's problem solving but also on the role of the teacher during small-group work. Until now, little research has been conducted on the role of the teacher when children are working together in small groups (N. M. Webb, 2009). However, a number of studies demonstrate that the presence of a teacher has a negative impact on the pupils' language use when young children play and work together, in comparison to contexts in which the teacher is present (Damhuis, 1995; Deunk, 2009; Wells, 1985). Wells (1985), for instance, demonstrates that young children during the preschool period (1.5-4 years of age) accomplish more utterances in interaction with peers around play and role-play in the absence of the teacher than when the teacher is present. Additionally, Deunk (2009) shows that preschoolers in play settings use more complex speech actions in peer interaction when the teacher is absent than in dyadic and small-group interactions in the presence of the teacher. Moreover, Damhuis (1995) shows that young second language learners' turns in group work in the absence of a teacher are much longer and their influence on topical development is greater than in interactions during small- and whole-group interactions where the teacher is present. These investigations illustrate that the teacher's presence has a great impact on young children's discourse during joint play activities or during group work.

Although teachers may have a great impact on children's discourse in whole-groups and during play time, less is known about the role of the teacher while young children are working in small groups. To our knowledge, no studies have been conducted that focus on teacher interventions during small-group work among young children. Instead, all investigations of this issue concern interventions during small-group work among older children in primary and secondary education and are experimental or normative in nature.

Webb (2009) shows that there are only a few effect studies on this subject

and that they all focus only on interactions between the intervening teacher and groups of older children. Some studies provide support for suggestions that the teacher should explore the problem with the children first (Chiu, 2004; Meloth & Deering, 1999), whereas other studies demonstrate that children who are questioned about their ideas or inconsistencies and who are challenged to give reasons before the teacher provides suggestions or instructions, discuss problems differently in their next peer interaction than the groups in which the teacher's interventions are more controlling or instructive (Dekker & Elshout-Mohr, 2004; Gillies, 2004; Gillies & Boyle, 2006). Therefore, the nature of the interaction during teacher interventions, and more specifically, the extent to which children may participate in problem solving with the teacher, also influences the extent to which children's task performance or cognitive outcomes of the small-group work are enhanced, as experimental studies demonstrate. Other researchers (Van de Pol, Volman, & Beishuizen, 2012) took a normative approach by developing a stage model that prescribes how these interventions should be built up and what teachers should do in each stage to enable the children to participate in the problem solving. In a subsequent study, Van de Pol, Volman and Beishuizen (2014) demonstrate that through an intervention on the basis of this stage model, the trained teacher practices can be enhanced.

As noted above, the few studies that have been carried out on teacher interventions focus not only on group work among older children but also have a normative and/ or experimental nature and are mainly focused on teachers' practices when children experience problems while working together. As argued in the prior section, such normative orientations take an analytical approach to analyzing problem-solving interactions from an analyst's perspective. By doing so, they do not account for the fact that such interactions are constructed by all the participants. An approach such as the Conversation Analysis (CA) (Ten Have, 2007) that starts from the participant's perspective may contribute to an understanding of how a teacher and a group of young children jointly establish problem-solving interactions. Although to our knowledge there are no CA studies on teacher interventions during group work among young children, a CA study on a teacher intervening group work among high-school students demonstrates that teacher interventions are potentially misplaced (Ford, 1999). The author shows, for instance, how students object to the teacher's intervention when it is not relevant to the current internal focus of the group. Additionally, problem-solving interactions in two other contexts may form a helpful framework, demonstrating that detailed research from a participant's perspective may reveal interesting information about problem-solving interactions with teachers.

First, it appears that teachers in problem-solving interactions with individual older children in primary and secondary education highly determine the course of the interaction and the extent to which children participate (Elbers, Hajer, Jonkers, Koole, & Prenger, 2008; Koole, 2006; 2010; 2012). For instance, Elbers et al. (2008) demonstrate that such interactions during individual learning activities are

constituted through a pupil initiation with a rather global problem description. The teachers then hardly ask to explore the problem as opposed to what is usual in other institutional contexts (Robinson, 2003). Instead, the teachers directly start with their explanations, which in turn narrows the pupil's problems and decreases the level of children's contributions to the continuation. In addition, Koole (2012) demonstrates that teachers then actually explain the problem that they presuppose themselves rather than the problems of the pupils. Moreover, he shows that pupils rarely object to the actions of the teacher, and when they do, the teacher starts a new explanation in regard to which the pupils can only acknowledge that they understand or know something. Although their investigations focus on problem-solving interactions with the teacher during individual work, it can be expected that the practices in and the structure of interactions with the teacher during small-group work when children call for help are highly similar.

Another relevant CA study on problem solving in groups focuses on young children in whole-group interactions. Within early childhood, education stories are an important source of discussing problems in whole-group interactions. Gosen, Berenst and De Glopper (2015) demonstrate how problem-solving interactions are jointly constituted during the interactive reading aloud of picture books. They show that the participants launch problems by a description and/ or an (implicit) negative assessment of a state of affairs relevant to the book, which then continues in a discussion about solutions in which both teachers and children can hypothesize, propose and evaluate possible solutions for the problems experienced by the book characters. Their study unravels that teachers, by treating the solutions as possibilities in their evaluations, are enabling all participants (teacher and pupils) to contribute to problem solving.

Thus both comparative studies and more detailed CA studies in different settings demonstrate that teachers may have an impact on the level and nature of children's contributions. Moreover, the CA studies mentioned above show that the way children may participate in problem solving is highly dependent on teacher practices in response to children's contributions. Therefore, it is our belief that both a comparative analysis and a detailed analysis informed by CA may enhance our understanding of the role of the teacher during episodes of peer interaction in small-group work.

1.4 The thesis

1.4.1. The research question

This thesis aims to contribute to the research field of classroom interaction in general and to the field of peer interaction more specifically in several ways. First, this thesis aims to unravel how young children's discourse during peer interaction differs from the discourse in the context of a small-group discussion with a teacher. As stated above, to our knowledge, this has never been investigated in the context of small-group work and teacher interventions. Second, the aim is to contribute insights into

educational teacher practices by describing the ways in which intervening teachers solve problems with a group of children. As explained earlier, little empirical research has been conducted on teacher interventions during peer interaction, especially related to young children's group work. Third, to our knowledge, there are no studies that account for the sequential organization of children's problem-solving interactions in small groups. Therefore, one aim of this thesis is to unravel how children construct problem-solving interactions during small-group work. Finally, since reasoning is often mentioned as a feature of effective problem solving during small-group work (e.g., Howe, 2010b; Littleton et al., 2005; Mercer & Littleton, 2007) while neglecting the sequential and joint nature in the analysis, this thesis tries to enhance insights into the ways that young children reason by investigating how they accomplish account sequences when they reason in peer interactions in small groups.

Thus, this thesis will give an answer to the following question: *How do young children design problem-solving interactions during small-group work?* This overarching question will be answered by focusing on the following questions:

1. *What are the differences between young children's discourse during peer interactions in small-group work when their teacher is either absent or present?*
2. *How are problem-solving interactions during small-group work accomplished by young children when their teachers are intervening?*
3. *How are problem-solving interactions during small-group work accommplished by young children in the absence of their teachers?*
4. *Which account sequences do young children accomplish when reasoning during small-group work?*

1.4.2 Methodology

Context

The investigations reported in this thesis were all conducted in early childhood classrooms in Fryslân (the Frysian name for Frysia), a province in the north of the Netherlands. Early childhood classrooms are commonly referred to as kindergartens. In this thesis, kindergarten (K1/ K2) defines the first two grades of primary schools in the Netherlands. The reason for using that term lies in the Primary Education Act of 1985 in which separate kindergartens were combined with primary schools. Nowadays, the first two grades of the -integrated- primary schools are still informally referred to as kindergartens, whereas the third grade is comparable to the grade 1 in the American and British school system. In most primary schools in Fryslân, it is common practice to combine kindergarten grades (children 4-6-years-old) with grade 1 (and in some instance with grade 2), similar to other regions in the Netherlands that are experiencing a demographic decline. Consequently, most classrooms in which we collected the data did not fall within a distinct educational category (Unesco Institute for Statistics, 2011). Because of our focus on small-group work in young children, we explored problem-solving interactions among 4-7-year-old children only. As a

consequence, we excluded small-group work in which grade 2 children participated from our analysis. For that reason, the term *early childhood education* is used in this thesis to refer to kindergarten (potentially combined with grade 1) in primary schools.

The data for this thesis were drawn from a multiannual program in which teachers from seven Dutch primary schools participated. This 'Co-operation and Language Proficiency' program (in Dutch 'Samenwerken en Taalvaardigheid') (Berenst, 2011) was funded by the Dutch Taskforce for Applied Research (SIA). The aim of this program was to establish conditions that enhance the quality of children's peer talk during small-group work in the frame of five inquiry learning projects with specific topics that gave groups of students the possibility to construct their own research questions within the topics. Six of the participating schools were (very) small primary schools, and the other was a large urban school. All schools were part of different school districts in Fryslân. Two of these seven schools already participated in a prior program that focused on the enhancement of whole-group interactions (Walsweer, 2015). All teachers in our program participated voluntarily and were all willing to let pupils solve problems in their own ways within the topic and to engage with their children in peer interactions.

The teachers in higher grades conducted real research projects in an Inquiry Learning frame (Littleton, Scanlon, & Sharples, 2012; Pulles, Hiddink, & Herder, 2014; Walsweer, 2015), while eight teachers in the participating early childhood classrooms (including one teacher in a combined grade 1/ 2 classroom) conducted a different kind of inquiry learning project, according to the Storyline Approach (Bell, Harkness, & White, 2006; Egan, 1986; Frame, 2006). The latter teachers received several formats of a storyline developed by the research group that they could choose from and conduct in their classroom (Herder, Hiddink, Prenger, & Pulles, 2013; Walsweer, Gosen, & Berenst, 2012; Walsweer, Pulles, Wessels, Groen, & Nysingh, 2013). In these projects, children of 4-7-years-old needed to solve problems in their small groups (2-5 children) that came up in the events of the Storyline Approach. By small groups we mean groups consisting of two or more (up to five) children. An important reason to arrange inquiry learning according to the Storyline Approach was that this approach offers a structure to which teachers can hold themselves to and which also provides sufficient opportunities for children to take initiative and actively participate in (small) groups. This was deemed necessary since most participating teachers were reluctant or were feeling incapacitated to organize peer interactions among young children in kindergarten.

In the Storyline Approach, children are drawn into a story in a fictive world that is created in the classroom and that is mostly mediated by picture books and prepared by the teacher or other educators. The story has a build-up that consists of a clear beginning, a middle and an ending, mostly in the form of some kind of celebration. The narrative unfolds as the learners work together on all kinds of problems that are introduced as part of the story. These problems, which may be based on curricular

content, construct the story similarly to chapters in a book. For instance, at the start of a story, young children are confronted with the problems of a virtual character or a well-known character. In the case of a virtual character, they may first co-construct this character by discussing their ideas and thoughts about this story character before talking about possible solutions to help the character. Problems may be introduced following the receipt of a letter or the arrival of a 'visitor' (a colleague) asking for help. Children alternately discuss possible solutions in whole-group settings but also in small-group settings. Generally, the storyline may last between three and six weeks, but in the current research program, storylines were developed with a duration of three weeks, similar to the duration of the inquiry projects in higher grades.

Data collection

Each teacher's classroom in whole-group discussions before and after the peer interaction and the peer interaction itself on at least three occasions within each project were videotaped. To capture video and audio in each peer interaction, a camera on a tripod with a flat microphone that was positioned between the children was used. Since the aim of the general program was to establish classroom conditions that enhance children's peer interaction by aligning with each particular classroom setting and the practices of each teacher, both the size and the composition of the groups and the classroom organization of the small-group work in the data collection varied. The group size varied from two to five children per group, while the homogeneity of the groups in terms of age and gender also varied. In most instances, all small groups were working in the same classroom with the teacher walking around. In some cases, the small groups worked outside the classroom while the teacher mainly worked in the classroom, and in one case, the teacher joined the small-group work for almost the entire activity.

On the basis of Educational Design Research methodology (EDR, Collins, Joseph, & Bielaczyc, 2004; Plomp & Nieveen, 2009), individual teachers and one of the researchers observed and discussed the video recordings from the project. Based on these discussions regarding the process and the interactions during the project, with references to the video recordings of the interactions in the whole group and in the small groups, the researcher and teacher agreed to make adjustments in the next project in a particular classroom. By doing so, it was possible to align with the particular setting and teacher practices in every participating classroom. In total, each of the participating teachers carried out five projects in his or her classroom.

Data analysis

To answer the questions, CA, a qualitative micro-analytical approach to unravel the interactional patterns, was used in chapters 3, 4 and 5. CA is a micro-analytic and qualitative method for studying practices as they are used by participants in social interactions (Hoey & Kendrick, 2017). In this thesis, *practice* refers to the verbal,

vocal, bodily, or material resources that form an action, while action refers to the interactional function that is accomplished (in interaction) by these practices. A key principle for understanding how participants use language to perform activities in CA is the sequential organization of the interaction, meaning that our analysis of what a participant is doing is informed by where in the sequence the action occurs and how it is packaged (Schegloff, 1995; 1997). In addition, the next-turn proof procedure is essential in CA to understand how actions and turns function in interaction. This means that it is necessary to see how participants treat a particular turn in their response to that turn. By taking the participants' perspective into account, we as analysts are enabled to understand the meaning of that turn (Gosen & Koole, 2017). In chapters 3-5, the analysis was informed by CA to answer the questions and to gain insight into the nature of the problem solving and reasoning in the accounts of the particular participants. Only in chapter 2, in which the first question is answered, was a quantitative analysis of the distribution of some interactional characteristics performed to make a comparison between children's discourse in two contexts (small-group work with the teacher being either absent or present). Depending on the particular research question in each of the different chapters in this thesis, the conducted methods are discussed in more detail in each chapter. All used video data were transcribed according to the conventions of CA before detailed analysis took place (Mazeland, 2003; Ten Have, 2007); for detail, see appendix A.

The analyses were performed on the full range of collected data in chapters 2 and 3 where interactions between children (and their teachers) from (combined) K1, K2, grade 1, and grade 2 classrooms were investigated. Regarding the material of the combined classrooms that include grade 2 as well, we excluded data in which children originating from grade 2 classrooms were involved in the interaction in our analyses. The analyses in chapters 4 and 5 were restricted to the material from K1 and K2 primarily (for details, see chapters 4 and 5).

1.4.3 The structure of the thesis

This thesis consists of six chapters. Apart from this chapter and the final one containing the conclusion and discussion, all chapters are concerned with detailed analyses of small-group work either in the absence or the presence of the teacher. Our focus is on the interactional characteristics of problem-solving activities. First, the small-group discussions take place in the context of the solving of problems of the main character from the storyline. Within this framework, the interactional impact of the presence or the absence of the teacher on the language use of children is investigated. In addition, two chapters specifically focus on problem-solving interactions that occur during small-group work. Finally, we examine accounting as a central aspect of the reasoning of children because it is widely recognized as an important aspect of effective small-group work in which problems are solved.

The present thesis encompasses four chapters. Chapters 2 and 3 deal with the influence of the teacher on children's participation during group work and answer questions 1 and 2, respectively. *Chapter* 2 presents a quantitative analysis of 21 problem-solving activities in 6 kindergartens in the initial project. A comparison is made of children's discourse in peer interaction in the absence of the teacher with their language use in episodes in which the teacher is present in their group work. It is explored how complex their discourse is, how children take turns and how their speech actions are distributed in both interactional contexts. In *chapter* 3, the problem solving of small groups of young children solving problems with an intervening teacher are further explored. Using CA to explore 36 fragments that came out of all projects in all participating classrooms in which children initiated a problem, we investigated how these interactions were built up, which practices the participants accomplished in constructing their problem-solving activities and how these practices influenced the course of the interactions.

Chapter 4 and 5 report on young children's problem solving during small-group work and provide answers to questions 3 and 4. *Chapter* 4 illustrates how young children without the presence of a teacher discuss problems that arise during their peer interaction. In this conversation analytical study in 80 problem-solving fragments it is investigated how problem-solving interactions are built up and which specific actions and practices children carry out to construct different stages in relation to specific states of affairs. *Chapter* 5 describes how young children reason by analyzing what kind of sequences and practices children use in their accounts while they are solving problems in peer interaction. A detailed analysis of 205 smaller fragments coming from 49 problem-solving activities demonstrates that young children may construct single and multiple account sequences. The build-up of the different account sequences and the extent to which the development of both *single* and *multiple* account sequences is related to the action formation practices of the account(s) is explored.

In the final chapter (6) conclusions are drawn and methodological issues and theoretical and practical implications of the findings are discussed. By summarizing, integrating and reflecting upon the results of the different studies, the relevance of the study as a whole is addressed. Additionally, suggestions for future research are put forward.

Chapter 2

Young children's discourse in peer interaction during small-group work in the absence and presence of their teacher

Abstract

The present study explores young children's discourse in peer interaction during small-group work in the absence and presence of their teacher by comparing their language use across both contexts. Therefore, samples of peer interactions from 21 groups of children in 6 early childhood classrooms who work on problem-solving activities are analyzed and compared in terms of the following three main aspects of discourse: (1) complexity, (2) turn taking and (3) speech actions. It is found that the complexity of children's discourse and the distribution of children's speech actions vary across the two contexts. The distribution of children's turn-taking procedures is found to be stable across contexts. The analyses further show that children use more complex language and accomplish initiating speech actions more often in the absence of the teacher. In addition, the context in which the young children collaborate also influences the type of initiating and responsive speech actions that they perform. In the *absence of the teacher*, children use relatively more *questions*, *directives* and *markings* (expressive actions such as thanking or apologizing) as initiating speech actions than when the teacher is present. The results of this study thus indicate that peer interaction of young children in small groups who are solving problems in the absence of the teacher offers specific affordances for varied and complex discourse. Then, children have more influence on the development of the interaction in comparison to small-group interactions in the presence of the teacher. The consequences of these findings for research and educational practices in early childhood education are discussed.

2.1 Introduction

Theory and empirical evidence hold that one of the most important factors contributing to children's cognitive and linguistic development is the social interaction in which children actively participate. Two theoretical perspectives with substantial empirical support based on the ideas of Vygotsky and Piaget provide important ideas on understanding the relation between active participation in interaction and learning. Although their theories are often placed in opposition, they are comparable in many ways (Tudge & Rogoff, 1989). For instance, both underscore that using language is necessary for participants to achieve common ground while thinking together. Although Vygotsky and Piaget make different assumptions about the relationship between interaction and cognitive development, which is discussed in more detail elsewhere (e.g., Nicolopoulou, 1993; Rogoff, 1998; Tudge & Rogoff, 1989), they both stress the importance of interaction and have been highly influential in theorizing about learning and development. It is therefore no surprise that children's participation in interaction has become the main subject of educational research.

Socio-cultural theories that are based on Vygotsky's (1978) work argue that a person's participation and learning cannot be properly understood without

acknowledging the social context in which the interaction takes place. A core principle of this theory is that adults should help the child in the zone of proximal development (ZPD) to function at a level beyond the level that he or she is individually capable of. Piaget, on the other hand, has pointed out that peer interaction is a very beneficial context for children to learn in. In the early 1920's Piaget (1923; 1926) already demonstrated and explained how interactions and conflicts between equal peers may be more beneficial for children's cognitive development than interactions with adults. Various studies provide support for Piaget's stance, showing that peer interaction in which children have to solve problems may stimulate topical knowledge, insight and problem solving. In addition, there is now a general consensus that these positive effects of small-group work are highly dependent on the way that children talk together (Howe et al., 2007; Howe, 2010a; Littleton et al., 2005; Mercer et al., 1999; Mercer & Littleton, 2007; Tolmie, Howe, Mackenzie, & Greer, 2006). Only when their group discourse is more complex in terms of joint problem solving and reasoning does it contribute to positive outcomes.

Despite the widely acknowledged benefits of active participation of children in small-group work, less is known about how teachers contribute to the discourse during children's small-group work. This lack of research is rather remarkable, since it is an everyday practice for teachers to intervene during small-group work. It is their task not only to organize and supervise small-group work but also to intervene when a group of children is facing problems that cannot be solved by itself. According to Hofmann and Mercer (2016), teachers tend to intervene in at least three situations: when a small group proposes no ideas, an incorrect idea or a correct idea (or a solution). Therefore, it is interesting to understand how their presence influences the nature of the interaction in such a small group. Many studies on whole-group discussions demonstrate that teacher practices may highly influence children's opportunities to contribute to educational interactions, as has been shown in many studies on whole-group discussions (e.g., Alexander, 2008; Cazden, 2001; Howe & Abedin, 2013; Wells, 2009). Additionally, a few studies on teachers' interventions during small-group work show rather similar results, demonstrating that whether teachers enhance the nature and complexity of children's discourse depends to a great extent on their interactional practices (Chiu, 2004; N. M. Webb et al., 2009). These studies, however, concern only older children in primary and secondary schools.

Overall, it is still unclear how teachers may contribute to the discourse of young children during small-group work. Some comparative studies (Damhuis, 1995; Deunk, 2009; Wells, 1985) show that the nature and complexity of children's discourse during peer interaction in preschool and kindergarten is dependent on the interactional partners that they talk with, demonstrating, for instance, that children's turn length, variation in speech actions and influence on the topic is larger in peer interaction with the teacher being absent than when the teacher is present. These findings point out that peer interaction may stimulate language development in a

way that differs from the affordances that teacher-led interaction may provide. Since the above-mentioned studies mostly compare discourse between interactions with different partners in *play settings*, and since it is often reported that children's discourse in *play* and *group work* settings differs (Leseman, Rollenberg, & Rispens, 2001; Ramani & Brownell, 2014), it is not self-evident that similar differences will also hold for *small-group work* in kindergarten. Therefore, in this study, young children's discourse during small-group work in the absence of the teacher is compared to their discourse when the teacher takes part in the small-group discussion.

2.2 Background

For over four decades, classroom talk and interaction have been investigated by many different disciplines and from many different perspectives, such as psychology, educational sciences, ethnography, conversation analysis, linguistics, discourse analysis and so forth (e.g., Howe & Abedin, 2013; Mercer & Dawes, 2014; N. M. Webb, 2009). Since problem solving during small-group work has become an increasingly common feature of classroom education, peer interaction in this setting has frequently been studied (Cohen, 1994; Galton & Hargreaves, 2009; Howe, 2010b; Mercer & Littleton, 2007). Research suggests that small-group work has the potential to enhance cognitive development and children's topical knowledge, depending on the nature and complexity of the small-group discourse. Mercer (2004) and his colleagues, for instance, distinguish between three ways of talking when children solve problems in small groups that differ in terms of whether and how group members refer to and build upon each other's contributions. In *disputational talk,* there are many disagreements, and there are few attempts to resolve issues constructively. In *cumulative talk*, however, children elaborate positively but uncritically on the contributions of each other. This is in contrast to *exploratory talk* in which children elaborate critically but constructively on each other's ideas to reach a joint agreement (Dawes et al., 2000; Mercer et al., 1999). In numerous studies, it has been shown that participation in *exploratory talk* is related to higher levels of both collective and individual cognitive problem solving (Dawes et al., 2000; Mercer et al., 1999; Mercer & Littleton, 2007; Rojas-Drummond et al., 2006; T'Sas, 2018; Wegerif et al., 1999). Interestingly, these findings are not only reported for primary and secondary school children but also for young children (Littleton et al., 2005). These findings correspond to a large extent with results in the experimental research tradition, which show that the degree to which older children in primary and secondary education benefit from problem solving during group work depends on the nature of children's participation. In particular, such benefits are related to the extent to which children give and receive help, share knowledge, elaborate on each other's ideas and support their own, and whether children recognize and resolve contradictions between their own and other children's perspectives (e.g., Bossert, 1988; Howe et al., 2007; Howe, 2014; N. M. Webb & Palincsar, 1996).

Despite the growing consensus that children's active discourse in small-group work promotes learning, it has often been reported that children have difficulties working together in productive ways (Galton, 1999; Hogan, Nastasi, & Pressley, 1999; Howe & Abedin, 2013), especially in regard to young children. Some studies, for instance, indicate that (very) young children's competencies do not necessarily improve when they solve problems in small groups compared to children who solve problems alone (Gauvain & Rogoff, 1989; Perlmutter et al., 1989). Other studies show that young children's discourse during small-group work is less extensive and less complex than during play time (Leseman et al., 2001; Ramani & Brownell, 2014).

Studies on children's interactional practices in play settings demonstrate that young children may be competent interactional partners with peers. It has been widely accepted that the complexity of peer interaction in *play settings* correlates with measures of both social, pragmatic and literate development (Howes, Rubin, Ross, & French, 1988; Pellegrini, 1985; Pellegrini, 2009). Peer interaction during play time provides young children with opportunities to discuss and support various ideas and opinions and to explore discourse genres such as arguments and discussions while accomplishing both initiating and responsive actions (Genishi & Di Paolo, 1982). *How* young children use language then is described in ethnographic and discourse studies by using transcripts of natural talk. These investigations show, for instance, how (very) young children co-construct social and moral orders (e.g., Berenst & Mazeland, 2000; Goodwin, 1990; Kyratzis, 2004; Van der Schaaf, 2016) during relevant speech activities, such as fantasy play, narratives, disputes and arguments (Danby & Theobald, 2012). These studies have also unraveled how (very) young children adjust their language to the genre at hand and how they accomplish certain practices to coordinate their joint activities. They shape social and moral order, for instance, by attuning their directives to the gender of the other participants (Goodwin, 1990; Kyratzis & Guo, 2001) and by sophisticated practices during play entry negotiations (Cromdal, 2001; Van der Schaaf, 2016). Moreover, in collaborative fantasy play, the participants must signal to one another the projected imaginary scene that they are orienting to (Goodwin, 1993), and they must achieve some level of agreement. For instance, Heath (1986), Goldman (1998) and Deunk (2009) describe how (very) young children explicitly announce specific roles, actions or objects (e.g., 'you're the baby', 'I'm doing …', 'this is milk') to monitor and regulate their joint understanding. In addition to these explicit descriptions of the components of an activity, children also use implicit contextualization cues (Gumperz, 1982; 1996); for instance, to signal (during make-believe play) the role of a mother who is talking to a child, by using a pitch that is higher than their normal voice and by using particular addressing practices (e.g., 'my child'). Moreover, as they get older, children also interpret participants, roles and places with new meanings, allowing for a wider range of possible acts and practices in their fantasy play (Deunk et al., 2008).

Another line of research that focuses on (very) young children's disputes

and arguments underscores that children in peer interaction accomplish specific initiating and responsive actions (Danby & Theobald, 2012). Then, children may argue about rules, the organization and/ or the subject of play (Butler, 2008; Goodwin, 2007; Van der Schaaf, 2016) and about the ownership and possession of objects or toys (Church, 2009; Cobb-Moore, 2008; Danby & Baker, 1998). A dispute is a joint activity (Cromdal, 2004) launched by a verbal or non-verbal 'offensive' action of a participant that is challenged by one of the other participants (e.g., Church, 2009; Van der Schaaf, 2016). Almost every action may occasion a challenge and therefore a dispute (Maynard, 1985). These challenges may turn into aggravated disputes in which children accomplish different practices to design their opposition and to emphasize their position (Corsaro & Rizzo, 1990; Goodwin, 1983). For instance, children use accounts to support their position and to undermine the position of the other participants (Cobb-Moore, Danby, & Farrell, 2008; Goodwin & Goodwin, 1987); young children seem to do that more with increasing age (Van Krimpen-Bijlefeld, 1995). In addition, it turns out that the continuation of the dispute depends on the type of account. Church (2009) reveals that accounts that are subjective and personal in nature lead to a continuation of the sequence, whereas more factual and objective accounts result in sequence termination in the form of a resolution, a retrieval or a teacher intervention. Van der Schaaf's (2016) study supports these findings in Dutch children's interactions by showing that elaborated accounts that are more concrete and more objective lead to dispute termination. Although these studies demonstrate the social and discursive learning opportunities of peer interaction by displaying how young children may take initiatives and accomplish responsive actions, they all concern peer interaction during *play time.*

Hence, research into children's play interactions underscores that (very) young children are competent to interact with peers, even when there are problematic issues. Play time provides children with opportunities to construct problems and solutions by themselves, which is the reason for Ramani and Brownell (2014) to suggest that small-group work among (very) young children should integrate elements of free play time (such as establishing own goals, determining ways to find a solution by themselves, and engaging with familiar problems and settings) to enhance children's joint and active problem solving during small-group work.

The relationship between participants in peer interaction is, in principle, symmetrical in comparison to the relationship between children and adults, which is Piaget's (1923; 1926) main explanation for the great value of peer interaction for children's cognitive development. According to him, children may exchange opposing ideas in that context, resulting in conflicts that need to be resolved. In Piaget's view, true learning requires autonomy in checking the validity of assertions and their backings to resolve conflicts, which is favored by interactions with equal peers over asymmetrical interactions with adults (Piaget & Smith, 1995; Tartas, Baucal, & Perret-Clermont, 2010). Although it has been suggested that small groups are most likely to

be productive if teachers avoid intervening (Howe, 2010b), there is little doubt that it is not desired for teachers to simply leave groups to solve all problems by themselves. It is also a part of their task to help small groups of children overcome their problems.

However, the question of what kinds of teacher practices are beneficial for young children who work in these small groups is hardly addressed in the literature (Howe & Abedin, 2013; N. M. Webb, 2009). A few studies on teacher interventions when a group of children is experiencing problems are conducted in small groups of *older children* in primary and secondary education. These investigations demonstrate what type of specific teacher practices may affect both the nature and complexity of children's participation either *during* or *immediately next to* the teacher intervention (Chiu, 2004; Hogan et al., 1999; N. M. Webb et al., 2009). Chiu (2004), for instance, show that it is more stimulating for children when intervening teachers explore children's ideas first before the children have to take initiatives themselves. Teachers who do not explore children's ideas first are more directive and provide more explicit help, while teachers who explore them challenge the children to explain and explicate their thoughts more frequently during the intervention. In addition, Webb and colleagues' (2009) study differentiate between the different kinds of indirect help that teachers provide, especially the extent to which teachers press students to explain their thinking, and how these teacher practices relate to the accuracy and completeness of students' explanations. They reveal that particular teacher practices after a child's response to an initial teacher probing question influence students' opportunities to make their explanations explicit. A probing question in that position frequently helps students to complete and correct their initial explanation, especially when teachers do not interject their own thinking or assumptions into their probing questions.

The few studies on the role of the teacher demonstrate that teachers may influence the level and complexity of children's contributions during teacher interventions, which corresponds with findings on the effects of teacher practices on children's participation during whole-group interactions in both primary education and early childhood education. Since Bellack et al.'s study (1966) and Flanders' 'two-thirds rule' (1970; 1965), it has often been reported that teachers mostly tend to limit children's contributions during whole-group interactions (e.g., Alexander, 2003, p. 33; Wells, 2009, p. 92-104). Although whole-group interactions, in which children actively and in a complex manner contribute to the development of the topic, mostly by answering information-seeking questions (ISQs) (Mehan, 1979) and self-selecting their turns, are positively related to children's learning and development (e.g., Cazden, 2001; Howe & Abedin, 2013), most whole-group interactions do not stimulate children's participation (Alexander, 2008).

These findings in primary education have raised the attention of researchers and incited them to investigate how whole-group interactions are constructed in early childhood classrooms and how young children's contributions may be enhanced

(Gosen, 2012; Van der Veen, 2017). Gosen and colleagues (2012; 2015), for instance, show that shared reading in whole-group contexts may yield interactions that are more symmetrical in nature, by giving teachers handles for dialogue. These researchers demonstrate that both teachers and children may initiate problem-solving interactions as the picture book story unfolds. It turns out that both parties launch such interactions with similar practices, resulting in similar problem-solving structures in the development of the interaction. In the continuation of these interactions, for instance, both parties initiate and evaluate solution proposals that are tentative in nature. In addition, in his six-week field experiment Van der Veen (2017) demonstrate that teachers who are instructed on how to hold discussions in whole-group interactions and who reflect on their videotaped whole-group discussions, more often accomplish practices that are expected to contribute to the joint nature of the interaction (Michaels, O'Connor, & Resnick, 2008). Moreover, young children realize more complex contributions than before the intervention. Therefore, an intervention may be needed to draw teachers and children out of their asymmetrical relationship in whole-group interactions into more symmetrical relationships.

The studies on teacher interventions during small-group work and whole-group interactions suggest that it is not as a matter of course that children actively participate in interactions with the teacher. This is remarkable, since children's active participation is highly related to their learning. Instead, it may be expected that small-group work in which the teacher is absent may have specific affordances for the development of cognition compared to small-group work in which the teacher is present because its symmetrical nature may stimulate children's participation. Since the relationship between language development and cognitive development in interaction is evident (Snow, 1984), it is no surprise that studies on *language* development that compare (very) young children's discourse during small-group work with their discourse in small-group interactions with the teacher paint a similar picture. These comparative studies (Damhuis, 1995; Deunk, 2009; Wells, 1985) demonstrate that peer interaction has specific benefits for stimulating (very) young children's language development in comparison with other types of educational interactions in which the teacher is present. Deunk (2009), for instance, shows that preschoolers in play settings use more complex speech actions in peer interaction than in dyadic and small-group interactions with the teacher. Moreover, peer interaction seems to benefit second language development as well. Damhuis (1995) shows that the participation and control of young children's discourse in peer interaction is highly different from their discourse in either small-group or whole-group interactions that are organized and initiated by the teacher. In peer interaction, children use relatively more words, self-select their turns more often and have more often control over the topic development, which is beneficial for (second) language learners.

Thus, all studies point in the same direction that affordances for language and cognitive development are related to the nature and complexity of language use,

which in turn depends on the contexts, i.e., whether a teacher is present during small-group work (Wells, 1985). The impact of a teacher's presence in small-group work in early childhood settings, however, has not yet been investigated in relation to what children do in their small-group work when the teacher is absent. In other words, young children's discourse during small-group work has not been compared to their discourse when the teacher is present in that small-group work. Thus, our research question is as follows: *What are the differences between young children's discourse during peer interactions in small-group work when their teacher is either absent or present?*

2.3 Data and methodology

2.3.1 Corpus

To study the discourse of children during small-group work with the teacher either absent or present, data on children in six of the eight participating classrooms were selected. The data in this study came from the corpus of a broader multiannual research program on problem-solving activities during peer interactions in primary education (Berenst, 2011). This broader research program, in which seven primary schools participated, consisted of five classroom projects in each of the participating classrooms (for more details, see chapter 1). In each project, at least three group work sessions per classroom were recorded on video.

In this study, the data were drawn from *the initial project*. This project was built on a Frisian picture book 'Fjouwer dappere mûskes' ('four courageous mice'; Dam & Terpstra, 2013), in which the main characters were travelling around the world. This picture book laid the foundation for a storyline that was carried out by all participating teachers in which classroom dolls were missing. In the development of the story, classroom dolls were facing all kinds of problems that could raise the attention of the children to solve them (Walsweer et al., 2012). The data from the initial project were investigated since all teachers carried out the same subject of the Storyline Approach and were encouraged to discuss with their pupils as they were used to at the start of the general research program. All teachers voluntarily participated in the general research program and were all prepared to let pupils solve problems in their own ways and to engage their children in peer interactions. Two of the eight teachers, however, were only starting to implement whole-group interactions and moments of individual work as part of the Storyline Approach in their classrooms. Therefore, these classrooms were excluded from this study, resulting in six early childhood classrooms (one combined K1/ K2 classroom, two K2 classrooms, two combined K1/ K2/ grade 1 classrooms, and one combined grade 1/ 2) from six primary schools.

The collection of peer interactions in which children solved problems in small groups either in the absence or the presence of the teacher was established by selecting episodes of work in small groups in which the teacher took part, during or immediately after the children talked together. The following instances were excluded

from the analysis: peer interactions in which children did not work on the project but played together and interactions in which the audio recordings were of poor quality and could hardly be transcribed. This resulted in a data collection of 2 x 21 episodes, in which the average durations for the teacher absent context and the teacher present context were 13:38 min (sd is 11:44 min) and 4:55 min (sd is 3:31 min), respectively. Each context within the episodes and the episodes themselves varied in duration. Therefore, a sample per context of fragments was selected of (in principle) 5 minutes out of each episode. When the total duration of a context in an episode was more than 5 minutes, five times a minute with equal intervals per context was selected. When the total duration of a context in an episode was less than five minutes, the total sample was taken. This procedure resulted in a total sample size of 85:47 minutes (sd is 1:36 min) in the teacher absent context and of 77:43 minutes (sd is 1:19 min) in the teacher present context that were coded as will be explained hereafter.

2.3.2 Measurements

The fragments in these collections were analyzed in regard to three main aspects to establish children's discourse in both contexts in terms of (1) *complexity*, that is, the length of turns and the length of T-units, since more words on both measures may indicate more complex language use. Although both measurements are useful in establishing children's discourse in terms of complexity, they both neglect that each utterance is intentional and embedded in the structure of the interaction. Dore (1979) has argued that such rough measurements are more revealing when used with reference to the kinds of functional acts that children perform in interactions. Therefore, not only measurements of complexity were investigated but also children's (2) *turn-taking procedures*, as an indicator of children's influence on the interaction, and (3) *distribution of speech actions* were also investigated. The latter is of interest, since it has been argued that particular speech actions express more complex intentions than others (e.g., Deunk, 2009; Wells, 1985).

Ad 1. Complexity of talk

The complexity of children's talk was studied by exploring both the length of the turns and the length of the T-Units. The *Mean length of turn (MLT)* indicates how many words children used per turn on average. Higher scores on the MLT are considered indications of more opportunities for children to participate in the interaction. In the current study, a turn was conceptualized as everything one person said until another person started talking. An interruption by another speaker that does not gain the floor by itself does not end the current turn but was considered to be a turn of that particular speaker.

To determine turn exclusion, in this study, separate non-verbal utterances were also treated as turns because these utterances may function as all kinds of speech

actions as well. However, these non-verbal turns were not used in the quantitative analysis. Instead, these non-verbal turns were used in establishing prior or next turn-taking practices and speech actions. In addition to physical actions, non-verbal turns and utterances in our data were moments of laughter, hesitations, undefinable shouts, inaudible turns or incomplete and thereby undefinable utterances. The MLT was counted by totaling up the words in each of the turns found and dividing the sum by the total number of turns per context.

The second measure of children's complexity of talk is the *Mean length of T-unit (MLTU)*. Higher scores on the MLTU are taken up as indications of more complex grammatical structures, which in turn are related to higher levels of information that is distributed (Abedi & Lord, 2001; Hunt, 1970; Koutsoftas & Petersen, 2017). We drew upon Hunt (1970) to establish the MLTU. He introduced and defined a T-unit in 1965 *'as one main clause plus any subordinate clause or nonclausal structure that is attached to or embedded in it'*. Since the T-unit started out as a measure of syntactic complexity in writing, the establishment of T-units in verbal interactions is less straightforward than that presented by Hunt. For instance, in the analysis of the current study, interjections were included in both the counting of MLT as MLTU, while repair-utterances were included in the establishment of the MLT and not in determining the MLTU. In addition, (clausal) conjunctions were of course part of the analysis of the MLT. Since a conjunction may separate T-Units, it was counted as part of the next T-unit. The MLTU was counted by totalling up the words in each of the found T-units and dividing the sum by the total number of T-units per type of speaker per context.

Ad. 2 Turn-taking procedures

The determination of the different ways that participants take turns was informed by CA studies on these practices in natural settings (Sacks, Schegloff, & Jefferson, 1974) and in educational settings (e.g., Koole & Berenst, 2008; Walsweer, 2015). The following two general practices by which each turn was taken or allocated were distinguished in the analysis: 1. *self-selection* and 2. following *turn-allocation practices* by one of the other participants. The distribution of turn-taking procedures indicates the opportunities for children to participate and the level of their influence on the course of the interaction. High levels of self-selections (and consequently low levels of turn allocation) indicate that children have more opportunities to influence the interaction, while a reversed pattern is an indication that the interaction is steered by others, either the teacher or (one of) the other child(ren).

Ad. 3 Speech actions

The way that speech actions are distributed is indicative of speaker roles, rights and opportunities to participate. To analyze which speech actions children perform in both contexts, the speech action coding scheme, which was initially

developed by Berenst et al. (2008), before it was elaborated upon by Deunk (2009), was used. They developed this scheme to establish and compare the variation in young children's language use in early childhood settings. This typology was partly based on the classification system Inventory of Communicative Acts-Abridged (INCA-A) of Ninio and Snow (1994).

The coding scheme consists of 12 distinguishable speech actions, as shown in table 1. Although these 12 speech actions are at the core of the current study, more detailed subcategories within main speech actions were scored. A differentiation that was made within the first five speech actions was whether the performed speech action was *initiating* (either 1, 3, 5, 7 or 9) or *responsive* (either 2, 4, 6, 8 or 10). The speech actions *evaluations* (11) and *markings* (12) were only treated as initiating. Investigators relate the type of questions that children may respond to and the extent to which children may make analytical statements in classroom interactions to knowledge construction and the productivity of complex language use. Therefore, the distribution of both the subcategories *(responses* to*) known-answer questions (KAQs) and information-seeking questions* (ISQs) within the category of *questions* and *responses* and *descriptive, projective and analytical statements* within the category of *statements* and *responses* was explored as well.

Table 1. Speech actions coding categories (largely based on Deunk (2009), p. 108-109)

Nr.	Speech Action	Short description of the speech action
1&2	Questions and responses	Asking another to provide you with information. Responses take the form of statements or tokens of (dis)agreements.
3&4	Directives and responses	Making someone do something for you. Responses are agreements or refusals.
5&6	Statements and responses	Describing something in the world. Responses are agreements or disagreements.
7&8	Commitments and responses	Committing yourself to (do) something. Responses can be acknowledgements, protests or refusals.
9&10	Declarations and responses	Changing the immediate context by making a statement. Responses are agreements or disagreements.
11	Evaluations	Giving a positive or negative evaluation about something or someone.
12	Markings	Short routine utterances, often with fixed formats.

Concerning *questions* and *responses*, the line of Berenst et al. (2008) was followed. Also, in the current study, questions that the questioner does not know the answer to (*ISQs*) were distinguished from KAQ's where the questioner knows the answer and therefore uses the question to test the other. Moreover, with regard to

statements, descriptive statements (in which something from the world is described) were differentiated from projective statements (describing a future or future aspects) and analytical statements (e.g., accounting or inferences, conclusions or sequences are explicated). These three types of statements vary in the level of abstraction and therefore also in the level of complexity. In contrast to other inventories, the coding scheme used not only takes the speaker's perspective but also the interpretation of the interaction partner—as can be inferred from his or her response—to determine the child's intent.

2.3.3 Data analysis

Since this study was part of a larger research program in which Conversation Analysis (CA) is used, every fragment was transcribed according to CA conventions (e.g., Ten Have, 2007). To account for inter-rater reliability, a trained research assistant scored parts of the dataset. Inter-rater reliability proved to be *almost perfect* in terms of Landis and Koch (1977). Spearman's rho's analysis on both MLU and MLTU ($Rs = 0.99$, $p < 0.001$) indicated that the correlation between scores on both outcome measures was significant. Analysis by Cohen's kappa showed a mean percentage of agreement of 0.87 on turn-taking procedures ($p < 0.001$) and a mean percentage of agreement of 0.81 on speech actions ($p < 0.001$). For the analysis, we used IBM's Statistical Package for the Social Science (SPSS) version 25. The data were aggregated at the level of fragments. Consequently, we paid attention to the variability within fragments. The descriptive statistics of the data per context aggregated per fragment are presented in table 2. While the variation within fragments can be of interest, it is not relevant for our research question, since our focus is on the variation between contexts.

Table 2. Descriptive statistics of the data per context (aggregated per fragment)

	Teacher absent				Teacher present		
	Number of children	Duration (min)	Number of Turns	Number of T-units	Duration (min)	Number of Turns	Number of T-units
1	3	5:00	74	87	2:29	22	26
2	2	5:00	27	43	2:12	23	25
3	4	5:00	112	135	5:00	92	93
4	4	5:00	77	101	3:07	33	40
5	3	5:00	55	83	2:19	16	16
6	3	5:00	56	73	5:00	49	50
7	2	4:54	27	33	5:00	54	61
8	2	1:19	12	15	5:00	42	44

9	2	0:55	10	16	5:00	37	43
10	2	0:47	9	14	4:15	51	56
11	2	1:05	30	32	4:56	51	56
12	2	2:54	26	33	4:58	39	40
13	2	5:00	28	46	5:00	46	50
14	2	5:00	55	81	5:00	30	32
15	3	5:00	59	88	2:28	26	32
16	3	5:00	59	84	1:52	19	23
17	2	5:00	32	42	2:26	14	16
18	2	5:00	43	63	4:24	34	38
19	2	5:00	44	78	3:05	29	30
20	2	3:53	17	36	3:01	27	30
21	2	5:00	37	54	1:11	5	5
Mean (SD)		*4:05 (1:36)*	*42.3 (25.6)*	*58.9 (32.1)*	*3:42 (1:19)*	*35.2 (18.7)*	*38.4 (19.2)*

Q-Q plots indicated that the data on MLT and MLTU were normally distributed (see Appendix B). For that reason, differences in children's discourse scores (aggregated over fragments) on MLT and MLTU in both contexts were analyzed by a paired samples T-test.

To compare how the turn-taking procedures and initiating-responsive speech actions were distributed across both contexts, we calculated the proportion of self-selection and initiating speech actions per fragment (see Appendix C) by dividing the self-selection scores by the total number of turn-taking procedures and by dividing the initiating speech actions scores by the total number of speech actions. Q-Q plots indicated that the data on the proportion of self-selection and the proportion of initiating speech actions were normally distributed. For that reason, we used a paired samples T-Test to analyze children's scores on these outcomes.

To compare how the types of both initiating and responsive speech actions were distributed across both contexts, we calculated the proportion of each type of speech action by dividing the scores of the particular initiating or responsive speech action by the total number of speech actions (either initiating or responsive) per fragment (see Appendices D-H). Because the proportions of the types of both initiating and responsive speech actions were interdependent and summed up to 1.0, we did not test the proportion of the mid-type of initiating speech action and the mid-type of responsive speech action, unless the scores on one or more speech actions were 0. In that case, the scores on these particular speech actions were not statistically tested. Q-Q plots indicated that only the data on the *proportion of initiating statements* and *proportion of initiating commitments* were normally distributed. For

that reason, we used a paired samples T-Test to analyze children's scores on these outcomes. Differences in children's scores on the proportion of the other types of speech actions in both contexts were analyzed by the Friedman test.

Finally, we compared how the types of both initiating questions and responses to types of questions were distributed across both contexts. To do so, the proportions of ISQ and responses to ISQ were calculated by dividing the scores on either measure by the total number (either initiating ISQ or response to ISQ) per fragment (see Appendix I). A similar procedure was conducted to compare the distribution of types of initiating statements in both contexts (see Appendix J). Q-Q plots indicated that only the data on the *proportion of responses to ISQ's* were not normally distributed. For that reason, we used the Friedman test to analyze children's scores on these outcomes. Differences in children's scores on the proportion of the other measurements were found to be normally distributed. Therefore, we used a paired samples T-Test to analyze how these proportions are distributed in both contexts. Because the proportions of types of initiating statements were interdependent and summed up to 1.0, we did not test the proportion of the mid-type of initiating statements (analytical statements), unless the scores on one of the other types of statements were 0. Thus, this type is not tested.

2.4 Results

In this section, the results are described. In section 2.4.1, it will be described to what extent the complexity of children's discourse is different in both contexts. In the next section (2.4.2), it will be described what types of differences in children's turn-taking procedures in both contexts were found, while in section 2.4.3 the findings of our analysis on the variation of speech actions in the two contexts are demonstrated.

2.4.1 Discourse complexity

The discourse complexity in the two contexts is analyzed by comparing, aggregated over fragments, a. the mean length of turn (MLT) and b. the Mean length of T-unit (MLTU). In table 3, the aggregated descriptive statistics of both MLT and MLTU in both contexts are presented. The first measure that indicates discourse complexity is the MLT. The general picture arising from this table is that children used more words per turn in the teacher absent context. Statistical analysis by the paired samples T-test shows that the teacher absent context ($M = 6.8$) and the teacher present context ($M = 4.3$) differed significantly in the mean length of turns that children produced ($T(20) = 7.07$, $p < 0.001$). This indicates that young children accomplish longer turns in the teacher absent context in comparison to the context when the teacher is present.

Table 3. Mean (SD) of the MLT and MLTU aggregated over fragments

	MLT (SD)	MLTU (SD)
Teacher absent	6.8 (1.5)	4.5 (0.6)
Teacher present	4.3 (0.8)	3.7 (0.7)

The second measure of the complexity of children's discourse was the MLTU, which analyzed the linguistic complexity of the utterances in both contexts. A similar picture as for the MLT emerges in table 3, which is that the syntax of children's discourse is more complex in small-group work in the absence of the teacher than in the teacher present context. Young children on average accomplish more words per T-unit in the teacher absent context (as opposed to the teacher present context), which also indicates that they had more opportunities to use complex utterances in peer interaction. This is also supported by the statistical analysis of the paired samples T-test, which demonstrates that the teacher absent context ($M = 4.5$) and the teacher context ($M = 3.7$) differed significantly in the mean length of the T-unit ($T(20) = 5.12$, $p < 0.001$).

In sum, the analyses reveal not only that children produce longer turns in the absence of the teacher compared to the context when the teacher is present in the small group but also that the linguistic complexity of the utterances that children use in the teacher absent context is greater.

2.4.2 Turn-taking procedures

In table 4, an overview is given of the descriptive statistics of the proportion of self-selection in both contexts.

Table 4. Mean (SD) of the proportion of self-selection aggregated over fragments

	Proportion of self-selection
Teacher absent	0.79 (0.14)
Teacher present	0.76 (0.12)

Although the number of self-selections in both contexts exceeds the number of turn allocations, the descriptive statistics in table 4 indicate that neither context is more stimulating for children to get a turn on the basis of self-selection. Statistical analysis by the paired samples T-test shows that the teacher absent context ($M = 0.79$) and the teacher present context ($M = 0.76$) did not significantly differ in the distribution of turn-taking procedures ($T(20) = 1.19$, $p < 0.246$). The results indicate that young children in both contexts perform similar levels of self-selection and turn-allocation procedures, either by their teacher or by (an)other child(ren), to take their turns.

2.4.3 Speech actions

In table 5, the proportion of *initiating* speech actions (excluding evaluations and markings) across both contexts is presented. It demonstrates a different picture from the analysis of the turn-taking procedures: children accomplish more initiating speech actions in the absence of the teacher than in the context in which the teacher is present. The paired samples T-test reveals that the proportion of initiating speech actions in both contexts differs significantly ($T(20) = 2.257$, $p \leq 0.035$), indicating that children in the teacher absent context have more influence over the topic of the interaction.

Table 5. Mean (SD) of the proportion of initiating speech actions aggregated over fragments

	Proportion of initiating speech actions
Teacher absent	0.74 (0.75)
Teacher present	0.70 (0.56)

Although the data in table 5 provide information on the extent to which children may influence the course of the interaction, they do not provide information on how the types of both initiating and responsive speech actions are distributed. A more detailed analysis of the distribution of children's *initiating* speech actions in both contexts is presented in table 6, showing the proportion of each type of initiating speech action.

Table 6. Mean (SD) of the proportion of initiating speech actions (including evaluations and markings) aggregated over fragments

	Qu.	**Di.**	**St.**	**Co.**	**De.**	**Ev.**	**Ma.**
Teacher absent	0.20 (0.13)	0.10 (0.09)	0.45 (0.13)	0.17 (0.10)	0	0.01 (0.02)	0.07 (0.07)
Teacher present	0.09 (0.12)	0.04 (0.07)	0.65 (0.21)	0.18 (0.12)	0	0.01 (0.02)	0.04 (0.07)

Abbreviations: Qu.= questions; Di.= directives; St.= statements; Co.= commitments; De.=declarations; Ev.=evaluations; Ma.= markings.

As can be concluded from the table, children perform relatively more questions, directives and markings in the teacher absent context than in the teacher present context, while the proportion of statements is higher in the teacher present context. Per type of initiating speech action, statistical analyses were performed to calculate whether the proportion of each type of speech action (with exception of declarations) is distributed equally in both contexts. The performed Friedman test shows that the proportion of *questions* ($F(1) = 9.800$, $p \leq 0.002$) and the proportion of *markings* ($F(1) = 4.765$, $p \leq 0.029$) in both contexts differs significantly. In addition, the paired samples T-Test shows that the proportion of *statements* also differs significantly in both contexts ($T(20) = -3.446$, $p \leq 0.003$). The proportion of the other types of speech actions is not dependent on the context, as shown by the Friedman test on *directives*

(F (1) = 2.000, p ≤ 0.157) and e*valuations* (F (1) = 2.778, p ≤ 0.096) and by the paired samples T-Test on *commitments* (T (20) = -0.271, p ≤ 0.789).

These analyses indicate that the context in which children's discussions take place influences the proportion of the specific types of initiating speech actions that children perform. Although the context influences the distribution of particular speech actions, it is interesting to note that in both contexts, children perform a relatively high number of *initiating statements* during problem-solving activities.

In table 7, the distribution of children's *responsive* speech actions (excluding evaluations and markings) across the teacher absent context and the teacher present context is demonstrated. In the teacher absent context, children practiced relatively more responses to statements and commitments, while they performed much less responses to questions in comparison to the teacher present context.

Table 7. Mean (SD) of the proportion of responsive speech actions aggregated over fragments

	Qu.	Di.	St.	Co.	De.
Teacher absent	0.30 (0.22)	0.09 (0.11)	0.40 (0.24)	0.21 (0.22)	0
Teacher present	0.72 (0.18)	0.09 (0.14)	0.15 (0.09)	0.04 (0.07)	0

Abbreviations: Qu.= questions; Di.= directives; St.= statements; Co.= commitments; De.= declarations.

The Friedman test shows that the proportion of *responses to questions* (F (1) = 21.000, p < 0.000), *responses to statements* (F (1) = 8.048, p ≤ 0.005) and *responses to commitments* (F (1) = 9.941, p < 0.002) is significantly different in both contexts, while the proportion of *responses to directives* is found to be statistically similar in both contexts (F (1) = 0.067, p ≤ 0.796). These analyses indicate that the context in which children's discussions took place influenced most of the responsive speech actions children executed.

As accounted for in 2.3, more detailed analyses are performed regarding the type of questions (either ISQ or KAQ) that children raise and may respond to and the extent to which children may make analytical statements, since these speech actions are related to knowledge construction and the productivity of complex language use. First, the results of more detailed analyses of the proportion of *initiating ISQ's* and the proportion of *responses to ISQ's* in both contexts are shown in table 8.

Table 8. Mean (SD) of the proportion of initiating ISQ's and the proportion of responses to ISQ's aggregated over fragments

	Initiating ISQ's	Responses to ISQ's
Teacher absent	0.91 (0.12)	0.96 (0.09)
Teacher present	0.83 (0.37)	0.73 (0.19)

Statistical analysis by a paired samples T-Test demonstrates that ISQ's raised by children were distributed equally across both contexts. There is no significant difference between both contexts ($T(12) = 0.739$, $p \leq 0.474$), which indicates that the *proportion of ISQ's* raised by children is similar in the teacher absent and the teacher present context.

Second, a more detailed analysis is also conducted on the distribution of *children's responses* to questions in both contexts. The proportion of *responses to ISQ's* is also shown in table 8. The Friedman test reveals that the proportion of responses to ISQ in both contexts differed significantly ($F(1) = 9.941$, $p \leq 0.002$). This implies that the context in which the children's discussions take place influences the extent to which young children respond to either KAQ's or ISQ's. Although it also appears that in the teacher present context more ISQ's are raised compared to KAQ's, our results still indicate that young children respond more often to ISQ's in the teacher absent context than in the teacher present context.

Third, the results of more detailed analyses of the distribution of the types of *initiating statements* across both contexts are demonstrated in table 9. Children accomplish more statements in the teacher present context, as displayed earlier (in table 6). Moreover, our explorations demonstrate that the context also influences the types of statements children perform. Statistical analyses performed by paired samples T-Tests show that the difference in both *descriptive statements* ($T(20) = -2.204$, $p \leq 0.039$) and *analytical statements* ($T(20) = 2.527$, $p \leq 0.020$) in both contexts is significant. As mentioned in section 2.3, the types of initiating statements are interdependent. Therefore, we did not perform a statistical test on the proportion of projective statements.

Table 9. Mean (SD) of the proportion of initiating *statements* in both contexts aggregated over fragments

	Descriptive	Projective	Analytical
Teacher absent	0.65 (0.28)	0.18 (0.28)	0.34 (0.29)
Teacher present	0.81 (0.19)	0.04 (0.88)	0.15 (0.17)

To summarize, with respect to speech actions, the analysis shows that children (1) perform significantly more initiating moves in the teacher absent context in comparison to the teacher present context, (2) the distribution of particular initiating speech

actions is significantly influenced by the context, (3) the context significantly influence the distribution of most responsive speech actions, and (4) in both contexts, children perform similar proportions of ISQ's and as a consequence a similar proportion of KAQ's; however, (5) in the teacher absent context, the children respond significantly more often to ISQ's than in the teacher present context, and (6) in the absence of the teacher, children perform significantly more analytical statements than in the teacher present context.

2.5 Conclusions and discussion

The current study was designed to explore how young children's discourse is related to whether the teacher is absent or present during small-group work in kindergartens. Several characteristics of young children's discourse were analyzed in relation to the context that their discussions took place in. Analysis of their language use across both contexts reveals that young children's discourse in the absence of the teacher is significantly more complex in terms of longer turns and T-units than in the presence of the teacher, meaning that children may speak more and that the linguistic (syntactic) complexity is also greater in the teacher absent context. In contrast, the findings show that the context does not influence turn taking. In both contexts, the amounts of both self-selection and turn allocation are similar. Next, the analysis demonstrates that children accomplish relatively more initiating than responsive speech actions in the absence of the teacher. In addition, the types of initiating and responsive speech actions also differ significantly across both contexts. In the teacher's absence, children perform relatively more *questions* and *markings* as initiating speech actions than in the teacher present context, while they perform more initiating *statements* in the teacher present context. Although in both contexts the proportion of initiating statements is the largest, young children perform relatively many more *responses to statements* in the teacher absent context. Moreover, they also perform more *responses to commitments* in that context, while they provide many more *responses to questions* in small-group interactions where the teacher is present. In addition, in the teacher present context, children *respond more often to KAQ's* than when the teacher is absent, and since children in both contexts raise similar proportions of ISQ's and therefore similar proportions of KAQ's, the teacher probably determines the type of responsive speech actions and the type of questions children respond to. Finally, the type of statements that children accomplish is significantly different across both contexts: in the teacher's absence, children perform relatively more *analytical statements*, while they use more *descriptive statements* in the presence of the teacher, indicating that the statements among peers are more complex in nature than when the teacher is present. The general picture that emerges from this study is that peer interaction in the absence of the teacher provides young children affordances that differ from affordances in small-group interactions in which the teacher is present.

The overall conclusion is that peer interaction during small-group work is a beneficial context to use and accomplish different and more complex forms of language use.

Although a relatively small sample of 2 x 21 fragments from 6 classrooms was used and the results of this study should be interpreted with caution, most findings point in one direction, namely, that the context influences the discourse of children. Only the turn-taking practices are not dependent on whether the teacher is present or absent. Further inspection of turn takings that were scored as self-selection in our data shows several occasions on which children, in the presence of the teacher, start telling things to the teacher in overlap. Also, children sometimes talk to each other while the teacher interacts with another child in the group. In addition, these self-selections are allowed by the teacher as well. This is in contrast to whole-group interactions, in which teachers often control and determine the turn taking (e.g., Alexander, 2008; Cazden, 2001; Walsweer, 2015). An explanation for this difference between our findings and earlier research on whole-group interactions could be that teachers in small groups have to pay less attention to prevent order problems that may develop in consequence of children's turn overlaps in comparison to whole-group interactions.

The main finding that peer interaction in the absence of a teacher provides children specific affordances is, furthermore, consistent with earlier research in (pre)schools in the Netherlands (Damhuis, 1995; Deunk, 2009). Damhuis (1995), for instance, already demonstrated that young children accomplish more words in interaction with peers. However, she compared peer interaction in the absence of the teacher with teacher interactions (whole-) group interactions that were initiated and prepared by the teacher. Thus, the context of the current study, in which teachers also join group work without any preparation, is different in that respect. Moreover, the exploration of this study enriches the picture by analyzing the type of speech actions as well. The variation found in speech actions is in turn similar in some respects to the findings of Deunk (2009). In both studies, children perform more *analytical statements* in peer interactions, while they use many *more responses to question*s in small-group interactions with a teacher. However, compared to the play settings in preschool in Deunk's (2009) study, children use more *statements* and fewer *declarations* in activities in which they solve problems during small-group work in early childhood classrooms, such as in the current study. Although these differences in the use of speech actions can also be explained by differences in age, the finding once more underscores that the context in which children participate influences their language use, as socio-cultural theories (e.g., Wells, 1985) often demonstrate.

In addition, this investigation adds to Piaget's (1923) earliest studies on primary school children's language use. He noted that older children's discourse with peers is less 'egocentric', i.e., more adapted to what the other speaker has just said, than their discourse with adults. As discussed earlier, Piaget suggested that the

difference stems from contrasting power relations. He argued that as a consequence of the symmetrical relationship with peers, peer interaction might motivate children to compare the opinions of others with their own ideas and, in case of contrasting opinions, to try to actively overcome the cognitive conflict. The current study, however, revealed similar differences among younger children (aged 4-7), which suggests that even children in early childhood classrooms have already developed the autonomy that makes it profitable for them to work together in small groups. Further research into the benefits of working together in small groups may provide new evidence for Piaget's (1932, p. 396) idea that peer contexts in which children have to solve problems provide an important environment for cognitive development.

In view of all these findings, it is striking that small-group work still rarely occurs in early childhood education in contrast to, for instance, peer interactions in play settings (Hamre & Pianta, 2007). This may be due to the common perception that play settings form the most suitable contexts for young children to cooperate with others, which is, for instance, supported by the work of Leseman et al. (2001), who suggest that interactions among dyads during play time are more complex than during group work. However, in their research, the tasks that the groups of children had to perform were rather structured and teacher centred, which could explain the differences found, as shown by Ramani and Brownell's review (2014). They conclude that elements of free play, such as establishing own goals in ill-defined tasks, should be integrated into small-group work to enhance young children's group discourse. We certainly do not want to minimize the importance of play time for the development of children in early childhood, but the current study shows that ill-defined problem-solving activities similar to the Storyline Approach (Bell et al., 2006; Egan, 1986) might enable small-group interactions that certainly form valuable contexts for development in early childhood education, especially since they also elicit speech actions other than in play contexts. This calls for researchers and educators to be aware of the potential benefits of organizing peer interaction in small-group work in early childhood education.

An interesting point to follow-up on in research would be to investigate the turn-allocation procedures more closely. In the current study, we only documented whether children select their own turn or whether their turns were assigned. It would therefore be interesting to further investigate the teacher present context and take a closer look at when children select the turn by themselves and at who assigns the turns in small-group work with a teacher present. We expected that in most instances the teacher allocated the turn (just as in whole classroom interactions), but on the basis of the current analysis, we cannot confirm that.

Although this study indicates that young children's discourse in small-group work in the absence of the teacher is more complex and varied than when the teacher is present, this research does not provide insight into what specific moments of interactions in both contexts are profitable. Exactly such detailed information could

help practitioners enhance interaction in both contexts. Therefore, given that detailed research on this subject is lacking, a descriptive approach could be interesting for future investigations. On the basis of this study, two points of focus can be drawn upon: (1) Although the general picture is that the teacher present context provides other affordances for children in terms of their language use, a previously exploratory study shows that within the teacher context, there are more and less beneficial interactions when groups of children experience problems (Hiddink, 2014). Therefore, in the next chapter (chapter 3), it will be investigated by detailed explorations of the interactions how teachers and groups of children jointly shape problem-solving interactions. (2) Although small-group work in the absence of the teacher provides specific affordances, young children did not always have discussions in a co-constructive and therefore profitable manner according to the data. Since problem solving and reasoning are key features of productive peer interaction (Howe et al., 2007; Littleton et al., 2005), the third and fourth paper will explore how young children construct problems during small-group work (chapter 4) and how children accomplish account sequences when reasoning in these peer groups (chapter 5), respectively.

Chapter 3

Problem-solving interactions during teachers' interventions in small-group work

Abstract

Problem solving during teacher interventions may contribute to children's group discourse, which, in turn, is found to contribute to positive cognitive outcomes of small-group work. However, little research on teacher interventions has been conducted to date, and the few existing studies have been neglecting the different ways *both* parties accomplish problem-solving interactions. Therefore, the aim of this conversation analytical research is to investigate how problem-solving interactions are accomplished by a small group of young children with their intervening teacher. Detailed analyses reveal that problem-solving interactions around children's problems may consist of the following three stages: (1) problem construction, (2) problem exploration (optional) and (3) solution discussion. The data show three patterns of problem construction, depending on the response to the problem initiation in the form of a negative assessment or a description. The response to problem initiations may occasion either an instruction, an immediate solution discussion or one that is preceded by a problem exploration. Analyses show that the teacher plays a major role in the elicitation of and the transition between different stages and determines whether children may contribute to the developing interaction. In particular, the teacher's response to both problem initiations and solution proposals determines whether and how problem-solving interactions are jointly constituted and continued. A trajectory with many opportunities for children to participate during the solution discussion is only found when teachers' responses to solution proposals are packaged as tentative evaluations or as objections. The theoretical and practical implications of these insights will be discussed.

3.1 Introduction

The considerable volume of research on group work stresses that in productive peer problem solving, children share ideas, provide reasons for their positions, discuss different stances and resolve these issues to reach consensus in the group (Howe, 2010a; Howe, 2010b; Littleton & Howe, 2010; Mercer & Littleton, 2007). In addition, the teacher's instruction, guidance and intervention is crucial for enhancing children's peer talk (Dawes et al., 2000).

Although research stresses that the teacher can orchestrate effective group work *before* and *after* moments of peer problem solving, the role of the teacher *during moments* of actual peer problem solving has often been neglected (Hofmann & Mercer, 2016; Jadallah et al., 2011; N. M. Webb et al., 2009; N. M. Webb, 2009). Although the teacher's influence on classroom interactions in general is considerable (e.g., Alexander, 2008; Howe & Abedin, 2013), only a small number of studies are conducted on teacher's interventions in group work. The results of these investigations show that teacher's interventions may contribute to children's group discourse (N. M. Webb, 2009).

However, by focusing on teacher practices only, these studies neglect the ways that groups of pupils and teachers *jointly* establish their problem-solving activities and how these ways influence the continuation of such teacher interventions. In contrast, more detailed studies, grounded in Conversation Analysis (CA), improve our insights into how both participants establish shared problem-solving interactions in other contexts. They show, for instance, that the way medical issues are problematized by both a health-care professional, such as a doctor, and a patient or a client has consequences for problem-solving activities, such as the diagnosis of the concerns and the treatments of those issues (e.g., Robinson, 2001; Robinson, 2003; Robinson, 2013; H. Webb, Vom Lehn, Heath, Gibson, & Evans, 2013). Therefore, it may be expected that the joint nature and the sequential organization of the first activities in problem-solving interactions influences the course of the problem-solving interaction in educational contexts as well. Therefore, these aspects should also be considered in the analysis of these interactions.

To date, such detailed analyses have not been performed regarding problem-solving interactions in teachers' interventions during group work. Therefore, this investigation aims to gain insight into *how* the participants *construct* and *explore problems* and *how* they *discuss solutions* during teacher interventions. This chapter follows a straightforward progression. First, relevant literature will be discussed, which will end in the research questions of this study. After the description of the data and the methodology, the results section will describe how the participants construct problem-solving interactions around children's problems.

3.2 Background

Peer interaction has been researched frequently in educational studies (Janssen, Kirschner, Erkens, Kirschner, & Paas, 2010; Janssen, 2014), and positive effects regarding task outcomes (e.g., Johnson & Johnson, 1999; Kagan, 2010; Slavin, 1996), language development (Damhuis, 1995) and cognitive development (Howe, 2010a; Howe, 2010b; Mercer & Littleton, 2007) have been reported. Cohen, for instance, underscores that group work enhances thinking skills by providing children the opportunity to practice *'generating causes and effects, hypothesizing, categorizing, deciding, inducing, and problem-solving'* (Cohen, 1994, p. 14). In addition, several approaches associate cognitive growth with peer problem solving, including the *cooperative learning* tradition (Johnson & Johnson, 1999; Sharan, 1980; Slavin, 1996) and the *Thinking Together Approach* (Mercer & Littleton, 2007). Despite having a number of differences, both approaches formulate similar essential features of group discourse, such as sharing ideas, providing reasons for ideas and positions, discussing different opinions and resolving problems to reach consensus in the group (Howe, 2010a; Howe, 2010b; Littleton & Howe, 2010; Mercer & Littleton, 2007). Such discussions have been characterized as exploratory talk by Barnes (1976) and have been found to stimulate cognitive development (e.g., Howe, 2010a;

Mercer & Littleton, 2007; N. M. Webb, 1991).

Teachers play a crucial role to stimulate small groups to solve problems in such a manner by enhancing children's peer discourse during moments of instruction, reflection and intervention (Dawes et al., 2000). Many researchers focus on the role of the teacher *before* and *after* moments of group work. Some of these researchers conclude that the teacher should *instruct* children to share ideas, to provide evidence for their positions, to discuss their differences and to reach joint agreement (Boaler, 2006; Hunter, 2007), whereas others make a plea for the teacher to *discuss and reflect* with the children how to talk together constructively in a group (Dawes et al., 2000; Mercer & Littleton, 2007; Wegerif et al., 1999). Although these studies underscore that the teacher plays a crucial role orchestrating effective small-group work, less is known about the teacher's role *during* moments of peer problem solving (N. M. Webb, 2009).

In the cooperative learning tradition teachers are often advised to monitor small-group progress and to intervene only when necessary (Johnson & Johnson, 2008). This procedure is in line with Cohen's (1994) general recommendations for teachers intervening in group work when these groups encounter problems or function ineffectively. One of her recommendations is that teachers should listen to group discussions first before deciding to join the group, to keep interventions to a minimum. A second suggestion is that the help teachers offer, should avoid making students dependent. She argues that children would be more likely to take the initiative and show responsibility for their discussions when teachers are less directive (Cohen, 1994; Hofmann & Mercer, 2016).

Van de Pol, Volman and Beishuizen (2012) elaborated on these general suggestions by formulating a *normative stage model* for teacher interventions during small-group work, which is party based on their investigations of similar interactions during individual work (Van de Pol, Volman, & Beishuizen, 2010; Van de Pol, Volman, & Beishuizen, 2011). These researchers' work is inspired by Wood, Bruner and Ross's (1976) notion of *scaffolding*: the set of practices carried out by an adult (in the case of interventions, a teacher) intended to help children in their problem solving. Van de Pol et al. (2010) argue that scaffolding has three main features: contingency, fading of support over time and transfer of responsibility for a task or for learning to the student. To comply with these features of scaffolding, they claim that teacher interventions during small-group work should follow these stages in order: diagnosis of children's understanding, a check of the diagnosis, intervention strategies and a check of student's learning (Van de Pol et al., 2012).

Despite the common prescriptive recommendations about beneficial teacher practices, less empirical research is conducted on teacher interventions during group work (Hofmann & Mercer, 2016; N. M. Webb, 2009). All these studies took place in primary or secondary education classrooms. In a common approach to studying teacher interventions, the effects of teacher practices during these interventions on

the ways that children *continue their peer interactions* is investigated. Some studies provide support for the suggestion to explore the problem (Chiu, 2004; Meloth & Deering, 1999), whereas other researchers underscore the relevance of adequate support for the quality of the next group discourse (Dekker & Elshout-Mohr, 2004; Gillies, 2004; Gillies & Boyle, 2006). The latter studies, for instance, demonstrate that children who are questioned about their ideas or inconsistencies and who are challenged to give reasons before the teacher provides suggestions or instructions discuss problems differently in their next peer interactions than groups in which teachers' interventions are more controlling or instructive. The former groups of children show higher levels of reasoning, which is regarded as a key feature for productive group discourse, than the latter groups: they provide *more detailed explanations*, *elaborate on others' lines of reasoning* more often and *raise more questions* in peer interactions following the teacher's intervention (Dekker & Elshout-Mohr, 2004; Gillies, 2004; Gillies & Boyle, 2006; Jadallah et al., 2011). Other studies elaborate on these findings by showing that these teacher practices contribute to the group discourse only under the condition that the peer groups already used higher levels of reasoning in their discourse before the intervention (Hogan et al., 1999; N. M. Webb et al., 2009). Teacher interventions may enhance group discourse but only if the beneficial teacher practices are contingent with the actual way of talking in the group. All of these investigations involve interventions in which the teacher discusses problems with the group of children. For that reason, we refer to problem-solving interactions (during teacher interventions) in this study.

However, in the methodology used to analyze the discourse, the ways participants establish their joint orientation to the problem-solving activities during the interventions is neglected. In addition, participants' utterances are coded as independent actions through pre-defined categories or through categories based on an inductive analysis, neglecting the sequential nature of problem-solving interactions. Consequently, the ways problems are *launched* and *the ways problem-solving discussions develop* subsequentially with the intervening teacher during group work remain unclear. A more detailed approach, such as CA, might help provide insight into these issues, as can be concluded from CA studies about problem solving in other contexts, such as medical care.

Primary-care visits, for instance, in which participants deal with medical problems, consist of multiple normatively ordered sequences of actions: presenting the problem, gathering information, and diagnosing and solving the problem by some kind of treatment (Robinson, 2003). In addition, the ways patients construct the reason for their visit or problem influence the course of these problem-solving interactions (Robinson, 2001; Robinson, 2013; Stivers, 2002; H. Webb et al., 2013). Stivers (2002), for instance, demonstrates that patients have at least two different practices for presenting their medical concerns, which place differing amounts of pressure on physicians to solve the problem by treatments such as antibiotics. In line

with her findings, Webb and colleagues (2013) prove that the openings in optometry consultations are highly consequential to the diagnosis and the subsequent interaction; patients who are oriented on a solution construct a problem in the beginning of the interaction while accounting for their report, whereas patients who are not oriented on a solution do not explicitly refer to the existence of a problem while mitigating and/or delaying the reporting of the problems. Moreover, both patients and physicians are oriented on the whole project as accountably progressing until the concern is treated, which influences the parties' communicative behaviors (Lerner, 1996; Robinson, 2003; Robinson, 2013; Schegloff, 2007).

Positively, a number of *educational studies* have considered the joint nature of problem-solving interactions (Elbers et al., 2008; Hajer, 1996; Lockhorst, 2003). For instance, Lockhorst (2003) and Hajer (1996) demonstrate that the number of children's contributions decreases during the continuation of dyadic problem-solving interactions with the teacher. In line with these results, Elbers et al.'s (2008) analysis of similar interactions during individual work shows that pupils *initiate the* problem in general terms (like 'I don't understand …'). Interestingly, teachers do not ask questions to determine the actual problem, despite the proven relevance of problem exploration in primary-care visits, as discussed earlier. Instead, teachers start explaining immediately, and by doing so, they solve the problems that they presuppose instead of the children's problems, as Koole (2012) demonstrates. By doing so, they implicitly narrow the children's problems. Meanwhile, pupils rarely protest the teacher's dominance when the interaction *develops*, and when they do, the teachers neglect the objections. Teachers in secondary education tend to instruct children without exploring the problem first (Elbers et al., 2008; Koole, 2010; Koole, 2012), thereby restricting children's contributions. This is remarkable, since even young children can actively contribute in exploring problems and in discussing possible solutions, as is demonstrated in a study on the shared reading of picture books in kindergartens (Gosen, 2012; Gosen et al., 2015).

Thus, detailed analyses of problem-solving interactions in different settings exposed the ways participants establish their joint activities, determining the course of the problem-solving interactions at hand. Conversely, the few studies on teachers' interventions during group work neglected the joint and sequential nature of these interactions. Therefore, the aim of this investigation is to gain more insight into the problem-solving interactions between young children and their teachers who intervene during small-group work. Consequently, the research question is as follows: *How are problem-solving interactions during small-group work accomplished by young children when their teachers are intervening?*

3.3 Data and methodology

Data were collected in a multiannual program, as discussed in chapter 1. Eight teachers carried out five projects according to the Storyline Approach (Bell et al.,

2006; Egan, 1986; Frame, 2006) in their early childhood classrooms. The eight participating teachers received several formats of global storylines developed by the research group from which each teacher could make a choice appropriate for their classroom (Herder et al., 2013; Walsweer et al., 2012; Walsweer et al., 2013). Groups of children (4-7-years of age) with a varying group size of 2 to 5 children needed to solve problems arising in the events of the Storyline Approach.

During a first analysis, the moments in which a teacher joins a group during their problem solving were registered (275 in 73 fragments over the course of the main program). Subsequently, to answer the research question, the instances in which participants' contributions function as solutions were selected (115 of 275). Solutions may be described as suggestions to overcome an obstacle or a gap between where the children are and where they want to be (e.g., Jonassen, 2010; Newell & Simon, 1972). In the other instances, the participants were informing each other or they were discussing organizational issues. The selected interactions around instances in which a solution could be identified were further investigated by transcribing them before determining how the solutions were elicited and how the participants responded to them. These analyses revealed that problems initiated by a teacher were constructed and discussed in a different way than problems initiated by children (Hiddink & Berenst, 2016). For this study, the instances in which children initiated the problem were selected, resulting in a collection of 36 fragments originating from 23 peer interactions. These fragments were analyzed in detail according to the qualitative methodology of CA (e.g., Schegloff, 2007; Ten Have, 2007) to gain insight into the practices by which participants constitute and continue these problem-solving interactions.

In our collection, the problems differed in at least two aspects. The first aspect was the context in which the problem was initiated. In some instances, the teacher was elsewhere in the classroom. Sometimes she was an 'overhearer' (Goffman, 1974; 1981) initially, while in other instances, the children went to her and initiated the problem explicitly while returning to their group. In even other instances, the teacher sat by the group of children before children initiated the problem. The second aspect is the nature of the problem. Hence, the subjects in the distinguishable storylines differed, and since teachers were encouraged to make adjustments in the course of the storyline to align with their classrooms and practices, the nature of the problems in our collection also varied, as will become clear in the presentation of our findings.

3.4 Results

Inspection of the corpus of interactions in which children's problems are discussed with the intervening teacher yield a series of the following recurrent stages out of which a problem-solving interaction may be built: (1) problem construction, (2) problem exploration (optional) and (3) solution discussion. In the following, it will be demonstrated how both parties, teachers and children, construct a problem and

continue the interaction. The analysis unravels three patterns of problem construction. Moreover, it shows that each pattern leads to a distinguishable continuation of the problem-solving interaction. In this study, problem construction constitutes the initiation of the problem and the first response indicating it is being treated as a problem. Although both the context in which the problems were initiated and the nature of the problems in our collection may differ, it could not be established that these differences influence the way the problem was constructed.

In the first section (3.4.1), we show the ways that participants construct a problem. Our analysis unravels that the starting point of a problem-solving intervention consists of a report in the form of a *negative assessment* or a *description* of either a past or a current state of affairs given by either the teacher or one of the children. Although different practices for accomplishing problem initiation are found, each problem initiation implies an experienced difference between the past or current state of affairs and the desired state of affairs. As will be demonstrated, the response of the other party to that initiation indicates that the other party treats the situation as problematic (as well). As will be shown, three patterns of problem construction are found. Additionally, it will be demonstrated that the continuation of the discussion depends on the pattern of problem construction, which, in turn, depends on the response to problem initiation. A *teacher instruction* in response to an initiation contributes to the problem construction and simultaneously implies a solution. Consequently, when the teacher responds with an instruction, the problem-solving interaction is concluded with hardly any participation from the children except their own initiation. However, a practice that is described by Labov and Fanshel (1977) as a '*put-off*' by a teacher, in response to a problem initiation launches an insertion sequence, in which children and teachers jointly explore the problem. In this study we refer to a 'put-off' practice of one of the participants as a practice that postpones the delivery of a projected response, i.c. a solution (negotiation), to a problem initiation. In addition, a *teacher's invitation to present a solution* in response to a problem initiation appears to contribute to a *joint* continuation of the interaction as well, in the form of a solution discussion.

The next section (3.4.2) describes how the participants may *explore* the *problem* to more accurately characterize it before entering the solution discussion. As will be argued, teachers and children jointly accomplish this *optional* stage by the following three components: (1) a teacher *elicitation*, which launches (2) several *question-answer sequences,* eventually leading to (3) the *sharpening* of *the problem description*, involving a negative assessment about the state of affairs. As will be discussed, both the teacher and the children are often oriented to the stage of problem exploration by providing more information about the problem, even when the teacher's elicitation already projects the final stage of solution discussion.

The final section (3.4.3) shows how both parties (teachers and children) *discuss solutions*. In all instances of our data in which the interaction is continued

jointly after the problem construction, children present the first solution. It will be demonstrated that the nature of the teacher's response to that solution highly determines the continuation of this stage, leading to two trajectories by which the participants establish the solution discussion. First, it will be shown how an *evaluation* in combination with a *directive* in response to a *proposal* implies the teacher imposes the solution and how that practice restricts children's contributions to a minimum. Hereafter, it will be discussed how teacher practices such as a *tentative evaluation* and an *objection* in response to children's *proposals* and a *suggestion* contribute to a discussion in which the participants negotiate, explore and refine possible solutions by elaborating on each other's contributions.

3.4.1 Problem construction

Our analysis unravels that the construction of a problem consists of two elements. In all fragments, either the teacher or the pupils describe or assess a state of affairs, which functions as *problem initiation*. The second element is *the response* to that initiation, which indicates that the other party treats the presented state of affairs as problematic too. The combination of these two elements leads to three patterns of problem construction.

In most instances in our data, the first pattern of problem construction is built by a problem initiation of the children immediately followed by an instruction of the teacher. This pattern is exemplified in excerpt (1) in which children draw a police officer.

(1)

		Speaker	*Transcript*	*Dutch Original*
1	→	B1	COLi::N, so I don't have	COLi::N, zo heb ik niet
2			[enough space	meer [genoeg ruimte
3		Teacher	*[((approaches*	*[((komt aangelopen*
4			*with markers))*	*met stiften))*
5	→		with each oth°er° look.	met z'n twee°ën° kijk.
6			*((places markers on the*	*((legt stiften op tafel*
7			*table and moves paper to*	*en schuift papier naar*
8			*the middle))*	*het midden))*
9			(.) *((walks to other*	(.) *((loopt naar andere*
10			*children))*	*leerlingen))*
11		B1	[bu- I	[ma- ik
12		B2	[a handcuff (.) look and	[een handboei (.) kijk en
13			such a keyhole *((draws))*	zo'n sleutelgat
14				*((tekent))*
15		Teacher	*[((walks away))*	*[((loopt weg))*

In lines 1-2, B1 initiates the problem through an explicit *negative assessment* of B1's actions. Although B1 levels his reproach at B2, the teacher, who is an 'overhearer' (Goffman, 1974; 1981), treats this reproach as addressed to her, as may be deduced from her next action (lines 5-8): She instructs the children to carry out an action that may be understood as a solution, which implies that the presented current state of affairs is indeed problematic in her interpretation. The children's *negative*

assessment in the form of a *complaint* about the actions of another child often leads to an *instruction* of the teacher (lines 5-8).

By designing a solution in the form of an instruction, the teacher presupposes that something is problematic in the assessed state of affairs. However, with this response (lines 5-10), she imposes a solution on the problem that she presupposes. In most instances, when the teacher responds with an instruction in this sequential position, children are excluded from making subsequent contributions. In some instances, however, children respond with (the start of) an objection, as B1 does in line 11. As Koole (2012) points out, these objections may be indications of a lack-of-fit between the solution and the proposal. However, in none of these instances in our data the teacher treats it as such. Instead, they do not elaborate on it, and, in this instance, she walks away (similar to line 15). In other words, this teacher's response closes the problem-solving interaction. In contrast to this practice, we will show how other types of responses to a problem initiation lead to a problem-solving interaction in which both teacher and children remain involved.

The second pattern of problem construction consists of two elements: a problem initiation by the children and a teacher who responds with a 'put off' practice (Labov & Fanshel, 1977). This pattern is demonstrated in excerpt (2). Subsequent to G's initiating a *negative assessment* (26-28) on a reported description, the teacher's *clarification question* (lines 29-30) as a 'put-off' practice indicates that she treats the assessed state of affairs as problematic. More importantly, it causes G to elaborate on her complaint.

(2)

		Speaker	*Transcript*	*Dutch original*
22			(4.0) [*((G returns with*	(4.0) [*((M en de*
23			*the teacher at her*	*leerkracht komen terug*
24			*group constituted of B1*	*bij haar groepje met B1*
25			*and B2))*	*en B2))*
26	→	G	[( )-placed	[( )- op
27			it upside down	de kop heeft gezet
28			but that's not true:	maar dat is niet waar:
29	→	Teacher	what's the problem	wat is het probleem
30			then?	dan?
31		G	well [he wants] no	nou [hij wil] geen roze
32			pink and so on	enzo

Both foregoing extracts show that a child's report including an assessment launches a problem-solving discussion in which both parties participate, but only under the condition that the teacher's response to that report elicits children to contribute to its continuation (as in exc. (2)); then, it truly becomes a discussion. Moreover, the teacher's 'put off' as a response in excerpt (2) not only contributes to the construction of a problem but also launches a problem exploration, as will be discussed in 3.4.2, eliciting elaborations by the children on the state of affairs, as G

does now (lines 31-32).

Our data demonstrate that this second pattern of problem construction may be established by different practices for both problem initiation and the teacher's 'put off', as excerpt (3) demonstrates. The other practice for initiating problems found in our data is a *description of the situation* (without an assessment) by the children, which is collaboratively constructed with the intervening teacher (lines 5-6). In the second pattern, a problem initiation is met with a 'put off' from the teacher that is packaged as an *invitation to discuss* the state of affairs together (lines 11-14).

(3)

		Speaker	*Transcript*	*Dutch original*
1		Teacher	uh::: guys, are you	uh::: jongens zijn
2			back again?	jullie weer terug?
3			(0.4)	(0.4)
4		G	[yes	[ja
5		Teacher	[was he upstairs?	[was ie boven?
6	→	G	NO:::	NEE:::
7		Teacher	no[:::?	nee[:::?
8		?	[maybe at the very	[misschien helemaal
9			top	boven
10			(0.6)	(0.6)
11	→	Teacher	well, come and sit down	nou, ga maar even mee
12			(.) then we have to	om de tafel zitten (.)
13			discuss it together	dan moeten we het er
14				maar even over hebben
			((8 lines omitted, in which children walk towards their desks before exploring the problem with the teacher))	*((8 regels verwijderd, waarin kinderen naar hun tafels lopen voordat ze probleem met de leerkracht verkennen in het vervolg))*
23		Teacher	well, where did you	waar hebben jullie nou
24			search then?	allemaal gezocht dan?

In this classroom, a bird doll has disappeared. Prior to this excerpt, the children have carried out their initial ideas to search for him outside and inside the school. In line 1, the teacher starts a presequence, preceding her information-seeking question (ISQ) about the current state of affairs, the result of the children's search (line 5). The children respond to that question with a *negative description* and a display of a problem initiation (line 6): the bird is not yet found. The teacher shows that her earlier question is intended as an ISQ, since she designs her response to the children's answer with a rising intonation, indicating she is surprised by the children's description (line 7). The children then present a *hypothesis* about where the doll could be, which indicates that they regard hypothesizing as part of the problem-solving process. The teacher does not elaborate on the hypothesizing of the children; instead, she launches a problem exploration by inviting them to discuss the matter at the table (lines 11-14). In the following, this 'put-off' practice is met with the participants (lines 15-19) before the

teacher raises an ISQ (lines 23-24).

The prior examples illustrate two different actions by the teacher in response to problem initiation, resulting in distinguishable patterns of problem construction. In addition, we found a third pattern of problem construction in our data. This pattern also consists of two elements: the children who initiate the problem and the teacher who responds *with an elicitation to suggest next steps*, as shown in excerpt (4). First, the teacher raises a question that implies something *negative,* i.e., the unsuccessful search for the bird that elicits the children's *description* of the state of affairs (lines 17-24). In response to the children's description, *she asks for suggestions for next steps* (lines 25-27). Thus, the teacher indicates that she treats the description as problematic, requiring a *solution*.

(4)

		Speaker	*Transcript*	*Dutch original*
13		B2	or maybe he sits in the	of misschien zit ie in
14			[tree? *((talks to B1))*	de [boom? *((praat tegen*
15				*B1))*
16			*[((teacher joins))*	*[((LK schuift aan))*
17		Teacher	hey, but uh you haven't	hey, maaruh jullie
18			found him in here,	hebben hem niet hier
19			inside? *((looks at B3))*	binnen gevonden?
20				*((kijkt B3 aan))*
21	→	B1	[no	[nee
22		B2	[no	[nee
23		B3	[no	[nee
24		G1	[no	[nee
25	→	Teacher	ok (.) well, and now?	ok (.) nou, en nu?
26			*((looks around the*	*((kijkt groepje rond))*
27			*group))*	
28			(1.2)	(1.2)
29		B1	we have to search	moeten we buiten zoeken
30			outside or above	of boven

Before the teacher joins the group, B2 hypothesizes what might have caused the bird doll's disappearance (lines 13-16). Now the current state of affairs becomes problematic for the children. Even so, the teacher does more to construct a shared problem-solving discussion. Again, she does not follow the children's practice of hypothesizing. In contrast, she raises a negative rhetorical question, implying that the answer is negative and undesired (lines 17-20). The children initiate the problem by answering as projected before the teacher *elicits the children to present next steps to take* (lines 21-27). This teacher response contributes to a problem construction in the third pattern, but at the same time, this action launches a solution discussion stage, as will be discussed in 3.4.3, eliciting -as in Exc. (4)- a solution proposal first from the children (lines 29-30).

Thus far, it is shown how teacher actions in response to children's problem-initiating actions may contribute to the construction of a problem. In excerpt (5),

however, a variant of the third pattern of problem construction is shown. Here, a teacher describes and negatively assesses a state of affairs in a report (lines 1-3), leading to a solution discussion.

(5)

		Speaker	*Transcript*	*Dutch original*
1		Teacher	he:: guys too bad. Miss	he:: jongens helaas
2			Tiny doesn't have any	pindakaas. juf Tiny
3			marbles too	heeft ook geen knikkers
4			(0.2)	(0.2)
5		B1	nt:*((clicks with tongue))*	nt:*((klikt met tong))*
6		Teacher	because	want
7		B2	I also said that	dat zei ik ook
8		Teacher	they also have figured	ze hadden t daar ook al
9			out that shooting	bedacht dat knikkeren
10			marbles is a very nice	ook wel een erg leuk
11			game (.) but we have to	spelletje is (.) maar we
12			buy marbles first	moeten eerst nog
13				knikkers kopen
14		B1	nt:*((clicks with tongue*	nt: *((klikt met tong en*
15			*and [sighs))*	*[zucht))*
16	→	Teacher	too bad,[we can't test	helaas, [we kunnen het
17			it	niet testen
18	→	G	so, I have another idea	dus heb ik nog een idee
19		Teacher	oh?	oh?

With her statement, including a negative assessment (line 1-4), the teacher informs the children that the other classrooms have no marbles either. By doing so, she refers back to a prior interaction with the children in which they agreed that the teacher had to search for marbles as necessary objects in the children's experiment. Her report is first met with a tongue click of B1 (line 5), a practice aligning with the teacher's negative assessment. His second alignment (lines 14-15) is responded to with an expansion on the teacher's first report. One of the children (G) treats this description together with the assessment as problem initiation, as appearing in G's *announcement to have a solution* (line 18). Therewith, G displays her orientation to solution discussion, implying the lack of marbles is a problem to her. By designing her minimal response with a rising intonation ('oh?'—line 19), the teacher displays her surprise (Heritage, 1984) and invites G to elaborate on her announcement of having a solution. In the next turns, several solutions are negotiated.

In sum, problems might be initiated by reports with negative assessments as collaboratively established problem-oriented descriptions, implying that the speaker experiences a difference between the past or actual state of affairs and the desired (future) state of affairs. Although the initiation might be accomplished with different practices by either the children or the teacher, the initiation clearly launches problem explorations or solution discussions. We found three patterns of problem construction consisting a of problem initiation in combination with a response of the other party. Concerning the teacher's response to the children's initiation, the type of response to the children's initiations determines the children's opportunities to contribute to the

continuation of the problem-solving interaction. The first pattern consists of a problem initiation followed by a teacher *instruction*. This response implies that the initiation is treated as a problem, but it also limits to minimum children's contributions to the problem-solving interaction. In some instances, children object to the instruction, but the teacher does not elaborate on it. In contrast, both the teacher's responses to the problem initiation in pattern two (*clarification questions* and *invitations to discuss the matter at hand*) and the teacher's response to the problem initiation in pattern three (*elicitations to propose solutions)* contribute to the problem construction and invite children to contribute to the continuation of the interaction. A joint continuation is also found within a variation of pattern three in which children respond with an *announcement to present a solution* in response to the teacher's problem initiation. In our collection of 36 fragments, the problem was constructed according to pattern one in the majority of our data (27 instances). Only in the other nine instances are problem initiations responded to in such a way as to jointly continue the interaction. Nevertheless, a more detailed analysis of the sequences provides more interesting information about the actions contributing to these problem-solving interactions. As will be discussed in the following subsections, the response to the mentioned problem initiations may occasion either a solution discussion immediately or one that is preceded by a problem exploration. The next subsection shows how a teacher and a small group of children may jointly *explore* the problem.

3.4.2 Problem exploration

In four of the nine instances in the data, the problem is constructed according to pattern two. In those instances, both parties explore the problem before they start the solution discussion. In the other five instances, the participants construct the problem according to pattern three, leading to an immediate solution discussion. As our analysis unravels, participants aim to establish a more accurate characterization of the problem collaboratively in the problem exploration stage starting with a *teacher's elicitation*. This action launches several *question-answer sequences,* ending in a *more precise description* of the *problem*.

The most straightforward example of this three-part structure is shown in excerpt (6), in which children discuss their earlier searching for the missing bird doll. Preceding this problem-solving interaction, the children had been searching outside and upstairs. In our data, it is found that all problem explorations are initiated by the teacher with an elicitation (possibly preceded by an invitation to discuss the matter at hand as 'put off', as discussed in 3.4.1). She does so with a *clarification question* in this case as well (lines 23-24), which launches several answers, also in response to the next teacher's *questions* (lines 23-37). Finally, the teacher *characterizes the problem more precisely* (line 38), before she orients the children to the solution discussion with her invitation to present possible solutions (line 39).

(6)

		Speaker	Transcript	Dutch original
21			*((they are back at the*	*((ze zitten weer aan*
22			*table))*	*tafel))*
23	→	Teacher	well, where did you	waar hebben jullie nou
24			search then?	allemaal gezocht dan?
25		B1	OUTSIDE IN THE PLAYING	BUITEN IN HET SPEELLOKAAL
26			ROOM IN THE CLASSROOM IN	IN DE KLAS OP DE GANG BO-
27			THE HALLWAY UP-STAIRS	VEN
28		Teacher	ok::: (.) and (.) he was	ok::: (.) en (.) hij was
29			not there at all?	daar allemaal niet?
30		B2	also at the traffic yard	ook op het verkeersplein
31		Teacher	also at the traffic yard	ook op het verkeersplein
32			and I think that some	en ik geloof dat er ook
33			boys were there as well,	jongens waren, die hadden
34			who have been building a	een hut gebouwd (.)
35			cabin (.) have you been	hadden jullie daar ook
36			looking there as well?	gekeken?
37		B2	yes	ja
38	→	Teacher	he wasn't there as well?	daar was ie ook niet? (.)
39			(.) well, and now?	nou, en nu?

The problem exploration is launched when the *teacher raises an ISQ* regarding the locations of their search (lines 23-24). Moreover, it is concluded with the teacher's more precise problem definition packaged as *negative rhetorical question* involving an implicit *negative assessment* of the current state of affairs (line 38). In the context of the exploration in the form of several question-answer sequences (lines 23-37), the action formation practices of the problem definition imply that the problem is sharpened. Then, the teacher marks the end of problem exploration ('well'), before she invites the children to propose possible future steps as potential solutions ('and now?'; line 39).

The last excerpt (6) demonstrated that the problem, initiated by descriptions as the starting point, is explored in a three-part structure. Our analysis unravels that the exploration of problems initiated with negative assessments follows a similar structure. As has been shown in excerpt (6), teachers do not explicitly refer to a problem (or a solution) in their elicitations starting a problem exploration, when problems involve a description. However, the teacher elicitations launching the explorations around problems initiated with negative assessments are packaged with an explicit reference to a problem or to a solution in our data, as will be demonstrated in excerpt (7).

More importantly, excerpt (7) demonstrates also that a *teacher's explicit invitation to present a solution* might launch a *problem exploration*, although one might have expected that it only projects a *solution discussion*. Moreover, this excerpt illustrates that children are sometimes orientated to a *problem exploration* as a preface to solution discussion, as well, as G's response to the teacher elicitation displays (lines 10-16).

(7)

		Speaker	*Transcript*	*Dutch original*
1		Teacher	*((enters the room))*	*((komt binnen))*
2		G	miss, we didn't yet work	juf, we zijn er nog niet
3			it out, because we did	uitgekomen, want we
4			that game. and-and-and I	deden dat spel. en- en-
5			still want this and	en ik wil dit nog steeds
6			(jimmy and marten) chose	en (jimmy en marten)
7			Fedde all the time, but	koos Fedde de hele tijd,
8			I thought that was not	maar dat vond ik niet
9			good	goed.
10	→	Teacher	and what do you have for	en wat heb jij dan voor
11			solution then?	oplossing?
12	→	G	then I have done it one	toen heb ik nog een keer
13			more tim:e *((alternately*	gedaa:n *((afwisselend*
14			*pointing to herself and*	*wijzend naar zichzelf en*
15			*B: meaning eeny, meeny,*	*B: ze doelt op iene*
16			*miny, moe))*	*miene mutte))*
			((10 lines omitted))	
27		G	[yes and then, but then	[ja en toen, maar toen
28			was it like this *((and*	was het zo *((en wisselt*
29			*changes the objects on*	*de voorwerpen op*
30			*the form))*	*formulier om))*
31		Teacher	but then you haven't	maar dan hebben jullie
32			done eeny, meenye, miny	niet goed iene miene
33			moe correctl:y	mutte gedaa:n

In this excerpt, the teacher *explicitly invites* one of the children, G, to present a *solution*, immediately following G's problem initiation (lines 2-9). G, however, does not deliver the projected response, the solution suggestion. Instead, she redirects the interaction to a problem exploration, by *providing more information about the current state of affairs* (lines 12-16). In the following (until line 30), both parties explore the problem according to the mentioned pattern: through a series of question-answer sequences, before the teacher designs a conclusion, which, in turn, ends the problem exploration. This more precise problem characterization includes a negative assessment about the children's actions (lines 31-33). In the continuation, the children propose a solution as part of the solution discussion. This excerpt underscores the point that although the teacher plays a major role in structuring the interaction into different stages, the children's actions are very influential as well.

In sum, participants may characterize the problem, involving either a negative assessment or a description, more accurately in the problem exploration stage. This optional stage consists of three parts. All explorations are launched through an *ISQ of the teacher*. Interestingly, we have shown that children are also oriented to problem exploration by providing more information about the problem, even when the teacher's elicitation projects a solution discussion. The launched *question-answer*

sequences contribute to a more accurate determination of the problem, resulting in a more precise characterization of the problem by the teacher, which involves a(n) (implicit or explicit) *negative assessment*. At that moment, the problem exploration is finished and is followed by the final stage, solution discussion, which will be discussed in the next section.

3.4.3 Solution discussion

The next and final stage in problem-solving interventions is the *solution discussion,* which may either immediately follow the problem construction or be preceded by the problem exploration. In all nine instances in our data in which the teacher's response to the children's problem initiation contributes to a joint continuation of the interaction (either pattern two or pattern three of the problem construction), children present one or more possible solution(s) in the solution discussion. We found that children initiate the potential solutions themselves or they may propose solutions in response to a teacher's invitation to do so.

Our data reveal that several actions occur in response to a first or a subsequent solution contributing to a trajectory in which participants negotiate these solution proposals. However, in the majority of solution discussions (in eight of the nine cases), a specific combination of teacher actions in response to a first solution proposal leads to a trajectory in which children are prevented from negotiating the solution(s), as will be demonstrated.

This teacher's response to a child's first solution consists of an *explicit evaluation* and an *instruction* (lines 66-76). That combination of actions launches an instruction in the information-delivery format that Koole (2012) also found in problem-solving interventions with individual pupils. In this trajectory, children might only produce agreement tokens, mostly after an explicit elicitation at the end of the instruction (line 87), as demonstrated in excerpt (8). This excerpt is part of a problem-solving interaction in which the problem involves a complaint of G2 and G1 about the way G3 cooperates.

(8)

		Speaker	*Transcript*	*Dutch original*
60			how can you just arrange	hoe kun je nu afspreken
61			who is going to say what?	wie wat gaat zeggen↑
62			(0.6)	(0.6)
63		G1	to [talk in [turns	om[ste beurte p[raten
64		Teacher	[well not [speak	[nou niet doo[r elkaar
65			through each other	heen praten
66	→	G2	[by	[door naar
67			listening to each	elkaar te luisteren?
68			other?	
69	→	Teacher	exactly by listening	precies heel goed naar
70			very carefully to each	elkaar te luisteren en
71			other and if you say oh	als je zegt oh iemand
72			someone is telling	vertelt wat en ik wil zo

73			something and I also	ook wat vertellen, leg
74			want to tell something,	dan even je hand op tafel
75			just lay down your hand	
76			on table	
77			(1.0)	(1.0)
78			then the others also	dan weten de anderen ook
79			know that you want to	dat je wat wilt zeggen
80			say something	
81			(0.5)	(0.5)
82			and then they sure ask	en dan vragen ze vast hoe
83			how do you think about	denk jij erover?
84			it?	
85			(0.4)	(0.4)
86			is that an idea?=	is dat een idee?=
87	→	G2	=yes	=ja

Mostly, the teacher starts a solution discussion with an invitation to provide a solution. This is also the case in this excerpt (lines 60-61). The teacher raises the question how the children can arrange 'who is going to say what?' This elicitation is met with G1's solution proposal (line 63) first, which is done in overlap with the teacher's reformulation of her question (lines 64-65). In lines 66-68, G2 designs another answer that might also be a solution to the problem. The turn design of the child's answer, with a rising intonation, indicates that G2 has treated the initial question of the teacher as a *known-answer question* (*KAQ)*, an uptake confirmed by the teacher with a *positive evaluation* in the third turn (line 69). Moreover, the teacher evaluates the answer with 'exactly', implying that the child's answer is the only correct solution. In the same turn, she starts with her *instruction*, about an action that the children should perform, which she connects ('and') with the given answer and with a directive action for the children as the definitive solution (lines 69-86). In this instruction according to the information-delivery format, children do not have any opportunity to rethink or elaborate on their own ideas. They produce only *agreement tokens* after an active invitation to produce one at the end of an instruction (lines 78-87).

In eight instances in the data collection, the solution is discussed in this trajectory, launched by a combination of an evaluation and an instruction in response to the children's solution proposal. The following will show a contrasting trajectory, in which a *joint solution* discussion may be occasioned after the first solution. In addition, it will be demonstrated how the teacher and the pupils together negotiate possible solutions to overcome a problem. The participants do so by evaluating the earlier given solutions and/ or by bringing up more possible solutions. The nature and the constitution of these evaluations contrast highly with the direct and explicit (either positive or negative) *evaluation with an instruction* leading to a trajectory in the information-delivery format blockading the discussion. This contrasting trajectory will be demonstrated in the next excerpts, which are part of one longer fragment in which

the problem involves the disappearance of a classroom bird doll and the wish to find him back.

In the following excerpt (9), three teacher actions contribute to a joint solution discussion: an ISQ, a tentative evaluation and a commissive speech activity. In this established negotiation, both the teacher and the children evaluate and concretize the suggestion of B1 to 'lure him with bread' to solve their problem (lines 42-43), leading to an alternative solution of B2 (lines 70). After the teacher's *ISQs* addressing B1's proposal (lines 44-46), it is evaluated by the teacher (lines 50-53). This evaluation has a *tentative* nature, which is met with subsequent evaluations of that proposal by the other participants (lines 50-56). The teacher concretizes the solution, by making a *commissive action*, an announcement that she will have a look herself, which is again evaluated by the children (lines 58-69), before B2 raises an alternative solution (lines 70).

(9)

		Speaker	*Transcript*	*Dutch original*
42		B1	luring with eh:: pieces	lokken met uh:: stukjes
43			of bread	brood
44	→	Teacher	luring with pieces of	lokken met stukjes
45			bread? (.) do you have	brood? (.) heb jij
46			bread?	brood?
47		B1	no	nee
48		Teacher	oh↑	oh↑
49		B3	me neither	ik ook niet
50	→	Teacher	↑well, by itself it is	↑nou het is wel op zich
51			a good idea (.) because	een goed idee (.) want
52			birds do like bread	vogels vinden brood wel
53			indeed	lekker
54		B1	yes	ja
55		Teacher	yes, true indeed	ja, dat is wel waar (.)
56			(.)[yes	[ja
57		B3	[( ) [bread	[( ) [brood
58	→	Teacher	[we just	[we moeten dan
59			have to- I'll have a	maar even- ik kijk
60			look later on, because	straks wel even, want
61			maybe we have in eh the	misschien hebben wij
62			little room of the	ineh het kamertje van de
63			teachers still some	meesters en juffen nog
64			bread	wel brood liggen
65		B3	yes:::	ja:::
66	→	Teacher	yes, shall I check it	ja, zal ik daar zometeen
67			there in a [minute?	eens even [kijken?
68		B1	[no, I=	[nee, ik=
69			*((raises her hand)*	*((steekt vinger omhoog))*
70		B2	=or cookies=	=of koekjes=

The contributions of the teacher make clear that she treats the proposal of B1 as a *possible* solution to cause the bird doll to return to the classroom. B1 proposes to lure the bird cuddle with pieces of bread (lines 42-43). Now, the teacher raises two *ISQs*: a confirmation question immediately followed by a yes/ no-question

(lines 44-47) on the presence of bread. By raising the second question, she *launches a discussion about the feasibility of* B1's idea. The teacher's recipient token ('oh') with rising intonation in response to B1's negative answer on her question, indexing some astonishment (Heritage, 1984), demonstrates also that her question in lines 45-46 was intended as an ISQ (47-48). After this minimal response, B3 selects himself to inform the others that he does not have bread (line 49), which displays that he discusses the possibility of fulfilling the conditions for this idea too. Then, the teacher evaluates B1's proposal positively. However, the design of her evaluation leaves room for discussion: the '*by itself'* construction functions in a similar way as a 'hedge', which is normally used as the start for a next objection *('by itself.., but….'),* comparable to a so-called *''yes, but…'* construction (Steensig & Asmuß, 2005). Therefore, this turn design reiterates the presupposed tentative nature of the solutions brought in (lines 50-53). Then, two children and the teacher align with this tentative evaluation (lines 54-57) before the teacher appears to attempt to close the discussion by making a *commissive action*. This commissive action is a concretizing of B1's proposal, which is also packaged as a *question* by the teacher (lines 58-64 and 66-67), committing herself to search for bread. B3 evaluates this commissive action positively by aligning with it, but B1 formulates an alternative ('No, I') (lines 68-69), which implies a negative evaluation of the teacher's proposed action (lines 65-69). Then, B2 proposes a slightly different alternative solution to the first proposal (line 70), i.e., cookies instead of (pieces of) bread. Although the differences between the proposals seem rather small, it illustrates that a trajectory is constructed in which children may come with alternative proposals as well.

Thus far, not only the teacher but the children as well evaluate (the concretizing of) the solution tentatively, indicating that the proposed solution *may* contribute to solving the problem. The teacher may also critically evaluate solutions by *objecting* to them (lines 75-76 and 89-91). As the following excerpt (10) demonstrates, this action leads to *defending actions* of children, by *specifying* their proposal (lines 86-88) or by *providing accounts* (lines 97-100).

(10)

		Speaker	*Transcript*	*Dutch original*
73		B3	or, we search for a	of, we kijken straks
74			trace later on	waar een spoor is
75	→	Teacher	a trace? but you have	een spoor? maar jullie
76			been outside already!	zijn al buiten geweest!
77			have you seen a trace	heb je al een spoor
78			already then?	gezien dan?
79		B3	[no	[nee
80		G1	[no	[nee
81		Teacher	oh	oh
82		G1	and he was neither in	en ook niet in de
83			the sandbox	zandbak was ie
84		Teacher	he was neither in the	was ie ook niet in de
85			sandbox?	zandbak?

86		B2	we haven't looked at	we hebben nog niet aan
87			the other side of the	de andere kant van de
88			sandbox yet!	zandbak gekeken!
89	→	Teacher	oh, but I think you	oh, maar ik denk dat
90			have just been running	jullie allemaal rondjes
91			laps (.) or didn't you?	hebben gerend (.) of
92				niet?
93		B3	no	nee
94		B1	no	nee
95		Teacher	you haven't been	daar hebben jullie niet
96			looking over there?	gekeken?
97	→	B1	( ) go out	( ) naar buiten
98				
99	→	B2	because we have not	want we hebben niet
100			been ( ) outside	buiten ( )

This excerpt starts with B3 proposing an alternative solution (lines 73-74). Now, the teacher *objects* to that proposal. In the same turn, the teacher raises a question (lines 75-78). The teacher's minimal response ('oh'; line 81) after the children's denials emphasizes not only that she has intended her question as an ISQ but also that the answers contain new information for her. G1 supplements their earlier report about their prior search (lines 82-83), which is answered by the teacher raising a confirmation question (lines 84-85). This response is met with B2 who adds new information to their earlier report (lines 86-88). This answer functions as a specification of the initial proposal, according to the new *objection* that the teacher formulates (lines 89-91). After a negatively designed confirmation question (lines 91-92), which is confirmed by the children (lines 93-94), and another confirmation question (lines 95-96), the children give two accounts in support of their idea to go outside (lines 97-100). Thus, here the children as well do not simply provide the projected confirmation but carry on and give reasons for their idea to search outside.

The teacher may not only contribute to a joint solution discussion in response to children's ideas but also help to focus the children by giving an *accounted suggestion*. As excerpt (11) shows, this action in the form of an ISQ (lines 101-104) may function as a step for children to propose more specific solutions, as B1 does in lines 110-112. By doing so, this action launches a negotiation in which another aspect of the initial proposal (the elements of a potential trace) is discussed.

(11)

		Speaker	*Transcript*	*Dutch original*
101	→	Teacher	maybe you've seen some	hebben jullie misschien
102			little blue feathers?	ook blauwe veertjes
103			Raai de Kraai is blue of	gezien? Raai de Kraai is
104			course.	blauw natuurlijk.
105		B3	no::	nee::
106		G1	no, only a blue ball	nee, alleen een blauwe
107				bal

108		Teacher	only a blue ball (.) oh,	alleen een blauwe bal
109			[I don't think	(.) oh, [ik denk niet
110	→	B1	[maybe we can search for	[misschien
111			little blue feathers	kunnen we buiten blauwe
112			outside	veertjes zoeken
113		Teacher	yes, but I think, if you	ja, maar ik denk, als
114			have been there already	jullie al geweest zijn
115			I don't think you will	denk ik niet dat jullie
116			find that, do you?	dat zullen vinden of wel?
117		B1	but perhaps he is behind	maar misschien zit ie
118			the wall, though. there	wel achter het muurtje.
119			we haven't searched yet!	daar hebben we nog niet
120				gezocht!

In lines 101-104, the teacher changes the subtopic of potential search locations to indications of a trace perhaps leading to the bird. She does so by providing a *suggestion*, while at the same time she *accounts* for the presupposition behind it: 'Raai de Kraai is blue of course.' Both B3 and G1 respond negatively to this yes/ no-question, while G1 reports the kinds of blue objects they find (lines 105-107). By repeating it, the teacher accepts the report, while she starts to object to it as indicating a trace of the bird. However, she does not finish her statement, because B1 presents an alternative solution in overlap (lines 108-112). He sharpens B3's earlier solution (lines 73-74) and builds upon the teacher's suggestion (lines 101-104). The teacher responds to this specification, as in excerpt (11), with an *objection* in the form of a question that projects agreement as a preferred response (lines 113-116). However, B1 responds with a more specific location to search for the doll, which implies more or less a rejection of the teacher's objection. He continues his turn, with an account for his proposal (lines 117-120). Therefore, this excerpt demonstrates a *teacher's suggestion* in the form of questioning an idea of the children may function as a contribution to a next step to find an adequate solution.

Excerpts (9-11) are part of one longer excerpt in which participants negotiate solutions, illustrating that pupils can participate in *joint* solution discussion. This second trajectory has many characteristics of the participation framework of a 'discussion' as pointed out by Walsweer (2015). We have demonstrated that the participants may evaluate the proposed solutions in a tentative way, whereas the teacher may *evaluate* solutions *critically* by *objecting* to them. As shown, this action in particular seems to elicit accounting practices or adjustments of proposals. In addition to these responsive actions, the teacher may contribute to the critical discussion by focusing on the topic under discussion with a new suggestion.

In sum, teachers and pupils can discuss possible solutions in two distinct trajectories, depending on the nature of the teacher's evaluation to the children's proposed solutions. The first trajectory involves a teacher instruction in an information-delivery format. By *evaluating* a proposed solution *immediately* and *explicitly* combined with *a directive,* the teacher minimalizes children's influence. In the continuation, they only

produce agreement tokens with the teacher's solution and obey her directive actions. Conversely, the second trajectory involves a joint solution discussion, in which the participants' evaluations of solutions in the negotiation are tentative and less resolute than the directly given evaluation combined with instruction in the first trajectory. In the second trajectory, the children may align with the teacher but also oppose the teacher's evaluations and commissive actions, whereas the teacher may raise ISQs about the solutions before they evaluate them tentatively or before they object to them. Teachers may also initiate help in finding a solution by making suggestions. These teacher actions contribute to children's active participation in the solution discussion.

3.5 Conclusions and discussion

In this research, problem-solving interactions with the intervening teacher during small-group work are studied. The analyses in this chapter have shown that these interactions addressing children's problems may consist of the following three stages: (1) problem construction, (2) problem exploration (optional) and (3) solution discussion.

Two elements are found necessary to construct a problem: a problem initiation and the response to it. Two different practices may accomplish the problem initiation leading to comparable problem-solving interactions. Both *assessments* and *descriptions* by the pupils or by the teacher elicit one or more solutions. *Assessments* may be produced in the form of statements, while *descriptions* are often established collaboratively in question-answer adjacency pairs, started by the teacher. The type of response to problem initiations determines whether and how the interaction develops into *joint* problem-solving interaction. Three patterns of problem construction are found. Pattern one consists of a problem initiation followed by a teacher *instruction*. Although this response implies that the children's initiation is still treated as a problem, it limits children's contributions to the interaction to a minimum. In only some instances, children object to the solution imposed by the teacher in this sequential position, but the teacher does not elaborate on the objection. Pattern two consists of a problem initiation and a teacher 'put off', either in the form of a *clarification question* or an *invitation to discuss the matter at hand*. This response launches the next stage of problem exploration, in which the problem is more accurately characterized before solutions are discussed. Pattern three consists of a problem initiation, either produced by the children or the teacher, which is met with either an *invitation* or an *announcement to present a solution*. These responses may launch solution discussions (i.e., the final stage).

In the potential next stage of *problem exploration*, the participants aim to establish a more accurate characterization of the problem. The teacher launches this stage with an elicitation, followed by several question-answer sequences. Eventually the problem is characterized by a teacher description containing a negative

assessment about the state of affairs.

In all interactions in which the problem was brought under joint attention, children present a potential solution in a final *solution discussion*. Two trajectories of the solution discussion are found, depending on the teacher's response to the solution proposal: (1) A direct evaluation combined with an instruction will lead to an instruction in the information-delivery format in which children's responses may only produce agreement tokens. (2) Tentative evaluations and objections (preceded by clarification questions) may launch a joint solution discussion in which several solutions are negotiated and evaluated by both the children and the teacher.

By advancing an analytic understanding and offering practical implications, this study contributes to our knowledge about problem solving in young children's interactions. It not only provides us more detailed insights into the ways both parties accomplish problem-solving interventions, but it also emphasizes the relevance of specific teacher practices enhancing or limiting children's participation. As has been demonstrated, in general, young children may participate in two distinct ways in these problem-solving interactions. As indicated, this distribution is highly dependent on the teacher's response to either the problem initiation and/ or the solution proposals. *ISQs*, *tentative evaluations*, *suggestions* and *objections* by the teacher contribute to children's active participation and to the complexity of their actions in the final solution discussion stage. Children not only adjust their solution proposals, they also support their ideas with accounts in response to teacher objections. This detailed study therefore specifies the earlier research of Hogan and colleagues (1999) by presenting a more detailed overview of how teacher actions elicit such actions by the children. Teachers are often encouraged to raise probing questions, but our study clearly demonstrates that especially *the presence of the evaluation* and *the nature of the evaluation* of the young child's contribution are influential for the continuation of a problem-solving discussion.

The problem exploration stage is found to be optional in the development of the problem-solving interaction. In some of the cases considered in this study, children propose solutions without a prior exploration of the problem. Although it cannot be established that the nature of the problem influenced the problem construction, such an explanation cannot be excluded either. In most instances in the data, for instance, the problem was explored when it was initiated with a *negative assessment*. In addition, teachers are shown to launch problem explorations addressing negative assessments by referring explicitly to a problem or even a solution. Nevertheless, these findings are in contrast to Van de Pol and colleagues' (2012) normative stage model, which emphasized - but without empirical evidence from natural interactions- that a problem exploration stage is a necessary condition for teachers to scaffold groups of children. The observations in this study urge greater reluctance before imposing a normative stage model of interventions on teachers.

Teacher interventions addressing children's problems during group work are potential occasions for children's hypothesizing, accounting, reasoning, objecting and proposing alternatives. These occasions, however, are only launched when the interaction is jointly continued after the problem initiation and the first solution proposal. As shown, only then, does the discourse in the solution discussion stage show high similarities with a *discussion framework* (Walsweer, 2015) in which children critically contribute to the topic. Although not the focus of this study, we may infer based on Walsweer's (2015) investigation that these occassions contribute to the joint construction of knowledge. On the basis of his research on different participation frameworks in classroom interactions, he concludes that a discussion framework in which children can demonstrate knowledge and contribute to the solving of the problem is close to Bereiter's idea of *Knowledge Building Discourse* (2002). Moreover, even if such discourse with the intervening teacher would not lead to knowledge construction immediately, discussions in which children and teachers negotiate solutions on equal terms may form a profitable model for children to discuss problems in a similar way in peer interaction, which has been proven to lead to productive discourse (e.g., Wegerif et al., 1999).

Although our data collection was limited, we believe that the described actions and patterns give a fairly complete overview of how young children and their teachers may shape these types of interventions. Several reasons support our idea. First, the ways in which young children with their teachers construct problems show high similarities with the research of Gosen and colleagues (2015) on problem-solving interactions during the reading of picture books. In both contexts, children initiate problems by negative assessments and descriptions. A second reason is that other research also reports that teacher instructions and straightforward evaluations limit children's contributions. For instance, investigations of Elbers et al. (2008) also indicate that teacher *instructions* in response to problem initiations limit children's contributions. In contrast to their study, in some instances in our data, however, teachers respond with a clarification question or with an invitation for children's problem initiations instead of a directive, leading to a joint continuation in which children could propose a solution. In addition, during the reading of picture books, the presence and the nature of teacher evaluations may limit or enhance children's contributions (Gosen et al., 2015). However, the interaction during the reading of picture books may be continued by turning a book page or by drawing attention to another element of the picture even after a clear evaluation by the teacher, which is in contrast to teacher interventions during group work where such straightforward teacher evaluations are all-decisive in limiting children's participation.

Furthermore, our study supports the idea that reports or indications of problems appear to create opportunities for recipients to offer help. The response to a problem initiation does not simply contribute to a problem construction; it also

becomes a locus for the recipient for the expression of agency in interaction, similar to responses to polar-questions and requests, as found in other research (Heritage & Raymond, 2012; Kendrick & Drew, 2014). In teacher interventions, the response of the teacher expresses the children's degree of agency according to the teacher. While the teacher is practicing a greater degree of agency over problem solving by instructing a solution, the teacher indicates lower levels of agency over the problem by raising an ISQ about the problem or about a potential solution. Children in this context of small-group work during inquiry learning were regarded by their teachers as agents over their own problems. Our observations show, however, that this situation is quite uncommon. Children could contribute to the solution discussion in only 1 of 36 instances, suggesting that children's problem reports in early childhood classrooms carry a tacit claim of dependency on the teacher.

Based on this kind of distribution and teachers' tendencies to respond with instructions and evaluations to children's contributions, investigation is needed to gain more insight into how to help teachers applying actions and practices that enhance children's participation during these interventions. In particular, because several studies demonstrated that children's participation in problem-solving interactions during teacher interventions is beneficial for their group discourse (e.g., Chiu, 2004; Dekker & Elshout-Mohr, 2004). Based on our findings, future research should focus on helping teachers to respond beneficially to problem initiations and solution proposals. Although pre-defined teacher actions in the diagnostic stage (i.e., the problem-exploration stage) as part of a normative model can be trained effectively (Van de Pol et al., 2012), it is highly questionable whether this approach is the most appropriate approach for these interactions. First, the types of problems children initiate in open contexts are ill-defined in comparison to the well-defined problems found during teacher centered mathematics lessons, as was the focal point of Van de Pol and colleagues (2012). To support teachers in more open classroom learning contexts and to do justice to the ill-defined nature of children's problems, an approach similar to the Conversation Analytic Role-Play Method (CARM; Stokoe, 2014) is probably more promising. In follow-up research, it would be worthwhile to study the effects of this type of intervention consisting joint moment-by-moment analyses and discussions of natural video recordings of similar interactions on teachers' actions.

Chapter 4

Young children's problem-solving interactions during small-group work in the absence of the teacher

Abstract

This chapter reports on an applied conversation analytic study of problem-solving interactions during young children's small-group work in Dutch early childhood classrooms. The study illustrates how young children discuss problems that arise during small-group work. A close analysis of the data demonstrates that the overall structure of problem-solving interactions may consist of the following three stages: problem construction, potential discussion and solution discussion, depending on the type of problem, which are a current event, a current action and a future action. Our analyses also indicate that children engage in at least three distinguishable types of problem-solving interactions. Moreover, it is also found that young children undertake specific actions and practices in constructing the different stages in relation to the particular type of problem. Furthermore, our findings show how young children's problem-solving interactions manage to return to the main topic after side sequences by *recycling their own positions* or by *recycling an elicitation to accomplish new proposals* to return to the main problem. By accomplishing these practices, they continue the ongoing topic until they agree upon a solution. Therefore, these findings indicate that even young children from 4- to 7-years old can engage successfully in joint problem solving, practicing basic elements of problem solving that are regarded as crucial to the future knowledge-building society.

4.1 Introduction

The ability to solve problems with others is regarded as a crucial competence for people in our future society to construct knowledge with others. For that reason, Bereiter, among others, underscores that children should learn how to solve problems with others from an early age (e.g., Bereiter, 2002; Cho, Caleon, & Kapur, 2015). This research investigates the joint problem solving of young children during small-group work while they design solutions for problems that arise in classroom projects. These projects are built according to the Storyline Approach (Bell et al., 2006; Egan, 1986).

Much research about joint problem solving in the classroom focuses on organizing contexts in which children may solve problems together (e.g., Barab & Hay, 2001; Collins, Brown, & Newman, 1989; Hmelo-Silver, 2004; Kapur, 2012; 2014; Kolodner et al., 2003). Although considerable debate is ongoing about how to create the best classroom contexts for joint problem solving (Kapur & Rummel, 2009), it is widely accepted that contexts with open and authentic problems in which children may design solutions for the problem enhance children's involvement and motivations (e.g., Cho et al., 2015; Geitz & Sinia, 2017). However, investigators within this domain tend to overlook *how* young children solve problems together.

In another line of research, small-group work in the classroom is studied. These investigations are mostly experimental in nature, focusing on primary school children's joint solving of well-defined problems. These studies demonstrate that small-group work between older children has great benefits for task outcomes and

cognitive development (e.g., Brown & Campione, 1994; 1996; Engle, 2006; Howe, 2010a; Mercer & Littleton, 2007; Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003). The findings of experimental research on the benefits of young children's joint problem solving, however, are less consistent. The effectiveness of group work among young children is related to their discourse, which may be influenced by task characteristics such as *shared understanding* and *difficulty* (Ramani & Brownell, 2014). Only little experimental research into small-group work emphasizes that *the discourse* of both older and younger children influences the outcomes of the group work by focusing on specific practices, such as expressing contrasting ideas or the use of accounts (Howe, 2010a; Littleton et al., 2005; Mercer & Littleton, 2007).

However, even in the latter studies, the ways children establish their joint orientations to problem-solving activities have been neglected because of the methodology used to analyze the discourse. The participants' utterances are coded as independent actions through pre-defined categories starting from an analyst's perspective, neglecting the joint and sequential nature of problem-solving interactions. The methodology of Conversation Analysis (CA), to which participants' perspectives and interpretations are inherent, will help us to understand how young children constitute their problem solving during peer interaction. That phenomenon of problem solving is already studied in situations between adults during business meetings (e.g., Boden, 1994; Huisman, 2000). Therefore, that literature will also be discussed in the next section.

4.2 Background

Although problem solving is above all a social activity, it may also be regarded as an individual activity, referring to *'cognitive processing directed at achieving a goal when the problem solver does not initially know a solution method'* (Mayer, 2013, p. 769). According to cognitive psychologists, an individual experiences a problem when the situation in which they currently are and the situation in which they want to be are significantly different (Robertson, 2017). According to Jonassen (2011, xvii) problem solving is the most important goal of education because it is 'the most authentic and therefore the most relevant learning activity.' The following two accounts support his claim.

First, all life is problem solving (Popper, 1999). In their everyday lives, people face problems of different kinds both in work-settings and in personal contexts (Jonassen, 2000; 2010; Mayer, 2013; Robertson, 2017). Moreover, problem solving is something people encounter during everyday life and developing new tools and technologies to problem-solve is essential (Jonassen, 2000; Lave, 1988; Siegler & Alibali, 2005). For that reason, it is argued that education should teach children to solve all kinds of problems they might face in their future lives (2012).

Second, problem solving is strongly related to aspects of learning such as inferencing, reasoning, analysis and synthesis, decision-making, abstraction,

generalization and thinking (Mayer, 2013; Robertson, 2017). Psychologists such as Gagné (1985) positioned problem solving as a higher-order thinking skill. He suggested that a person learns 'higher-order thinking rules', which can be applied in different situations, by participating in problem-solving activities. According to Gagné (1985), higher-order rules represent combinations of simple rules for the solving of complex problems. In other words, 'a higher-order rule is still a rule and differs only in complexity from the simpler ones that compose' (Gagné & Driscoll, 1988, p. 52). Because of its cultural and educational importance, cognitive psychology has long regarded problem solving as an *individual* psychological process (Mayer, 2013).

Psychologists have divided this process into two main stages: *problem representation*, in which a mental representation of the problem situation is constructed, and *problem solving*, in which a solution is sought. In the latter stage, Newell & Simon's classical definition of problem solving (1972) can be recognized: trying to achieve the goal when the solution is not yet in place. In the psychological research into problem solving, a great deal of attention has been paid to the individual processes supporting these two main stages: representation, planning, execution and monitoring (Mayer, 2013; Robertson, 2017).

The line of research described thus far focuses on individual problem solving. However, problem solving is often not just an individual affair; above all it involves a social process with others. According to Vygotsky (1978, p. 86), interaction in problem solving is crucial for learning. He defines the zone of proximal development (ZPD) as *'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers'.* Within the sociocultural paradigm, based on Vygotsky's ideas, many studies are conducted to unravel problem solving between an adult and a child (e.g., Elbers et al., 2008; Hoogsteder, Maier, & Elbers, 1996; 2012; Van de Pol et al., 2010; Wood et al., 1976), whereas others focused on problem solving in peer interactions (e.g., Mercer et al., 1999; T'Sas, 2018; Wegerif et al., 1999). According to Bereiter (2002) problem solving in small groups especially should be the point of attention in education. He argues that children should develop their abilities to solve problems together with peers from an early age so that they will be able to solve all kinds of problems society will face in the future.

To date, most of the research investigating peer interaction in the classroom is experimental in nature. Many studies within this line of research ratify Bereiter's idea by demonstrating that children can solve problems in interaction with their peers. Forms of collaborative problem solving in classrooms may enhance children's critical thinking, discussion and knowledge construction (e.g., Brown & Campione, 1994; 1996; Engle, 2006; Howe, 2010a; Mercer & Littleton, 2007; Rohrbeck et al., 2003). During peer interaction in small-group work, children learn new skills, they

provide one another with mutually challenging situations, and they help each other if asymmetry exists in their competencies (Rogoff, 1998; Rubin, Bukowski, & Parker, 2006). Therefore, peer interaction during small-group work in the classroom may be a beneficial organizational classroom unit for enhancing children's learning.

More importantly, this experimental line of research has shown that peer interaction between primary school children is more effective for all kinds of developmental areas than working independently. Tudge and Rogoff (1989) conclude that children during small-group work are challenged to participate in more complex problem solving than they are when they work individually, providing them the opportunity to internalize these skills for use in future problem-solving situations. Compared to primary school children working alone, primary school children who work with others have a better understanding of the task, are more able to generate relevant hypotheses and are more likely to retain knowledge following well-defined collaborative tasks (Azmitia & Montgomery, 1993; Rittle-Johnson & Star, 2009; Teasley, 1995; Tudge, Winterhoff, & Hogan, 1996; Yarrow & Topping, 2001). Thus, peer interactions during small-group work in which primary school children solve problems influence cognitive change by enhancing their performance, knowledge and understanding.

However, the findings involving the cognitive benefits of solving well-defined problems in peer interaction among young children are less consistent than they are for primary school children (e.g., Golbeck, 1998; Miller & Brownell, 1975). This result is remarkable, since young children can meet the essential conditions for joint problem solving such as the joint establishment of a mutual understanding of the task, the final product, and the process to complete the joint goal (Tomasello, 2009). Cooper (1980), for instance, reports that 3- and 4-year-old children raise questions, explain the task and their own actions as well as evaluate particular actions while working together on a task to identify pairs of blocks of the same weight. Other developmental studies show that even 2- and 3-year-old children successfully solve collaborative problem-solving tasks (Brownell et al., 2006; Eckerman & Peterman, 2001; Warneken et al., 2006). In addition, 3.5-year-old dyads could coordinate their actions and language to win a prize by completing a more complex task (Ashley & Tomasello, 1998). Thus, (very) young children are skilled in discussing and solving problems with their peers.

Even so, the findings on the effects of young children's small-group work are not consistent. According to Ramani and Brownell (2014), the nature of the problem-solving task may explain the inconsistent findings of the effectiveness of young children's group work. *Shared understanding of the task* and *task difficulty*, for instance, may influence children's problem-solving practices (Ramani & Brownell, 2014). Gauvain and colleagues demonstrate in several studies (Duran & Gauvain, 1993; Gauvain & Rogoff, 1989) that task involvement and shared responsibility to find solutions for the problem are associated with knowledge gain among (very)

young children's group work, especially during tasks that are likely to be familiar to them. In addition to the level of familiarity, the difficulty of the task also influences the way children participate and talk together. Studies of Holmes-Lonergan (2003) and Perlmutter *et al.* (1989) in which preschool dyads solve experimental tasks show that it may be harder for young children to establish joint goals and to agree about the process to solve the task when the difficulty increases. Therefore, task characteristics may enhance cognitive outcomes by influencing young children's discourse.

Regarding discourse during small-group work, discussions about joint goals in particular has positive effects (e.g., Forman & McPhail, 1993; Perret-Clermont & Brossard, 1985). During peer interaction, shared goals must be (re)established or altered if the initial goal cannot be successfully met. More recent research underscores that the discourse between *primary school* children in solving their own problems during small-group work determines whether the peer interaction is productive. Howe, Tolmie and colleagues (Christie, Tolmie, Thurston, Howe, & Topping, 2009; Howe et al., 2007; Tolmie et al., 2005; Tolmie et al., 2006), for instance, demonstrate that the negotiation and the establishment of a common goal and the discussion regarding the actions to be taken to achieve the goal in particular contribute to cognitive effects for older children. Moreover, these studies emphasize the expression of contrasting ideas about either the goal or the process to reach it makes the peer interaction during small-group work between primary school children effective (Howe, 2010a).

That discourse plays an important role for group work to be effective, is also found in the intervention program the Thinking Together Approach (e.g., Mercer et al., 1999). The aim of this educational program is to enhance children's discourse during small-group problem solving. Studies in several countries demonstrate that children's joint problem solving can be improved by participating in group work and by reflecting on their group discourse. These studies evaluate the program's effects on children's discourse by a quantitative analysis of formal indicators of (joint) reasoning, thinking (e.g., 'I think') and causal conjunctions (e.g., 'because', 'since') as well as by a qualitative analysis of children's talk in rather general terms. Based on the studies' analysis, they conclude that primary school children not only use more and different formal indicators and causal conjunctions, but also, that children are better able to solve problems individually compared to children who did not participate in the program (Mercer & Littleton, 2007; Rojas-Drummond et al., 2006; T'Sas & Van den Eynde, 2016; T'Sas, 2018). *Young children* also enhance their group discourse by participating in this intervention program, leading to similar positive results as reported for older children (Littleton et al., 2005).

Although the research above underscores the relation between discourse and the cognitive gains of peer interaction during small-group work for both older and younger children, in the methodologies used to analyze the discourse, the participants' utterances are coded as independent actions through pre-defined categories starting from an analyst's perspective, neglecting both the sequential nature of the problem-

solving interactions and the practices that participants may accomplish to establish their joint orientation. Consequently, the ways in which young children launch and solve problems remain unclear during their group work interaction. A more detailed approach such as CA (Schegloff, 2007) will help to provide insight into these issues, as can be concluded from CA studies about problem solving between adults.

Detailed work on the problem solving of adults mainly focuses on interactions in work settings. At work, one encounters problems needing to be resolved with others. Often, these problems are discussed in business meetings, in which decisions should be made about which future actions (one of) the participants need(s) to execute to solve a problem under discussion. CA studies show that participants of business meetings constitute a joint focus gradually (Atkinson, Cuff, & Lee, 1978; Kunda, 2006; Meier, 1997) before they become oriented on making joint decisions about how to solve problems in the future.

As mentioned earlier, in prescriptive literature such as cognitive psychology, problem solving is often described as a process consisting of several stages such as problem description, problem exploration and solution discussion. However, descriptive studies in this field demonstrate that these problem-solving interactions are not constituted in a linear manner. Instead, problems and solutions are not always explicitly put forward, and problems can be explored more in-depth before solutions are discussed (e.g., Boden, 1994; Huisman, 2000; 1994; Meier, 1997; Van Kruiningen, 2010). In addition, these stages cannot be fully differentiated since they are highly intertwined (Angouri & Bargiela-Chiappini, 2011; Van der Schoot & Mazeland, 2005). Van de Schoot and Mazeland's (2005) study, for instance, shows that participants can return from each stage to the preceding stage when disagreement occurs requiring resolution.

Moreover, they show that adults in business meetings may describe problems in different ways, which may result in distinguishable continuations of the interaction (Van der Schoot & Mazeland, 2005). In addition, Huisman (2000; 2001) demonstrate that these problem descriptions of a state of affairs in combination with an (implicit) assessment of that state of affairs jointly construct a problem. Furthermore, she found that, during business meetings, descriptions and assessments of state of affairs continually alternate, implying that solutions are established by these practices as well (Huisman, 2000).

The only detailed study on problem solving in primary education to our knowledge that accounts for the joint and sequential nature of the interaction shows that problems between young children and the kindergarten teacher during shared reading of picture books are also constructed through a description and/or an assessment, leading to solution discussions in which potential solutions are discussed by describing and evaluating them (Gosen et al., 2015).

The CA studies on problem solving mentioned above demonstrate the

importance of understanding how problems are constructed and how these practices might influence the continuation of the problem-solving interaction. Since descriptive empirical studies on the ways young children construct and solve problems in peer interactions are lacking, the central research question of the present study is the following: *How are problem-solving interactions during small-group work accomplished by young children in the absence of their teachers?*

4.3 Data and methodology

Data were collected in a multiannual program in which teachers from seven Dutch primary schools participated (see Chapter 1). In this study we only focused on the data in the seven early childhood classrooms, which concern (combined) K1, K2 classrooms (on two occasions combined with grade 1). Each of the participating early childhood teachers carried out five projects according to the Storyline Approach (Bell et al., 2006; Egan, 1986; Frame, 2006). The teachers received several formats of a storyline developed by the research group (Herder et al., 2013; Walsweer et al., 2012; Walsweer et al., 2013) from which they could choose to carry out each project. In each project, children aged 4-7 years needed to solve problems arising in the events of the Storyline Approach. The aim was to videotape at least three group-work sessions (2-5 children per group) in each classroom per project.

The collection of problem-solving interactions to answer the research question of this study was established by selecting the instances during the peer interactions in the first and the final project in which the participant's contributions were defined as problems or as solutions. Problems may be described as an obstacle or a gap between where the children are and where they want to be, in which situations solutions may be defined as proposals or ideas to overcome those obstacles or gaps (e.g., Reese, 1994). The interactions around these instances in which either a problem or a solution could be identified are further investigated by transcribing them before determining how the problems are constructed or how the solutions were elicited and how the participants responded to them. The collection therefore consists of 80 fragments from 21 project activities. These fragments are analyzed in detail according to the qualitative methodology of CA (e.g., Schegloff, 2007; Ten Have, 2007) to gain insight into the ways participants constitute and continue these problem-solving interactions.

4.4 Results

Analyses show that young children construct at least three different types of problem-solving interactions. These interactions are accomplished according to a similar overall structure, consisting of a problem-construction stage, a (potential) problem-exploration stage and a solution-discussion stage. Although the overall structure is similar, our analyses unravel that children accomplish different actions and practices, highly related to the nature of the problem constructed.

The finding that young children accomplish three distinguishable problem-solving interactions, determines the layout of this section. In 4.4.1, it will be shown how children constitute problem-solving interactions involving a *current event* while working together. Next, in 4.4.2, problem-solving interactions centered on the *current actions* of one of the participants are described, before the problem-solving interactions involving a *future action* are exposed in 4.4.3. In each section, the practices of the children in constructing and solving the problem at hand will be illustrated.

4.4.1 Current events

The first type of problem-solving interaction between children involves a problematic *current event* that is caused by one of the children during their peer interaction. Our analysis unravels that the overall structure of this type of problem-solving interaction may consist of a problem construction, a problem exploration (optional) and a solution discussion. Moreover, children construct problems centered on current events in at least two patterns, which influences the continuation of this type of problem-solving interaction.

Excerpt (1) demonstrates the first pattern for constructing such types of problems, which consists of three elements: a *current event* that is *negatively assessed* by one of the children, which is met with a *presentation of a solution* by one of the other children. Such responses to a negative assessment of the event result in an interaction consisting of a problem construction and a solution discussion, as illustrated in this excerpt. In this joint process, children calculate with soup bowls and water how much soup has to be cooked for a feast of the Queen.

(1)

		Speaker	*Transcript*	*Dutch original*
1	→	B	dl- oe: *((messes water*	dl- oe: *((knoeit water*
2			*next to the bowl))*	*naast de kom))*
3			(2.8)	(2.8)
4	→	G2	cloth cloth cloth cloth	doek doek doek doek
5			*(1.6)*	(1.6)
6		B	quick cloth cloth I	snel doek doek ik
7			[( )	[( )
8		G2	*[((takes a cloth))*	*[((pakt een doek))*
9			*((both children wipe out*	*((beide kinderen vegen*
10			*the water with the cloth*	*in het vervolg het water*
11			*in the continuation))*	*op met de doek))*

In this excerpt, two elements of problem construction (a current event and a negative assessment of it) can be observed in lines 1-2. While B makes a mess with the water, her utterance (‘oe’) is an indication of her displeasure about it. In the next turn, G2 presents a solution for that event by a multiple repetition of her request (‘cloth’) (lines 4-5). By doing so, she emphasizes that a cloth is quickly needed, underscoring the problematic nature of the event. Therewith, the problem is constructed in lines 1-5. However, importantly, the presentation of a solution starts

the solution-discussion stage at the same time. In this case, the proposed solution is accepted by B (lines 6-7) before both children carry out the solution, which concludes the solution discussion (lines 9-10).

Thus, problematic current events may project quick solutions. The second pattern for constructing types of problems that consist of a *current event*, a *negative assessment* and *an explanation of the problem's* cause in response. This action results in an explanation discussion before the participants discuss solutions, as seen in excerpt (2). Moreover, it illustrates that both the explanation discussion and the solution discussion may result in an interaction in which the participants propose alternatives respectively for problem explanations or for solution proposals. In this excerpt, three children jointly draw possible solutions to allow the classroom dolls Pompon and Co to return.

(2)

		Speaker	*Transcript*	*Dutch original*
1			*((all children are*	*((alle kinderen tekenen,*
2			*drawing, while G makes a*	*terwijl G een gaatje in*
3			*puncture in the paper))*	*het papier maakt))*
4	→	G	oe:: a small hole in it.	oe:: een klein gaatje
5			is not that bad	erin. is niet zo erg
6			(3.0)	(3.0)
7		B1	no	nee
8	→	B2	you're also- you're also	je gaat ook- je gaat ook
9			pushing very hard	heel hard drukken hoor
10		G	yes but look here is	ja maar kijk hier zit
11			such a line and then it	zo'n streep en dan gaat
12			penetrates here and if	het hier doorheen en als
13			*[((moves paper))]*	*[((verschuift papier))]*
14		B1	[yes like that]	[ja zo]
15		G	always go color so	gaan altijd zo zacht
16			softly, because then-	kleuren want dan want nu
17			because now I don't have	kan ik er niet zo goed
18			access to it	bij
19		B1	oh	oh
20		B2	*I do:*	ikke we:l
21		B1	*((moves paper)) like*	*((verschuift het*
22			*this?*	*papier))* zo?

The current event that is central in this construction involves puncturing the paper by G. She negatively assesses the consequences of her own behavior with an exclamation indicating a negative assessment of the situation ('oe'), which, in this excerpt, is combined with a description of the emerging situation (lines 4-5). After a long pause and an alignment of B1 with G's attenuation of the severity of the situation (lines 5-7), B2 formulates an explanation for the emergence of the event and holds G1 responsible for it, as B2's statement implies (lines 8-9). This response displays that he treats the puncture in the paper as 'marked', which needs to be explained. This statement contributes, therefore, to problem construction.

Interestingly, this action also launches a discussion of possible causes for the problem. In lines 10-13, G proposes an alternative problem explanation. She explains that the way the two tables stand against each other has led to the puncture. She also starts an explanation why an alternative paper position is not a suitable alternative to continue their group work. Her replacement of the paper, however, is treated by B1 as a proposal for a solution (line 14). By agreeing with the replacement in overlap in the next turn, a solution discussion has been launched jointly in these turns. In lines 15-18, G objects to the solution proposal that is jointly established by G and B1. After B1's acknowledgment of the grounds for G's objection, B2 claims that the proposed paper position is not problematic to him (lines 19-20). In the next turn, B1 proposes a new alternative, by moving the paper to an alternative position and by asking for confirmation of the alternative. Subsequently however, his proposal is not confirmed explicitly, possibly since the children focus on other materials handed out by the teacher.

Thus, the overall structure of the type of problem-solving interactions covering a current event may consist of the following stages: problem construction, (optional) discussion about explanations and solution discussion. As has been illustrated, these stages may overlap, since the actions to establish the one stage may also elicit the next stage. As has been shown, the problem covering a current event is constructed according to one particular build-up. All problems are launched by an *event* caused by one of the participants, which is *negatively assessed* by one of the participants and is responded to by one of the other participants. As indicated, two different responses may result in two different patterns of problem construction and may result in two distinguishable continuations. The response in the first pattern is a solution proposal and leads immediately to solution discussion. The response in the second pattern is a problem explanation, which results in a discussion about explanations before the children discuss solutions, as has been demonstrated. Furthermore, it has been illustrated that the solution discussion is relatively short: Solutions may be carried out immediately or (alternative) solution(s) may be negotiated or explicated shortly before they are carried out.

4.4.2 Current actions

The second type of problem-solving interaction involves a *current action* of one of the participants. These interactions are accomplished according to a similar overall structure as problem-solving interactions involving current events, as described in section 4.4.1. Specifically, these types of problems cover a difference of opinion whether an executed action is adequate. These differences of opinion can lead to a prolonged discussion before the participants reach joint agreement. This section shows the ways in which young children accomplish this type of problem-solving interaction. First, the pattern for constructing such problems about someone's current

actions and the structure of the discussion are discussed before the practices leading to an agreement of the other participant(s) are shown in more detail.

Our analyses unravel that young children construct such types of problems through three elements: an *action* carried out (potentially being explicated) by one of the participants, which is *opposed to in combination with a supporting action* by a second participant, leading to an *explication of the action* (or a reinitiation). Two practices supporting the opposition and explicating the problem are found. The first is *a statement that the action does not result in the goal*, as illustrated in excerpt (3), in which the children create an envelope with paper and other materials. In addition, this excerpt demonstrates that the constructed problem, i.e., the difference of opinion does not always result in a discussion in which solutions might be negotiated.

(3)

		Speaker	*Transcript*	*Dutch original*
1		G3	*((off camera: glues a*	*((buiten beeld: lijmt*
2			*piece of the paper near*	*over een stukje vlakbij*
3			*where G2 is working))*	*waar G2 bezig is))*
4	→	G2	no-ho::: that's not	nee-hee::: dat hoeft **net**
5			necessary	
6	→	G3	yes it i:::s	**jawo:::l**
7		G2	°I'll help Else° *((wipes*	°ik help wel Else°
8			*away the glue))*	*((veegt lijm weg))*
9		G3	ye-es:: (0.2) minus-	ja-a:: (0.2) mienus-
10			minus	mienus

In lines 1-3, G3 glues a piece of the paper. This action launches a problem construction, as becomes clear in lines 4-5, where G2 rejects that action. The design of her rejection implies that G2 regards the action as unnecessary (to reach a goal). By doing so, she characterizes G3's action as *inadequate*. In the third turn, G3 explicates her action (line 6). Her claim 'it is' implies that her action contributes to the achievement of the goal, i.e., making the envelope. In this example, G2 provides a solution by offering and carrying out help (lines 7-8), which is immediately accepted by G3 (line 9).

The second practice of children to support their oppositions to an action is the use of an account in which it is *claimed that the action will lead to future problems*. This practice contributes to a similar pattern of problem construction, as shown in excerpt (4). This excerpt demonstrates that problem constructions about a current action may launch discussions between the participants also. In this excerpt, the children calculate how much soup is needed for a party of the Queen.

(4)

	Speaker	*Transcript*	*Dutch original*
1		*((B and G2 are scooping*	*[((B en G2 scheppen*
2		*water from the pan in*	*water uit de pan in de*
3		*the soup bowl, while G1*	*soepkom, terwijl G1*
4		*is pouring water from*	*water uit de maatbeker*
5		*the measuring cup into*	*in de pan schenkt))*
6		*the pan))*	

7	→	G2	don't do like that with	doe niet steeds zo (.)
8			me (.) all the time	bij mij, want ik heb
9			because I have way to	veel te vee-ee:::l
10			ma-ma:::ny	
11			*((B and G1 continue))*	*((B en G1 gaan door))*
12	→	G2	or else I have way too	ik heb anders veel te
13			many yeah	veel ja
14			(0.2)	(0.2)
15	→	B	sorry the, yes just stop	sorry de, ja stop maar
16			*((looks from the side))*	*((kijkt vanaf de*
17			(.) we have to do just	*zijkant))* (.) we moeten
18			one small liter *((and*	nog een klein litertje
19			*continues))*	*((en gaat weer verder))*
20		G2	[ok and now you're done	[ok en nou is het klaar
21			*[((G1 walks away with*	*[((G1 loopt met de*
22			*the measuring cup))*	*maatbeker weg))*
23		B	*((scoops again))*	*((schept nogmaals))*
24		G2	do-o::ne I tell you	klaa-aa::r zeg ik nou
25		B	*((scoops again)) now it*	*((schept nogmaals))* nu
26			*is done*	is het klaar

This excerpt shows how a problem-solving interaction containing a discussion regarding one's current action is built. First, the problem is constructed (lines 1-19), which launches a discussion about the necessity of the action (lines 20-26), which is concluded with B's agreement with G2's command. The problem construction is launched with B's action in lines 1-6, in which B and G2 scoop water from the pan into the soup bowl, while G1 works individually. B's action is rejected by G2 in the next turn. Moreover, she supports her rejection with an account that B's action *will result in a future problem* (lines 7-10). B continues his action in line 11, which leads to a reformulation of G2's account. By designing the potential future problem in the form of a statement, G2 reinforces the problematic nature of B's action (lines 12-13). Such accounts are often packaged, as in line 12, by the construction '*or else',* as the start of an undesired consequence. After acknowledging that it may be problematic *('sorry')*, B -the other child- announces that he will continue his scooping because the job is not finished yet (lines 15-19). Such differences of opinion may turn into a discussion, as can be observed in lines 20-26 of this excerpt. Here, B and G2 recycle their positions in a series of rounds before B stops his action while explicating 'it is done' in lines 25-26, implying a completion of the discussion.

Thus far, two practices are shown to be used by a second speaker to support the opposition to an action as part of the problem construction. As we have demonstrated, these differences of opinion may result in a discussion, which is concluded by an (implicit) agreement of one of the participants, although it has to be said that those examples are relatively short. However, we found that also longer discussions are concluded by an (implicit) agreement.

Our analysis unravels that young children *recycle the own stance* in reiterating a (longer) discussion, after (short) side sequences, which is illustrated

in excerpt (5). Before the start of this excerpt, the group of children constructed a problem in a similar pattern as described earlier. In this excerpt, they disagree whether B2's actions are adequate to create one computer of wooden blocks. During the discussion elaborating on their difference of opinion, the participants may return to the main sequence (i.e., whether B2's actions are adequate) subsequent to a side sequence by *recycling the speaker's own stance* addressing the main difference of opinion.

(5)

		Speaker	*Transcript*	*Dutch original*
51		B2	[we have to make the	[we moeten de letters
52			↓letters	↓maken
53		G	*[((pushes her*	*[((schuift haar bouwwerk*
54			*construction to B1))*	*naar B1))*
55			(0.4)	(0.4)
56		B1	just many more	nog heel veel
57		B2	but how should we make	maar hoe moeten we de
58			the letters	letters maken
59			(0.4)	(0.4)
60		G	we need <u>two</u>	we moeten <u>twee</u>
61			*((hereafter they work*	*((hierna werken ze*
62			*individually))*	*individueel))*
			((60 lines ommitted))	*((60 regels verwijderd))*
122	→	B2	*((looks at G))* I do make	*((kijkt G aan))* ik maak
123			one	er wel één
124		G	n::ho[:::	n::he[:::
125		B2	[I do make one	[ik maak er wel één
126		G	no::: amain don't make	ne::: aiman niet alleen
127			it al↓lone	mak↓en
128		B1	*((looks at B2))*	*((kijkt naar B2))*
129			ai:ma[::=	ai:ma[::=
130		G	[because you have	[want je moet samen
131			to ma↓ke it with <u>us</u>	met <u>ons</u> ma↓ken
132		B1	Ai:ma↓:n *((looks at B2))*	Ai:ma↓:n *((kijkt naar*
133				*B2))*
134		B2	I↑ make i:t (.)	ik ↑maak he:t (.)
135	→	B1	no::ho:: °you [should	ne::he:: °dit[moet je
136			make this°	maken°
137			*((the discussion covers*	*((de discussie gaat nu*
138			*the construction of the*	*over het maken van een*
139			*keyboard))*	*toetsenbord))*
			((45 lines ommitted))	*((45 regels verwijderd))*
184		B2	[°or ↑so° *((aims his*	[°of ↑zo° *((richt de*
185			*opened hands towards*	*handen geopend naar*
186			*his construction of a*	*zijn bouwwerk van een*
187			*computer; shortly B1*	*computer, B1 kijkt hier*
188			*watch at it and G*	*kort naar en G kijkt*
189			*doesn't look at it))*	*niet))*
190			(4.6)	(4.6)
191	→	B1	*and Aiman you have to*	en Aiman je moet
192			*help with us ((looks at*	meehelpen met ons
193			*B2))*	*((kijkt naar B2))*

194		(1.0)	(1.0)
195	B2	*I make one already*	ik maak al één *((gooit*
196		*((destroys his own*	*zijn eigen bouwwerk*
197		*construction))*	*kapot))*

The first side sequence is launched in lines 51-52 by B2, who claims that they must make letters. He follows his claim, by raising a question displaying that the steps they must take to make letters (of the keyboard) are unclear to him (lines 57-58). The other participants do not elaborate on this. This silence leads to a short period of individual work (lines 61 and following). In lines 122-123, B2 steers the interaction back to the main sequence (i.e., whether B2's actions are adequate), by *recycling his initial stance* on the topic: he still claims his action is adequate, implying that it contributes to the making of one computer. In the next turn, G recycles her own position, by rejecting B2's claim, launching a new period in the discussion (lines 122-136).

This practice is also accomplished to reiterate the main sequence following the second side sequence. B1's correction and claim (lines 136-137) is intended to convince B2 to join G's and B1's actions in making one computer. However, B2 elaborates on a specific element in B1's claim 'this', by proposing how to make the keyboard. By doing so, the second side sequence about the making of the keyboard is launched (lines 138 and following). Also, in this instance, one of the participants reiterates the main sequence. Now B1 *recycles his stance* on the initial difference of opinion (lines 191-193). In response, B2 recycles his stance, implying a rejection of B1's claim and a reiteration of the main discussion (lines 195-197). This discussion results in a completion by B2's agreement, who destroys his construction in lines 195-197.

So far, the actions and practices contributing to the *construction* of the type of problem and to the reiteration of the discussion involving current actions are described. However, the practices contributing to the *completion* of such types of problem-solving interactions have not yet been addressed. The children execute different supporting practices strengthening their positions. Such position-supporting practices, accomplished either by the first or by the second speaker, are found to be convincing, leading to an (implicit) agreement of the other participant. In the light of problem solving, this completion therefore implies that the participants reach joint agreement about a solution for a problem. These different position-supporting practices, which contribute to the completion of the problem-solving interaction, either concern physical or verbal actions to (find) support (for) the own position and/or packaging issues, as will be explained in more detail hereafter.

Position-supporting practices: Carrying out

The first position-supporting practice children may execute that leads to an agreement of the other participant(s) is that children *carry out their own positions* (or solution proposals). By doing so, the position or proposal is presented to others as a fait accompli excerpt (6), which is a copy of excerpt (3), G3 glues something, which is rejected by G2 (lines 1-5). Subsequent to G3 re-initiating her action in line 6, G2 offers to help while erasing the glue (lines 7-8). By doing so, G2 presents it as a fait accompli. This strengthens her position, as can be concluded from G3's subsequent explicit agreement (lines 9-10).

(6)

		Speaker	*Transcript*	*Dutch original*
1		G3	*((off camera: glues over*	*((buiten beeld: lijmt*
2			*a piece near where G2 is*	*over een stukje vlakbij*
3			*working))*	*waar G2 bezig is))*
4		G2	no-ho::: that's not	nee-hee::: dat hoeft **net**
5			necessary	
6		G3	yes it i:::s	**jawo:::l**
7	→	G2	°I'll help Else° *((wipes*	°ik help wel Else°
8			*away the glue))*	*((veegt lijm weg))*
9		G3	ye-es:: (0.2) minus-	ja-a:: (0.2) mienus-
10			minus	mienus

Position-supporting practices: Soliciting collaboration

The second position-supporting practice of children during problem-solving interactions around current actions is *soliciting for collaboration* of other pupils. This practice leads to an agreement in the next turn, as illustrated in excerpt (7). In all these instances children accomplish this practice by looking at another participant while recycling their own position, as in this excerpt, in which B does so to support his action and claims to make points by cutting paper out (lines 6-9). This is a position-supporting practice that is convincing to young children, as seen by G2's agreement in the next turn (lines 10-11).

(7)

		Speaker	*Transcript*	*Dutch original*
1		B	*[((brings scissors to*	*[((brengt schaar naar*
2			*the paper))*	*het papier))*
3			[(1.6)	[(1.6)
4		G2	no you don't have to cut	nee dat moet je niet
5			it out	eruit knippen
6		B	yes I do, look, you have	jawel, zie, zo moet je
7			to make points like	toch punten maken? eruit
8			this, haven't you? Cut	knippen? *((kijkt G1*
9	→		it out? *((looks at G1))*	*aan))*
10		G2	yes, but then you have	ja, maar dan moet je een
11			to use your own scissors	eigen schaar pakken

Position-supporting practices: Prosodic marking

The third practice children deploy to support their stances leading to an agreement in the next turn concerns packaging issues of *prosodic marking* in the kind of action. This practice may be accomplished through *stretched vocals*, as excerpts (8) and (9) indicate, or by *accentuating words*, as seen in excerpt (10).

In excerpt (8), which shows the completion of excerpt (4), B and G2 conclude their discussion about G2's request for B to stop his action. In line 24, G2 recycles her prior claim(s), but now she stretches the vocals in 'done', and by doing so she emphasizes her stance, leading to an agreement from B in the next turn (lines 25-26).

(8)

		Speaker	*Transcript*	*Dutch original*
23		B	*((scoops again))*	*((schept nogmaals))*
24	→	G2	do-o::ne I tell you	klaa-aa::r zeg ik nou
25		B	*((scoops again))* now it	*((schept nogmaals))* nu
26			is done	is het klaar

In excerpt (9), G2 agrees with G1's rejection of her action, implying a completion of their discussion addressing her action. In lines 1-3, G2 first lifts her pencil, before she announces her intention to draw something else. This announcement implies that she will place her pencil again on the paper. This action is rejected by G1 in lines 4-5, and by stretching the vocals of both the receipt and the rejection, her rejection is emphasized, leading to G2's agreement in lines 6-7.

(9)

		Speaker	*Transcript*	*Dutch original*
1		G1	*((lifts her pencil of*	*((tilt stift op van*
2			*the paper))* uh:: [I'm	*papier))* uh:: [ik
3			°(doing)]	°(doe)°]
4	→	G1	[oh:::	[oh:::
5			no::] don't do it	nee::] **net** doen
6		G2	(ok) ( ) I don't	(ok) ( ) ik doe
7			do it anymore	**ut ek net meer**

Children support their actions not only by stretching vocals but also by accentuating words. This practice also results in agreement in the next turn, as seen in excerpt (10), which shows the completion of the discussion that was to a large extent displayed in excerpt (5). G and B1 discuss with B2 whether B2's actions contribute to the assignment, i.e., making one computer. In line 210, G recycles his and B1's stance, but now he emphasizes B2 has to help them, by accentuating 'us'. This practice leads to an agreement of B2, who pushes his blocks to B1 (lines 211-213).

(10)

		Speaker	*Transcript*	*Dutch original*
210	→	G	*you have to ↓help us*	je met ons mee↓helpen
211		B2	*((pushing the wooden*	*((schuift de houtjes van*
212			*blocks from his*	*zijn bouwwerk naar B1))*
213			*construction to B1))*	

Thus, the overall structure of types of problem-solving interactions involving one of the participants' current actions may consist of the following three stages, that may overlap in some instances: problem construction, (optional) discussion and solution discussion in which the difference of opinion is resolved. As demonstrated, the problem construction implies a difference of opinion consisting of the following three elements: an action, a supported opposition either in the form of a rejection or a counter, and an explication of the action by the actor. Children may package the support for the opposition in two forms to relate the action to a problem: by claiming that the action is inadequate or by claiming that it will lead to future problems. The constructed problem may immediately lead to an (implicit) agreement by one of the participants, implying a change of stance. It may also result in a discussion between the participants before one of the participants changes his or her stance and accepts the position of the other child. The solution is accomplished by position-supporting practices by one of the participants for his or her own position, which are met with an (implicit) agreement by the other participants. These position-supporting practices either concern *carrying out the proposal* or *soliciting for collaboration* and/or packaging issues of prosodic marking in the kind of action.

4.4.3 Future actions

The third type of problem-solving interaction that children may constitute during their group work covers *future actions* that one or more participants may have to carry out either to prevent or to solve a problem. Our analyses unravel that such types of problem-solving interactions involve making decisions about future actions. The problem construction consists at least of one proposal for a future action. The continuation of this decision-making interaction proves to be highly dependent on the response to the proposal(s). This section shows how the participants construct a problem and how they accomplish practices in the discussion stage to recycle or to conclude the discussion about (a) proposal(s), potentially leading to a solution discussion stage. This type of problem-solving interaction may be accomplished in a similar overall structure as problem-solving interactions involving current events or current actions. In the discussion of these practices, the structural pattern of these types of problem-solving interactions involving future actions is displayed as well.

Our analysis indicates that children construct problems that involve future actions in three patterns. The first pattern consists of two elements, an *elicitation* and a *proposal for a future action* in response, as shown in excerpt (11). In the framework of the Storyline Approach in all instances, children discuss or design potential solutions for a problem of the main character of the story. In this excerpt, the children construct a computer by using different materials that may contribute to the solving of the main character's problem.

Elicitations invite other participants to make a proposal, but more importantly, they put next proposals in a framework of making a joint decision, implying that next steps in their design processes are unclear and therefore problematic. Before G elaborates on her announcement that she has an idea (lines 7-8), B2 accomplishes the first proposal (line 11). By doing so, the problem is constructed. The action of the proposal is immediately carried out in this case, which leads to an agreement, implying a joint decision, as demonstrated in lines 15-25 of this excerpt.

(11)

		Speaker	*Transcript*	*Dutch original*
1			*((children are working*	*((kinderen zijn aan het*
2			*with the construction-*	*werk met de constructie*
3			*materials at their*	*-materialen aan hun*
4			*table))*	*tafel))*
5	→	B2	how should we do this	hoe moeten we dit doen
6			(0.5)	*(0.5)*
7		B1	how should we ever glue	hoe moeten we dit ooit
8			this with a (man) or	plakken met een (man)
9			↑so	of↑zo
10			(1.5)	(1.5)
11	→	G	I kno::w it *((looks at*	ik wee::t het *((kijkt*
12			*B1))* I kno::::::w i::t	*naar B1))* ik wee::::::t
13			(.) I kno↑[::::W i::t:	he::t (.) ik
14				wee↑[::::T he::t:
15		B2	[°stop°	[°hou op°
16			(1.0)	(1.0)
17		B2	glueing glueing	plakkah plakkah
18		G	( )	( )
19		B1	what do you know ↑then	wat weet je ↑dan
20			[(0.8)	[(0.8)
21		B2	*[((glues balls of wool*	*[((plakt bollen wol op*
22			*on woodstrips))*	*houten latjes))*
23			*((9 lines omitted; since*	*((9 regels verwijderd;*
24			*every child is talking*	*omdat elk kind over een*
25			*about a different*	*verschillend onderwerp*
26			*topic))*	*praat))*
27		G	[( ) but glue gently	[( ) wel fijn plakken
28			then	hoor

While the children construct the computer, B2 raises a question (line 5). Thereby, he invites the other children to accomplish a proposal for a future action, implying the next steps they must take are unclear to him. After a reformulation of the invitation by B1, G announces that she has an idea (lines 11-14). However, B2 accomplishes a proposal first; therefore, the problem is constructed in line 11. Next to B1's invitation for G to elaborate on her announcement (line 19), B2 supports his proposal by enacting it, sticking the wool to the wooden blocks (lines 21-25). This practice supports the proposal, which leads to a positive evaluation of it by G in lines 27-28, although she makes a remark about the way B2 works. The sequence is concluded by G's positive evaluation, implying that the participants have made the decision about which solution may solve the problem.

Interestingly, proposals may also start such problem-solving interactions without being elicited. This is the case in the second pattern of problem construction consisting of two elements: a *proposal* is supported with an *account* in which *the action*, which is accounted for, *is claimed to be relevant in the prevention of a potential future problem*, leading to *an agreement* of the other participant(s). Although this pattern may result in a similar continuation as schematized in the figure above, it has an important implication. In these instances, the solution is accomplished before the problem is expressed. This order has also been reported in decision-making episodes during business meetings between adults (Huisman, 2000). Specifically, such accounts support the proposal (i.e., solution) by claiming that the future actions prevent any future problems, but at the same time, the problem becomes clear in that account, as shown in excerpt (12). In this excerpt, three girls construct an envelope.

(12)

		Speaker	*Transcript*	*Dutch original*
1		G3	we have to make it	wij **matte ut** helemaal
2			really cram-full	propvol **moaitsje**
3		G1	yes	ja
4			(0.6)	(0.6)
5	→	G3	or else it is not an	anders is ut geen
6			[envelope	[envelop

In lines 1-2, G3 proposes to fill the envelope. In line 3, G1 meets G3's proposal, which is packaged in the form of a statement. In lines 5-6, G3 provides support for the necessity of the proposed action. She marks her account by 'or else', indicating that it helps in preventing an unwanted potential situation. In this excerpt, the first speaker (G3) provides an account in the third turn, after an acceptance from the other participant. We also found instances in our data in which the proposal is supported with such an account in the first turn by the first speaker or in the second turn by the second speaker, resulting in a similar decision-making structure.

The third pattern in which children construct a problem around a future action consists of three elements: a proposal, a counter proposal and an objection in which it is claimed the *contrasting proposals are in conflict with the goal of the peer problem solving* (i.e., to agree on one solution). This practice to accomplish an objection is executed when two proposals are oppositional, as demonstrated in excerpt (13). In turn, children only establish a second oppositional proposal when the initial proposal is not immediately supported with a practice, as displayed in the prior excerpts. Then, the initial proposal may be evaluated negatively, leading to (an) alternative proposal(s) of other participants. In those instances, one of the children may *state that these contrasting ideas are in conflict with the goal of the peer problem solving*. This *objection* implies that the decision-making develops in an undesired manner, which, in combination with the accomplished proposals, constructs the problem. At the same time, this practice results in a discussion in which several alternative proposals

are provided in response to each other, before the final proposal is supported by an account and subsequently accepted by the other participant. In this excerpt, the children must decide where they think a missing classroom doll is.

(13)

		Speaker	*Transcript*	*Dutch original*
1		G2	[may also enjoy going to	[kan ook mooi naar ut
2			the playground or to the	speeltuintje naar ut
3			play (park)	speel (park)
5		G1	°yea°	°joa°
6			(0.2)	(0.2)
7			t- to the beach and to	na- naar ut strand en
8			the play paruk	naar ut speelparuk
9	→	G2	but we may only choose	maar we mogen maar één
10			one thing	ding kiezen
11			(0.4)	(0.4)
12		G1	ow:	ow:
13		G2	shall we do the	zullen we ut restaurant
14			restaurant?	doen?
15		G1	um	um
16		G2	or the zoo?	of de dierentuin?
17		G1	just do the beach	doe maar ut strand
18		G2	but you know what is	maar weetju wat ook
19			also a lo::t of fun,	hee::l leuk is, als je
20			when you go to the zoo,	naar de dierentuin gaat
21	→		then you may feed the	dan mag je ook beesten
22			animals as well	eten geven
23		G1	ok, do the z- zoo	ok, die- dierentuin doen

In lines 1-3, G2 proposes that the lost doll should be either on the playground or in the play park. Her proposal is evaluated negatively by G1 (line 5), before she formulates an alternative, which in this case consists of two alternatives (lines 7-8). These proposals are in conflict with each other, and, more importantly, they are in conflict with the task to which they were assigned, as seen in G2's response (lines 9-10). By marking her response with the conjunction *'but'* as an objection, she emphasizes that the decision-making about one solution develops in an undesired manner (lines 9-10). Now, the problem is constructed, resulting in a discussion of several alternative proposals, implying negative evaluations of earlier proposals (lines 12-22). The discussion of several proposals is finished in a similar way as the development of the decision-making described in the prior excerpts. Here, G2 accompanies her last proposal by an account (lines 21-22), resulting in G1's explicit agreement by 'oke' and the repetition of G2's proposal (i.e., solution; line 23).

Thus far, three patterns of problem construction around proposals for future actions are illustrated. In addition, the continuation of the these types of problem-solving interactions (and thus its structure) is highly dependent on the response to the initial proposal, which is influenced by the presence or absence of supporting practices, such as carrying out or accounting for the initial proposal. When such supporting practices are lacking, the participants may accomplish alternative proposals, as demonstrated

in excerpt (13). Additionally, when subsequent proposals are supported by these practices, they are accepted by the other participant(s), implying a completion of the sequence.

During those (prolonged) discussions consisting of series of alternatives, it is found that children *invite the other participants to provide (new) proposals to make a decision*. This practice reiterates the main sequence, launching the solution discussion sequence, as shown in the following excerpt (14). In this excerpt, two children must decide which two of six colors they want for the materials in constructing objects for a classroom party. The problem construction around this decision-making developed as in pattern three; thus, the sequential pattern was similar to excerpt (13). After a series of alternative proposals (lines 41-43 and preceding) leading to objections, such as the one in lines 44-48, B2 shows his need to make a decision *by inviting the other participants to provide (new) proposals to make a decision* (lines 62-66). By doing so, he displays that he is oriented on concluding the problem solving (i.e., the decision-making on one solution) by reaching joint agreement on a solution.

(14)

		Speaker	*Transcript*	*Dutch original*
41			I would like to have	ik wil graag deze drie
42			these three (.) then you	hebben (.) dan ga [jij
43			[go	
44		B1	[but then I have two and	[maar
45			I want green and blue	dan heb ik twee en ik
46			and I also like °this	wil groen en blauw en
47			and that°	deze vind ik ook °mooi
48				en die°
50			(3.3)	(3.3)
51		B2	and the uhm- I like all	en de uhm- ik vind deze
52			these three	alle drie mooi
53			(2.5)	(2.5)
54		B1	well I like these- all	nou ik vind deze-
55			of these (.) I like	allemaal mooi (.) ik
56			those *((yellow))* those	vind die mooi *((geel))*
57			*((purple))* those those	die mooi *((paars))* die
58			↓those *((points at the*	mooi die mooi die ↓mooi
59			*pile of green red and*	*((wijst op de stapel*
60			*blue strips))*	*groen rood en blauw))*
61			(6.2)	(6.2)
62	→	B2	okey what shall we do	okey wat zullen we nu
63			now you these ↑two or I	doen jij deze ↑twee of
64			those two *((referring to*	ik die twee *((gaat om de*
65			*the purple and yellow*	*paars en gele stroken))*
66			*strips))*	
67		B1	you	jij
68		B2	no *((shakes head))*	nee *((schudt hoofd))*
69			(7.0) *((looks around))*	(7.0) *((kijkt rond))*
70		B1	then I just take these	dan neem ik dees
71			*((yellow and purple))*	wel*((geel en paars))*
72			(0.3)	(0.3)

73		B2	then I like those too,	dan vind ik die ook mooi
74			but I also like that	maar ik vind dat ook
75			*((points to the pile in*	mooi *((wijst naar de*
76			*B2's hands))*	*stapel in B2's handen))*
			((9 lines ommitted))	*((9 regels verwijderd))*
86			(1.0)	(1.0)
87	→	B2	okey let's do it	okey we doen het
88	→	B1	let's do it	we doen het
89		B2	he little umbrella (0.3)	he parapluutje (0.3)
90			little umbrella *((holds*	parapluutje *((houdt de*
91			*the strips above his*	*stroken boven zijn*
92			*head)) °what should we*	*hoofd))* °wat moeten we
93			*do now°*	nou doen°

After the second objection to the proposed alternatives (lines 44-48), which implies that these proposals are in conflict with the task to which they were assigned, both participants accomplish new alternatives (lines 51-61). Next, B2 seems to project coming to a completion of the sequence by *eliciting B1 to accomplish new alternative proposals*, as seen in lines 62-66. B2 packages his invitation with disjunction markers as 'okay' and 'now' (Beach, 1993; Filipi & Wales, 2003; Sacks, 1992, Vol II). 'Okay' is accomplished at the beginning of the turn, which is often reported to indicate misplacement, allowing for an early projection of the turn within the ongoing activity of decision-making (Heritage, 2002; Schegloff, 1987; Sidnell, 2007), as it does in this case. By doing so, B2 displays his urge to come to a joint decision quickly, while 'now' emphasizes the duration of the discussion thus far. By designing his elicitation in this way, it displays that up till now the decision-making has taken too long according to B2 and that he prefers a quick decision. In the next turn, B1 accomplishes a (new) proposal (line 67), which is negatively evaluated by B2 (line 68). This evaluation is met with an alternative proposal of B1 (lines 70-71), which is agreed to and elaborated on by B2 (lines 73-76). Interestingly, both children explicitly confirm their joint decision: B2 states that the decision has been made, which is repeated by B1 (lines 87-88).

Thus, the overall structure of the types of problem-solving interactions around future actions may consist of problem construction, (potential) discussion about future actions and solution-discussion. These stages do not always develop in a linear way from problem to solution (i.e., decision), as has been demonstrated. The continuation of the interaction is highly dependent on the way the problem is constructed, which may be done in three sequential patterns. The first pattern consists of an invitation to accomplish a proposal, implying that the next steps to take are not straightforward, combined with a proposal. The second pattern involves a proposal with an account in which the action is claimed to be necessary in preventing a potential future problem and an agreement. The third pattern consists of a proposal and a counter proposal, leading to an objection to the situation by one of the children, indicating that the

contrasting proposals conflict with the aim of the peer interaction. Furthermore, the second pattern leads to an agreement immediately, whereas the other patterns may lead to a discussion about alternative proposals, in which participants negatively evaluate each other's proposal(s). Finally, all problem-solving interactions of this type are concluded by an explicit agreement, which is always preceded by a proposal in combination with supporting practices such as accounting or carrying out the proposed action. This agreement is an explication of the decision they have made together.

4.5 Conclusions and discussion

Based on this descriptive study, in which small groups of young children solve problems arising in the Storyline Approach, an answer can be given to our question about the ways young children accomplish problem-solving interactions in the absence of the teacher.

The first conclusion is that problem-solving interactions in general develop in a similar overall structure, consisting of problem construction, discussion about actions that either may explain the problem or be necessary in either the present or in the future, and a completion either in the form of a solution-discussion stage. Despite the similarities in the overall structure, the action and practices for constructing the stages differ, depending on the problem at hand.

The second conclusion is that young children in peer interaction may accomplish at least three types of problem-solving interactions. These different interactions are related to the different states of affairs and to the different actions and practices children carry out in constructing and solving each problem. First, types of problems covering a *current event* are constructed through a negative assessment regarding the current event. These types of problems may be constructed in two distinct patterns depending on the response of the other participant(s) to such assessment. This response is established either in the form of a problem explanation or a solution proposal. These types of problems project quick solutions, which may be preceded by a short discussion about the cause, depending on the pattern of problem construction. The solution proposals have the nature of physical activities the participants (need to) carry out to solve the problem.

Second, types of problems involving a *current action* are constructed with three elements: an action carried out, an accounted opposition to that action and a reinitiation or an explication of the action. Children package the support for the opposition in two forms to relate the action to a problem: by claiming the action is inadequate or by claiming it will lead to future problems. The difference of opinion may lead to a discussion varying in duration about either the adequacy of the action or whether the action results in a new problem. The solution is accomplished by position-supporting practices by one of the participants for his or her own position, which are met with an (implicit) agreement by the other participants. These position-supporting

practices either concern *carrying out the proposal* or *soliciting for collaboration* and/or packaging issues of *prosodic marking* in the kind of action.

Third, types of problems covering a *future action* are centered on proposals. These types of problems may be constructed in three sequential patterns: (1) an elicitation marking that next steps are unclear and a proposal to take future steps; (2) an accounted proposal in which it is claimed the future action is necessary to prevent problems and an agreement; and (3) a proposal, a counter proposal and an objection in which it is claimed the contrasting proposals are in conflict with the goal of the problem-solving interaction (i.e., to agree on one solution). In all instances, the response (either an acceptation or rejection) to the initial proposal influences the continuation of the problem solving, which has the character of decision-making. These types of problems always lead to an explicit marking of the participants' joint decision, implying an agreement of one of the participants with a solution proposal of the other participant(s).

The third conclusion is that young children display on four different positions their oriented to solving their problems until agreement of the solution is reached. First, problems may be constructed with an orientation to the solution, most clearly when a *solution proposal* is used to contribute to the construction of a problem. Second, children employ *accounts that are packaged with an orientation to the (solving of a) problem*. These accounts designed with an 'or else'-construction either contribute to problem construction or to solving the discussion. Third, children discuss the ongoing topic until they agree upon a solution by *recycling their own positions* or by *recycling an elicitation to accomplish new proposals* to return to the main problem. Fourth, every problem-solving interaction is *(implicitly) concluded*, implying that children (implicitly) agree with a solution (proposal) for each problem.

The analysis in this chapter indicates that young children are very competent in managing problem-solving topics in the absence of the teacher. In other words, they remain jointly oriented to solve the problem at hand. By analyzing in detail *how* young children solve different problems distinguishably, our study not only provides support for Baines and Howe's (2010) findings that young children from 4-7 years of age are able to manage their topics, but it also, more importantly, demonstrates *how* they accomplish problem-solving interactions. First, they carry out particular actions and practices in constructing both the problems and solutions, depending on the nature of the problem. As we have shown, they continuously use practices appropriate to the nature of the problem to construct the stages during the development of each problem-solving interaction. Second, our analysis unraveled that they accomplish specific practices such as *recycling their own positions* or *recycling an elicitation to accomplish new proposals* to return to the main sequence.

Our findings contrast with earlier research suggesting young children's topical coherence is rather poor and only guaranteed during short sequences (Brinton &

Fujiki, 1984; Dorval & Eckerman, 1984; Foster, 1986). In the study of Brinton and Fujiki (1984), for instance, children lack a joint orientation in the analyzed casual interactions, which is in contrast to the interactions part of our analysis. Whether young children manage the topic depends on task conditions of the small-group work that influence the extent of children's orientation on joint goals and interdependency (Baines & Howe, 2010). In addition, children's joint orientation and interdependency are enhanced in meaningful and relevant tasks (Ramani & Brownell, 2014). Our findings demonstrate that small-group work in the Storyline Approach may be meaningful and relevant to children. Not only are young children able to manage the topic of each problem by discussing joint goals, but they also construct their own problems with a joint orientation in finding a solution. Both activities are regarded in the experimental literature as essential features of beneficial peer interaction (Baines & Howe, 2010; Howe, 2010a).

This descriptive study differs from the experimental research on small-group work in the line of Howe et al. (2007) and Tolmie et al. (2005) by showing *how* young children solve problems: orienting to a clear action pattern with different actions and practices, depending on the kind of problem they must solve. In our analysis from the participant's perspective, the sequential nature of problem solving is considered, as is the (systematic) variance in practices to perform the different actions. This variation is related to different problem types. In experimental research on peer interaction, researchers code some pre-determined discourse phenomena such as 'disagreement' and 'argumentation markers' (e.g., Howe, 2010b; Mercer & Littleton, 2007). By using CA, however, we could analyze in much more detail how children's problem-solving actions and practices are accomplished by different children in interaction and which contextual aspects (like the nature of the problem) are related to the used interactional practices. In that regard, this analysis could also clarify the problem contexts in which we find interactional practices that could be characterized as more or less beneficial for the development of the children because of their triggering of argumentation actions. Around problems involving current events, for instance, low levels of argumentation are observed. This observation may be due to the participants' strong orientations on quick solutions and to the membership knowledge of all children about the undesirability of the event and the possibilities for how to solve such problems.

Moreover, this research contributes to CA studies on problem solving in groups, which thus far mainly focus on decision-making during business meetings between adults. The way young children in *work situations* solve problems around future actions shows similarities with the manners of adults in business meetings. In both instances, the general meeting is built from a series of problem-solving interactions. Moreover, in the decision-making interactions in both contexts, the participants plan future actions in a discussion not following a linear stage model but in which, for instance, the solution often precedes the problem (e.g., Huisman, 2000;

2001; Koole & Ten Thije, 1994).

A highly interesting difference, however, is that young children explicitly mark their joint decision in problem-solving discussions around future actions, which is in contrast to business meetings in which decisions are seldom marked or put forward explicitly (Huisman, 2000; 2001). In our opinion, the time frame between the decision-making and the execution of future actions may be a factor, which possibly implies that the time frame to carry out a future action is less unspecified for children than for adults. A consequence of this implication would be that children package their proposals with specific time indications. However, within the time frame that the teacher has already determined in organizing small-group work, such packaging issues do not seem necessary.

For that reason, it would be interesting to analyze in more detail the proposals that are involved in problems around future actions in follow-up research. Another reason to explore whether the nature of the proposals influences the continuation of the interaction, is earlier research of Houtkoop-Steenstra (1987). She distinguished between *immediate proposals*, the proposals to perform an action immediately and *remote proposals*, the proposals to perform an action at some time in the future. Both lead to different sequential patterns in telephone calls. There are indications in our data that remote proposals are mainly involved in the third pattern of problem construction and lead to prolonged discussions, whereas immediate proposals are mainly found in pattern one and two. However, because of the small number of instances of these types of problem-solving interactions in our corpus, we have not been able to establish systematic differences in the ways children accomplish problem-solving interactions around future actions on this issue.

This research clarifies how young children solve problems during work situations in which they try to design or construct solutions. In these mostly ill-defined activities, children display that they are jointly oriented to solve the problems of the main character. These findings are in contrast to the study of Leseman *et al.* (2001), in which children demonstrated less joint orientation in well-defined and structured work tasks. Our research indicates that the Storyline Approach may be a successful methodology for integrating elements of free play in group tasks, as plead for by Ramani and Brownell (2014), affording opportunities for shared goal-setting and shared planning. Making tasks more challenging and authentic in such a manner may contribute to educational efficacy, as other research has shown (e.g., Rogoff, 1998). Based on these insights, we infer that group work in the Storyline Approach has the potential to contribute to cognitive development by eliciting shared discourse activities in which children jointly solve problems.

Chapter 5

Account sequences in young children's reasoning during small-group work

Abstract

This chapter reports on a conversation analytic study of account sequences in problem-solving discussions during small-group work at seven early childhood classrooms in the Netherlands. The study illustrates how young children construct account sequences and how the practices used for accounting influence the sequential structures while solving problems in small groups. A close analysis of the data shows that assessments, assertions, requests, proposals and physical actions can function as first pair parts (FPPs) in the account sequence. Detailed analyses show that young children may construct sequences in which either one or more accounts are provided, which will respectively be referred to as *single* and *multiple* account sequences. Children are found to construct single account sequences in the context of both preferred second pair parts (SPPs) and dispreferred SPPs (a rejection or a counter). Nevertheless, dispreferred SPPs may launch multiple account sequences as well. Whether single or multiple account sequences are constructed in sequences involving a dispreferred SPP is determined by the action formation practices of the account(s). In this respect, based on children's response to an account, a difference is made between *successful* and *unsuccessful* accounts. *Successful accounts* are directly verifiable in nature; are packaged with intensifiers and evidentials; and result in sequence completion, mostly by accepting the actions of the other speaker. *Unsuccessful accounts*, by contrast, are personal, moral or tentative in nature; and are packaged either as expressions of personal stances, indicating that the actions meet or fall short of the norm, or as display of doubt or as expressions of possible future (negative or positive) consequences of the proposed action. In contrast to successful accounts, young children exhibit two distinguishable responses to unsuccessful accounts of the other speaker, either recycling the speaker's own stance or providing an account, leading to two distinguishable multiple account sequences. This detailed study of account sequences provides insights into young children's accounting during problem solving in small groups, demonstrating that accounting is an interactional phenomenon with sequential characteristics.

5.1 Introduction

This study investigates problem-solving discussions during peer interactions of young children in seven early childhood classrooms participating in a longitudinal program with the aim of obtaining insight into classroom conditions fostering peer interaction. During the projects that followed the Storyline Approach, small groups of young children solved problems that came up while the story unfolded. The small-group work within this approach was found to occasion episodes of young children's reasoning. An important element of children's reasoning is argumentation (Schwarz & Asterhan, 2010). However, in the literature, argumentation only concerns interactions that involve *assertions*. But we also aim to explore children's use of arguments in

other actions such as requests and proposals. Therefore, we use the term *accounts* to refer to the children's support for actions in general. In this study we refer to account sequences as coherent, orderly successions of actions during the problem-solving discussions, in which at least one of the participants produces an *account* (an argument, a justification or another supporting action) in the base sequence or in post-expansion. The accounts are found to provide support for *assertions, assessments, requests, proposals* or *physical actions* by one of the participants.

This chapter will describe the types of sequential structures that young children establish while accounting during peer problem solving, and it will show how these structures are related to the practices children use for accounting. As will be shown, young children support their positions with accounts in relationship to both preferred and dispreferred SPPs. Both types of SPPs are found to launch single account sequences, but the latter may also launch multiple account sequences. Sequences that contain only one account (either in the base sequence or in post-expansion) are referred to as *single account sequences,* while sequences that contain more than one account are referred to as *multiple account sequences.* Before discussing the differences between these sequences and the different trajectories within both single and multiple account sequences in section 5.4, relevant literature and the data and methodology will be discussed in sections 5.2 and 5.3.

5.2 Background

Bereiter (2002) emphatically pleads that children in education should learn how they could solve complex problems in groups and so construct new knowledge products together. To construct knowledge together, it is crucial to engage in argumentation. As Andriessen (2006) puts forward, argumentation involves activities such as *elaboration*, *reasoning* and *reflection*, which have been shown to contribute to deeper conceptual learning (Bransford, Brown, & Cocking, 2000). In addition, much of the thinking we do involves silently arguing with ourselves as well as formulating and weighing arguments for and against a course of action, a point of view or a solution to a problem (Bilig, 1987; Kuhn, 1994). Therefore, these studies on argumentation regard this as the essence of *individual* human thinking.

Moreover, argumentation plays a crucial role in the *social* thinking process, as Mercer and his colleagues have suggested in their Thinking Together approach (Dawes et al., 2000; Littleton et al., 2005; Mercer & Littleton, 2007; Wegerif et al., 1999). Argumentation is regarded as *'a verbal, social, and rational activity aimed at convincing a reasonable critic of the acceptability of a standpoint by putting forward a constellation of propositions justifying or refuting the proposition expressed in the standpoint'* (Van Eemeren & Grootendorst, 2004, p. 1). Therefore, arguments provide support for a *viewpoint* or an *assertion* and build the foundation in argumentation (Van Eemeren & Grootendorst, 1984; Van Eemeren & Grootendorst, 1992; Van Eemeren & Grootendorst, 2004). Because most research on giving support in interaction

involves argumentation backing up *assertions* and *assessments*, important issues in this research will be discussed hereafter.

The above-mentioned studies emphasize the relevance of argumentation for knowledge construction, however most children do not formulate arguments in educational collaborative situations (Hogan et al., 1999). This insight drew the attention of some investigators who aim to enhance children's peer talk through an intervention program called the *Thinking Together Approach* (Dawes et al., 2000; Dawes & Sams, 2004). Central to this approach is that children discuss and make agreements about how they should talk and think together in small groups to enhance the group discourse. Although those studies focus on the way children solve problems during small-group work (Littleton et al., 2005; Mercer & Littleton, 2007; Wegerif et al., 1999), the reported positive effects of the intervention on both primary school and young children's discourse and argumentation are mainly based on quantitative analyses of pre-defined categories and individual interactional practices. By doing so, the sequential and the joint nature of children's argumentation is neglected. Consequently, there is a lack of insight into the interactional characteristics of argumentative behavior in peer interaction. It remains unclear which actions occasion arguments as well as in which sequential positions and with which practices arguments are used by the speakers. Moreover, most research into argumentation in small-group work focuses on older children in primary and secondary education, resulting in a lack of understanding of young children's argumentation practices in peer interaction.

Although little is known regarding the ways young children *produce* arguments in interactions, (very) young children's abilities to argue have been demonstrated in several studies, reporting their argumentative competencies from an early age. In a series of *receptive studies*, Stein and colleagues (Stein & Glenn, 1979; Stein & Miller, 1990; Stein & Bernas, 1999; Stein & Albro, 2001; Stein & Trabasso, 1982; Stein & Miller, 1993) illustrate very young children's abilities to recognize arguments supporting their own positions in familiar and personally relevant moral dilemmas. However, some research shows that young children are also capable of *producing* arguments. McWilliam and Howe (1999; 2004) found that young children provide arguments in non-conflictual talk after why-questions have been raised. All other research reporting on young children's use of arguments focuses on peer disputes. In general, (very) young children's conflicts consist of *a series of rounds of an assertion, a challenge, and a counterchallenge* (Cook-Gumperz & Kyratzis, 2001). Although *argumentation* as a verbal practice is obliquely referred to in this line of research, some studies indicate children from three to five years of age increasingly use arguments in their conflicts (Dunn, 1996; Dunn & Munn, 1987; Eisenberg & Garvey, 1981; Eisenberg, 1987; Goetz, 2010; Van Krimpen-Bijlefeld, 1995), which contribute to resolve the dispute according to earlier research (Dunn & Munn, 1987; Eisenberg & Garvey, 1981).

Additionally, sequential analyses suggest that argumentation in disputes does not appear at random. Arguments are provoked by certain elements in young children's conflicts. First, the way opposition is constructed seems to influence the complexity of the subsequent discussion. For example, the presence of an argument in this opposition evokes argumentative practices other than opposition lacking such support, as pointed out by Phinney (1986). In addition, Church's (2009) detailed study shows that the type of argument has consequences for the dispute's continuation too. The propositional content of the argument influences the success of the turn. Consequently, she proposes a continuum between *personal and subjective arguments* on the one hand, leading to a reiteration of the dispute, and *factual, tangible and objective arguments* on the other hand, resulting in dispute resolution (Church, 2009). These sequential analyses show how the continuation of disputes between young children is related to the form of opposition, to the presence of an argument and to the type of arguments.

All above-mentioned studies on giving support in interaction involve argumentation backing up *assertions* and *assessments*, however arguments are also used to support *requests* or *proposals* by children in small-group interaction. Walsweer (2015), for instance, demonstrated that primary school children more often construct discussions around procedural problems initiated by those type of speech acts than discussions around declarative problems mentioned in *assertions*. Because of this diversity in starting actions, the concept of *account* is used in this study to refer to all types of supporting practices carried out by the children during their peer problem-solving discussions.

In sum, a sequential analysis of *accounting*, including argumentation, may contribute to understanding the ways young children provides support for their (speech) acts during joint problem solving. The research question is: *Which account sequences do young children accomplish when reasoning during small-group work?*

5.3 Data and methodology

As described in the previous section, the aim in this study is to examine the structures of account sequences. To gain more insight 205 account sequences gleaned from videotapes of unsupervised groups who solve problems together were analyzed.

This collection was drawn from all peer interactions that were part of a multiannual project, in which eight teachers participated (for more details, see chapter 1). In the current study we only focused on the data in the seven early childhood classrooms that concern (combined) K1, K2 classrooms (on two occasions combined with grade 1). The participating early childhood classroom teachers received a description of the overall structure of each project (Herder et al., 2013; Walsweer et al., 2012) based on the Storyline approach (Bell et al., 2006; Egan, 1986; Frame, 2006). In the framework of this approach, small groups, consisting of 2 to 5 children

(from 4 to 7 years old), were encouraged to solve problems arising in the development of the story.

The collection of account sequences was established by selecting the instances in which children's contributions function as accounts aimed at making (non)verbal action(s) at issue more acceptable. The interactions around these accounts were further investigated by transcribing them before determining how the accounts are elicited and how the participants respond to them. Those coherent, orderly, meaningful successions of actions during the problem-solving interactions, in which at least one of the participants produces an *account*, were in this study considered as *account sequences*. 61 peer interactions from 49 project activities in which children formulated an account were found. Within those 61 peer interactions, children established 264 *account sequences*. For reasons of simplicity, we analyzed only the account sequences in which two children were involved, even when more children were part of the small-group work in which the account sequences were established. This resulted in a collection of 205 account sequences in this study.

The fragments were analyzed according to the qualitative methodology of Conversation Analysis (e.g., Ten Have, 2007). Regarding the analysis of sequence structures and the role of action formation practices, we drew upon the work of Coulter (1990) and Mazeland (1994), who have described how adults establish argumentation sequences. For clarity reasons, in this study, arguments are treated as specific types of accounts, and the focus in this chapter is broadened to accounts as supporting actions for a range of speech acts, as argued in the prior section. The basic elements in interactions are First Pair Parts (FPPs) and Second Pair Parts (SPPs), which together form adjacency pairs (Schegloff, 2007). In argumentation, according to Coulter (1990) and Mazeland (1994), the FPP consists of an *assertion* (and its variants) or an *assessment*, while the SPP can take the form of an *agreement,* a *rejection* or a *counter*. The latter is characterized as an alternative *assertion* or *assessment*. An *agreement*, which is a preferred SPP, is *closure implicative* (Jefferson, 1981) and leads normatively to the sequence's completion. On the other hand, an *opposition,* which is refined by Mazeland (1994) to a *rejection* and a *counter*, is a dispreferred SPP. Therefore, an *opposition* may result in post-expansions in which it is appropriate for one or both of the participants to *account for their point of view* (Coulter, 1990; Heritage, 1988; Mazeland, 2003; Schegloff, 2007). Although it has been reported that dispreferred turns may be packaged as preferred turns and vice versa in young children's disputes (Church, 2009), indicating that expansion of the dispute might be preferred, we were not able to determine whether this was systematically the case in our data as well. Therefore, we follow the line of Coulter and Mazeland in referring to agreement as preferred and oppositional turns as dispreferred, as mentioned above. The results of the analysis in this study are described in terms of patterns, explicated and illustrated by examples from the data (Freebody, 2003; Ten Have, 2007).

5.4 Results

Providing accounts during problem solving in peer interactions entails different sequential structures. Although distinguishable First Pair Parts (FPPs) of the first speaker in the form of an *assertion*, an *assessment*, a *proposal*, a *request* or even a *physical action* launch an account sequence, detailed analysis reveals that the variation of account sequences is not dependent on the type of FPP. Conversely, the variation is dependent on two other aspects: (1) *the type of the Second Pair Part* (SPP) following an FPP and (2) *the practices* to accomplish the account. These two aspects are found to determine whether only one account is provided in the sequence (either in base sequence or in post-expansion), or whether more accounts are provided in the sequence, which, as a consequence, leads to a prolonged post-expansion. We describe sequences in which only one account is accomplished by one of the participants as *single account sequence*, and account sequences in which more accounts are provided either by one participant or by both speakers as *multiple account sequences*. The differentiation in the build-up between these two sequences, as overviewed in figure 1, will become apparent in the discussion of sequence structures in the following subsections.

Single account sequences				Multiple account sequences			
Preferred SPP		Dispreferred SPP		Dispreferred SPP			
Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker
Accepting (prior/) in response to account		Accepting in response to account		Recycling in response to account		Accounting in response to account	

Figure 1. Overview over the possible build-up of the account sequences

The structures of *single account sequences* will be discussed in subsection 5.4.1. It will be shown how and in which sequential position one of the participants produces an account and how the type of SPP (either an acceptation, a rejection or a counter) influences the sequential structure. Although the differences between these sequences will be elaborated on, in all single account sequences the account is immediately followed by sequence completion, possibly in the form of (or preceded by) acceptance actions of the other participant.

However, sequences with a rejection or a counter in the SPP are found to potentially lead to multiple account sequences as well, when the initial account of one of the speakers is not met with the accepting actions of the other speaker. Since detailed analysis reveals the response to an account is highly dependent on the *practices* by which the account is accomplished in a sequence with a dispreferred SPP, the different action formation practices of children's accounts are discussed first in subsection 5.4.2., before the different structures of *multiple* account sequences will be shown in the final subsection (5.4.3). In these multiple account sequences either

one of the participants produces more than one account or both participants produce one or more accounts, as will be demonstrated.

5.4.1 Single account sequences

Single account sequences are referred to as instances in which only one of the participants provides one account. This account immediately leads to sequence completion, possibly in the form of immediate accepting actions (that on some occasions even precedes the account) by the other participant. Young children are found to accomplish single account sequences in sequences in which the second speaker accomplishes either a *dispreferred* SPP or a *preferred* SPP in response to the first speaker's FPP.

The latter single account sequences are first discussed (5.4.1.1). In total, four single account sequences are found that involve a *preferred* SPP. In three sequences the account is produced by a first speaker; in the remaining sequence it is produced by a second speaker. In the first sequence a first speaker supports a FPP with an account in the FPP. In the second sequence a first speaker supports a FPP with an account in the third position after a minimal agreement of the second speaker. In the third sequence a first speaker supports a FPP with an account in an insertion sequence after a clarification question from the second speaker. In the fourth and most notable sequence the second speaker accounts for the FPP of the first speaker, in support of the own acceptance in the SPP.

5.4.1.1 Single account sequences with a preferred SPP

Both the first and the second speaker may provide an account in sequences with a preferred SPP. In three distinct sequences the first speaker was found to account the FPP. In a fourth sequence the second speaker provides an account in the SPP, while accepting the FPP of the first speaker. These types will be discussed in this section. Figure 2 shows the position of the build-up of these types of account sequences in overview.

Single account sequences				Multiple account sequences			
Preferred SPP		Dispreferred SPP		Dispreferred SPP			
Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker
Accepting (prior/) in response to account		Accepting in response to account		Recycling in response to account		Accounting in response to account	

Figure 2. Build-up of single account sequences with a *preferred SPP* in overview

The first account sequence is the most straightforward: the first speaker provides an account as part of the FPP turn, immediately followed by an acceptance of the second speaker in the SPP. This sequence is illustrated in excerpt (1), in which

children create a bakery.

(1)

		Speaker	Transcript	Dutch original
10	→	G2 FPP +	it needs to be closed	het het moet dicht
11		account	(writings also inside),	(schrijven ook erin),
12			closed (.) because when	dicht (.) want als deze
13			this is completely full	helemaal vol is *((wijst*
14			*((points towards a plate*	*op plaat op tafel))* dan
15			*on table))* then it can	mag hij weer open, ja?
16			be open again, yes?	(.) °( )°
17			(.)°( )°	[*((stapt opzij))*
18			[*((steps aside))*	
19	→	G1 SPP	[this pass is closed for	[deze pas is even
20			now	gesloten
21		G2	*((while she pushes the*	*((terwijl ze samen met*
22			*cupboard on wheels with*	*G1 de rolkast duwt))*
23			*G1))*	

In lines 10-16, G2 *proposes* that the shop, which is demarcated by the cupboard, must be closed. In this turn with the *proposal* in the FPP she also *accounts* for that proposal, packaged with a tag-question 'yes?' By doing so, she makes very clear that *acceptance* is the preferred response. In the next turn, G1 verbally *accepts* the proposal by specifying G2's idea for the bakery to be closed and declares 'this pass, between two cupboards, is closed' (lines 19-20). Therewith, the initiated project is finished within two turns. Subsequently, both children accomplish the goal and push a cupboard towards the pass (lines 21-23).

However, in many instances in our data, the first speaker provides an account in that position, while the second speakers do not explicitly accomplish a preferred SPP. Instead, they do not respond at all, as demonstrated in excerpt (2), in which children search for some possible traces of the lost classroom bird doll.

(2)

		Speaker	Transcript	Dutch original
1			(2.0) *((children*	(2.0) *((kinderen*
2			*discover Styrofoam))*	*ontdekken piepschuim))*
3	→	B1 FPP +	we truly need to take	echt dit moeten we
4		account	this, because this is, I	allemaal pakken want dit
5			think, also a trace	is denk ik ook een spoor
6			*((B1 is collecting the*	*((B1 verzamelt het*
7			*Styrofoam))*	*piepschuim))*
8		B2	O:H LOOK! *((holds a*	O:H KIJK! *((houdt een*
9			*piece of wood with*	*stuk hout met*
10			*barbed wire))*	*prikkeldraad eraan*
11				*vast))*
12		B3	YES WITH THAT WE CAN-	JA DAAR MEE KUNNEN WE-

Further investigation led us to the conclusion that the distribution of these (lack of) responses is determined by the accounting practices. When the account in the first position contains a tag-question, the second speaker provides a preferred SPP explicitly, as demonstrated in excerpt (1). However, when the account in

that position lacks a tag-question, the second speaker does not respond at all, as illustrated in excerpt (2), in which B1 accounts for his proposal to take the Styrofoam as well (lines 3-5). This pattern is found only for accounts in this sequential position. Furthermore, as can be concluded from the continuation of the group work in this and other cases, the lack of a preferred SPP is not noticeably absent for young children. The first structure is summarized in table 1. Moreover, to be complete, this structure is found for instances with either a *proposal* or an *assertion*, such as the FPP.

Table 1. Account sequence 1: first speaker is accounting in the FPP

			Basic structure	Alternative structure
1	→	A	FPP + account (+ tag-question)	FPP + account
2		B	Preferred SPP	#

In a second type of account sequence, the first speaker formulates an account (lines 10-18) in the third turn, after a minimal agreement of the second speaker as the SPP in response to the first speaker's FPP (lines 7-9), as shown in the following excerpt (3). In this event, two children construct a time machine for which they can choose the materials. At the start of this excerpt, B2 holds a hose.

(3)

		Speaker	*Transcript*	*Dutch original*
1		B1	*((takes alarm from the*	*((pakt wekker uit de bak*
2			*bin with possible*	*met mogelijke*
3			*materials))* this clock	*materialen))* deze klok
4			can be added	kan er wel bij
5		B2	huh? *((still manipulates*	huh? *((is nog bezig met*
6			*the hose))*	*de slang))*
7		B1 FPP	this clock, hey bas,	deze klok, hey bas, deze
8			this clock can be added	klok kan er wel bij
9		B2 Min.agree.	yes	ja
10	→	B1 Account	is a time machine, he	is een tijdmachine,
11			also needs the time	ndnd, hij moet ook de
12			*((moves his hands in the*	tijd hebben *((beweegt*
13			*bin))*	*handen in de bak))*
14			(4.0)	(4.0)
15			but this can't, because	maar deze kan niet, want
16			than it keeps spinning	dan gaat ie draaien
17			*((turns the coupling of*	steeds *((draait aan de*
18			*the hose))* and then it	*koppeling van de slang))*
19			slips off *((holds up*	en dan gaat ie eruit
20			*both the hose and the*	*((houdt de slang en de*
21			*coupling))*	*koppeling omhoog))*

In lines 7-8, B1 repeats his earlier *assessment* to add the clock to the time machine. Following B2's *minimal acceptation*, the first speaker provides support for his FPP (lines 10-13). As demonstrated, it is found that first speakers provide an account, even after the realization of the projected response in the form of minimal

agreement. Most likely, first speakers treat these *minimal agreements* as *weak agreements* (Davidson, 1984; Pomerantz, 1975, p. 82) and as being possibly rejection-implicative. Reformulating their FPPs, supported with an account, may indicate *'that first speakers [take] this possibility of rejection as coming from some inadequacy in the initial version'* (Davidson, 1984, p. 112). The second speaker (B2) does not elaborate on the first speaker's (B1's) account of the FPP but starts a new topic after a long pause (lines 14-21). The fact that these sequences are not concluded with a clear observable SPP, even after the accounted redoing of the FPP, is not noticeably absent for young children, implying that this situation is nonproblematic for them. This sequence is found in instances starting with a *proposal* or an *assessment* in the FPP as schematized in table 2.

Table 2. Account sequence 2: first speaker accounting in the third turn

1		A	FPP
2		B	Minimal agreement
3	→	A	Account of FPP
4			#

In the third structure, an account of the first speaker as a SPP of an insertion sequence, is found subsequent to the second speaker's *request for clarification*, as shown in excerpt (4), in which children draw clothes that might keep the classroom cuddles warm when they are lost in a cold country. In addition, in this instance, the pending SPP of the basic sequence is not provided but is not noticeably absent for the speakers.

(4)

		Speaker	*Transcript*	*Dutch original*
1		B2 FPP	uhm: may I color these	uhm: mag ik deze alvast
2			already? *((colors))*	wat inkleuren?
3				*((kleurt))*
4			(3.0)	(3.0)
5		B1 Solicit	why do you do that?	waarom doe je dat?
6	→	B2 Account	just seems nicer to me	gewoon leek me wat
7				leuker
8			(2.0)	(2.0)
9		B2	uhm: what shall I do	uhm: wat zal ik nou gaan
10			next? HANDS!	doen? HANDJES!

In the FPP, B2 asks permission to color some clothes or materials; meanwhile, he matches his request with deeds (lines 1-3). B1 starts an insertion-sequence. With his solicit, he tries to obtain more information before implementing the pending SPP (line 5). B1 focuses on his clarifying question only on B2's coloring action and treats it as an *assertion*. This solicit in the insertion sequence is met with B2's account in lines 6-7, which, in turn, does not lead to an observable response of B1: the second pair part of the basic sequence is absent. After a long pause (2.0), B2 starts a new

topic (line 6).

The third type of account sequence is schematized in table 3. Children construct this structure with at least an assertion or an assessment as the FPP. Additionally, in this instance, sequences are concluded without a clear SPP. Instead, children start a new topic or silently continue their own work. In all instances in the data corpus, the pending SPP after an insertion-sequence was not noticeably absent.

Table 3. Account sequence 3: first speaker accounting in an insertion-sequence

1		A	FPP
2		B	Request for clarification
3	→	A	Account of FPP
4			#

Thus far, three structures are presented with the first speaker's account to support the FPP, leading to (1) the second speaker's acceptance of the FPP or (2) an ultimately undetermined response of the second speaker. Remarkably, second speakers are also oriented to provide accounts themselves, even when they have provided the preferred SPP. In this fourth type, second speakers formulate an account in combination with a preferred response to a FPP, as illustrated in excerpt (5). In this event, four children search the schoolyard for possible traces of the lost classroom bird cuddle.

(5)

		Speaker	*Transcript*	*Dutch original*
10		B2 FPP	this is truly very	dit is echt heel
11			dangerous	gevaarlijk
12	→	B3 SPP+	yes, soon you will fall	ja straks val je nog
13		Account	somewhere in and you got	ergens in en ben je dood
14			dead or something like	ofzo
15			that	
16		B1	LOOK! another trace	KIJK! nog een spoor
17			*((keeps up a stone))*	*((houdt steen omhoog))*

B2 *assesses* their searching actions as dangerous (lines 10-11), which functions as the FPP of the account sequence. B3 agrees in the SPP, which concludes the sequence. However, he does more in the SPP. With his description of what might happen, he accounts for the dangerous aspect of their search (lines 10-15). This fourth account sequence is found at least in instances with an *assertion*, an *assessment* or a *request* as the FPP and can be characterized as in table 4.

Table 4. Account sequence 4: second speaker accounting in the SPP

1	A	FPP
2	B	Preferred SPP + account for SPP

5.4.1.2 Single account sequences with a dispreferred SPP

In this subsection single account sequences are discussed in which the second speaker opposes the FPP of the first speaker, by accomplish a dispreferred SPP in response to a FPP. We found two distinct structures, depending on the sequential position of the account: (1) The first speaker may provide an account in the third turn to get the launched project in the FPP realized in response to a dispreferred SPP that is not accounted for. The first speaker's account is met with an accepting action of the second speaker, implying a change of stance. (2) The second speaker may accompany the dispreferred SPP, either a rejection or a counter, with an account. This action always results in an acceptance of the rejection or counter by the first child in the third turn, implying a change of stance, without any attempt to get the launched project to be realized. Figure 3 shows the position of the build-up of these types of account sequences in overview.

Single account sequences				Multiple account sequences			
Preferred SPP		Dispreferred SPP		Dispreferred SPP			
Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker
Accepting (prior/) in response to account		Accepting in response to account		Recycling in response to account		Accounting in response to account	

Figure 3. Build-up of single account sequences with a *dispreferred SPP* in overview

In the first type, first speakers provide an account to get the launched project to be accomplished when they are confronted with a dispreferred SPP of second speakers. By doing so, the first speaker supports the FPP in the third turn, leading to the second speaker's accepting actions with that account and the stance it adopts, implying sequence completion.

In excerpt (6), this structure regarding a *rejection* of the second speaker (B1) in the SPP (line 3) is shown. In this excerpt, G1 and B1 make a chair of wooden blocks.

(6)

		Speaker	*Transcript*	*Dutch original*
1		G1 FPP	now (I'll) sit on it	(ik ga) er nu eens op
2			once =	zitten?=
3	→	B1 SPP	=NO STO::P	=NEE STO::P
4	→	G1 Account	NO, but I may sit on it	NEE, maar ik mag ook
5			once as well	weleens op zitten
6		B1 Acceptance	go *((and steps aside))*	ga *((en stapt opzij))*
7			(0.6) *((G1 kneels in*	(0.6) *((G1 knielt voor*
8			*front of the chair))*	*de stoel))*

In lines 1-2, the first speaker (G1) announces that she will sit on the chair. This proposal is rejected by B1 in line 3. G1 rejects this dispreferred SPP and supports her

own FPP with an account in the third turn (lines 4-5). Then, B1 accepts this account and the stance it adopts. This response implies not only a change in his stance but also a completion of the sequence.

Although, as a dispreferred SPP, a counter differs from a rejection, it may result in a similar structure, as excerpt (7) exemplifies. In this event, two girls look for photos in books representing historical situations or products.

(7)

		Speaker	*Transcript*	*Dutch original*
1		G2 FPP	an old factory	een ouwe fabriek
2		G1	coo::::l	koe::::l
3		G2	look (1.0) , I think an-	kijk (1.0) dat is denk
4			no -	ik een- nee dat is-
5	→	G1 SPP	an compu- no, this is no	een compu- nee dit is
6			fac[tory::] this is	geen fab[riek::] dit is
7			work::	werruk::
8		G2 Rej SPP +	[yes!] no this is not	[jawe-] nee dis
9	→	account	work, this is a real	geen werruk, dis een
10			fac[tory (.)] look,	echte fab[riek (.)]
11			those jackets (.) those	kijk, die jasjes (.) die
12			come out of a factory	komen uit een fabriek
13		G1 Acceptance	[oh yeah::] yes,	[oh ja::] ja,
14			they:: make such jackets	zulke jasjes maken ze::
15		G2	yes	ja

G2 asserts that she sees an old factory in line 1. Her assertion functions as the FPP of the account sequence. After a positive assessment and an attempt to supplement the description of the photo (lines 2-4), G1 counters the FPP in lines 5-7. In the third turn, G2 rejects this dispreferred SPP (line 8-10) and reinforces her claim ('a real factory') in combination with an account (lines 10-12). G1, then, explicitly accepts the account and the stance it supports by specifying G2's account with her second turn component 'they make such jackets' (lines 13-14).

As illustrated, the acceptance by the second speaker of the first speaker's account in the third turn implies a change in the second speaker's stance and a completion of the sequence. This structure, summarized in table 5, is found in sequences with either a rejection or a counter of the second speaker in the SPP in response to the first speaker's FPP. In case of a counter, the first speaker's account in third position may be in support of the FPP or against the SPP. Detailed analysis reveals children may start this structure with an *assertion*, an *assessment*, a *proposal*, or a *physical action* as the FPP.

Table 5. Account sequence 5: first speaker's account in the third turn in response to a dispreferred SPP

1		A	FPP
2		B	Request for clarification
3	→	A	Account of FPP
4			#

Another structure is found in which the second speaker accompanies the dispreferred SPP with an account in response to the first speaker's FPP. Then, the first speaker responds with accepting actions, implying sequence completion in third position. Excerpt (8) illustrates this sequence for an *accounted rejection* in the SPP. In this event, two children search in books for pictures that are indicative of situations and machines from the past.

(8)

		Speaker	*Transcript*	*Dutch original*
1			*((G2 has turned the*	*((M2 heeft de bladzijde*
2			*page))*	*omgeslagen))*
3		G2	look (1.0) what are	kijk (1.0) wat zijn dit
4			these for ladies?	voor dames?
5		G1 FPP	those are the police-men	dat zijn de polities
6	→	G2 SPP +	no:::, it truly doesn't	nee:::, het lijkt er
7		account	look alike *((almost*	niet echt op, hoor
8			*turns the page))*	*((slaat bijna bladzijde*
9			[(letter]boxes in the	*om))* [(brieven]bussen in
10			(nighters)	de (nachters)
11		G1 Acceptance	[it i-] no	[het i-] nee
12			*((they take a look on*	*((ze kijken naar de*
13			*the next page))*	*volgende bladzijde))*

In the FPP, G1 asserts that the picture shows policemen, in response to G2's question (lines 3-5). The second speaker (G2) rejects this FPP and provides an account for his dispreferred SPP (lines 6-10). The first speaker's alignment, designed with a negated agreement token (line 11) as a result of the negative statement as the FPP (lines 6-7), implies that the sequence is concluded in the third turn. The first speaker does not make any effort to get the initiated project realized, when she agrees with the accounted rejection. However, G1 changes her initial stance.

A similar sequence is found when the second speaker responds with an *accounted counter* in the SPP to the FPP of the first speaker. Again, first speakers immediately accept the opposition in the third turn, as demonstrated in excerpt (9), in which children draw an explosion in the laboratory of Professor Knowhow.

(9)

		Speaker	*Transcript*	*Dutch original*
1		G1 FPP	so *((taps on the paper))*	zo *((tikt op het*
2				*papier))*
3	→	B1 SPP +	no Nika has to sit also	nee Nika moet hier ook
4		account	here, otherwise you draw	zetten anders teken je
5			it upside down	het op de kop
6		G1 Acceptance	oh yes	oh ja
7			(1.0) *((G1 takes chair))*	(1.0) *((M1 pakt stoel))*

In lines 1-2, G1 taps on the paper with her pencil. Her short 'expression' allows her physical action to be treated by B1 as an assertion to start drawing from this location at the desk. B1 rejects it and proposes an alternative location, with an account in the same turn (lines 3-5). In third position, G1 explicitly accepts B1's

account and his position (lines 6-7), which leads to sequence completion.

The accepting actions of the first speaker in third position after an accounted dispreferred SPP of the second speaker implies a withdrawal of the original FPP. Remarkably, without any attempt to get the projected FPP realized, first speakers change their stances by aligning with the account and the dispreferred SPP in these instances. This sequence is schematized in table 6 and is found to be launched with an *assertion*, an *assessment*, a *proposal*, or a *physical action* as the FPP.

Table 6. Account sequence 6: an accounted dispreferred SPP

1		A	FPP
2	→	B	Dispreferred SPP + account
3		A	Acceptance

5.4.2 Accounting practices

As discussed in the prior section, an account, provided by either the first or the second speaker, may immediately lead to accepting actions and, as a consequence, to sequence completion. As argued, these sequences are referred to as single account sequences. As has been shown, this pattern applies to sequences with either a preferred or a dispreferred SPP.

The analysis, however, unraveled that accounts in sequences with a dispreferred SPP not always lead to sequence completion in the form of accepting actions. In those instances, the sequences were extended and one or more postsequences may follow. It is found that the *action formation practices* of the account, provided by either the first or the second speaker, determine whether these initial accounts are accepted by the other speaker. For that reason, the different action formation practices for accomplishing accounts will be discussed first in this section, before discussing the structures of multiple account sequences (5.4.3).

The action formation practices that are found to influence the success are the *semantics* of the account (the propositional content of the accounting action) and the way the account is *packaged.* These two aspects determine how an account is responded to and whether the sequence is concluded. Accounts leading to sequence completion in the next turn will be referred to as *successful*, whereas accounts that are not accepted immediately and lead to a reignition of the sequence, in which one or more accounts follow, are referred to as *unsuccessful*. Therefore, the success of an account given by one of the speakers determines whether the discussion results in a single or a multiple account sequence. In the next two subsections, the action formation practices for successful and unsuccessful accounts are discussed in more detail. For clarity reasons, we distinguish between semantics and packaging in describing the action formation practices of both successful and unsuccessful accounts.

5.4.2.1 Successful accounts

The propositional content of successful accounts is directly verifiable in nature. In their successful accounts, children refer to either *an undesired consequence* of an action (excerpts (10) and (11)) or *to a joint agreement* (excerpt (12)). An important feature of both is that the statement about the referent can directly be proven or be verified upon by any of the speakers.

Semantics: Directly verifiable accounts

Successful accounts of young children refer to immediately verifiable observable phenomena. These accounts may support their own positions by describing an *undesired consequence* ('or else' or 'but then') for the group, implicating the necessity of the actions they support, as excerpts (10) and (11) show. These accounts appeal to the needs of the group to produce qualitatively good work.

(10)

3	→	B1	no Nika has to sit also	nee Nika moet hier ook
4			here, or else you draw	zetten anders teken je
5			it upside down	het op de kop
6		G1	oh yes	oh ja

(11)

9	→	B1	no but then the house is	nee maar dan is het huis
10			upside down	on ne kop
			((9 lines omitted, where children draw individually))	*((9 regels verwijderd, waarin kinderen individueel tekenen))*
20		B2	[after	[daarna mag
21			that, you may on my	jij op mijn stoel
22			chair	

Other successful accounts may *refer back to earlier agreements* made in the group regarding the division of labor. By accomplishing these accounts, children may underscore that an action carried out by one of the speakers falls short of the group norm, as excerpt (12) illustrates. In this excerpt, B2 rejects G's action and supports his dispreferred SPP with a successful account (lines 9-10), leading to a different action of G, implying that she accepts B2's stance (lines 11-14).

(12)

7		G1	but actually I should	maar eigenlijk moet ik
8			here because	hier want
9	→	B2	no: because I [must	nee: want ik [moet pr]of
10			pr]ofessor know-how	essor knowhow
11		G1	[wait a	[wacht
12			second] *((brings her arm*	even] *((schuift haar arm*
13			*under B2 and starts*	*onder B2 door en begint*
14			*drawing))* I think I	*te tekenen))* ik heb
15			marked your shirt, but	volgens mij op jouw
16			yes (.) sorry	shirt getekend maarja
17				(.) sorry

Packaging: evidentials and/ or intensifiers

In many cases, participants design their successful accounts with *evidentials.* By using evidentials, which is a type of sensory evidence for the position of a participant (such as 'look'), participants underscore that these accounts are empirical in nature, in the sense that the support given is concrete and directly observable, as excerpts (13) and (14) demonstrate. In excerpt (13) the first speaker (G2) responds to the counter as a dispreferred SPP with a rejection of the counter and a reformulation of her FPP before defending it with an account designed with an evidential. The build-up of that account is similar to B2's account in excerpt (14). However, in this case it defends B2's rejection as a dispreferred SPP in lines 7-8.

(13)

8		G2	[yes!] no this is	[jawe-] nee dis
9			not work, this is a real	geen werruk, dis een
10			fac[tory (.)] look,	echte fab[riek (.)]
11	→		those jackets (.) those	kijk, die jasjes (.) die
12			come out of a factory	komen uit een fabriek
13	→	G1	[oh yeah::]yes,	[oh ja::] ja,
14			they:: make such jackets	zulke jasjes maken ze::

(14)

5		B1	*((folds sign backwards))*	*((vouwt teken naar*
6				*achter))*
7		B2	no-o:, it shouldn't be	nee-hee, zo moet dat
8			like that	niet
9			(3.0)	(3.0)
10	→		look *((the cap falls*	zie *((de pet valt uit*
11			*apart))*, then that will	*elkaar))*, dan gaat dat
12			disappear	weg
12			[(1.0)	[(1.0)
13		B1	*[((sticks paper only on*	*[((plakt het papier nu*
14			*front side now))*	*alleen aan de voorkant))*

Young children not only design successful accounts with evidentials but also reinforce their support with intensifiers, i.e., words that make adjectives stronger. In our data we found intensifiers, such as 'always', 'truly', 'never' or (variances of) 'very'. Excerpt (15) demonstrates such a variant. Here, B2 defends his rejection of B1's hypothesis in the dispreferred SPP with an account in which he asserts that the bird doll is 'way too' big (lines 6-7). That B1 does not elaborate on his FPP or on the SPP after G1's topic switch (lines 8-10), implies his withdrawal from the discussion and his acceptance of the accounted SPP. In excerpt (16), G1 backs up her correction of G2's action (lines 5-7) with an account in which she claims gluing things together 'always' needs to be done in the right order, before she provides her counter (lines 16). The girls make 'grass' of green paper.

(15)

3		B1	maybe uh::: Raai de	misschien is uh::: Raai
4			Kraai is splashed in	de Kraai in de bekertjes
5			the cups	geplonst
6		B2	no, impossible, he is	nee dat kan niet, hij is
7	→		way too (.) [bi::g]	veel te (.) [groo::t]
8		G1	[small] green clay,	[klein] groene klei,
9			blue clay and (0.4)	blauwe klei en (0.4)
10			[how should I know	[weet ik veel

(16)

5		G1	*((looks at G2))* ho ho ho	*((kijkt naar G2))* ho ho
6			ho::: *((walks to G2))*	ho ho ho::: *((loopt naar*
7				*G2))*
8			(3.0) *((takes away the*	(3.0) *((pakt lijm van G2*
9			*glue of G2))*	*af))*
10			you shouldn't <u>just</u> do	dat moet je niet <u>zomaar</u>
11	→		that (0.2) you always	doen (0.2) dat moet je
12			have to do it in the	altijd in de goede
13			right order	volgorde doen
14			(6.0) *((G1 folds the*	(6.0) *((G1 vouwt het*
15			*paper on a particular*	*papier op een bepaalde*
16			*way))*	*wijze))*
17			this needs to be cut in	deze moet dan doormidden
18			half1	
19		G2	*((cuts the paper, like*	*((knipt het papier,*
20			*G1 showed))*	*zoals G1 voordeed))*

5.4.2.2 Unsuccessful accounts

In contrast to *successful accounts*, *unsuccessful accounts* lead to responses other than acceptances; therefore, they reignite the discussion. The propositional content of unsuccessful accounts is either *personal, normative* or *tentative* in nature, as will be displayed in the examples.

Semantics of personal, normative and tentative accounts

Personal accounts refer to (the lack of) personal competencies (excerpt (17)) or personal (dis)likes (excerpt (18)) of either the first or the second speaker. These accounts are inherently subjective, as the speaker's own perspective serves as grounds for either the FPP or the SPP, as seen in the following instances.

(17)

20	→	G	but I can't draw that it	maar dat kan ik helemaal
21			at all (1.8) I just can	niet tekenen (1.8) ik
22			only draw a zoo	kan alleen maar een
23				dierentuin tekenen
24			(0.8)	(0.8)
25		B	but that's something ↑I	maar dat kan ↑ik weer
26			can't draw!	niet tekenen!

(18)

18	→	G1	yes, you can also do	ja je kan ook slingers
19			garlands, because once I	doen, want ik heb al
20			already did about making	eens gedaan over
21			garlands	slingers maken
22		B2 Re-FPP	then these and *((points*	dan deze en *((wijst naar*
23			*to the same pictures as*	*dezelfde plaatjes als*
24			*first))*	*eerst))*

Normative accounts refer to behavioral obligations and either support the appropriateness of the speaker's own behavior or justify criticizing the appropriateness of the actions of the other participant. These accounts underscore a breaking of normative rules related to expected behavior, as excerpt (19) illustrates, in which G refers to an implicit rule 'you may sit where your paper is lying'. These accounts, referring to behavioral obligations, are unsuccessful. When these rules were not jointly established, as is the case in successful accounts (such as in excerpt (12)), the strength or the applicability of the rule for that situation is discussed.

(19)

16	→	G	[but I'm sitting here,	[maar ik zit hier, want
17			because here is my	hier zit mijn papiertje=
18			paper=	
19		B	=no, here [(lay-)	=nee hier [(la-)

Tentative accounts may refer to future possible consequences of the proposed action that may happen (excerpts (20) and (21)). These consequences cannot directly be proven or verified, which make them unsuccessful. Additionally, they are inherently unsuccessful because different future consequences exist for consideration.

(20)

20	→	G2	=yes, but soon it will	=ja maar, straks komt
21			come=	ut=
22		G1	=not at all	=nee hoor

(21)

20	→	G1	well, I like this	nou ik vind deze beter,
21			better, because if he	want als hij struikelt
22			stumbles and falls on	en op zijn hoofd valt,
23			his head, he <u>just</u> hurts	doet ie zich gewoon
25			himself=	<u>pijn=</u>
26		G2	=yes but if he runs-	=ja maar als ie hol-
27			without cap having (.)	zonder pet heeft (.) en
28			and he- h and he uh:	hij h- en hij uh: valt
29			falls very hard on his	heel hard op zijn hoo-
30			hea-ead (.) then he	oofd (.) dan heb hij wel
31			actually has a	een hersenschudding
32			concussion	

Packaging of personal, normative and tentative accounts

In personal accounts children mostly use 'I' to express the subjective nature of the support, as excerpt (22) indicates, in which the account involves the lack of the personal competencies of B1.

(22)

5	→	B1	no, because I don't	nee, want ik weet niet
6			know what you should	wat je met het witte
7			do with the white	papier moet
8			paper	
9		B2	I do	ikke wel

Normative accounts, in which children refer to behavioral obligations, are often shaped by words as 'have to' or 'should' to indicate that either their own actions meet the norm or that the actions of the other participant fall short of the norm, as excerpts (23) and (24) illustrate.

(23)

5	→	B1	yes, has to	wel, moet even
6			(.)	(.)
7		B2	no (.) go sit on your	nee (.) ga maar op je
8			own chair	eigen stoel

(24)

6	→	G1	no, it shouldn't be like	nee, zo hoort het niet
7			that	
8		B	yes it should=	jawel=

Tentative accounts may be built by words indicating some type of uncertainty, such as 'it looks', as shown in excerpt (25).

(25)

9	→	G1	but it just looks like a	mar dat liket wol op een
10			caterpillar	rups
11		B1	( ) it's just a	( ) ut is gewoan un
12			horse ( ) ( )	hinder ( ) ( )

In most cases, however, children shape tentative accounts by constructing a possible (either positive or negative) future consequence of the proposed action. Additionally, in some instances they use constructions such as 'but then' or 'or else' to describe a consequence. However, in contrast to successful directly verifiable accounts, these possible consequences cannot be verified immediately. The 'but then'-construction is demonstrated in excerpt (26). The illustrated account (lines 16-19) supports B3's proposal to strew seeds to lure the missing classroom bird doll in response to B1's rejection. In addition, even after a tag-question, which indicates that alignment is the preferred response, none of the children respond. In the continuation of this event, the children do not strew seeds, implying that the nonresponse to B3's proposal with the tag-question is negative.

(26)

15		B1	no don't STRE-EW	nee niet STROOI-UN
16	→	B3	YES::: but then he comes	WEL::: maar dan komt ie
17			to pick up the food and	het eten oppikken en dan
18			then we could catch him	kunnen we hem ergens
19			somewhere	pakken
20			(3.0)	(3.0)
21			right?	toch?
22		G1	uhm: peanuts *((B3 and G1*	uhm: pinda's *((B3 en G1*
23			*feel in the bag with*	*voelen in de bak met*
24			*seeds))*	*zaadjes))*

One special tentative accounting practice was apparent in our data, in which children reason from the perspective of a *virtual other* to construct potential (either positive or negative) consequences of a proposal. Interestingly, young children not only design this account *from the perspective of virtual others*, but they also account in this way when these virtual others are *in dialogue with others*, as shown in excerpt (27). In this excerpt, G2 accomplishes this account (lines 38-42) to support her rejection of G1's proposal to choose a fire helmet as a solid alternative for a police officer who has lost his police hat.

(27)

38	→	G2	=but then everyone says	=maar dan zegt iedereen
39			against that fireman o:h	tegen die brandweer o:h
40			I don't have fire oh I	ik heb geen brand oh ik
41			don't have fire. I have	heb geen brand, ik heb
42			fire, I have fire.	brand, ik heb brand
43			[( )	[( )
44		G1	[( ) but then they	[( )maar dan zeggen
45			say °( )° something	ze °( )° tegen jou
46			else to you, he? to you	iets anders he? tegen
47			they also say something,	jou zeggen ze ook weer
48			but I do not [know what	wat, maar ik weet [niet
49				wat

As discussed in this section, the action formation practices of the accounts, such as the propositional content and the packaging, are highly influential in determining the accounts' success. Directly verifiable accounts and/ or accounts containing evidentials or intensifiers may be typified as successful since they easily lead to sequence completion, mostly in the form of an accepting action of the other participant. Accounts designed by these practices are found in single account sequences, as described in section 5.4.1, or as the final account in multiple account sequences. In contrast, unsuccessful accounts lead to responses other than acceptances and result in post-expansions of the sequence. These unsuccessful accounts are *personal*, *normative* or *tentative* in nature and may be designed respectively with 'I', expressing the personal perspective; words indicating that the actions meet or fall short of the norm; or words indicating doubt or constructions laying out possible future (negative or positive) consequences of the proposed action. The last may be designed as a virtual dialogue between virtual others.

5.4.3 Multiple account sequences

In contrast to single account sequences in which one successful account is given, more accounts are provided by either one speaker or by both speakers in multiple account sequences. As mentioned before, multiple account sequences are found only in sequences with a dispreferred SPP of the second speaker in response to a FPP of the first speaker, following *unsuccessful accounts*. Conversely to successful accounts that are met with accepting actions or at least sequence completion, unsuccessful accounts may be responded to with two different response types leading to two distinct structures.

In the first structure with a dispreferred SPP, only one of the speakers provides more accounts, as will be demonstrated in the first subsection (5.4.3.1). This structure is constructed when the other speaker *recycles his own* stance in response to an unsuccessful first account. Subsequently, this recycling response is met with a second account of the accounting speaker, as will be shown.

In the second structure with a dispreferred SPP, both speakers provide one or more accounts, as will be discussed in subsection 5.4.3.2. This structure is accomplished when the other speaker provides *an account in response* to an unsuccessful first account of either the first or second speaker. The action formation practices of this second account are highly influential for the continuation of the sequence. They determine the extent to which the accounts are successful. And as was said before, successful accounts lead to sequence completion, while unsuccessful accounts may result either in alternative proposals or even in a recursive pattern in which both speakers keep accounting, as will be demonstrated.

5.4.3.1 Multiple account sequences: further accounts by one of the speakers

In the first multiple account sequence with a dispreferred SPP, only one of the speakers provides more accounts. This structure is constructed when the other speaker *recycles their own stance* in response to an unsuccessful account. This response leads to a second account of the accounting speaker, which is either the first or the second speaker, depending on the sequential position of the initial account, as will be shown hereafter. Figure 4 shows the position of the build-up of these types of account sequences in overview.

Single account sequences				Multiple account sequences			
Preferred SPP		Dispreferred SPP		Dispreferred SPP			
Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker	Account of first speaker	Account of second speaker
Accepting (prior/) in response to account		Accepting in response to account		Recycling in response to account		Accounting in response to account	

Figure 4. Build-up of multiple *account sequences with recycling in response* to an account, in overview

The build-up of this structure in which the first speaker provides more accounts is demonstrated in excerpt (28). In response to a dispreferred SPP, the first speaker provides an unsuccessful account. The second speaker may respond by recycling the SPP, which leads to a second account of the first speaker. In this event, of which this excerpt is part, three couples sit at a large desk. Each couple must separately make a police hat from paper. In this excerpt, the focus rests on B1 and B2 as a couple. For clarity reasons, each couple has its own glue pot, as agreed upon with the teacher.

(28)

		Speaker	*Transcript*	*Dutch original*
1			*((G1 and a boy from*	*((G1 en jongen uit ander*
2			*another group take glue.*	*groepje pakken lijm. Op*
3		B1/B2(FPP)	*On the desk of B1 and B2*	*de tafel van B1 en B2*
4			*stands their glue pot))*	*staat hun lijmpot))*
5		G1	we have the fullest	wij hebben de volste
6			*((raises her glue pot))*	*((tilt haar lijmpot op))*
7		B2	*((grabs their glue pot)*	*((pakt hun lijmpot))*
8		B4	no, we have the fullest	nee hoor, wij hebben ook
9			too	volste
10		B2 (SPP)	me too *((takes another*	ik ook *((pakt een andere*
11			*glue pot))*	*lijmpot))*
12			(0.2)	(0.2)
13	→	B1 Re-FPP +	no I ha- *((puts hand*	nee ik ha- *((legt hand*
14		account	*back on the glue pot))*	*terug op lijmpotje))* nee
15			no look, we have to	kijk, wij moeten delen
16			share *((raises glue pot,*	*((houdt lijmpot omhoog,*
17			*that already was*	*die al op tafel stond))*
18			*standing on their desk))*	
			((10 lines omitted))	
29		B2 Re-SPP	sure we have to have two	we moeten wel twee
30	→	B1 Re-FPP +	no, look, everybody ha-	nee, kijk, iedereen hee-
31		account	uses just one	gebruikt er maar een
32			(6.0)	(6.0)
33	→	B2	shall we yellow as well?	zullen wij nog geel?
34			*((gets up to pick up*	*((staat op om geel*
35			*yellow paper))*	*papier op te halen))*

The situation at the start of this event and excerpt contains the implicit FPP of the account sequence: B1 and B2 as a couple share their own glue pot standing on their desk, as do the other couples, while they make a police hat (lines 3-4). The assertion of G1, who is working with another child, starts a discussion among all the couples about who has the fullest glue pot (lines 5-9), leading to B2's counter (lines 10-11). He asserts that he personally has the fullest glue pot. B1 treats this assertion as a counter to the non-verbal and implicit FPP (in line 3), as can be understood from his response in the third turn (lines 13-18). The implicit FPP can be traced back to the agreement made with the teacher earlier that each child must share the glue pot within each couple. This agreement implies that the glue pot belongs to both B1 and B2, as was the situation at the start of this excerpt. B1 rejects the presupposition in

the second speaker's (B2's) counter (i.e., he has a glue pot on his own, as do all the other children), while providing an unsuccessful normative account for the FPP in the third turn of the sequence. Now, the second speaker (B2) recycles his counter by explicating the presupposition for it (line 29). This response leads to another account of the first speaker (B1), which is successful and designed with a type of *intensifier* ('everybody') (lines 30-31) in the generalization. After a long pause, B2 withdraws from this discussion, implying his agreement with B1's stance (lines 33-35).

The excerpt above illustrates the structure in which the first speaker provides a second account in response to the second speaker's recycling of the dispreferred SPP. This sequence is launched with at least either a *request* or a *proposal* as FPP, and is schematized in table 7. In all of these instances in the data, the second account in this position is successful. However, it cannot be ruled out that young children may provide an unsuccessful account in this position as well, which will probably lead to another expansion.

Table 7. Account sequence 7: more accounts by the first speaker

1		A	FPP
2		B	Dispreferred SPP
3	→	A	Re-FPP + unsuccessful account
4		B	Re-SPP
5	→	A	Re-FPP + successful account
6		B	Agreement

Second speakers may provide a second account in certain contexts as well. They do so after a reinitiation of the FPP in the third turn by the first speaker, which is a response to a dispreferred SPP in combination with an unsuccessful account of the second speaker, as demonstrated in excerpt (29). In this excerpt, three children must make a joint decision about which two of six party objects (displayed on six pictures) they want to make together.

(29)

	Speaker	*Transcript*	*Dutch original*
1	B2 FPP	*((during teacher's*	*((in de instructie van*
2		*instruction B2 already*	*de leerkracht heeft B2*
3		*mentioned which party*	*al aangegeven welke*
4		*objects he wants to*	*feestobjecten hij wil*
5		*make, while putting his*	*maken, terwijl hij zijn*
6		*hands on those*	*handen op die plaatjes*
7		*pictures))*	*legt))*
8		*((teacher leaves))*	*((LK gaat weg))*
9	G1 SPP	butuh you can also make	maareuh je kan **ek**
10		garlands *((points to*	**slingers maaitse** *((wijst*
11		*that picture))*	*naar dat plaatje))*
12		(2.0)	(2.0)

13		B2 Re-FPP	I want to do thi-these	ik wil di- deze en deze
14			and these *((takes the*	doen *((pakt dezelfde*
15			*same pictures as first))*	*plaatjes als eerst))*
16	→	G1 Re-SPP +	yes, you can also do	ja je kan ook slingers
17		account	garlands, because once I	doen, want ik heb al
18			already did about making	eens gedaan over
19			garlands	slingers maken
20		B2 Re-FPP	then these and *((points*	dan deze en *((wijst naar*
21			*to the same pictures as*	*dezelfde plaatjes als*
22			*first))*	*eerst))*
23	→	G1 account	because then uh- then	want dan uh- dan kan je
24			you can make it with	met rondjes maken
25			rounds	
26			(3.0)	(3.0)
27	→	G1	but can also make a flag	maar kan ook een vlag
28				maken

During the teacher's instruction, B2 already mentioned which objects he wants to make. This statement functions as the FPP (lines 1-7). In lines 9-11, G1 responds with a counter as a dispreferred SPP. B2 does not change his initial stance and recycles his FPP (lines 13-15). But G1 does not abandon her position either. Instead, she repeats her counter and provides also an (unsuccessful) account for it, which is based on personal experience (lines 16-19). In response to that unsuccessful account, the first speaker (B2) reformulates his FPP (lines 20-22). This reinitiation is met with a second unsuccessful account of G1 to support her recycled counter (23-25). This series of recycles comes to an end with a long pause, since B2 does not respond now. This silence is treated as a possible *rejection-implicative*, since G1 follows with a proposal of an *alternative* in lines 27-28. By doing so, she shows that she, as second and opposing speaker, is willing to leave her position. In some instances in the data, however, the second account of the second speaker in this sequential position is successful, leading to the immediate completion of the sequence, mainly in the form of accepting actions of the first speaker.

In sum, in this structure the second speaker provides several accounts. As shown, the first speaker's response to an unsuccessful accounted dispreferred SPP, in the form of a reinitiation of the FPP, creates a context in which the second speaker can provide a second account. Depending on the action formation practices of that second account, the first speaker either agrees with the account and the stance of the second speaker or the first speaker holds the own position. In the latter situation, the second speaker formulates an alternative as indicated in the structure description in table 8. The data show that children launch this structure with at least either an *assertion* or a *proposal*.

Table 8. Account sequence 8: more accounts by the second speaker

			Basic structure	Extended structure
1		A	FPP	FPP
2	→	B	Dispreferred + unsuccessful account	Dispreferred + unsuccessful account
3		A	Re-FPP	Re-FPP
4	→	B	Re-SPP + successful account	Re-SPP + unsuccessful account
5		A	Acceptance	Rejection
6		B	-	Alternative

Thus, structures in which *one of the speakers*, either the first or the second speaker, provides more accounts are found in sequences with a dispreferred SPP and the first (unsuccessful) account is met with a recycling of the other speaker's own stance. This structure is found only in sequences with a counter as dispreferred SPP. When the unsuccessful account of either the first or second speaker is met with an account of the other speaker, a multiple account sequence is constructed in which *both speakers* provide one or more accounts. This pattern will be demonstrated in the next subsection.

5.4.3.2 Multiple account sequences: one or more accounts by both speakers

In the second structure of multiple account sequences, both speakers provide one or more accounts. This structure is constructed when the other speaker provides an account in response to an unsuccessful account of either the first or second speaker in sequences with a dispreferred SPP. Figure 5 shows the position of the build-up of these types of account sequences in overview.

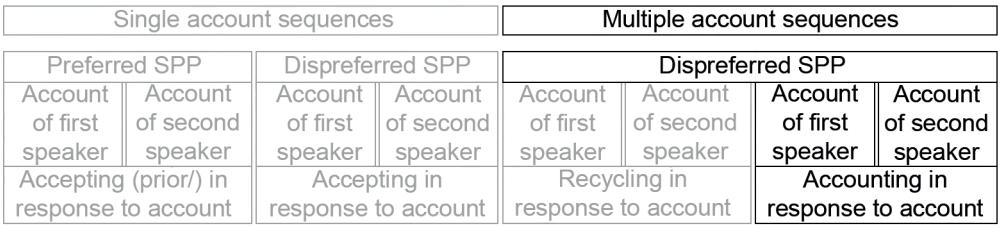

Figure 5. Build-up of multiple *account sequences with accounting in response to an account* in overview

The build-up of this structure, in which first speakers provide the second account, is demonstrated in excerpt (30). First speakers may respond then with their own accounts to an unsuccessful accounted dispreferred SPP of the second speaker. When this account, i.e., the second account in the sequence, of the first speaker is

successful, it leads to sequence completion, possibly in the form of accepting actions by the second speaker. In this excerpt, both B and G claim to sit on a certain place (lines 6-13). The second speaker (G), who does not agree with the nonverbal claims of B (in that he has the right to sit on place X), provides next to her second verbal non-acceptance of B's claim (lines 17-18) an unsuccessful account for her counter (line 16). This account is met with a successful account of the first speaker B to support his FPP (lines 23-25). The next speaker's withdrawal implies the completion of the sequence (lines 26-30). In this event, both children make a sketch of a possible solution, which helps to prevent farm animals climbing in the tree, a problem triggered by the Frisian picture book *'Wêr sit Joazefine'* (Steffensmeier, 2012).

(30)

		Speaker	*Transcript*	*Dutch original*
1			*((both children walk*	*((beide kinderen lopen*
2			*back and forth. At a*	*heen en weer en op een*
3		(FPP)	*certain point they*	*gegeven moment gaan ze*
4			*return to B's side of*	*terug naar 's plek van*
5			*the table))*	*de tafel))*
6		G SPP	*((moves the sketches on*	*((schuift hun*
7			*paper back and forth))*	*individuele ontwerpen op*
8				*papier heen en weer))*
9		B	*((moves [the papers to*	*((schuift [de papieren*
10			*the initial positions))*	*terug op de oude plek))*
11		G	[no-ho:: I'm	[nee-hee:: ik
12			sitting here *((and takes*	zit hier *((en pakt de*
13			*B's chair))*	*stoel van B))*
14		B Re-FPP	*[((B also grabs the*	*[((B pakt de stoel ook*
15			*chair))*	*vast))*
16	→	G	[but I'm sitting here,	[maar ik zit hier, want
17		Unsuccessful	because here is my	hier zit mijn papiertje=
18		account	paper=	
19		B	=no, here [(lay-)	=nee hier [(la-)
20		G	[but we are	[maar we
21			sitting here together↑	zitten hier samen↑
22			(2.0)	(2.0)
23	→	B Successful	yes bu- but I- [my paper	ja ma- maar ik- [mijn
24		account	was here first so	papiertje was hier eerst
25				dus
26		G	*[((takes*	*[((pakt*
27	→		*her own paper, turns to*	*haar eigen papiertje en*
28			*the other side,*	*draait andere kant op,*
29			*stands up, walks and*	*staat op, loopt weg en*
30			*'falls' on the floor))*	*'valt' op de grond))*
31		B	huh? *((and looks at G))*	huh? *((en kijkt naar G))*

The initial position of the papers (lines 1-5) and B's nonverbal actions of returning his paper to the initial position (lines 9-10 and 14-15) function as (re-initiations of) the *FPP*, which implicitly show that his position at the table is still the location where his paper was lying initially. G meets the (re-initiations of the) FPP with counters and an accounted *counter* (lines 6-8, 11-13 and 16-18). Her unsuccessful account 'I'm sitting here, because my paper is here' refers to a debatable normative

rule. This account is met with a successful *account* of the first speaker (B) in support of his FPP (lines 23-25). In lines 26-29, the second speaker (G) withdraws, which implies a sequence completion. Although the first speaker's (B) account seems to be unsuccessful at first, being orientated on the following normative and disputable rules (1) you may sit where your paper is located and (2) the first location of the paper leads in the implementation of the first rule, it still functions as a successful account. Possibly it is successful and convincing for young children since B traces back to the implicit earlier agreement addressing their seating 'but my paper was here first' (lines 23-24). Such an earlier agreement between the children is direct verifiable, as demonstrated in 5.4.2.1.

The action formation practices of the second account in this sequential position is found to be highly influential for the continuation of the sequence. As shown in the prior excerpt, a successful account leads to sequence completion. Detailed analysis, however, reveals that an unsuccessful account may result in an unambiguous continuation, as demonstrated in excerpt (31). In this excerpt, three children make a crown for the Queen, by decorating it with triangles (points) and circles (rounds).

(31)

		Speaker	*Transcript*	*Dutch original*
1			*((G1 and B are working*	*((G1 en B werken naast*
2			*beside each other))*	*elkaar aan tafel))*
3		B FPP	look we already got one	zie hebben we al één
4			point	punt
5			(0.4)	(0.4)
6	→	G1 SPP +	no, it shouldn't be like	nee, zo hoort het niet
7		unsuccessful	that	
8		account		
9		B	yes it should=	jawel=
10		G1	=no=	=nee=
11	→	B Re-FPP +	=I cannot make other	=ik kan geen andere
12		unsuccessful	points °so° *((and*	punten maken °dus°*((en*
13		account	*continues))*	*gaat weer verder))*
14			(1.4)	(1.4)
15	→	G1	shall I just he- *((and*	zal ik je er even mee
16			*puts read band on her*	*((en doet de rode band*
17			*head and walks to the*	*om haar hoofd en loopt*
18			*teacher))*	*naar de leerkracht))*

In lines 3-4, B *asserts* he has finished making a point, which functions as the FPP of the account sequence. After a short pause, G1 overtly rejects this claim and supports this dispreferred SPP with an unsuccessful account reflecting her normative idea about the way a point should be made (lines 6-7). B does not leave his stance, as appears from the post-expansion launched. In this example the post-expansion starts, as it often does in children's interaction, with a yes-no-exchange (lines 9-10), which is simply a reinitiation of the FPP and a repetition of the dispreferred SPP. Then, after this short *series of inversions* (Maynard, 1985), the real defense of B starts. As

first speaker, he supports his own claim with an unsuccessful account (lines 11-13), concerning his reflections about (the lack of) his personal competencies, and G1 does not agree. Instead of agreeing, G1 *offers to help him*, after a pause. However, with her impetus to find a solution she still tries to realize her own stance (line 15). By doing so, she rejects not only B's initial position but also the account supporting his assertion. However, in the following, she walks to the teacher to discuss some issues around making the band on which she works. Therefore, this practice allows no clear joint completion of the discussion. The continuation of the interaction following this second unsuccessful account is unambiguous. The turn design indicates that the proposal of an alternative or a compromise was intended. However, in all these instances, the continuation of the participants did not clarify how this action was intended or treated.

Nevertheless, both excerpts demonstrate the action formation practices of the second account influences the continuation of this sequence. This structure, in which the first speaker accounts to support the FPP in response to an accounted dispreferred SPP of the second speaker, is summarized in table 9. This structure is found in sequences launched by either an assertion or a proposal.

Table 9. Account sequence 9: first speaker's account in response to an accounted dispreferred SPP

			Basic structure	Extended structure
1		A	FPP	FPP
2	→	B	Dispreferred SPP + unsuccessful account	Dispreferred SPP + unsuccessful account
3	→	A	Re-FPP + successful account	Re-FPP + unsuccessful account
4		B	Acceptance	Unambiguous continuation

The structure, in which the second speaker provides the second account of the sequence to obtain acceptance for the dispreferred SPP after an unsuccessful account of the first speaker in support of the FPP, is demonstrated in excerpt (32). In this excerpt, both children must first agree about the type of environment the missing classroom cuddle would be in and second about how they want to reconstruct that environment.

(32)

	Speaker	*Transcript*	*Dutch original*
1	G	I already know something	ik weet al iets hoor
2	B	what then? but ↑I also	wat dan? maar ↑ik moet
3		have to like it	het ook leuk vinden
4		(2.2)	(2.2)

5		B	↑what do [you like?	↑wat vind [jij leuk?
6		G FPP	[the zoo	[de dierentuin
			((9 lines omitted))	*((9 regels verwijderd))*
16		B SPP	NO dude (0.5) the	NEE jongen (0.5) het
17			restau↑rant!	restau↑rant!
18		G	yes	ja
19			(4.5)	(4.5)
20	→	Re-FPP +	but I can't draw that it	maar dat kan ik helemaal
21		unsuccessful	at all (1.8) I just can	niet tekenen (1.8) ik
22		account	only draw a zoo	kan alleen maar een
23				dierentuin tekenen
24			(0.8)	(0.8)
25	→	B Re-SPP	but that's something ↑I	maar dat kan ↑ik weer nie
26		unsuccessful	can't draw!	tekenen!
27		account		
28			(0.5)	(0.5)
29	→	B	yes, then we just have	ja dan moeten we [maar-
30			[to-	
31			*[((teacher enters the*	*[((LK*
32			*room))*	*komt binnen))*

After two clarification questions of B following G's announcement, G formulates her proposal (to design 'the zoo'), which is the FPP of the account sequence (line 6). In lines 16-17, B proposes a counter as a dispreferred SPP. Although G seems to agree with B's counter at first (line 18), she formulates an unsuccessful account after a long pause. G's unsuccessful account not only supports her FPP but is also aimed against the dispreferred SPP of B (lines 20-23), implying her rejection of B's counter. In lines 25-26, B responds with an unsuccessful account based on the same personal grounds as G's accounts *against* G's FPP. Therefore, both participants formulate accounts *for* their own positions and *against* the position of the opponent. After a pause (0.5), B seems to propose a compromise as a possible solution for the problem (29-30). However, in overlap the teacher enters the room, leading to a teacher-centered discussion in the following. Most likely, the discussion could have been extended if the teacher had not entered the room.

This structure in which the second speaker provides an account in response to an unsuccessful account may be launched with at least an *assertion* or a *proposal* as the FPP and is summarized in table 10. (Extended) structures are found only when the account of the second speaker to support the dispreferred SPP is unsuccessful as well, leading to a compromise or an alternative by one of the speakers. However, there is no reason to believe that the second speaker in that position could not provide an successful account also, which would lead to accepting actions by the first speaker in the next turn. Therefore, this potential (basic) structure is schematized, as well.

Table 10. Account sequence 10: second speaker's account in response to first speaker's unsuccessful account

			Potential basic structure	Extended structure
1		A	FP	FPP
2		B	Dispreferred SPP	Dispreferred SPP
3	→	A	Re-FPP + unsuccessful account	Re-FPP + unsuccessful account
4	→	B	Re-SPP + successful account	Re-SPP + unsuccessful account
5		A/B	Acceptance	Compromise / Alternative

Thus far, two different build-ups of a structure involving a counter as a dispreferred SPP, in which both speakers present an account, are described. Although the build-up differs, in both structures a second account that is successful in the sequence produced by either the first or the second speaker results in sequence completion in the form of accepting actions of the other speaker. As shown, unsuccessful accounts positioned as the second account may result in either an unambiguous continuation, a compromise or an alternative. Unsuccessful accounts in this sequential position, however, may also result in a recursive accounting pattern, before one of the speakers proposes a compromise or an alternative, as excerpt (33) shows. In this excerpt, two girls must decide on the best alternative hat for police officer De Vries, who has lost his police hat. Both girls have contrasting ideas. In lines 4-5 and 18-19, G2 proposes repeatedly the cowboy hat as the FPP, which is recursively responded to by G1's accounted counter (lines 6-17 and 20-26).

(33)

		Speaker	Transcript	Dutch original
1		G1	[*((coughs))*	[*((hoest))*
2			but we must choose one	maar we moeten één
3				kiezen
4		G2 FPP	shall we do this?	zullen we deze doen?
5			*((wears cowboy hat))*	*((heeft cowboyhoed op))*
6	→	G1 SPP +	nahu:: *((has displeased*	nahu:: *((heeft*
7		unsuccessful	*look))* na if a police	*ontevreden blik))* na als
8		account	has to run fast, he	een politie hard moet
9			can't fall so so so	rennen kan ie niet zo-
10			safely *((and taps a few*	zo- zo veilig vallen
11			*times with her hand on*	*((en tikt een paar keer*
12			*her head))* but (with)	*met haar hand op haar*
13			this one he can fall	*hoofd))* maar (bij) deze
14			safely, because then he	kan ie wel veilig
15			does not hurt himself	vallen, want dan doet ie
16			*((and put the fire*	zich niet pijn *((en doet*
17			*helmet on))*	*de brandweerhelm op))*
18		G2 Re-FPP	but (.) he can do with	maar (.) hij kan toch
19			this one?	met deze wel?

20	→	G1 Re-SPP +	well, I like this	nou ik vind deze beter,
21		unsuccessful	better, because if he	want als hij struikelt
22		account	stumbles and falls on	en op zijn hoofd valt,
23			his head, he <u>just</u> hurts	doet ie zich gewoon
25			himself=	<u>pijn=</u>
26	→	G2 Re-FPP +	=yes but if he runs-	=ja maar als ie hol-
27		unsuccessful	without cap having (.)	zonder pet heeft (.) en
28		account	and he- h and he uh:	hij h- en hij uh: valt
29			falls very hard on his	heel hard op zijn hoo-
30			hea-ead (.) then he	oofd (.) dan heb hij wel
31			actually has a	een hersenschudding
32			concussion	
33	→	G1 Re-SPP +	yes then (he actually	ja dan (heb hij wel) een
34		unsuccessful	has) a concussion:, yes	hersenschudding:, ja
35		account	but with that one he can	maar met die kan ie ook
36			also (have) a	een hersenschudding
37			concussion=	(hebben)=
38	→	G2 Re-FPP +	=but then everyone says	=maar dan zegt iedereen
39		unsuccessful	against that fireman o:h	tegen die brandweer o:h
40		account	I don't have fire oh I	ik heb geen brand oh ik
41			don't have fire. I have	heb geen brand, ik heb
42			fire, I have fire.	brand, ik heb brand
43			[( )	[( )
44	→	G1 Re-SPP +	[( ) but then they	[( )maar dan zeggen
45		unsuccessful	say °( )° something	ze °( )° tegen jou
46		account	else to you, he? to you	iets anders he? tegen
47			they also say something,	jou zeggen ze ook weer
48			but I do not [know what	wat, maar ik weet [niet
49				wat
50	→	G2	[and if *((takes green*	[en als *((pakt*
51			*wig))* takes this one?	*groene pruik))* deze nou
52			*((and places it on the*	eens doet? *((en doet het*
53			*head))* then he says:	*op het hoofd))* dan zegt
54			hi:: clow:::n	ie: hoi:: clow:::n
55			(1.4)	(1.4)

In lines 4-5, G2 proposes to choose the cowboy hat, which serves as the FPP of the account sequence. In lines 6-17, G1 rejects with a disagreement token and an unsuccessful *account* both against G2's suggestion and in support for her counter as a dispreferred SPP. Through the action formation practices an 'virtual other' account is created, designed from the perspective of the police officer. This account is unsuccessful because of the tentative nature. These actions of both speakers are recursively recycled in lines 18-25. G1's second account is unsuccessful and tentative as well. Immediately the first speaker (G2) responds to that account with an unsuccessful *tentative account* (lines 26-32). The formulation of her account 'yes, but' (line 26), indicates that G2 acknowledges G1's unsuccessful account (the danger of the cowboy-hat for a police officer). However, at the same time, her unsuccessful account suggests that it can always be worse: it is more problematic with no hat at all, so he better wears the cowboy hat (lines 26-32). Therewith, the first speaker (G2) expands the unsuccessful account of the second speaker (G1). This account launches a recursive accounting pattern in the continuation. G1 provides another

unsuccessful tentative account in which she admits a concussion might be a possible consequence of working without a hat, but it could also be a consequence of wearing the cowboy hat, as suggested by G2 (lines 33-37). Therefore, the discussion covers the adequacy of G2's unsuccessful tentative account.

In the continuation, G2 formulates an *unsuccessful tentative account* (lines 38-43). Through the action formation practices a virtual dialogue between virtual bystanders and the *virtual other*, i.e., the police officer, is created. The first speaker (G2) imagines a situation in which virtual bystanders clarify they do not understand that the police officer is a policeman. This statement implies that wearing a fire helmet may lead to social misunderstandings; therefore, it is not a suitable alternative for a policeman. In turn, the second speaker (G1) partially agrees with the suggestion that wearing a fire helmet might lead to social misunderstandings and formulates a new unsuccessful tentative account from the perspective of a virtual other in response, although she cannot think of a misinterpretation that this third person might express (lines 44-49). This recursive accounting pattern comes to an end when G2 proposes *an alternative* (a green wig, which is treated as clown's wig) as a potential solution for the deadlock (lines 50-54).

As illustrated in the last excerpt, the recursive accounting pattern may come to an end through the proposal of a compromise or an alternative. In the data, no instances are found in which one of the speakers provides a successful account during such a recursive pattern. However, based on the successful accounts in the other sequence structures, it may be inferred that a successful account in this recursive pattern might result in sequence completion, as well.

5.5 Conclusions and discussion

Young children frequently engage in accounting during small-group work. The study reported in this chapter leads to four main conclusions in answer to the research question, which was: *Which account sequences do young children accomplish when reasoning during small-group work?*

The first conclusion is that accounts are not only accomplished in sequences launched with *assessments* and *assertions*, which are often reported as the possible starting point of adult account sequences, especially in the literature concerning argumentation. Instead, young children construct account sequences also around *requests, proposals* and *physical actions*. In addition, the realization of the type of sequence structure proves to be independent of the type of action in the FPP.

The second conclusion is that account sequences may involve a *single* account or may consist of *multiple* accounts, which is determined by the *action formation practices* of the account, at least for account sequences involving a dispreferred SPP. These action formation practices concern the propositional content of the accounting action and the packaging of it, and determine the success of an account independent whether it is accomplished by the first or the second speaker. Accounts characterized

as *successful* lead to sequence completion, possibly in the form of explicit acceptation of the actions of the other speaker. They are also rather quick accomplished in *single account* sequences. Successful *accounts* refer in their propositional content to directly verifiable state of affairs, while the packaging might include reinforcing elements, such as evidentials and intensifiers. In contrast, *unsuccessful accounts,* which are not immediately accepted, are met with either a recycling of the speaker's own stance or by proposing an other account. Consequently, *unsuccessful accounts* lead to sequence expansion in *multiple account* sequences, in which one or more accounts may follow. The propositional content of unsuccessful accounts is personal, moral or tentative in nature, and the packaging either expresses a personal stance, or indicates that the actions meet or fall short of the norm or indicates doubt or possible future (negative or positive) consequences of the proposed action.

The third conclusion is that the structure of *single account sequences* depends not only on the action formation practices of the account but also on the type of the SPP that we came across. Sequences around a *preferred SPP* consist of only one account that may be accomplished by either the first speaker in the FPP, after a minimal agreement, or following a clarification question or by the second speaker in the SPP. Meanwhile, accounts in the context of a dispreferred SPP (either a *rejection* or a *counter)* may be accomplished by the first speaker in the third turn either to support the FPP or against the counter or by the second speaker accompanying the dispreferred SPP. Additionally, at the risk of overstatement, in single account sequences the account of one of the speakers is successful and results in sequence completion, possibly in the form of accepting actions of the other speaker.

However, dispreferred SPPs may lead to multiple account sequences. This phenomenon leads to the fourth conclusion, which is that the structure of *multiple account sequences* is not only influenced by the action formation practices of the account but also by the response of one of the speakers to an unsuccessful account of the other speaker. Two different responses to unsuccessful accounts are found, leading to two distinguishable structures. In the first structure, only one of the speakers provides more accounts. This structure is constructed when a speaker *recycles the speaker's own stance* in response to an unsuccessful account of the other speaker. This response is met with a second account of the accounting speaker. In that position successful second accounts result in sequence completion, whereas unsuccessful accounts result in an unambiguous continuation. In the second structure, however, both speakers provide one or more accounts. This structure is constructed when the other speaker provides *an account in response to an unsuccessful account* of either the first or the second speaker. The action formation practices of this second sequential account is highly influential for the continuation of the sequence. Successful accounts in this position lead to sequence completion, while unsuccessful accounts in this position may result either in alternative proposals or even in a recursive pattern in which both speakers continue accounting.

In the conclusion that the different account structures in young children's small-group work are partly dependent on the SPP type, this study is partly consistent with McWilliam's findings (1999) that young children also use accounts in dialogues without opposition. This finding contrasts with investigations on disputes and argumentation that take opposition as the starting point for accounting (e.g., Church, 2009; Corsaro & Rizzo, 1990; Goodwin, 1990; Maynard, 1985; Van der Schaaf, 2016). In addition to McWilliam and Howe's study (2004), which reported that a request for clarification may elicit young children's accounts in sequences involving a preferred SPP, the investigations of this chapter clearly demonstrate that young children are also oriented on accounting without being asked to do so in that context. Although this study underscores that accounting in sequences involving a preferred SPP should not be overlooked, the most expanded sequences, i.e., multiple account sequences, involve a dispreferred SPP. This finding provides evidence a rejection or a counter as the SPP normally creates the context for accounting, which Piaget (1926) already mentioned as the starting point for *genuine arguments* between young children. This finding corresponds with the reported sequential position of accounts (in post-expansion) during argumentation among adults. On the one hand, the speaker who formulates an assertion or an assessment is expected to defend or support their initiating action. On the other hand, the opposing speaker may need to account for their dispreferred SPP (Coulter, 1990; Mazeland, 1994; Van Eemeren & Grootendorst, 1984; Van Eemeren & Grootendorst, 1992; Van Eemeren & Grootendorst, 2004). This study clearly extends these insights by demonstrating that the continuation of the post-expansion is, above all, highly dependent on the action formation practices of the accounts and on the ways to which unsuccessful accounts are responded to.

The result that the action formation practices of the account are related to the sequential continuation is in line with recent studies on arguments in disputes (Church, 2009), which indicate that the content of an argument relates to sequential positions in dispute interactions. This chapter shows how successful accounts lead to sequence completion, whereas unsuccessful accounts lead to sequence continuation, which is similar to the findings of Church that successful accounts are found at the end of the dispute and unsuccessful accounts are accomplished in an earlier sequential positions of the dispute. However, the characteristics distinguishing successful from unsuccessful accounts are refined: not only the propositional content is of importance, as suggested by Church, also the packaging determines whether accounts are successful. In addition, detailed investigation reveals that the success of an account is independent, whether accomplished by the first or the second speaker for the continuation of the sequence. This underscores that the continuation of the sequence is mainly dependent on action formation practices concerning the accounts.

This finding leads to the next point to address. One action formation practice to accomplish unsuccessful accounts, was apparent in the data: the *tentative accounts*

in which children *design a potential negative or positive consequence* of a (speech) act by constructing a *virtual situation* including a virtual other. This action formation practice demonstrates that young children can very well account from the perspective of others, even fictitious persons. Young children design a virtual dialogue with *virtual others and their bystanders* to support their rejection of the ideas of the other participant. Wegerif pinpoints the need for children to learn how to orient themselves on the *infinite other*, which means that education should draw them *'into participation in dialogues in an ultimately unbounded context'* (Wegerif, 2013, p. 3). He claims that, by doing so, children are enabled to solve every (future) problem. The data show that young children are already do so. This suggests that Wegerif's (2013) idea that it is unnatural for young children to participate in such dialogues and as a consequence, they must be educated in it, is rather pessimistic. Instead, discussing with an *infinite other* (i.e., a *virtual other*) is contingent with the actions of some children in contexts that elicit young children to invent tentative solutions for problems in which they might reason from another's perspective. Its importance should not be underestimated, as this type of account may explain whether multiple account sequences may turn in a recursive accounting pattern, such as indicated in excerpt (31).

Although this study did not focus on knowledge construction, through the detailed analysis, insights into the ways that children accomplish accounts are extended, which has often been related to knowledge construction in the literature on argumentation. The data clearly demonstrate that accounting often leads to an exchange of perspectives and/ or (eventually) to a change in the stance of one the participants. In many instances, children discuss procedural problems, which is not surprising, because in most instances in our data children had to design possible solutions for the problem of a main character in the Storyline Approach. However, they do not distinguish procedural problems from declarative problems in constructing account sequences. In addition, the sequential structure does not seem to be influenced by the type of speech act in the FPP, which demonstrates children do not seem to differentiate between the types of actions to be considered, especially when they are not taken up in the preferred way. Instead of the speech act in the FPP, the sequential position of the account and the action formation practices are highly influential for the continuation of the discussion, as mentioned earlier. These insights have at least one major methodological implication, which is that studies into accounting and specifically argumentation should not make pre-defined distinctions on the natures of either the problem or the speech acts in the FPP. Instead, they may better start their analysis by determining the sequential position of the account, since the continuation of the sequence is dependent on that factor.

Additionally, as demonstrated, the findings could be determined only through an analysis from the children's perspective as participants, not from an analysts' perspective. Such a detailed approach not only lays out the sequential account structures but also extends insights in *how* young children value and negotiate the

applicability of each other's accounts while they participate in joint problem-solving discussions. By analyzing in more detail how young children respond to an account, insights are gained in the ways they evaluate its success, which are indicative of the sources to which children orient themselves in knowledge construction. This understanding is of great value since Enfield (2011) pointed out that by gaining insight into to the sources to which participants orient themselves while demonstrating their knowledge about the world, their perceptions of the social and moral world can be better understood.

Although the existence of other structures cannot be ruled out, sufficient reasons exist to believe that the overview in this chapter covers the distribution. First, the large data collection showed a great variety in the nature of the naturalistic interactions. The found structures, for instance, were confirmed on the basis of theoretical saturation. Moreover, it is found that the structures are applicable for a great variety of problems. The nature of the problems differed across subjects, tasks and actions in the storyline in the projects in the different participating early childhood classrooms. Second, investigations of children's reasoning in primary education (De Vries, 2018; Van der Weijde, 2017) demonstrate that 10-12-year-old children construct similar account sequences, in which the success of the account is of a similarly high influence for the continuation of the sequence, and in which the success of the account is determined by similar action formation practices.

Nonetheless, this investigation raises some new questions that would be very interesting for follow-up studies. First, future research should explore the extent to which the found structures apply to account sequences in which more than two children are involved. In the current study, we only analyzed the account sequences in which two children were involved. Considerably more work will need to be done to determine whether third-party alignment with an account or with rejections or counters of first or second pair parts, may contribute to the extent to which accounts are successful. It could be an interesting starting point to compare the action formation practices of the accounts and the structures of account sequences between more than two children with our findings. Second, further longitudinal research regarding the ways in which these types of structures and action formation practices of accounts are manifest at different ages would be worthwhile. Since we have shown that young children in early childhood classrooms already realize many different and complex sequential structures in group work, we would urge to start future explorations with even younger children from the moment they start playing together, to improve our insights into the development of reasoning from an early age.

Chapter 6

Summary, conclusion and discussion

6.1 Background of the thesis

This thesis reports on the problem-solving activities of 4- to 7-year-old children with and without their teachers during small-group work in early childhood education. It is widely accepted that problem solving promotes learning. Although it can also be regarded as an individual activity, problem solving is above all a social activity mediated through interaction (Vygotsky, 1978). Many studies focusing on classroom interactions in early childhood education have investigated whole-group interactions or interactions during play time, despite peer interactions in which children solve problems together having proved to be a relevant context for learning and development as well (Howe et al., 2007; Howe, 2010a; Johnson & Johnson, 2008; Mercer et al., 1999; Rojas-Drummond et al., 2006). The few studies on problem solving in small groups in early childhood education have been mostly experimental in nature (Gauvain & Rogoff, 1989; Perlmutter et al., 1989). Additionally, these studies have disproportionately focused on analysis of the discourse regarding small-group work during science lessons and on the ways in which competing positions are discussed between children, as pointed out by Howe and Abedin (2013). Consequently, there is a lack of insight into the natural ways in which young children solve problems in peer interactions in early childhood education. The lack of insight might be part of the explanation of why small-group work in which young children solve problems is still rarely present in early childhood settings (Hamre & Pianta, 2007). This scarcity, in turn, is a major setback, since research has shown that even young children who reason and solve problems together enhance their individual problem-solving skills (Littleton et al., 2005). Moreover, problem solving with others in small groups is an important competence for future *knowledge workers* and should be learned from an early age, as Bereiter (2002) emphatically recommended.

In addition, the role of the teacher *during episodes* of peer problem solving has often been neglected (Hofmann & Mercer, 2016; Jadallah et al., 2011; N. M. Webb et al., 2009; N. M. Webb, 2009). Whereas the teacher's (considerable) influence on classroom interactions has been widely studied (e.g., Alexander, 2008; Cazden, 2001; Howe & Abedin, 2013; Mercer & Dawes, 2014; Van der Veen, 2017; Walsweer, 2015), only a small number of studies has been conducted on teachers' interventions in group work. These studies have suggested that teachers can contribute to children's group discourse by practices that enhance children's reasoning and elaborations (N. M. Webb, 2009). However, by focusing on teachers' practices only, these studies have neglected the ways in which groups of pupils and teachers *jointly* establish their problem-solving activities and how these manners influence the continuation of problem solving during teacher interventions.

To contribute to our understanding of the manners with which young children solve problems with each other in small groups and, on occasion, during interventions by their teachers, the general aim of this thesis is to gain more detailed insight into

the ways in which participants construct problem-solving interactions during peer interactions in early childhood education. The overarching research question of this dissertation therefore is: *How do young children design problem-solving interactions during small-group work?* To address specific issues, this research question is specified in four related research questions.

The first study focuses on answering the first research question: *What are the differences between young children's discourse during peer interactions in small-group work when their teacher is either absent or present?* The complexity of both young and older children's discourse in terms of joint problem solving and reasoning is often related to positive outcomes of small-group work (e.g., Howe et al., 2007; Howe, 2010b; Littleton et al., 2005; Mercer et al., 1999). However, despite research shows that teachers in other early childhood settings may influence children's discourse in peer interactions (Damhuis, 1995; Deunk, 2009), the extent to which children's discourse during small-group work is related to whether the teacher is either present or absent has never been investigated.

The second study focuses on the second research question: *How are problem-solving interactions during small-group work accomplished by young children when their teachers are intervening?* Although it has been widely recognized that teachers play an important role during episodes of children's small-group work, teacher interventions have been less investigated (N. M. Webb, 2009). The few studies conducted have been normative or experimental, neglecting the joint and sequential nature of problem-solving interactions. The aim of this detailed study was therefore to investigate, using Conversation Analysis (CA), how the participants accomplish problem-solving interventions.

The third research question is: *How are problem-solving interactions during small-group work accomplished by young children in the absence of their teachers?* Most studies of problem solving during group work have started from an analyst's perspective, instead of the participant's perspective, which is common in CA. Since CA research on problem solving in other settings has shown that problem solving does not develop in a linear manner from problem to solution and that the ways in which participants construct problems and discuss solutions influence the continuation of interactions, this particular study investigates how young children accomplish problem-solving interactions during small-group work in the absence of their teachers.

In chapter 5, the fourth research question is answered: *Which account sequences do young children accomplish when reasoning during small-group work?* Reasoning has often been related to learning and knowledge construction. However, there is a lack of insight into the ways in which young children in interactions reason and in particular how they account for their claims, rejections, alternatives, proposals and other actions. This particular detailed study therefore investigates the sequential position by which children accomplish accounting practices and how these structures

are related to the practices children use for accounting.

The data for this thesis were drawn from video recordings of inquiry learning activities within a multiannual program called 'Co-operation and Language Proficiency' (in Dutch 'Samenwerken en Taalvaardigheid', Berenst, 2011), which was based on Educational Design Research (EDR, Collins et al., 2004; Plomp & Nieveen, 2009). Eight early childhood teachers in the seven participating primary schools conducted five inquiry learning projects according to the Storyline Approach (Bell et al., 2006; Egan, 1986; Frame, 2006), in which children 4 to 7 years old needed to solve problems that arose in the events of the storyline.

Quantitative and, mostly, qualitative research methods were used to answer the research questions. In chapter 2, the first question is answered by conducting a quantitative analysis of the distribution of characteristics of children's discourse in peer interactions with and without the teacher being present. In the other chapters (3, 4 and 5), a qualitative micro-analytical approach, CA, was used to answer questions 2, 3 and 4, which pertain to the nature of the problem solving of the particular participants.

This final chapter summarizes the findings of the four analytical chapters and draws conclusions on the basis of these findings. It concludes with a methodological and theoretical discussion, before presenting some implications for practice and suggesting directions for future research.

6.2 Summary of findings

The analytical chapters of this thesis range from two studies of the role of the teacher while children are working together in small groups to two studies of problem solving among the children themselves. A short summary of the findings of each of the four investigations is provided by section.

6.2.1 Young children's discourse in peer interactions in small-group work in the presence and absence of their teacher

Chapter 2 addresses the question of '*What are the differences between young children's discourse during peer interactions in small-group work when their teacher is either absent or present?'* To answer this research question, the discourse of children in the absence of the teacher in 21 peer interactions in 6 kindergartens during the initial project is compared to their discourse in episodes where the teacher was present.

It is found that young children's language use in the teacher's absence differs from that during episodes in which the teacher is present in the peer interaction. First, children's turn length and T-unit length are significantly longer in the teacher's absence, indicating that they not only can speak longer but also that the syntactic

complexity of their language use is also greater in this context. In contrast, the findings show that the context does not influence the turn taking. In both contexts, the amounts of self-selection and turn-allocation are similar. Next, the analysis shows that children use significantly more initiating than responsive speech actions in the absence of the teacher compared to peer interactions with the teacher present, indicating that children are more in control regarding the content of the interaction in the absence of the teacher, compared to peer interactions in which the teacher is present. Furthermore, the comparison reveals that the distribution of both initiating and responsive actions differs significantly across both contexts. In the absence of the teacher, children use relatively more *questions* and *markings* (expressive actions such as thanking or apologizing) as initiating speech actions, while they perform more initiating *statements* in the teacher present context. Although in both contexts, the proportion of *initiating statements* is the largest, young children perform relatively many more *responses to statements* in the teacher absent context. Moreover, they also perform more *responses to commitments*, while they provide many more *responses to questions* in small-group interactions in which the teacher is present. In addition, in the teacher present context, children *respond more often to known-answer questions (KAQs)* than when the teacher is absent, and since children in both contexts raise similar proportions of information-seeking questions (ISQs) and therefore similar proportions of KAQs, the teacher likely determines the type of responsive speech actions and the type of questions to which children respond. Finally, the type of statements that children practice is significantly different across both contexts: in the teacher's absence, children perform relatively more *analytical statements*, while they use more *descriptive statements* in the presence of the teacher, indicating that statements among peers are more complex in nature compared to when the teacher is present.

6.2.2 Problem-solving interactions during teachers' interventions in small-group work

In **chapter 3** the following question is answered: *How are problem-solving interactions during small-group work accomplished by young children when their teachers are intervening?* A close analysis of 36 fragments that arise from all of the projects reveals that these interactions addressing children's problems potentially consist of the following three stages: (1) problem construction; (2) problem exploration (optional); and (3) solution discussion. Moreover, the teacher's response to either the problem initiation or the solution proposal, respectively in the first or the final stage, is highly influential for the continuation of the problem interaction.

It is found that each problem construction consists of two elements: a problem initiation and the response to it. Problems can be initiated by both *assessments* and *descriptions,* accomplished either by the pupils or by the teacher, leading to

comparable continuations of the interaction. *Assessments* can be produced in the form of statements, while *descriptions* are often established collaboratively in question-answer adjacency pairs, initiated by the teacher. The analysis unravels that the type of response to problem initiations determines whether and how the interaction develops into a joint problem-solving interaction. Three patterns are found in which the participants construct problems. Pattern one consists of a problem initiation, followed by a teacher *instruction* to undertake the next steps as potential solutions to the problem since the problem is interpreted by the teacher. Although this response implies that the children's initiation is still treated as a problem, it limits children's contributions to the interaction to a minimum. In only some instances, children object to the solution imposed by the teacher in this sequential position, but then the teacher does not elaborate on the objection. Pattern two consists of a problem initiation and a teacher practice, which starts an insertion sequence. Such a practice, which is called a 'put off' by Labov and Fashel (1977), is accomplished either in the form of a *clarification question* or an *invitation to discuss the matter at hand*. The insertion sequence forms the next stage of problem exploration, in which the problem is more accurately characterized before solutions are discussed. Pattern three consists of a problem initiation, produced by either the children or the teacher, met with either an *invitation* or an *announcement to present a solution*.

Only the second pattern of problem construction results in the next stage of problem exploration. This stage is launched with a *teacher elicitation*, followed by several *question-answer sequences*, in which children provide more information about the problem in response to the raised questions. Eventually, the teacher establishes a more accurate characterization of the problem using a *description that contains a negative assessment* about the state of affairs.

The problem construction according to pattern one, begins a solution discussion in the form of a teacher instruction, as mentioned above, in contrast to all other instances in which the problem is constructed according to either pattern two or pattern three. Then, it is found that children present a potential solution in a final solution discussion, either self-initiated or following a teacher elicitation. The analysis demonstrates that the teacher's response to the solution proposal determines how this final stage continues. Two distinguishable trajectories are found: (1) a direct evaluation combined with an instruction of the teacher in response to the child's solution proposal leads to a teacher instruction in the *information-delivery format,* in which children can only produce agreement tokens in response to the teacher instruction; and (b) tentative evaluations and objections (preceded by clarification questions) of the teacher in response to the child's solution proposal launch a joint solution discussion, in which several solutions are negotiated and evaluated (tentatively) by both the children and the teacher.

6.2.3 Young children's problem-solving interactions during small-group work in the absence of the teacher

Chapter 4 addresses the question of '*How are problem-solving interactions during small-group work accomplished by young children in the absence of their teachers?'* CA is used to investigate 80 problem-solving interactions that arose from 21 different project activities. It is found that children engage in at least three distinguishable types of problem-solving interactions.

First, types of problems covering a *current event* are constructed through a negative assessment of the current event. These types of problems can be constructed in two distinct patterns, in the form of either a problem explanation or a solution proposal, depending on the response of the other participant(s) to such an assessment. Types of problems that involve a current event project quick solutions, which can be preceded by a short discussion about the cause of the problematic event, depending on the pattern of problem construction. The solution proposals have the nature of physical activities that the participants (must) perform to solve the problem.

Second, types of problems involving a *current action* are constructed with three elements: an action carried out; an accounted opposition to that action; and a reinitiation or an explication of the action. Children package the support for their opposition in two forms to relate the action to a problem: by claiming that the action is inadequate or by claiming that it will lead to future problems. The constructed difference of opinion can lead to a discussion varying in duration about either the adequacy of the action or whether the action results in a new problem. The solution is accomplished by position-supporting practices by one of the participants for his or her own position, which are met with an (implicit) agreement by the other participants. These position-supporting practices either concern *carrying out the proposal* or *soliciting for collaboration* and/ or packaging issues of *prosodic marking* in the kind of action.

Third, types of problems covering a *future action* are centered on *proposals.* These types of problems can be constructed according to three distinct sequential patterns: (1) an elicitation marking that the next steps are unclear and a proposal to take future steps; (2) an accounted proposal, in which it is claimed that the future action is necessary to prevent problems, and an agreement in response to the proposal; and (3) a proposal, a counter proposal and an objection, in which it is claimed that the contrasting proposals are in conflict with the goal of the peer problem-solving interaction. In all three patterns, the response (either an acceptation or a rejection) to the initial proposal influences the continuation of the problem solving. Problems that involve a future action always lead to an explicit marking of the participants' joint decision, implying agreement of one of the participants with a solution proposal of the other participant(s).

Regarding four different positions during problem solving, young children are found to be oriented to solving their problems until agreement on the solution is reached. First, problems are constructed with an orientation toward the solution, most clearly when a *solution proposal* is part of the problem construction. Second, children employ *accounts that are packaged with an orientation to the (solving of a) problem to support or reject an action*. These accounts, designed with an 'or else' construction, either contribute to the problem construction or to solving the discussion. Third, children discuss the ongoing topic until they agree upon a solution by *recycling their own positions* or by *recycling an elicitation to accomplish new proposals* to return to the main problem. Fourth, children *conclude* every problem-solving interaction, either implicitly or explicitly, by agreeing with a solution proposal. This finding implies that every problem-solving discussion results in agreement with (proposed) solutions.

6.2.4 Account sequences in young children's reasoning during small-group work

In **chapter 5,** the following question is explored: *Which account sequences do young children accomplish when reasoning during small-group work?*

The detailed exploration of 205 account sequences reveals that several actions in the first pair part (FPP) launch account sequences. Not only assessments and assertions are possible starting points of account sequences, as often reported in discussions among adults, but young children are also found to construct account sequences around requests, proposals and physical actions. In addition, the analysis unravels that the type of FPP in the account sequence does not influence the type of sequence structure that is realized.

Moreover, our analysis reveals that the ways in which young children reason in the account sequences are influenced by both the type of SPP (second pair part) in response to the FPP and the type of accounts they accomplish. It is found that, at least for account sequences that involve a dispreferred SPP, the action formation practices of the provided account determines how the other child responds to the account and, consequently, whether children provide one (single account sequences) or more accounts in the interaction (multiple account sequence). The action formation practices concern the *propositional content* of the accounting action and its *packaging*. Both determine the success of an account, which is conducted by either the first or the second speaker of the sequence. Accounts characterized as successful are accounts that lead to sequence completion, mostly in the form of accepting actions of the other speaker in the next turn; thus, they are accomplished in single account sequences. Successful accounts refer in their propositional content to the *directly verifiable state of affairs*, while the turn design might include reinforcing elements, such as *evidentials* and *intensifiers*. In contrast, accounts characterized as unsuccessful are accounts responded to by the other speaker in the form of either a recycling of one's

own stance or a delivering of an account. Consequently, unsuccessful accounts lead to expansion of the sequence (of either the base sequence or the post-expansion) in multiple account sequences, in which one or more accounts might follow. The propositional content of unsuccessful accounts is *personal*, *moral* or *tentative* in nature, and the packaging either expresses a *personal stance* or indicates that the actions meet or fall short of the *norm* or that either *doubt* or *possible future (negative or positive) consequences* result from the proposed action.

Furthermore, it has been found that the structure of *single account sequences* not only depends on the success of the account but also on the type of SPP. Sequences around a preferred SPP consist of only one account that might be provided by either the first speaker in the FPP after a minimal agreement or following a clarification question by the second speaker in the SPP. Accounts in the context of a dispreferred SPP (either a rejection or a counter) may be accomplished by the first speaker in the third turn either supporting the FPP or against the counter of the second speaker in the SPP. In the context of a dispreferred SPP, the second speaker is found to provide an account accompanying the dispreferred SPP in response to the FPP of the first speaker. Additionally, at the risk of overstatement, in single account sequences, the account of one of the speakers is successful and results in sequence completion, possibly in the form of accepting the actions of the other speaker.

However, dispreferred SPPs can also lead to *multiple account sequences*. The analysis in this chapter shows that the response of one of the speakers to an unsuccessful account of the other speaker influences the continuation of the multiple account sequence as well. Two different responses to unsuccessful accounts are found, leading to two distinguishable structures. In the first structure, only one of the speakers provides more accounts. This structure is constructed when a speaker *recycles the speaker's own stance* in response to an unsuccessful account of the other speaker. This response is met with a second account of the speaker who delivered the first account in the sequence. Successful second accounts result in sequence completion, whereas unsuccessful accounts result in unambiguous continuation. In the second structure, however, both speakers provide one or more accounts. This structure is constructed when the other speaker provides *an account* in response to an unsuccessful account of either the first or the second speaker. Successful accounts in this position lead to sequence completion, while unsuccessful accounts in this position can result either in alternative proposals or even in a recursive pattern in which both speakers continue accounting.

6.3 Conclusions

This thesis contributes to the developing insights in the precise ways in which problem-solving interactions among young children and on occasion with their teachers in early childhood education are accomplished by answering the following overarching

research question: *How do young children design problem-solving interactions during small-group work?* The analytical chapters illustrate how participants work on the solving of problems that arise during young children's small-group work, which takes place in the Storyline Approach. In response to the overarching research question, it can be concluded that the ways in which children design problem-solving interactions during small-group work are influenced by their interactional partners and by interactional characteristics.

The findings of **chapter 2** show that *the presence of specific interactional partners* (teacher and peers or peers only) with whom they are solving problems has an influence. The findings lead to the conclusion that young children's discourse in terms of complexity and type of performed speech actions is dependent on whether the teacher is present or absent. Based on the findings that young children participate differently in the two contexts, it is concluded that peer interaction - in the absence of a teacher - provides young children affordances that differ from the affordances provided when the teacher is present in small-group work.

However, as shown by a more detailed investigation in **chapter 3** of the ways in which children solve their own initiated problems with the intervening teacher, problem-solving interactions with the intervening teacher can enable children to participate in ways that are considered in the literature to be beneficial for learning and development. The findings demonstrate that whether and how children participate in problem-solving interactions with the teacher are highly dependent on *the teacher practices in response to both the problem initiation and to the solution proposal* of the children. Beneficial problem-solving interactions can be characterized by their tentative nature, in which the children and teacher discuss several possibilities before they reach a joint agreement. Teachers contribute to the tentative problem solving by playing the role of a partner and a discussion leader by responding to children's contributions as possibilities, instead of immediately evaluating the contributions of the children, enabling children to participate in an extended manner while they reason and elaborate on each other's contributions. These practices are related to knowledge construction and cognitive development, as suggested in the literature (Howe et al., 2007; Howe, 2010b; Howe, 2014; McWilliam & Howe, 2004; Mercer et al., 1999; Mercer & Littleton, 2007; B. B. Schwarz, 2009).

Concerning the solving of a problem among peers – in the absence of their teacher- during small-group work, other interactional characteristics are found to be important. As the study on problem-solving interactions in **chapter 4** shows, young children in peer interactions accomplish at least three distinguishable types of problem-solving interactions, related to different *problematic states of affairs*. Although problem solving can develop according to a rather similar and linear overall structure from problem construction to a discussion to the solution stage, there are different sequential patterns in which the different stages are constructed by the participants, depending on the nature of the problem. However, the findings also show that the

practices of the participants to accomplish problem solving can lead to varieties of this overall problem-solving structure. These practices therefore explain why problem solving does not develop in a linear manner from problem to solution.

In group discourse, reasoning is an element that has proved to contribute to the effectiveness of problem solving in small-group work (e.g., Howe, 2010a; Mercer & Littleton, 2007). The study of account sequences in **chapter 5** leads to conclusions about the way in which children reason in account sequences, when solving problems must be understood from the sequential structure. The way in which account sequences are accomplished mainly depends on the *nature of the response in response to an FPP* of the other speaker and on the success *of the accounts* that one of the speakers realizes. Preferred SPPs in response to FPPs lead to single account sequences, in which one account is provided. In contrast, dispreferred SPPs in response to FPPs can be part of both single and multiple account sequences. In the latter sequence, more accounts are provided by the participants.

The structure of multiple account sequences is partly influenced by the success of the account, which in turn is determined by the action formation practices of the account conducted by either the first or the second speaker in the account sequence. The action formation practices concern the *propositional content* of the accounting action and its *packaging*, as elaborated upon in section 6.2.4. A successful account of a speaker is an account that leads to acceptation actions of the other speaker and thus to sequence completion, whereas an unsuccessful account of a speaker is an account that leads to sequence expansion. Moreover, the response of one of the speakers to an unsuccessful account of the other speaker partly determines how a multiple account sequence continues. As demonstrated in chapter 5, two different responses to unsuccessful accounts are found, leading to two distinguishable structures to finish the discussion.

Thus, both the context in which young children participate and the particular characteristics of the interaction determine how young children design problem-solving interactions during small-group work. The interactional partners with whom they discuss problems, i.e., peers only or peers with the teacher, are of influence, as has been shown. Not only do the findings in chapter 2 support this conclusion but also the more detailed investigations in the subsequent chapters provide evidence for the impact of the teacher on children's problem-solving discourse. Moreover, chapters 3, 4 and 5 also show the interactional characteristics that influence the ways in which the participants design problem-solving interactions, revealing interactional differences between these contexts.

6.4 Discussion

6.4.1 Methodological discussion

We arranged inquiry learning projects, in which the small-group work took place, in such a way that the data from each of the inquiry learning projects across the different classrooms were comparable and ecologically valid. First, several formats for the projects according to the Storyline Approach were developed, from which participating teachers could choose one to conduct in their classrooms. By doing so, we not only supported teachers in organizing small-group work in early childhood classrooms, but we also ensured that all of the teachers were able to organize open-ended and complex problems, with affordable opportunities for shared goal setting and shared planning, which in turn are regarded in the experimental pedagogical literature as essential features of beneficial peer interaction (Baines & Howe, 2010; Howe, 2010b). These choices in organizing small-group work resulted in most instances in the data groups of children having to design solutions to solve problems. During these small-group tasks, the children showed a variety of problem-solving practices and an enduring orientation toward each other.

This approach to conducting the data raises the question of the extent to which the analyzed interactions were naturalistic. The method (CA) that we used in the qualitative analytical chapters, in principle, describes how participants organize naturalistic interactions in all types of everyday settings and institutional contexts (Ten Have, 2007). A more recent development within this method is that applied research is being performed on the ways in which these interactions change, possibly under influence of interventions (Antaki, 2011; Lester & O'Reilly, 2019). One of the main questions from the main research program, from which the data for this thesis are obtained, was how the ways in which young children solved problems during small-group work changed over time. To answer this question, we had to organize the group work as described, because, in the participating schools, as in other early childhood settings, group work was little organized (Hamre & Pianta, 2007). In addition, to guarantee the comparability as mentioned above, although we believe that, within this created small-group work setting, the analyzed interactions could be regarded as naturalistic, the children had many opportunities to make decisions themselves and to construct their own problems, as displayed in the analytical chapters.

Regarding generalizability, there are a few issues to discuss. The first issue concerns the statistical generalizability of our first analytical study, which is quantitative in nature. As indicated, the data collection for the study in chapter 2 is relatively small, implying that we should be cautious in interpreting the conclusion that small-group work in the teacher's absence provides specific affordances for children's language use, in contrast to small-group work in which the teacher is present. Strictly speaking, we can only generalize the results statistically to other early childhood classrooms in Fryslân that work with the Storyline Approach, but we see no reason to expect that

the results would be very different in other early childhood contexts. First, different types of schools participated in the project. The schools varied in terms of school size and classroom size, in being rural or urban schools, in the number of year groups in the classroom, in the level of teacher experience and in school concepts. In addition, the results found are consistent with the findings of other researchers, painting a similar picture for young children in preschools and in SLA classrooms (Damhuis, 1995; Deunk, 2009).

In the other studies applying qualitative analysis to problem solving, there are also issues of generalizability. One issue is the systematic analysis of the data using CA. First, potential patterns emerge in the analysis before they are validated in the data. We used several smaller data sets to analyze the problem-solving interactions more extensively in chapters 3, 4 and 5. Because the entire data collection involves five projects in seven kindergarten classrooms, an extensive and systematic study of the data was possible, while in contrast, it still enabled us to draw conclusions based on more than one practice of either the children or the teacher. By zooming in on these data, a wide variety of interactional practices are found, helping us to validate the patterns found in the data. Moreover, when some data deviated from the found patterns, they provided additional evidence for the pattern. Few deviant cases were found in the data, and when we did find deviant cases, explanations were found in the contexts of the data regarding why they diverged from the found patterns. Because of these explanations, they provided additional evidence for the found patterns.

Another issue is that we should realize that there might be other patterns in this type of data that we did not find. Although we believe that we analyzed the data systematically in our analysis, it cannot be excluded that other patterns in the problem-solving interactions in the peer interactions or in the interactions with the teacher exist. Nor can we exclude that there are other sequences in which children realize accounts. Strictly speaking, we cannot determine the possible scope of the patterns based on our analysis. However, we have little evidence to believe that there are many other patterns. First, many of our findings are, to a large extent, similar to findings in other interactions between children or with the teacher, as discussed in the different chapters. Second, these studies did not display other relevant patterns, supporting our belief that we did not overlook any patterns in our analysis.

6.4.2 Theoretical discussion

It is widely emphasized that the way in which children participate in solving problems during small-group work influences whether peer interactions contribute to learning. In the analytical chapters, it was shown how both children and teachers accomplish problem solving in interactions. By doing so, this thesis contributes to a better insight into the ways in which children participate in solving problems.

The finding that peer interactions offer children other affordances to solve problems than interactions with teachers is not only consistent with earlier Dutch

research in early childhood settings (Damhuis, 1995; Deunk, 2009), but it is also in line with Piaget's (1923; 1926; 1932) ideas about the importance of peer interaction. He shows that children strive more actively and more intensively to find solutions to cognitive conflicts that are often regarded as problems in interactions among each other, contrasting with interactions with an adult or a teacher. As we have shown, young children not only construct disputes or arguments, as often reported as a basis for the cognitive conflict (Piaget, 1926) but also construct problems themselves that are content related, and they are flexible in solving these problems, depending on interactional characteristics. By doing so, our research enriches the ideas of the possibilities of young children to realize and overcome cognitive conflicts. Since a cognitive conflict is regarded as an important source for learning and development in the neo-Piagetian tradition (Howe, 2010b), this thesis contributes to insights into how children can construct profitable conditions for learning in small-group work.

That they are able to construct content-related problems themselves as a source for cognitive conflicts not only supports Piaget's ideas about the importance of peer interaction, but it is also significant in the context of the recent insights of Howe (2010a), who in earlier work emphasized the necessity of the design of cognitive conflicts by the teacher beforehand. However, on the basis of some of her and her colleagues' recent studies (Christie et al., 2009; Howe et al., 2007; Tolmie et al., 2006), Howe currently argues that it is a necessary condition for small-group work among primary school children to exert learning effects on task-related content and cognitive development such that children realize cognitive conflicts *themselves*, while solving problems in groups, instead of solving problems defined by the teacher beforehand. The research presented in this thesis shows that young children can also solve problems without the teacher. By doing so, the findings demonstrate that young children can fulfill the conditions for the learning effect of small-group work that Howe postulated.

Additionally, the finding that young children solve their problems more or less explicitly is in contrast to research of Howe and colleagues (Howe et al., 2007; Tolmie et al., 2006) showing that secondary school children hardly resolve their problems in dialogue; rather, they resolve the issues delayed. On this basis, Howe (2010a) concluded that there might be development from delayed resolution first to dialogic resolution later. One explanation for this difference could be that, in this study, local problems within a larger problem-solving event are investigated, while Howe and colleagues operationalized problems at the task level. Nevertheless, based on the finding that young children in our data - always - come to a dialogic resolution, we advocate being cautious with developmental conclusions.

In addition, this research contributes to the criticisms of Piaget's (1923; 1926) early ideas that young children are especially egocentric, finding it difficult to respond coherently to each other's contributions and experiencing problems with a Theory of Mind. Although his observations and his ideas have been criticized from different

perspectives, including by himself later (Piaget, 1962), as pointed out by Kesseling and Muller (2011) in their description of the origin and development of the concept of egocentrism, our research mainly confirms earlier findings (Berenst & Mazeland, 2000; Ochs Keenan & Klein, 1975) that children can respond coherently to each other's contributions. Where these researchers showed that young children can coherently discuss moral issues and construct moral rules in their talks with other children, we demonstrate that children are also able to interact coherently in problem-solving interactions while working together. In addition, our findings indicate that children can relate to the ideas of others who are directly involved in the interaction. Moreover, they can even relate to *virtual others* in their reasoning - to imaginary persons not directly present in the small-group work.

The finding that young children use virtual other accounts also sheds new light on what young children are already capable of doing in dialogues with peers. Wegerif (2013) made an emphatic plea for educators to enhance the dialogic space of children in education. According to Wegerif, an essential part of the dialogic space is that children are able to reason from the infinite other; i.e., they should be able to approach every problem and every solution from different perspectives. Consequently, he emphasized that educators should teach children how to reason from an *infinite other*. Wegerif's (2013) ideas have been well supported by much research that demonstrates the importance of forms of dialogic interaction in the classroom for children's learning and the development of children (e.g., Alexander, 2008; Cazden, 2001; Howe & Abedin, 2013; Wells, 2009) However, our data show that young children are already using the concept of the *infinite other* in specific ways in their discussions (as a virtual other in their reasoning). This finding has not only theoretical consequences, as discussed here, but also consequences for educators, which are discussed in the next section.

Moreover, the findings of the structure of problem-solving interactions imply that normative models for how problem solving should develop should be questioned (e.g., Jonassen, 2011; Robertson, 2017). As demonstrated, problem solving between young children can develop in a linear manner from problem to possible exploration to discussing solutions, but these stages can also be constructed in a nonlinear and even intertwined order. Thereby, this research demonstrates that young children can construct and solve problems in small groups in similar nonlinear ways as adults do in business meetings (Huisman, 2000; Meier, 1997; Van Kruiningen, 2010).

Our research also provides nuance to a premise regarding the guidance by the teacher. Next, to *contingency*, the operationalization of the zone of proximal development in scaffolding by Van de Pol et al. (2012; 2010) assumes also that the role of the teacher should decrease gradually (*fading*), while at the same time, children's *responsibility* for the problem solving should increase over the course of the intervention. On the basis of our empirical findings, however, it is questionable whether (groups of) pupils will accept more responsibility for the problem solving when

the teacher plays a major role at the beginning of the intervention. In our data, we have only seen that, when the teacher is reluctant to play a major role in evaluations of children's contributions, children keep participating actively in a manner found to improve next small-group discussions (Chiu, 2004), while in contrast, when the teacher solves the problem by evaluating children's contributions and by instructing them immediately, children's contributions decrease instantly.

In this thesis we documented more accurately how children during small-group work and on occasions with the intervening teacher solve problems and reason. Both aspects of small-group work are related to learning. By detailed descriptions of these contexts, which are shown to be valuable for knowledge development, we gain insight into how participants construct solutions together and what interactional practices seem to foster this cooperation. For instance, we have shown that children change their positions in a discussion or challenge each other to elaborate on each other's points in extended exchanges. Moreover, these episodes of problem solving and reasoning show that these practices are sequential in nature, in contrast to approaches that regard them as individual accomplishments. In education, documenting the development of individuals is currently a regular practice, but when describing how children solve problems in interactions, we are not directly concerned with children's individual practices. Instead, our findings demonstrate that these practices are *social* practices.

6.4.3 Practical implications

Early childhood education provides an important setting for children's development with high impacts on their development and achievements in later life. By studying the interactional practices that might contribute to young children's learning in development, this thesis is therefore valuable for education professionals (and their practices of teacher training and professionalization), curriculum specialists, and editors and publishers of teaching materials.

Based on our findings, we believe that teachers and teacher students should become oriented toward the value of small-group work in early childhood education. Hamre and Pianta (2007) showed that teachers hardly develop activities in which pupils can collaborate in small groups, and based on the findings of chapter 2 the affordances that are provided by organizing small-group work for children to use language should not be underestimated. However, we want to emphasize that it is not just important that teachers organize small-group work. In the current educational practice, the importance of small-group work is often addressed from a pedagogical perspective (Johnson & Johnson, 1999; 2008; Kagan, 2010; Slavin, 1996). Consequently, teachers often focuses on the roles and tasks of pupils and on classroom organization and less on the quality of peer interactions. However, not only pedagogical considerations should be considered in organizing group work, but it is also important to draw attention to the ways in which children use language

in small groups while solving problems. Based on this thesis and in line with the existing literature on young children's interactional skills with peers (Blum-Kulka & Snow, 2004; Cekaite, Blum-Kulka, Grøver, & Teubal, 2014; Church, 2009; Danby & Baker, 1998; Van der Schaaf, 2016), teacher training programs should pay attention to the different ways in which pupils among each other might work together and how discourse practices used in this respect are related to the construction of knowledge. This goal could be realized by making issues that are related to group work, thinking and talking in peer interaction structurally part of the teacher training curriculum.

Another point that should be considered in teacher training and professionalization programs is to prepare teachers how to observe the ways in which young children accomplish discourse practices. Hamre and Pianta (2007) showed that most interactions in early childhood education are between the teacher and one or more pupils. When teachers are not aware of the social context in which children accomplish their speech actions and practices and thus do not recognize what pupils do in small-group work interactions, they might base their judgment of children's language skills on interactions with themselves, in which children participate in another, often less active, manner. It would therefore be very relevant for teachers to be able to observe how children use language in different contexts. Further, because the nature of the problems, the structures of problem solving, the types of accounts and virtual others prove to be important characteristics of problem-solving interactions, we believe that teachers should particularly focus on the recognition of these interactional characteristics in interactions among and with young children.

When teachers and teacher students are more aware of what to observe in young children's interactions, it can help them to interact with children while intervening in small-group work. Our findings suggest that, during teacher interventions, problems are solved in a different way than children solve problems in the absence of the teacher. Our data, for instance, clearly show that problem solving with intervening develops in a structured, linear way, while children's problem solving - in the wild - develops normally in a nonlinear manner. Moreover, during interventions, we did not find teachers elaborating on children's problem-solving practices, such as hypothesizing on possible explanations or possible solutions for the problem, while children themselves did so. These found differences raise the question of the extent to which teachers should adapt their discourse to the problem-solving practices of children. Of course, teachers may have professional reasons to design interventions in a more instructional fashion, which is also supported in the literature (Macbeth, 2003), like they often did in our data. However, potential occasions for language learning are not always used then. Snow and colleagues (Ninio & Snow, 1996; Snow, 1984), for instance, demonstrated that certain adaptive responses (e.g., recasting, etc.) to children's contributions are helpful strategies in language learning.

In addition, we believe that teachers should also learn to be aware of the dominant roles that they play in interactions with young children in small groups.

The more detailed research of chapter 3 shows that especially *the presence (and the nature) of evaluations* of young children's contributions are influential for the continuation of a problem-solving discussion. If teachers raise ISQs, instead of KAQs, and evaluate children's contributions in a less straightforward manner, they offer room for extended participation by the children. Discussions in which children and teachers negotiate solutions on equal terms can form a profitable model for children to discuss problems in a similar way in peer interactions, which has been proved to lead to productive discourse (e.g., Wegerif et al., 1999). This practice is something in which teachers could be trained. Our study provides more detailed insight into the practices that teachers could use in this context to evaluate not as an expert, such as suggesting and summarizing children's contributions, which are also found to be important in whole-group interactions (Gosen, 2012; Walsweer, 2015). When teacher training and professionalization programs stimulate teachers' awareness of how they can establish learning opportunities in interactions, teachers can use these practices more consciously.

To enhance teachers' awareness of the importance of particular interaction practices of both children and themselves, teacher training and professionalization programs could orient them on these practices using an approach that shows similarities to video interaction guidance, namely, CARM (Stokoe, 2014). In professionalization programs, video data and transcripts of real naturalistic interactions, as used in our research, could form the basis and be concretized in Conversation Analytic Role-Play Method (CARM) (Stokoe, 2014). To support teachers organizing more open classroom-learning contexts and to allow them to reflect on their discourse practices, this method is promising. Until now, this approach has only been realized in other institutional contexts, to enhance professionals in, for instance, medical or call-center encounters. A first intervention in teacher training in which CARM played a small part (Hiddink, 2018) showed that this method can lead to a more detailed and prolonged analysis of teacher training students' own interactions with their pupils.

6.4.4 Future research

An important issue for future research in light of the prior section is how we can orient teachers (and students) on the ways in which children work together in groups and on their own roles in interaction with groups of pupils. As mentioned before, CARM offers interesting opportunities to explore. The video data that are part of this thesis, as well as the data of other papers and theses in this field (Herder, Berenst, De Glopper, & Koole, 2018; Van der Schaaf, 2016; Walsweer, 2015; Willemsen, Gosen, Van Braak, Koole, & De Glopper, 2018; Willemsen, Gosen, Koole, & De Glopper, 2019), provide sufficient ground for the development of CARM workshops for teachers on this or related issues and to investigate the interactional changes that occur under the influence of training, workshops and education into which CARM was integrated.

Furthermore, it would be interesting to investigate other contexts that contribute

to the enhancement of children's dialogic space (Wegerif, 2013) by examining the extent to which other contexts than the Storyline Approach elicit particular account sequences in which children are reasoning as well. A specific point of interest is how children in these contexts are reasoning from the perspective of virtual others. In fact, our study of account sequences suggests that unsuccessful accounts and especially virtual other accounts result in more and prolonged reasoning. Since the problems in the storyline are of an external character, we believe that contexts in which children also discuss problems of persons outside the classroom or school might provide similar reasoning practices. Possible forms are *concept cartoons* or projects that are part of so-called *kubus schools (https://kubusschool.nl)*, in which the problems of others also play a large role but are open ended at the same time.

The research in this thesis demonstrated that young children aged 4-7 years old use a great range of problem-solving practices. In this thesis, we did not investigate to what extent the problem-solving interactions change over the course of time. An analysis of the available material around this issue would also provide interesting opportunities to account for the longitudinal framework in which the thesis was conducted. An option would be to analyze how the problem-solving practices among each other and with the intervening teacher change over the course of the different projects. Now that we have improved the insights into how children solve problems and reasoning during small-group work in this dissertation, it also enhances the insight into the types of changes that could be sought. Although we demonstrated that at least the sequential nature of the interactions should be considered when addressing issues of development, we still must be cautious regarding something like development, which is no more than adaptation to another social context, as Sidnell (2010) demonstrated.

Another issue is the question of what young children learn from the world by participating in problem-solving interactions. As discussed, most research on small-group work in early childhood has been experimental in nature, and the reported effects on language and cognitive development are not consistent, as reviewed by Ramani and Brownell (2014). The authors argued that the inconsistency could be explained by small-group work in experimental settings often imposing well-defined problems on children, in turn influencing the group discourse. Therefore, the authors advocated for adding elements of free play, such as having freedom of choice and ownership, to group work. Based on our findings, we believe that the small-group work in the Storyline Approach also contains these elements. Therefore, it should be interesting to investigate the extent to which children construct knowledge by participating in these small groups in follow-up research.

Finally, we would like to recommend that future applied educational research shall focus on analyzing interactions to understand how young people structure their early childhood lives in the 21st century. Studying interactions from a perspective that regards language as a functionally integrated component of a group's organization

and culture may help us to better understand how more cultural forms of (language) learning (Gee, 2004) could be embedded in the traditional schooling of children; moreover, by using methods such as CA and by investigating the sequential organization of early childhood interactions, we are able to avoid the pitfalls of analyst-based approaches, which tend to focus on analytical categories rather than on the interactions between participants. An approach such as CA does not observe children's discourse practices from a normative perspective, with the risk that we, as observers, consider something to be missing. However, by simply describing the discourse practices and development of children from a participant's perspective, such a detailed analysis helps us to understand how children accomplish their everyday sense-making activities. This perspective enables us to improve our understanding of children's discourse practices from their perspective. In addition, by treating them as agents actively involved in the construction of the world around them, rather than as passive subjects who are recipients of the culture that they are in, we will do more justice to them, and as a consequence, educational research will be better equipped for education in the 21st century, in which children are often regarded as active agents of their development (Bereiter, 2002; Voogt & Roblin, 2010). Further, although the 21st century has been under way for a while, this thesis provides a relevant contribution to our understanding of young children's accomplishments as active agents in education by revealing young children's discourse practices in problem solving.

Appendices

Appendix A. Transcript notations

Based on Jefferson (1984):

[	text overlapping speech; point at which an ongoing utterance is joined by another utterance
=	break and subsequent continuation of contiguous utterances
(0,4)	pause (in seconds)
(.)	micro pause (less than 0,2 seconds)
.	stopping fall in tone (not necessarily at the end of a sentence)
,	continuing intonation (not necessarily between clauses of sentences)
?	rising inflection (not necessarily a question)
!	animated tone (not necessarily an exclamation)
-	halting, abrupt cutoff
↓	marked falling shift in intonation
↑	marked rising shift in intonation
°	talk that is quieter than surrounding talk
TEXT	talk that is louder than surrounding talk
<u>text</u>	emphasis
:	extension of the preceding sound (0,2 seconds for every colon)
>text<	speech is delivered at a quicker pace than surrounding talk
<text>	speech is delivered at a slower pace than surrounding talk
hhh	audible aspiration
•hhh	audible inhalation
(text)	transcriber is in doubt about the accuracy of the transcribed stretch of talk
( )	transcriber could not achieve a hearing for the stretch of talk
((text))	description of a phenomenon, of details of the conversational scene or other characterizations of talk
[[text]]	personal comment of the transcriber
text	talk in Frisian

Appendix B. Descriptive statistics of MLT and MLTU (aggregated per fragment)

	MLT (SD)		*MLTU (SD)*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	5.0 (3.2)	3.6 (1.9)	4.1 (2.3)	3.0 (1.6)
2	6.3 (6.3)	4.5 (2.6)	4.1 (2.3)	4.0 (2.2)
3	5.7 (4.0)	3.8 (2.1)	4.6 (2.2)	3.7 (2.1)
4	5.8 (4.5)	4.7 (4.0)	4.3 (2.7)	3.6 (2.4)
5	8.3 (7.7)	3.2 (2.3)	4.9 (2.4)	3.2 (2.3)
6	6.9 (6.1)	3.6 (2.9)	4.7 (2.8)	3.5 (2.7)
7	7.8 (8.4)	5.6 (5.3)	6.2 (6.0)	4.7 (3.2)
8	3.6 (3.1)	3.9 (4.3)	2.8 (1.9)	3.3 (2.8)
9	7.7 (6.1)	5.4 (6.9)	4.6 (2.3)	4.5 (3.5)
10	7.8 (14.8)	4.2 (4.4)	4.4 (2.9)	3.2 (2.6)
11	4.8 (3.2)	3.9 (3.4)	4.3 (2.4)	3.4 (2.2)
12	5.6 (3.9)	3.3 (2.9)	4.2 (2.4)	3.2 (2.6)
13	8.3 (11.8)	4.3 (3.6)	5.0 (2.7)	3.8 (2.8)
14	7.5 (5.7)	6.3 (5.0)	4.8 (2.4)	5.5 (3.4)
15	6.8 (5.1)	5.2 (3.2)	4.5 (2.0)	4.3 (2.4)
16	7.1 (7.4)	5.2 (5.1)	4.8 (3.4)	4.6 (2.9)
17	5.8 (5.7)	4.4 (3.8)	4.2 (2.7)	3.7 (2.6)
18	6.7 (6.6)	4.8 (4.4)	4.5 (2.7)	4.0 (2.4)
19	9.6 (7.7)	3.8 (3.5)	5.1 (2.0)	3.4 (2.3)
20	9.2 (6.8)	3.5 (2.5)	4.0 (1.7)	3.1 (1.7)
21	6.4 (5.1)	3.6 (3.2)	4.4 (2.3)	2.8 (2.2)
Mean (SD)	*6.8 (1.5)*	*4.3 (0.8)*	*4.5 (0.6)*	*3.7 (0.7)*

Appendix C. Proportion self-selection and proportion initiating speech actions (aggregated per fragment)

	Proportion self-selection		*Proportion initiating speech actions*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.81	0.89	0.69	0.76
2	0.69	0.73	0.79	0.75
3	0.95	0.79	0.66	0.78
4	0.86	0.78	0.80	0.79
5	0.64	0.44	0.80	0.69
6	0.86	0.69	0.72	0.68
7	0.85	0.76	0.74	0.65
8	0.67	0.73	0.73	0.65
9	0.40	0.75	0.56	0.67
10	0.56	0.70	0.71	0.62
11	0.93	0.76	0.72	0.64
12	0.92	0.78	0.59	0.67
13	0.79	0.67	0.76	0.63
14	0.70	0.61	0.70	0.70
15	0.85	0.85	0.80	0.69
16	0.97	0.97	0.81	0.78
17	0.88	0.86	0.71	0.74
18	0.88	0.77	0.78	0.76
19	0.73	0.62	0.83	0.68
20	0.76	0.73	0.85	0.61
21	0.92	1.00	0.83	0.73
Mean (SD)	*0.79 (0.14)*	*0.76 (0.12)*	*0.74 (0.75)*	*0.70 (0.56)*

Appendix D. Proportion initiating questions and proportion initiating directives (aggregated per fragment)

	Proportion initiating questions		*Proportion initiating directives*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.25	0.25	0.16	0.00
2	0.18	0.13	0.29	0.00
3	0.20	0.12	0.08	0.09
4	0.29	0.04	0.11	0.00
5	0.06	0.00	0.16	0.00
6	0.15	0.06	0.13	0.00
7	0.38	0.10	0.00	0.03
8	0.55	0.06	0.00	0.00
9	0.33	0.00	0.00	0.00
10	0.30	0.05	0.00	0.05
11	0.04	0.27	0.13	0.03
12	0.10	0.10	0.00	0.00
13	0.19	0.46	0.03	0.08
14	0.13	0.13	0.11	0.19
15	0.23	0.00	0.13	0.00
16	0.03	0.00	0.14	0.07
17	0.10	0.00	0.16	0.29
18	0.04	0.00	0.16	0.05
19	0.26	0.13	0.05	0.00
20	0.23	0.00	0.03	0.00
21	0.09	0.00	0.29	0.00
Mean (SD)	*0.20 (0.13)*	*0.09 (0.12)*	*0.10 (0.09)*	*0.04 (0.07)*

Appendix E. Proportion initiating statements and proportion initiating commitments (aggregated per fragment)

	Proportion initiating statements		*Proportion initiating commitments*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.39	0.50	0.13	0.19
2	0.29	0.56	0.21	0.25
3	0.48	0.59	0.16	0.16
4	0.36	0.89	0.08	0.04
5	0.63	0.33	0.09	0.33
6	0.38	0.47	0.28	0.35
7	0.27	0.53	0.12	0.30
8	0.27	0.69	0.18	0.19
9	0.44	1.00	0.22	0.00
10	0.30	0.55	0.40	0.35
11	0.46	0.33	0.25	0.37
12	0.55	0.70	0.30	0.20
13	0.64	0.38	0.00	0.00
14	0.44	0.50	0.10	0.13
15	0.43	0.93	0.21	0.07
16	0.59	0.87	0.07	0.07
17	0.58	0.43	0.06	0.29
18	0.65	0.80	0.14	0.15
19	0.57	0.75	0.11	0.13
20	0.42	0.83	0.26	0.17
21	0.33	1.00	0.18	0.00
Mean (SD)	*0.45 (0.13)*	*0.65 (0.21)*	*0.17 (0.10)*	*0.18 (0.12)*

Appendix F. Proportion initiating evaluations and proportion initiating markings (aggregated per fragment)

	Proportion initiating evaluations		*Proportion initiating markings*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.02	0.00	0.05	0.06
2	0.00	0.06	0.03	0.00
3	0.02	0.00	0.05	0.04
4	0.04	0.00	0.13	0.04
5	0.04	0.00	0.01	0.33
6	0.02	0.06	0.04	0.06
7	0.00	0.00	0.23	0.03
8	0.00	0.00	0.00	0.06
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.13	0.00
12	0.00	0.00	0.05	0.00
13	0.00	0.00	0.14	0.08
14	0.03	0.00	0.18	0.06
15	0.00	0.00	0.00	0.00
16	0.00	0.00	0.17	0.00
17	0.06	0.00	0.03	0.00
18	0.00	0.00	0.00	0.00
19	0.00	0.00	0.02	0.00
20	0.00	0.00	0.06	0.00
21	0.07	0.00	0.04	0.00
Mean (SD)	*0.01 (0.02)*	*0.01 (0.02)*	*0.07 (0.07)*	*0.04 (0.07)*

Appendix G. Proportion responsive questions and proportion responsive directives (aggregated per fragment)

	Proportion responsive questions		*Proportion responsive directives*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.38	0.70	0.08	0.10
2	0.11	0.33	0.33	0.22
3	0.34	0.72	0.05	0.20
4	0.29	0.69	0.18	0.08
5	0.06	10.00	0.06	0.00
6	0.20	0.85	0.05	0.03
7	0.29	0.77	0.00	0.03
8	0.50	0.75	0.00	0.00
9	0.29	0.81	0.00	0.00
10	0.75	0.78	0.00	0.00
11	0.13	0.58	0.00	0.00
12	0.00	0.87	0.00	0.00
13	0.40	0.68	0.00	0.03
14	0.20	0.75	0.05	0.00
15	0.61	0.82	0.11	0.06
16	0.07	0.38	0.21	0.50
17	0.09	0.67	0.09	0.00
18	0.14	0.44	0.14	0.28
19	0.31	0.95	0.31	0.00
20	0.80	0.92	0.00	0.00
21	0.33	0.67	0.22	0.33
Mean (SD)	*0.30 (0.22)*	*0.72 (0.18)*	*0.09 (0.11)*	*0.09 (0.14)*

Appendix H. Proportion responsive statements and proportion responsive declarations (aggregated per fragment)

	Proportion responsive statements		*Proportion responsive commitments*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.42	0.10	0.12	0.10
2	0.44	0.22	0.11	0.22
3	0.39	0.04	0.23	0.04
4	0.35	0.23	0.18	0.00
5	0.88	0.00	0.00	0.00
6	0.55	0.12	0.20	0.00
7	0.14	0.16	0.57	0.03
8	0.50	0.25	0.00	0.00
9	0.00	0.15	0.71	0.04
10	0.00	0.22	0.25	0.00
11	0.25	0.23	0.63	0.19
12	0.46	0.13	0.54	0.00
13	0.60	0.27	0.00	0.03
14	0.60	0.25	0.15	0.00
15	0.28	0.12	0.00	0.00
16	0.64	0.13	0.07	0.00
17	0.64	0.22	0.18	0.11
18	0.57	0.22	0.14	0.06
19	0.38	0.05	0.00	0.00
20	0.00	0.08	0.20	0.00
21	0.22	0.00	0.22	0.00
Mean (SD)	*0.40 (0.24)*	*0.15 (0.09)*	*0.21 (0.22)*	*0.04 (0.07)*

Appendix I. Proportion initiating ISQ's and proportion responses to ISQ's (aggregated per fragment)

	Proportion initiating ISQ's		*Proportion responses to ISQ's*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.93	1.00	1.00	0.43
2	1.00	1.00	1.00	0.67
3	0.89	0.75	1.00	0.50
4	0.92	1.00	1.00	0.78
5	0.50		1.00	0.40
6	0.75	1.00	0.75	0.89
7	1.00	1.00	1.00	0.75
8	1.00	0.00	1.00	0.52
9	1.00		1.00	0.64
10	1.00	1.00	1.00	0.96
11	1.00	1.00	1.00	0.80
12	1.00	0.00	1.00	0.69
13	1.00	1.00	0.75	0.64
14	0.75	1.00	0.91	0.92
15	0.94		1.00	0.71
16	1.00		1.00	1.00
17	1.00		1.00	1.00
18	1.00		0.75	0.75
19	0.65	1.00	1.00	0.48
20	1.00		1.00	0.86
21	1.00			1.00
Mean (SD)	*0.91 (0.12)*	*0.83 (0.37)*	*0.96 (0.09)*	*0.73 (0.19)*

Appendix J. Proportion types of statements (aggregated per fragment)

	Proportion initiating descriptive statements		*Proportion initiating projective statements*		*Proportion initiating analytical statements*	
	Teacher absent	**Teacher present**	**Teacher absent**	**Teacher present**	**Teacher absent**	**Teacher present**
1	0.63	0.88	0.04	0.00	0.33	0.13
2	0.70	0.78	0.00	0.22	0.30	0.00
3	0.70	0.95	0.02	0.00	0.27	0.05
4	0.97	1.00	0.00	0.00	0.03	0.00
5	0.52	1.00	0.02	0.00	0.45	0.00
6	0.50	0.88	0.00	0.13	0.50	0.00
7	0.29	0.69	0.00	0.00	0.71	0.31
8	1.00	0.82	0.00	0.00	0.00	0.18
9	0.00	0.88	0.00	0.00	1.00	0.13
10	0.00	0.91	0.00	0.00	1.00	0.09
11	0.64	0.80	0.00	0.00	0.36	0.20
12	0.64	0.43	0.00	0.00	0.36	0.57
13	0.87	0.80	0.00	0.00	0.13	0.20
14	0.70	0.88	0.00	0.00	0.30	0.13
15	0.67	0.93	0.03	0.07	0.30	0.00
16	0.66	0.77	0.10	0.00	0.24	0.23
17	0.67	0.33	0.00	0.33	0.33	0.33
18	0.59	0.75	0.03	0.06	0.38	0.19
19	0.95	0.50	0.05	0.00	0.00	0.50
20	1.00	1.00	0.00	0.00	0.00	0.00
21	0.87	1.00	0.07	0.00	0.07	0.00
Mean (SD)	*0.65 (0.28)*	*0.81 (0.19)*	*0.18 (0.28)*	*0.39 (0.09)*	*0.34 (0.29)*	*0.15 (0.17)*

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Samenvatting

Probleemoplossingsinteracties van jonge kinderen. Gesprekken tijdens groepswerk in de onderbouw van de basisschool

In dit proefschrift wordt verslag gedaan van een onderzoek naar probleemoplossingsinteracties in groep 1-3 van het Nederlandse basisonderwijs. Binnen dit onderzoek staan de interacties centraal die jonge kinderen onderling of met de leerkracht hebben tijdens groepswerk. Hoewel eerder onderzoek heeft aangetoond dat peer-interactie in de klas waarin oudere kinderen in de basisschool samen problemen oplossen bijdraagt aan hun taal- en cognitieve ontwikkeling, hebben experimentele studies naar de effecten van groepswerk van jonge kinderen niet tot vergelijkbaar eenduidige resultaten geleid. Te weinig vrijheid in het construeren van het probleem en het vinden van een oplossing doordat taken vooraf zijn opgelegd zou het gebrek aan overtuigende resultaten kunnen verklaren. Bovendien zijn de interacties binnen het gedane onderzoek vooral door vooropgezette codering en kwantitatieve analyses gekarakteriseerd.

Vergelijkbare kwesties doen zich voor wanneer het gaat over de rol van de leerkracht wanneer deze intervenieert terwijl kinderen samenwerken. Er zijn slechts enkele studies op dit terrein verricht en het merendeel van de resultaten wijst er op dat leerkrachtinterventies tijdens problemen bij groepswerk potentieel leerzame momenten zijn voor de kinderen, maar dat de leerzaamheid ervan sterk afhankelijk is van de gesprekspraktijken van de leerkracht. Het eerdere onderzoek richt zich echter alleen op interventies tijdens groepswerk van oudere kinderen in de basisschool of in het voortgezet onderwijs. Bovendien zijn ook deze interacties vooral via codering en kwantitatieve analyse bestudeerd en betreffen deze vooral het handelen van de leerkracht.

Om beter te begrijpen hoe probleemoplossingsinteracties van jonge kinderen met klasgenoten en/ of met hun leerkrachten, kunnen bijdragen aan hun ontwikkeling zijn kwalitatieve analyses van hun naturalistische gesprekspraktijken en interacties in de onderbouw van de basisschool nodig. Daarom heeft dit proefschrift het doel om meer inzicht te verkrijgen in de manieren waarop gespreksdeelnemers samen probleem-oplossingsinteracties tijdens groepswerk in de onderbouw van de basisschool vormgeven.

Voor dit onderzoek is gebruik gemaakt van de video-opnames die zijn verzameld binnen het grotere, meerjarige en door Raak-Pro gefinancierde praktijkgerichte onderzoek ‘Samenwerken en taalvaardigheid’, waarin met de deelnemende leerkrachten uit zeven Friese basisscholen geprobeerd is om profijtelijke condities voor het samenwerken van kinderen in het kader van onderzoekend leren, te bepalen. De klassen in de onderbouw (zeven gecombineerde kleuterklassen en één gecombineerde groep 3/4) van de deelnemende basisscholen hebben in dat verband gedurende tweeëneenhalf jaar vijf onderzoekend-leren-projecten uitgevoerd volgens de methodiek van verhalend ontwerpen (*Storyline Approach* in het Engels).

Binnen die projecten hebben groepjes kinderen van 4-7 jaar (bestaande uit 2 tot 5 deelnemers) problemen van personages opgelost die zich voordeden terwijl het verhaal zich ontwikkelde.

Door delen van het uitgebreide corpus gedetailleerd te analyseren, is een beeld verkregen van de probleemoplossingsinteracties tijdens groepswerk in de onderbouw van de basisschool. Hiertoe is in hoofdstuk 2 een kwantitatieve analyse verricht op basis van coderingen van kenmerken van de gesprekken van kinderen die in kleine groepjes werkten, zonder en met de leerkracht. In de hoofdstukken 3, 4 en 5 zijn gedetailleerde analyses verricht waarbij gebruik gemaakt is van de methode zoals die is ontwikkeld in de conversatie analyse (CA). In de CA wordt onderzocht hoe gespreksdeelnemers hun interacties actief construeren. Een belangrijk uitgangspunt daarbij is dat onderzoekers beschrijven hoe gespreksdeelnemers *zelf* elkaars uitingen interpreteren en behandelen. Iedere uiting wordt in samenhang geanalyseerd, samen met de uiting(en) die eraan vooraf ging(en) en de uiting die erop volgt (Mazeland, 2003). Met deze methodiek is in dit onderzoek beschreven hoe kinderen zelf met elkaar (en met hun leerkracht) ordelijk georganiseerde interacties realiseren waarin zij problemen construeren en oplossen en redeneren. De onderzoeksresultaten hebben enerzijds een wetenschappelijk belang: zij vergroten de wetenschappelijke kennis omtrent gesprekspraktijken van jonge kinderen en hun leerkrachten tijdens groepswerk. Anderzijds kunnen deze resultaten gebruikt worden in het kader van de verdere ontwikkeling van curricula van opleidingen tot leraar basisonderwijs en de professionalisering van leerkrachten in (de onderbouw van) het basisonderwijs.

Gespreksbijdragen van kinderen tijdens groepswerk met en zonder de leerkracht

Allereerst zijn in hoofdstuk 2 de gespreksbijdragen van jonge kinderen tijdens groepswerk waarin de leerkracht afwezig is, vergeleken met hun bijdragen tijdens de aanwezigheid van de leerkracht. Daartoe zijn de gespreksbijdragen van leerlingen in beide contexten geanalyseerd op de mate van complexiteit, de beurtwisselingsprocedures en op de aard van de taalhandelingen.

Het blijkt dat jonge kinderen langere beurten en complexere zinnen realiseren in afwezigheid van de leerkracht dan wanneer de leerkracht aanwezig is. Daarentegen blijken de beurtwisselingsprocedures niet afhankelijk te zijn van de aan- of afwezigheid van de leerkracht. In beide contexten zijn vergelijkbare proporties zelfselectie en beurttoewijzing gevonden. Verder realiseren kinderen andere taalhandelingen in afwezigheid van de leerkracht dan in aanwezigheid van de leerkracht. In afwezigheid van de leerkracht realiseren kinderen meer initiërende taalhandelingen, wat erop duidt dat leerlingen meer invloed hebben op de inhoud van het gesprek. Daarnaast is de verdeling van verschillende typen initiërende taalhandelingen afhankelijk van de twee contexten. In afwezigheid van de leerkracht realiseren kinderen

meer *vragen* en *markeringen*, terwijl ze in aanwezigheid van de leerkracht meer *beweringen* realiseren. Ook de verdeling van de typen responsieve taalhandelingen is afhankelijk van de twee contexten. In afwezigheid van de leerkracht realiseren kinderen meer *responsieve verplichtingen* en *beweringen*, terwijl in interactie waarin de leerkracht aanwezig is kinderen vooral *responsief* reageren op *vragen*. Tenslotte laat de analyse van de complexiteit van specifieke taalhandelingen zien dat kinderen vaker *antwoorden* op *informatiezoekende vragen* en vaker *analytische beweringen initiëren* in afwezigheid van de leerkracht, wat erop duidt dat de complexiteit van de taalhandelingen hoger is wanneer zij onderling communiceren.

De resultaten demonstreren dat de aan- of afwezigheid van de leerkracht van invloed is op de manier waarop kinderen problemen oplossen tijdens groepswerk: hun gespreksbijdragen in termen van complexiteit en de typen uitgevoerde taalhandelingen verschillen tussen beide contexten. Groepswerk in afwezigheid van de leerkracht biedt dus andere gespreksmogelijkheden dan interacties tijdens groepswerk waarin de leerkracht aanwezig is.

Zoals in dit hoofdstuk is aangetoond, heeft de aanwezigheid van de leerkracht invloed op de manier waarop kinderen deelnemen aan het oplossen van problemen tijdens groepswerk. *Hoe* probleem-oplossingsinteracties zowel met als zonder de interveniërende leerkracht verlopen blijft echter onduidelijk. Vandaar dat eerst in hoofdstuk 3 de leerkrachtinterventies tijdens groepswerk, wanneer leerlingen een probleem aankaarten, gedetailleerder zijn geanalyseerd, voordat in de daaropvolgende hoofdstukken de probleemoplossingsinteracties zonder de leerkracht nauwkeuriger zijn verkend.

Probleemoplossingsinteracties met de interveniërende leerkracht

In hoofdstuk 3 wordt duidelijk dat probleem-oplossingsinteracties tijdens leerkrachtinterventies uit de volgende drie mogelijke fasen bestaan: (1) een probleemconstructie, (2) een optionele probleemverkenning en (3) een oplossingsbespreking.

Een probleemconstructie bestaat uit een probleeminitiatie en een reactie daarop. Problemen worden geïnitieerd met een *negatieve evaluatie* en/ of een *beschrijving*, door ofwel de leerlingen ofwel de leerkracht. Beide opties kunnen leiden tot drie patronen volgens welke de probleemconstructie vorm krijgt, afhankelijk van de reactie op de probleeminitiatie. Patroon één bestaat uit een probleeminitiatie en een *instructie van de leerkracht* om actie te ondernemen als oplossing voor het door de leerkracht veronderstelde probleem. Dit patroon resulteert in een interactie waarin kinderen alleen nog een enkele keer bezwaar kunnen aantekenen tegen de instructie van de leerkracht, maar waar niet op wordt ingegaan. Patroon twee bestaat uit een probleeminitiatie en een leerkrachtreactie, die kan worden aangeduid als '*put off*'. Deze praktijk start een probleemverkenning, welke bestaat uit een serie van vraag-antwoord sequenties, alvorens de leerkracht komt tot een andere karakterisering

van het probleem. Patroon drie tenslotte bestaat uit een probleeminitiatie, die kan worden beantwoord met een *verzoek om een oplossing te presenteren* of met een *aankondiging om een oplossing te presenteren*, welke resulteren in een oplossingsbespreking.

In tegenstelling tot patroon één leiden patroon twee en drie elk tot een gezamenlijk vervolg van het gesprek, waarin kinderen (uiteindelijk) een oplossing kunnen voorstellen. Duidelijk is geworden dat de leerkrachtreactie op dat oplossingsvoorstel bepaalt hoe de oplossingsbespreking verloopt en in welke mate de kinderen nog kunnen deelnemen aan de interactie. Enerzijds resulteert een *directe evaluatie* in combinatie met een *instructie* van de leerkracht in reactie op het oplossingsvoorstel van één van de kinderen, in een instructie volgens het *information-delivery format*, waarin kinderen alleen nog instemmingstekens realiseren. Anderzijds leiden *tentatieve evaluaties*, *bezwaren* en *informatiezoekende vragen* van de leerkracht in reactie op het oplossingsvoorstel van de leerlingen tot een gezamenlijke oplossingsbespreking waarin diverse oplossingen worden besproken en geëvalueerd, door zowel de leerlingen als de leerkracht.

Deze resultaten leiden tot de volgende conclusie: in hoeverre de probleem-oplossingsinteractie tijdens de leerkrachtinterventie volgens de bovengenoemde drie fasen verloopt en in hoeverre leerlingen kunnen deelnemen aan de interactie hangt af van de leerkrachtreactie op de probleeminitiatie in de probleemconstructie en eventueel van diens reactie op het oplossingsvoorstel van leerlingen in de oplossingsbespreking. In die laatste fase blijken kinderen op een uitgebreide manier deel te nemen aan de interactie wanneer leerkrachten mede door tentatief evalueren een gelijkwaardige gespreksrol innemen. Daarin *redeneren* kinderen samen en *bouwen* zij *voort op elkaars gespreksbijdragen*; dit wordt in de literatuur vaak gerelateerd aan leren en cognitieve ontwikkeling.

Probleemoplossingsinteracties tussen jonge kinderen onderling

De gedetailleerde analyses in hoofdstuk 4 hebben duidelijk gemaakt dat jonge kinderen onderling drie typen probleem-oplossingsinteracties vormgeven.

Het eerste type probleemoplossingsinteracties heeft plaats wanneer een gebeurtenis die tijdens de interactie plaatsvindt (aangeduid als een *huidige gebeurtenis*) tot een probleem wordt gemaakt door een *negatieve evaluatie* daarvan door één van de kinderen. Dit type problemen wordt geconstrueerd volgens twee verschillende patronen, afhankelijk van de reactie van één van de andere kinderen op de negatieve evaluatie. Een *probleemverklaring* als reactie leidt tot een analyse van de mogelijke oorzaken van het probleem voordat een oplossing wordt besproken, terwijl een *oplossingsvoorstel* als reactie direct resulteert in een oplossingsbespreking. De aard van de oplossingsvoorstellen is *directief* waarbij kinderen bepaalde acties moeten ondernemen om het probleem op te lossen.

Het tweede type probleemoplossingsinteracties vindt plaats rondom een

actie van één van de kinderen, uitgevoerd tijdens de interactie (aangeduid als een *huidige actie*). Dergelijke problemen worden geconstrueerd volgens een sequentieel patroon bestaande uit drie elementen: een *uitgevoerde actie*, *een met een account onderbouwde oppositie* tegen de actie en een *(hernieuwde) explicatie* van de actie. Het account waarmee de oppositie wordt ondersteund, wordt op twee manieren vormgegeven: (1) door te beweren dat de actie inadequaat is of (2) door te beweren dat de actie leidt tot toekomstige problemen. Afhankelijk van de vormgeving van het account resulteert het probleem in een qua duur variërende discussie over enerzijds de adequaatheid van de actie of anderzijds het al dan niet resulteren in een toekomstig probleem. De oplossing komt uiteindelijk tot stand doordat één van de standpunten wordt geaccepteerd nadat één van de kinderen het eigen standpunt heeft versterkt door het *uitvoeren van de actie*, door *het zoeken van steun bij een ander* of door *prosodische markering* bij het (opnieuw) vormgeven van het standpunt.

Het derde type probleemoplossingsinteracties betreft problemen die betrekking hebben op een actie*,* die in de directe toekomst of op een later toekomstig moment plaatsvinden (aangeduid als een *toekomstige actie)*. Dit type problemen kan in drie sequentiële patronen worden geconstrueerd: (1) een *uitnodiging om voorstellen* te doen waarin naar voren komt dat volgende te ondernemen stappen nog onduidelijk zijn, gevolgd door een *voorstel voor vervolgstappen*, (2) een *door een account ondersteund voorstel* waarin wordt beweerd dat een toekomstige actie nodig is om een probleem te voorkomen en een daarop volgende *acceptatie*, en (3) een *voorstel* voor een oplossing van een probleem, gevolgd door een *alternatief voorstel* en een *bezwaar*, waarin wordt gesteld dat de tegenstelling tussen de voorstellen in strijd is met het doel (één echte oplossing) waar ze met elkaar naar op zoek zijn. Een afwijzing van het initiële voorstel of een alternatief voorstel in reactie op het initiële voorstel in het eerste en derde patroon kan leiden tot een discussie over de best mogelijke voorstellen. In alle drie de patronen wordt het vervolg van de interactie dus bepaald door de reactie van één van de kinderen (een acceptatie, een afwijzing of een alternatief) op het initiële voorstel. De probleemoplossingsinteracties van dit type leiden in onze data uiteindelijk altijd tot een expliciete markering van het instemmen met het gezamenlijke besluit inzake een oplossing.

Deze bevindingen leiden tot de conclusie dat kinderen tenminste drie typen probleemoplossingsinteracties kunnen vormgeven, waarbij deze afhankelijk zijn van het type probleem en van de manier waarop de tweede spreker reageert. Mede op basis van de observatie dat kinderen op verschillende posities in de interactie laten zien dat zij georiënteerd zijn op een oplossing kunnen we bovendien concluderen dat probleemoplossingsinteracties veelal niet-lineair verlopen: zij volgen niet de in veel normatieve benaderingen geprefereerde route van probleem naar probleemverkenning naar oplossing, een benadering die leerkrachten ook blijken te prefereren.

Accountsequenties wanneer jonge kinderen redeneren tijdens groepswerk

Zowel redeneren als meer specifiek het ondersteunen van standpunten door accounts wordt gerelateerd aan cognitieve ontwikkeling. Daarom hebben we ons in hoofdstuk 5 gericht op de structuur van argumenteren van de kinderen. Omdat argumentatie in de literatuur echter alleen op *beweringen* wordt betrokken, maar we hier ook het gebruik van argumenten door de kinderen bij acties als *verzoeken, voorstellen* etc. bekijken, spreek ik niet over argumentaties maar over *verantwoordingen*, die verder met de Engelse en in de literatuur gebruikelijke term *accounts* worden aangeduid. In deze studie hebben we accountsequenties opgevat als gespreksstructuren waarin ten minste één account wordt geleverd door één van de gespreksdeelnemers in het basispaar of in post-expansie.

Het blijkt dat verschillende acties in het eerste paardeel (EPD) accountsequenties kunnen doen starten. Niet alleen *evaluaties* en *beweringen* zijn mogelijke uitgangspunten van accountsequenties, zoals vaak wordt gerapporteerd; zoals gezegd: jonge kinderen starten ook accountsequenties naar aanleiding van *verzoeken*, *voorstellen* en zelfs *fysieke acties*. Het type EPD van de sequentie waar we de accounts aantreffen, blijkt overigens geen invloed te hebben op de structuur van de accountsequenties zelf.

De manier waarop jonge kinderen accountsequenties vormgeven, wordt wel beïnvloed door zowel het type tweede paardeel (TPD) in reactie op het EPD als door de aard van de accounts die zij realiseren. Op basis van onze analyse hebben we onderscheid gemaakt tussen *enkelvoudige accountsequenties*, sequenties waarin één account wordt geleverd, en *meervoudige accountsequenties*, waarin meerdere accounts worden geleverd.

De structuur van *enkelvoudige accountsequenties* wordt in eerste instantie vooral bepaald door het type TPD en in tweede instantie ook door het type account. Sequenties met een *acceptatie in het TPD* bestaan uit één account dat kan worden geleverd door enerzijds de eerste spreker in het EPD, na een *minimal agreement*, of na een ophelderingsvraag van de tweede spreker. Anderzijds kan de tweede spreker ook een account leveren samen met de acceptatie in het TPD. Enkelvoudige accountsequenties in de context van een oppositioneel TPD (hetzij een *afwijzing* of een *counter*) kennen twee structuren. Enerzijds kan het account geleverd worden door de eerste spreker in de derde beurt, na een oppositioneel TPD. Anderzijds kan de tweede spreker een account leveren in combinatie met het oppositionele TPD, in reactie op een EPD van de eerste spreker. In enkelvoudige accountsequenties wordt het account van één van de sprekers (voorafgegaan of) opgevolgd door expliciete acceptatie of door acties die functioneren als acceptatie door de andere spreker. Deze reacties impliceren dat de sequentie is afgerond en leiden ertoe dat we deze accounts hebben gekarakteriseerd als *succesvol*, zoals we hieronder zullen toelichten.

Een oppositioneel TPD kan echter ook resulteren in een *meervoudige accountsequentie*. Die kent dan een vergelijkbare opbouw in de aanloop van de sequentie als de enkelvoudige accountsequenties met een oppositioneel TPD, maar kent na het account een ander verloop. De inhoud en vormgeving (de *action formation practices*) van het account in sequenties met een oppositioneel TPD blijken de reactie van de andere gespreksdeelnemer te bepalen. Op basis van die reacties hebben we een onderscheid gemaakt tussen *succesvolle* accounts en *onsuccesvolle* accounts. Accounts die als succesvol worden aangeduid zijn accounts waarop wordt gereageerd met acceptatie (of acties die functioneren als acceptatie) door de andere spreker. *Succesvolle accounts* verwijzen in hun propositionele inhoud naar direct verifieerbare zaken, terwijl de vormgeving elementen zoals verwijzingen naar zintuigelijk bewijs (*evidentials*) en versterkers (*intensifiers*) zou kunnen laten zien. Accounts die als onsuccesvol worden aangeduid zijn accounts die door de andere spreker worden beantwoord met een herhaling van de eigen positie of met het leveren van een account voor de andere positie. De propositionele inhoud van *onsuccesvolle accounts* is persoonlijk, moreel of tentatief van aard, en de vormgeving drukt een persoonlijke relatie uit, of geeft aan dat de acties niet aan de norm voldoen, of wijst op twijfel of mogelijke toekomstige (negatieve of positieve) gevolgen van de voorgestelde actie.

De reactie van één van de sprekers op een onsuccesvol account van de andere spreker beïnvloedt de structuur van de meervoudige accountsequentie. Zoals genoemd hebben we twee verschillende typen reacties op onsuccesvolle accounts gevonden, wat leidt tot twee nader te onderscheiden structuren. De eerste structuur, waarin slechts één van de sprekers meerdere accounts levert, wordt geconstrueerd wanneer één spreker het eigen standpunt herhaalt in reactie op een onsuccesvol account van de andere spreker. Dan levert die andere spreker een tweede account. Wanneer dit tweede account succesvol is, wordt het geaccepteerd in de volgende beurt en leidt het dus tot afronding van de sequentie, terwijl onsuccesvolle accounts in deze positie leiden tot een onduidelijke voortzetting.

In de tweede meervoudige accountsequentie geven beide sprekers één of meer accounts. Deze structuur komt tot stand wanneer een spreker een account levert in reactie op een onsuccesvol account van de andere spreker. De succesvolle accounts in deze positie leiden tot afronding van de sequentie, in de vorm van acceptatie-acties, terwijl niet succesvolle accounts in deze positie kunnen resulteren in alternatieve voorstellen, veelal na een recursief patroon waarin beide sprekers voortdurend accounts blijven leveren totdat één van beide een acceptatie realiseert.

Deze bevindingen leiden tot de conclusie dat de structuur van accountsequenties wordt bepaald door zowel het type TPD dat volgt op de initiërende actie in het EPD en door de typen accounts, die weer afhankelijk zijn van zowel de propositionele inhouden als van de vormgevingen van die accounts. Daarmee duiden deze bevindingen erop dat redeneren ook voor jonge kinderen een interactionele

aangelegenheid is, waarbij ze op basis van kenmerken van de uiting van hun gesprekspartner hun eigen volgende bijdrage afstemmen. Jonge kinderen blijken dus in dit soort gesprekssituaties naar elkaar te luisteren en coherent op elkaar te reageren, waarmee ze samen systematisch op een ordelijk georganiseerde manier redeneren.

Conclusie en discussie

Dit onderzoek laat zien dat gedetailleerde analyses van probleemoplossingsinteracties in de onderbouw van de basisschool niet slechts leiden tot inzicht in de aard van de gespreksbijdragen van jonge kinderen in relatie tot die van hun leerkrachten, maar ook bijdragen aan ons inzicht in de manieren waarop gespreksdeelnemers probleemoplossingsinteracties vormgeven en, in het kader van redeneren tijdens groepswerk accounts leveren. De bevindingen in de afzonderlijke hoofdstukken demonstreren dat zowel de aan- of afwezigheid van de leerkracht als specifieke gesprekspraktijken in de interactie bepalen hoe kinderen deelnemen aan de probleemoplossingsinteracties. Hoofdstuk 2 demonstreert dat de gespreksbijdragen van leerlingen mede bepaald worden door de aan- of afwezigheid van de leerkracht. Ook de gedetailleerde analyses in de daaropvolgende hoofdstukken onderstrepen deze conclusie. Daarbij is dan ook een antwoord op de slotvraag uit hoofdstuk 2 gegeven naar de aard van het verschil in gespreksstructuren en -praktijken in de context met en zonder leerkracht. Allereerst is duidelijk geworden dat probleemoplossingsinteracties met de interveniërende leerkracht volgens een duidelijke structuur verlopen, waarbij de reactie van de leerkracht op de probleeminitiatie en op het oplossingsvoorstel van leerlingen een grote invloed heeft op de mate waarin kinderen kunnen deelnemen. Vervolgens is aangetoond dat probleemoplossingsinteracties tussen kinderen onderling zowel lineair als non-lineair kunnen verlopen. Bovendien is gedemonstreerd dat jonge kinderen verschillende typen problemen met verschillende gesprekspraktijken construeren en vervolgens bespreken. Ook is duidelijk geworden dat het verloop van elk van de drie typen probleemoplossingsinteracties afhankelijk is van specifieke gesprekspraktijken. Tenslotte is gedemonstreerd dat het leveren van accounts een interactionele aangelegenheid is en dat de sequentiële structuur afhankelijk is van het type reactie in het tweede paardeel op een eerste paardeel en van het type account dat geleverd wordt.

Naast de integratie van de bevindingen uit de empirische studies, hebben we de studies ook integraal bediscussieerd. In de methodologische discussie zijn we ingegaan op de wijze waarop we het groepswerk op een systematische wijze hebben georganiseerd, om zo de vergelijkbaarheid van de verzamelde data te waarborgen. Daarnaast hebben we besproken dat de dataset van de studie in hoofdstuk 2 beperkingen oplegt wat betreft de generaliseerbaarheid van de kwantitatieve resultaten, terwijl voor de kwalitatieve studies in de daaropvolgende hoofdstukken besproken is dat we, ondanks dat we niet kunnen uitsluiten dat er nog andere

gespreksstructuren zijn, geen reden zien om te twijfelen aan de gevonden patronen, mede op basis van de systematische wijze waarop de gesprekken zijn geanalyseerd. In de daaropvolgende inhoudelijke discussie zijn de inzichten uit dit proefschrift vergeleken met die uit de bestaande onderzoeksliteratuur. Het belangrijke inzicht dat peer-interactie andere mogelijkheden biedt om problemen op te lossen dan interactie met peers in het bijzijn van een leerkracht is in overeenstemming met eerder Nederlands onderzoek (Damhuis, 1995; Deunk, 2009). Bovendien ondersteunen onze bevindingen ook de ideeën van Piaget (1923) die stelt dat kinderen actiever zijn in het oplossen van een probleem in afwezigheid dan in aanwezigheid van een volwassene.

Een ander discussiepunt betreft de rol van de leerkracht. Hoewel kinderen in interactie met een interveniërende leerkracht ook actief problemen kunnen oplossen, blijkt dit wel sterk af te hangen van het handelen van de leerkracht in alle fasen van de interactie. Onze bevindingen demonstreren dat leerkrachten vanaf het begin terughoudend moeten zijn in het evalueren van oplossingen van jonge kinderen en in het leiding nemen, om kinderen ruimte te bieden. Daarmee plaatsen we kanttekeningen bij normatieve modellen over de begeleiding door leerkrachten (Pol, Volman, & Beishuizen, 2012), waarin wordt gesuggereerd dat leerkrachten *gaandeweg* het gesprek terughoudender moeten optreden en kinderen meer ruimte en gelegenheden moeten bieden om zelf verantwoordelijkheden te nemen.

Door daarnaast te laten zien hoe jonge kinderen onderling zelf problemen construeren en hoe ze in zowel korte als langere complexere interacties doelgericht tot een gezamenlijk oplossing komen dragen we bij aan de kritiek op Piaget's (1926) vroege ideeën dat jonge kinderen vooral egocentrisch zijn en moeite hebben om passend te reageren op elkaars bijdragen en zich te verplaatsen in anderen. Daarmee krijgen we ook meer zicht op belangrijke veronderstelde kenmerken van leerzaam groepswerk (Howe, 2010). Aanvullend is gedemonstreerd dat probleemoplossingsinteracties tussen kinderen onderling niet noodzakelijkerwijs hoeven te verlopen volgens normatieve lineaire modellen (e.g., Jonassen, 2011; Robertson, 2017) van probleem, naar probleemverkenning naar oplossing. In plaats daarvan kunnen deze fasen door elkaar lopen en in een niet-lineaire structuur voorkomen, vergelijkbaar met manieren waarop volwassenen vergaderen (Huisman, 2000; Kruiningen, 2010; Meier, 1997). De bovenstaande bevindingen roepen daarmee de vraag op in hoeverre probleem-oplossen en redeneren in een dialogische ruimte aangeleerd moet worden op school zoals vaak wordt voorgesteld (e.g., Trilling & Fadel, 2009; Wegerif, 2013) of dat we juist contexten moeten creëren waarbinnen jonge kinderen de ruimte hebben om dit te doen.

Naast deze wetenschappelijke bijdragen levert deze studie door zijn gedetailleerde uitkomsten ook bijdragen die bruikbaar zijn voor de praktijk. Op basis van de uitkomsten van dit onderzoek kunnen (aspirant-)leerkrachten bewuster gemaakt worden van de mogelijkheden die groepswerk tussen jonge kinderen biedt

voor het aangaan van uitdagende interacties. Bovendien kunnen leerkrachten (in opleiding) aan de hand van de opbrengsten van dit onderzoek georiënteerd worden op (de gevolgen van) de keuzes voor gesprekshandelingen die zij kunnen maken wanneer zij interveniëren in de gesprekken van kinderen tijdens groepswerk. Door (aspirant-)leerkrachten te oriënteren op de mogelijke manieren waarop kinderen zowel problemen oplossen als redeneren en op de gesprekspraktijken die daarbij stimulerend zijn, zouden leerkrachten hun eigen gedrag in interacties met jonge kinderen op basis van die observaties kunnen analyseren en waar nodig bijstellen. Wanneer leerkrachten tenslotte de mogelijkheden van hun eigen handelen op video krijgen te zien, kunnen zij tijdens het begeleiden van groepswerk verschillende gesprekspraktijken wellicht bewuster inzetten. De uitkomsten van deze studie zouden op deze wijze kunnen bijdragen aan het opleiden en het verder professionaliseren van leerkrachten.

Naast deze praktische implicaties geven de uitkomsten van de studies in dit proefschrift ook aanleiding tot vervolgonderzoek. Ten eerste is er meer onderzoek nodig om na te gaan hoe we leerkrachten kunnen oriënteren op de manieren waarop kinderen samen werken, maar ook op hun eigen rol in gesprekken met (groepjes) kinderen. We hebben gesuggereerd dat CARM (Stokoe, 2014) een interessante mogelijkheid biedt om de inzichten van leerkrachten op dit terrein te vergroten. Ten tweede is er meer onderzoek nodig naar de vraag welke andere didactische methodieken dan verhalend ontwerpen kunnen bijdragen aan de dialogische ruimte van kinderen. Ten derde zou het gewenst zijn om inzicht te krijgen in mogelijke veranderingen in probleemoplossingsinteracties in zowel af- als aanwezigheid van de leerkracht te onderzoeken. De data uit het meerjarige onderzoeksproject bieden gelegenheid om dit nader onderzoeken. Ten vierde zou toekomstig onderzoek zich moeten richten op de vraag in hoeverre kinderen kennis over de wereld en zichzelf opdoen door samen te werken in kleine groepjes binnen de methodiek van verhalend ontwerpen. Tot slot willen wij aanbevelen dat toekomstig praktijkgericht onderwijsonderzoek zich in vervolg op deze studie richt op het beschrijven en analyseren van interacties om te begrijpen hoe jonge kinderen hun leven in de 21e eeuw zelf vormgeven.

Curriculum vitae

About the author

After studying the Teacher Training Program in Leeuwarden, **Frans Hiddink** (1981, Middelburg) studied Inclusive and Special Needs Education at the University of Groningen. After graduating in 2004, he worked as a research assistant in the Social Psychology department and as an orthopedagogue in secondary education, before he started to work at the Teacher Training Program of Stenden University of Applied Sciences (2005-2009). There, his interest in educational research increased, which motivated him to study Developmental Psychology at the University of Groningen. Frans graduated in 2010, with a master's thesis on the interaction between an adult and individual children during a dynamic learning test. During those years, he started to work as a lecturer at the Teacher Training Program of NHL University of Applied Sciences (2009), currently NHL Stenden University of Applied Sciences. Since 2011 he is a member of the research group Discourse & Learning, where he started his PhD research in 2013 that resulted in this thesis. In 2018, Frans received a grant (Comenius Teaching Fellow) from the Dutch Organization for Educational Research (NRO/ NWO) to develop a course to enhance Teacher Training students' discourse practices, by teaching them to analyze their interaction with primary school children. Frans will continue his work as a lecturer and in his research he will focus on classroom interaction and learning in the new research group Multilingualism & Literacy within the Academy of Primary Education of NHL Stenden University of Applied Sciences.

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