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IMPROVING PRE-SCHOOLERS' REASONING SKILLS USING THE PHILOSOPHY FOR CHILDREN PROGRAMME

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Abstract. *Research Findings:* This study investigated the impact of philosophical group discussions, using the Philosophy for Children (P4C) programme, on verbal reasoning skills. The originality of the study is the implementation of P4C with pre-schoolers. Children aged 5 to 6 participated in a quasi-experiment (N = 125), where 58 children were included in an intervention group and 67 children in a control group. The data was collected using a pre- and post-test implemented with individual children. The intervention group participated in a weekly philosophical group discussion over eight months. The results show that children in the intervention group were able to give significantly more reasons that included: (1) comparison, (2) analogy, (3) justification, (4) the wording "because of that", and (5) causal connection than children in the control group if they were asked to reason their opinion. *Practice or Policy:* Findings suggest the value of implementing weekly philosophical group discussions based on P4C in pre-schools to promote four basic language skills and academic achievement by fostering verbal reasoning skills.

Keywords: verbal reasoning, Philosophy for Children programme, philosophical group discussion

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1. Introduction

Developing language, independent thinking and cooperative learning are essential tasks for young children, and this is the focus of preschool activities for children aged 3–7 in many countries (Fisher 2001, Goh, Yamauchi, & Ratliffe 2012, Koolieelse lasteasutuse riiklik õppekava 2008, Taggart, Ridley, Rudd, & Benefield 2005). In the context of basic education, verbal reasoning capacity could be defined as an essential cognitive domain for success in one's life and academic education because verbal reasoning is the precondition to fostering the four main language skills: speaking, listening, reading and writing (Fisher 2001). Acquisition

and competent use of these language skills assumes consciousness and deliberative activity, the achievement of which is associated with verbal reasoning (Vygotsky 1934/2014). That is why it is important to develop verbal reasoning skills as a precondition to fostering the four main language skills in children as early as possible, and to find an effective method to achieve that (Lipman 1975 1984). Some authors have emphasized that structured conversations are very good places to learn verbal reasoning skills in a variety of ways (Aubrey, Ghenta, & Kanira 2012, Lipman 1977, Taggart et al. 2005). Piaget and Vygotsky also both stressed the importance of interactions with others to develop a child's ability to explain points of view (Piaget & Inhelder 1975, Vygotsky 1934/2014). This leads us to Sperber and Mercier's (2010) research, which pointed out that groups perform better at reasoning tasks than individuals, and in some cases, only about 10% of the participants give the correct solution (when questioned individually), while an astonishing 70% of groups did. Therefore, in a group discussion, participants are able to produce more good arguments to develop verbal reasoning. But there is a problem, some researchers (Goh et al. 2012) have found that children aged 3 to 7 often have limited opportunities to be involved in structured conversations and group discussions. For instance, Jacoby and Lesaux (2014) observed learning activity through literacy-based lessons with children 2 to 6 years old and found that only 22% of the 147 children observed could participate in the group discussion, the rest were listening to what the teacher was saying. It is known that some investigated learning methods that rely on group discussions have been found to be extremely effective at developing thinking skills (Aubrey et al. 2012, Cabell, Justice, McGinty, & DeCoster 2015, Daniel, Gagnon, & Pettier 2012, Goh et al. 2012, Lipman 1973, White 2012), and these are now being adopted at all levels of education (Sperber & Mercier 2010).

Therefore, we assume that structured group discussions could be implemented regularly with pre-schoolers to support verbal reasoning. Therefore, this study aims to obtain some clarity on what effect philosophical group discussions following the Philosophy for Children (P4C) programme have on supporting children's verbal reasoning skills as well as on raising children's talkativeness and reducing the extent to which children answer "I do not know".

2. Verbal reasoning

Reasoning is often considered one of the higher-level thinking skills (Evans 2003, Sperber & Mercier 2010), which is beyond the reach of children in their early years (before the age of 5) (Aubrey et al. 2012, Becker, Miao, Duncan, & McClelland 2014, Daniel et al. 2012, Koerber, Sodian, Thoermer, & Nett 2005, Matsak 2010, Myers 2005, Nobes, Martin, & Panagiotaki 2005, Ridley 2006). Some researchers (Apperly & Butterfill 2009, Evans 2003, Sperber & Mercier 2010) are of the opinion that reasoning can be carried out through two distinct cognitive systems: the first system is cognitively efficient but limited, inflexible,

unconscious, implicit, automatic, associative or heuristic – it is also seen as fast, of little value and generally efficient in ordinary circumstances, and runs in the wrong direction when problems are non-standard, the second system is described as conscious, explicit, rule-based, analytic or flexible and demanding of general cognitive resources. Both systems start with attention and memory, followed by learning, reasoning and decision-making, but the second cognitive system of reasoning consists of functions like conscious attention, logical memory, abstraction, comparisons and distinctions (Apperly & Butterfill 2009, Sperber & Mercier 2010). Therefore, conscious attention as the first function of the second conscious cognitive system of reasoning should also develop to foster children's verbal reasoning.

Verbal reasoning as a type of reasoning is not only learning the pronunciation of words, but as they are spoken also organising them into grammatically correct structures and relating thoughts to one another logically (Lipman, Sharp, & Oscanyan 1977). Even children aged three often use the segment "because of that" when they reason using the first unconscious cognitive system of reasoning, which develops long before the child acquires causal relationships according to the second conscious cognitive system of reasoning (Sperber & Mercier 2010, Vygotsky 1975). Therefore, it is essential to distinguish whether the child uses the segment as a word or concept because concepts develop later (Vygotsky 1975). If the child uses the segment "because of that" just as a word (according to the first unconscious cognitive system of reasoning) and not deliberately, she or he is actually unable to give a reason for his or her opinion (i.e. she or he does not yet understand the meaning of the segment "because of that"). If the child uses the segment as a concept deliberately (according to the second conscious cognitive system of reasoning) and she or he is able to give a logical and sense-making explanation, she or he is able to reason verbally (see Sperber & Mercier 2010, Vygotsky 1975). Vygotsky (1934/2014) claims that the development of concepts begins when the child first hears a new incomprehensible word in a comprehensible sentence, and then in the second sentence, then she or he will settle for the meaning of the word, then feels the need to use the word, and the word and the concept become his or her property. Since verbal reasoning develops through the child's own experience of the process and interactions during a certain period (Lipman et al. 1977, Sperber & Mercier 2010, Vygotsky 1975), it is therefore essential that children participate in group discussion.

The development of speech and thinking is interrelated and occurs in social contexts where the child often hears more than he or she is able to speak. Children 2 to 7 years of age learn verbal reasoning just from overhearing the conversations of others (Blum-Kulka & Snow 2003, Cabell et al. 2015, Vygotsky 1934/2014). Many investigators, by implementing conversational approaches and group discussions with pre-schoolers, have emphasized the important role of language in the development of children's mental states (Lohman & Tomasello 2003, Ornaghi, Brockmeier, & Gavazzi 2011). Therefore, in terms of verbal reasoning it is primarily essential about what a more competent person is talking with the child

and how the conversation process is organised, because the child learns through such conversations (Vygotsky 1934/2014). What is talked about (learned) is not primary in terms of verbal reasoning (Lipman et al. 1977), but linguistic interaction and the meaning of words and their pragmatic use is essential (Ornaghi, Brockmeier, & Gavazzi 2011). In line with these arguments, we focused on the implementation of philosophical group discussions with pre-schoolers.

3. Philosophical group discussion based on P4C

Philosophical group discussions according to the Philosophy for Children (P4C) programme, created by Matthew Lipman in collaboration with his colleagues in the 1970s, have been specially developed to foster verbal reasoning skills through arguing (Lipman et al. 1977). In this study we talk only about philosophical discussions based on P4C. Participants in a philosophical group discussion, based on their own experiences, collectively formulate, defend and explore each other's viewpoints, negotiating and composing new meanings – using language as a tool to promote reasoning skills (Lipman et al. 1977, Vygotsky 1934/2014). Children are guided to play with ideas, draw and communicate through physical movements with an emphasis on expressing their thoughts and giving reasons for their own opinions (Haynes & Murris 2011, Lipman & Sharp 1974), whereby differences of opinion are seen as developmental opportunities (Costa 2014). As a result of philosophical discussions, the participants explore ideas, try their own thoughts out and eventually arrive at adequate generalisations (Reznitskaya 2012).

The children are guided in the philosophical discussions to think more carefully about issues and problems that do not have a "right" answer (Cam 2013). In the process of P4C, the teacher is a facilitator whose primary task is to stimulate the children to reason about their own problems through discussion, and not evaluate the children's standpoints at all. The focus is the process of discussion, and not achieving any particular or detailed conclusion – the teacher does not need to present herself to the children as possessing a great store of information (Lipman & Sharp 1974).

The aim of P4C as a learning method is to create an environment in which children can develop the courage to discuss, reason, reflect, express him or herself, compare and contrast, articulate, think about thinking and explore their own interpretations of the world and bring these into dialogue with others (Cam 2013, Lipman & Sharp 1974).

Various approaches are combined in the P4C programme: the teacher (a) often asks open-ended and analytical questions, (b) asks questions according to the children's responses to help explain their own point of view, (c) guides discussion based on the children's ideas and summarises the arguments of the children, (d) asks and relies on the children's earlier beliefs and experiences, and (e) implements pre-philosophical exercises fostering executive functions with the main aim of activating the skill to notice where attention is directed and focus attention

consciously to perform the desired mental activity (Zoller 2008, Fisher 2001, Lipman et al. 1977, Pihlgren 2008, Richland & Burchinal 2013). These are indicated as techniques for fostering verbal reasoning skills that can also be implemented separately outside the P4C programme.

4. Previous studies

Many researchers (Biggeri & Santi 2012, Fisher 2001, Lipman 1984, Murris 2008) are of the opinion that P4C as a discussion method is a suitable pedagogical approach for developing talents and abilities for thinking by offering training in how to reason, opportunities to inquire and explore, and enhancing critical, creative and caring thinking through quality questioning (Biggeri & Santi 2012). Systematic studies have also shown that philosophical discussion with children (aged 6–16) leads to growth in the learners' verbal reasoning abilities (see Camhy & Iberer 1990, Lipman 1973, Philosophie – eine Schule der Freiheit 2008, Trickey & Topping 2004, Topping & Trickey 2014). In many countries, P4C is now in the school curriculum for different grades (Göd 1995, Philosophie – eine Schule der Freiheit 2008, Poelchau 2007).

Previous studies on P4C have shown that even children aged 5 to 7 have the capacity to engage in philosophical group discussion (Daniel et al. 2012, Fisher 2007, Murris 2008). Daniel et al. (2012) implemented P4C with 5-year-old children over two consecutive years (four months and then six months) and found that the intervention group were able to present better cognitive levels than the control group, and produced more responses that embodied the skills of dialogical critical thinking (logical, creative, responsible and metacognitive).

Philosophical discussion based on P4C uses quality questioning as a primary technique (Lipman et al. 1977), but as far as the authors of this study are aware, the questioning techniques implemented during the P4C programme have not themselves been investigated. Therefore, we explore other investigations which examined the impact of questioning techniques to foster verbal reasoning skills in children 5 to 6 years old. Previous studies show that teachers and even parents tend to ask primarily closed-ended questions (valuing factual knowledge) from children, and for example, ask less "what" and "why" questions, which encourage reasoning skills and higher order thinking skills (Gillies & Khan 2009, Harris & Williams 2012, Junefelt & Tulviste 1997, Lee, Kinzie, & Whittaker 2012, Meacham, Vukelich, Han, & Buell 2014, Walsh & Sattes 2005). When a teacher asks open-ended and analytical questions (higher order) the children produce answers of a higher cognitive level (logical reasoning, argumentative), and this is widely associated with higher academic achievement (Lee et al. 2012, Topping & Trickey 2014, Walsh & Blewitt 2006, Zucker, Justice, Piasta, & Kaderavek 2010).

In a philosophical group discussion based on P4C, the teacher guides discussion through questioning, and asks questions according to the children's responses, therefore, it is essential that children can explain their own opinion

freely, and can be talkative and do not answer just "I do not know". Walsh and Sattes (2005) claim that the results from previous studies indicate that school children at different ages answer "I do not know" less when teachers ask open-ended questions to encourage higher order thinking skills. Research by De Rivera, Girolametto, Greenberg and Weitzman (2005) and Lee et al. (2012) indicated that teachers found that open-ended questions resulted in children aged 4 to 6 years using a larger number of words. Cabell et al. (2015) found in their research that based on children's responses and ideas, guided discussion raised the number of words (talkativeness) in responses by 4 to 5-year-old children. Koerber et al. (2005) found that the previous beliefs and experiences of 4 to 6-year-old children caused a positive effect on verbal reasoning skills.

During philosophical group discussions it is important to hold the group's attention on the topic, to understand the other participants' viewpoints and to be able to argue. Different pre-philosophical exercises before a philosophical discussion according to P4C (Zoller 2008) develop executive functions and the skill of conscious attention (to maintain focus on the context), which predicts better cognitive flexibility, and early and long-term academic success (Becker et al. 2014). Developing executive functions encourages cognitive skills (cognitive flexibility and shifting attention) because it helps to control attention and keep the working memory active (Becker et al. 2014), which are pre-requisites for the reasoning system (Sperber & Mercier 2010). Executive functions, defined as the ability to control cognitive actions, allow such complex skills as planning, monitoring, task switching and controlling attention while holding it active in the working memory (Becker et al. 2014, Richland & Burchinal 2013). Some researchers claim that executive-functioning resources during early childhood are related to long-term gains in fundamental reasoning skills and higher academic outcomes (Becker et al. 2014, Richland & Burchinal 2013).

5. The present study

5.1. The aim of this study

P4C is also widely used around the world with younger children, and practitioners have created a variety of alternative materials to philosophise with younger children (Murris 2008, Zeitler 2010, Zoller 2008), but so far little research has been conducted about P4C's effectiveness with children aged 5 to 6 (Daniel et al. 2012). Furthermore, there is no known experimental research about the development of verbal reasoning skills from implementing P4C with children 5 to 7 years old. Therefore, the main aim of this study was to investigate the effect of the P4C programme with 5 to 6-year-old children, and after an eight-month experiment, to compare the verbal reasoning skills of the intervention and control groups, their talkativeness and the frequency that they answer "I do not know" when asked to reason their own opinion.

5.2. Hypotheses

From the above review of previous research, the development of verbal reasoning appears to begin at least at the age of five. Hence, we hypothesized that a systematic intervention could show clear differences in the ability of children to reason verbally. Based on Daniel et al. (2012), Justice et al. (2010) and Lee et al. (2012), we ask: Are children in the intervention group able to provide significantly more reasons that include: (1) comparison, (2) analogy, (3) justification, (4) the wording "because of that", and (5) causal connection than children in the control group if they are asked to reason their opinion? Therefore, we expected that after an eight-month implementation of P4C that combines different approaches, including questioning techniques and philosophical group discussion, where children can learn from hearing others, the following would be true:

Hypothesis 1: Children in the intervention group give more explanations than children in the control group.

Hypothesis 2: Children in the intervention group give more "because of that" responses according to the second system of reasoning than children in the control group.

According to de Rivera et al. (2005) and Walsh and Sattes (2005), we assume that using open-ended questions children express their thoughts more often and give less empty responses, therefore we ask: How often do the children in the intervention group compared the children in the control group answer "I do not know", "I just know that" or are silent if they are asked to reason their opinion? Therefore, we expected that after an eight-month implementation of P4C, the following would be true:

Hypothesis 3: Children in the intervention group less often answer "I do not know", "I just know that" or are silent less than children in the control group.

Based on Cabell et al. (2015), Koerber et al. (2005) and Lee et al. (2012) and our assumption that using different approaches activates verbal expression in the intervention group, we ask: How talkative are the children in the intervention group compared to the children in the control group if they are asked to reason their opinion? Therefore, we hypothesized that combining different approaches such as asking about the children's beliefs and experiences using open-ended questions, and guiding topics in the philosophical discussion based on the children's ideas, the following would be true:

Hypothesis 4: Children in the intervention group are more talkative (number of words is greater) than children in the control group.

Based on Becker et al. (2014) and Richland and Burchinal (2013) that training children's attention using pre-philosophical exercises in the intervention group, we ask: Do the children in the intervention group give less incoherent responses than children in the control group if they are asked to reason their opinion. Therefore, we hypothesized that, with the implementation of pre-philosophical exercises that aim to train attention before philosophical discussions, the following would be true after an eight-month implementation of P4C:

Hypothesis 5: Children in the intervention group maintain better focus on the context, and therefore, give less incoherent responses than children in the control group.

6. Method

The quasi-experimental design – pre-test/post-test (non-equivalent) group design – was used because a true experiment design was not feasible in such a lengthy study with a high and costly workload (Cohen, Manion, & Morrison 2007). The sample was selected from among those kindergartens that were nearest, had a separate room for testing and whose parents agreed to participate, therefore, convenience sampling was used. Children aged 5 to 6 years were invited to the intervention group when their kindergarten provided a suitable room for testing and for philosophical discussions every week for eight months. Nearly all invited children decided to take part in the experiment, one child left the group after two weeks. Children aged 5 to 6 years were invited to the control group when their kindergarten provided a suitable room for testing but not for discussions every week for eight months. The control group was not offered to participate in the intervention group.

6.1. Participants

The sample consisted of 125 Estonian-speaking children (58 intervention, 67 control), between 5 and 6 years of age (i.e. 5 years and 4 months to 6 years and 5 months, average age 5 years and 6 months) from four kindergartens in the town of Tartu (37 intervention, 36 control) and two in the county of Tartu (21 intervention, 31 control), the number of boys was 59 (31 intervention, 28 control) and of girls 66 (27 intervention, 39 control). The mean age does not differ significantly in the intervention and control groups (in the intervention group it was 5 years and 6 months, in the control group 5 years 5 months, $p > .05$). The parents of all 125 children were informed and gave written permission for them to participate in the study. Teachers were asked to evaluate the children's social, emotional, general physical, mental and cognitive development, and verbal ability on a 5-point scale, according to the following levels: significantly more than age appropriate, somewhat over age appropriate, age appropriate, somewhat below age appropriate and significantly below age appropriate. The maturity of the children in the intervention and control groups, according to the teachers' evaluations, did not differ ($p > .05$). The average years of the mother's level of education did not differ significantly: 15.4 years in the intervention group and 15.7 years in the control group ($p > .05$), the majority had a secondary or higher education.

6.2. Measure

The Younger Children Verbal Reasoning Test (YCVR test) (Säre, Luik, & Fisher 2016) was used to determine the existence of verbal reasoning in the

children's responses. The same YCVR test was used as a pre-test/post-test for the intervention and control group, initially at the beginning of the academic year and a second time at the end of the academic year, there were approximately eight months between the two tests. "Bravery" is used as a discussion topic in the YCVR test, which according to Zeitler (2010) is a suitable topic to discuss with children aged 5 to 6. The YCVR test consisted of three phases: introduction, practice phase and test phase (using scenarios with illustrations) (see an example question from the YCVR test in Appendix A). The different test phases included open and closed questions, with a total of 28 questions. The test phase included five scenarios, each with two questions, the children's responses to these questions were subsequently analysed. Appendix A presents a translation of the YCVR test into English, the original version of the test was in the Estonian language. The validity and reliability was controlled by the authors of the YCVR test (Säre et al. 2016). The investigation of the YCVR test by Säre et al. (2016) confirms the content and face validity of the YCVR test. The Cronbach's alpha coefficient showed internal reliability for the YCVR test to be .90 (Säre et al. 2016). The Cronbach's alpha coefficients used in this study for each of the sup-types were as follows: .80 for the direct description of the picture, .75 for association based on reality, .81 for connection between the words, .84 for sense-making explanation, causal connection, understanding about mental states, and .60 for "Because of that" (Säre et al. 2016).

The procedure is the same as in the YCVR test (Säre et al. 2016). Before implementing the YCVR test, the researcher played with the children in order for them to become familiar with her and her with them, and then to inform them that the researcher would like to talk to them and ask some questions. First, the researcher explained that if the child did not know the answer or wanted to think longer, he or she should say that. The participants were each tested individually in a session that lasted approximately 10–20 minutes in a separate room at their own kindergarten, the researcher and the child were the only ones present during the test (Säre et al. 2016).

The researcher was trained previously to use the test in a trustworthy manner. To provide more objectivity in the quasi-experiment design, the audio-recordings of the tests were controlled to minimise the effect of the researcher. An independent expert checked the recordings (25% of the sample) and gave her acceptance of their objectivity. According to the opinion of the expert, the tester questioned all children equally with a caring and supportive attitude, the tone of voice in all cases was friendly, the speed of the questioning was generally moderate and adapted quickly to the needs of the child (if the child was slow then the tester also slowed the speed of questioning). The researcher's attitude in all cases was encouraging and benevolent and provided enough waiting-time for thinking.

6.3. Scoring and analyses

The tests were all audio-recorded, transcribed verbatim and analysed. Each child's responses were sorted into two scoring categories: "reason" and "no

reason". The categories of reasons were adapted from the YCVR test (Säre et al. 2016), being simplified and adapted for this study: the category "no reason" was added with three subcategories, and instead of five categories of "reasons" we also used three.

The children received a score of 1 for each "reason" and a score of 1 for each "no reason", the scores were summarised and the means and standard deviations calculated. The "reason" and "no reason" given by the children were then sorted into three main scoring categories (see Table 1). Two people independently coded all the data, producing a coding reliability of 95% agreement. Reliability was calculated for both outcomes – reason and no reason – using Cohen's kappa coefficient resulting in .96 (near perfect levels, Cohen et al. 2007), differences that occurred in scoring were resolved by negotiation until consensus was reached. The Mann-Whitney test was used to determine the maturation of the children in the opinion of their teacher and compare this with the means.

Table 1. Type of response and scoring examples

Type of response	Description	Scoring examples
No reasons		
1. Incoherent response	Child's response was unclear, incoherent or out of context.	– I have a scratch here.
2. "I don't know" or no answer at all	Child replies "I don´t know" or no verbal answer at all.	– I just know that. – I do not have that answer. – Don't have any ideas.
3. Direct description of the picture	Child described the situation in the picture and repeated the researcher's explanation.	– He falls down all the time. – He jumps from high up into the water.
Reasons		
1. Association based on reality	Child described activities related to the situation in the picture.	– Then he will be put in plaster. – Because he falls down from the tree, and then the ambulance has to come.
2. Connection between the words (analogy, comparison, contrast, inference)	Child´s response contains connection, analogy, comparison, contrast and inference, but no response contains "because of that".	– Yes, he is brave. I would also not be afraid. – I would have done it. – If she jumps then she should be brave, otherwise she would not jump.
3. Sense-making explanation: causal connection, understanding about mental states	Child´s response contains a logical explanation or causal connection, saying "because of that".	– I do not know the feeling of the other person. He can be brave and he can be not brave. Freddy is the bravest. – Maybe that is why he jumped off the tree even when there was nothing put down for him to land on.

6.4. Intervention group

The intervention group participated in weekly philosophical group discussions of 30 minutes for eight months guided by the first author of this study. The children were divided into 5 groups in three kindergartens consisting of 9–13 children. Every group participated in 26 to 29 philosophical group discussions. Five groups participated all together in 141 philosophical group discussions, and the same researcher conducted all 141 philosophical discussions with all 58 children. Each lesson had a new topic. Four main areas for discussion were considered during the eight months in this study according to suggestions from Zeitler (2010) and Zoller (2008):

1. Who am I? Feelings, emotions, senses, the uniqueness of an individual.
2. Me and others. How am I related to others?
3. Me and the world.
4. Values. What is important in life?

The philosophical discussions were carried out at the children's own kindergarten in a separate room. An effortless atmosphere was created by sitting in a circle, using a musical ritual, voluntary talking, agreeing on the rules of discussion, pre-philosophical exercises, adult guidance free of estimates and the children's own evaluation of the process. The children and the researcher always sat in a circle. An effortless atmosphere was created for the discussions to create the circumstances where it is less important that a child remember certain data than that she or he think effectively. Before the beginning of the regular once a week philosophical group discussions, it was essential to agree on how the participants would participate in the group discussions. According to Fisher (2007), the following agreements were discussed to reach an understanding and feeling of unity: "Only one speaks at a time. We all listen carefully to the others. We say what we mean. We think about what other people say. We give reasons for what we say. We can disagree and ask "why"? We show respect to others." These agreements were often discussed before the philosophical lessons with the purpose of recalling them. In addition, before introducing the topic, an atmosphere was created to achieve a suitable mood and to foster executive functions through pre-philosophical exercises.

The main aim of the pre-philosophical exercises was to focus the children's attention consciously on the process and the topic of the discussion, to calm down and to activate their cognitive control, for example, through the monitoring of breathing, stimulating of different senses or visualization of the appropriate situation. For instance, to stimulate the sense of hearing and train their attention the children were asked to close their eyes and listen to voices in the room. In another exercise that primarily aimed to calm them down and train their attention, the children were asked to close their eyes, to observe their inhalation and exhalation and as they inhaled they turned their palms upward and as they exhaled turned them downward.

The role of the researcher was that of a questioner who was interested in stimulating and facilitating the discussion among the children. According to Lip-

man and Sharp (1974), the researcher accepts all answers and does not expect correct or incorrect answers as right or wrong. A typical philosophical group discussion in this study started with a musical ritual, philosophy song or focusing exercise (also discussing the rules, a relaxation or breathing exercise, a fantasy trip or a thinking game), which was then followed by sharing a stimulus (presenting a story, observing a picture book or playing a game) and then thinking time (children think about what is interesting or unusual about the stimulus), then followed questioning and discussion (children are asked to respond, with the researcher probing for reasons, examples and alternative viewpoints), and finally the evaluation of the process (children are asked to summarise what has been said and reflect upon the activity) where the children answer sample questions: (1) Have you felt good during the discussion? (2) Did you listen to others? (3) Did others listen to you? (4) Did you like this discussion?

6.5. Control group

The children in the control groups participated in different activities according to the general recommendations of the curriculum with their own teachers in their various conventional approaches (the teacher shares knowledge, children are questioned, children work in pairs or small groups, individual work, games). According to the national curriculum it is not strictly directed how the knowledge and skills should be taught in kindergarten. The control group children came from eight groups from four kindergartens with 16 teachers, every teacher was free to use the most suitable and pleasant learning activities to teach the recommended topics according to the national curriculum. Therefore, the teachers applied irregular and often unsystematic methods from among various approaches. For instance, to illustrate the activities in the control groups, the teacher often read a story while the children listened. After reading, the children are asked to re-tell the story, or the teacher checked what they could remember about the story, or they were asked to say what they had learned from the story. In another illustrative example the group observed a picture while the children were asked to say what they could see in the picture or what is wrong in the picture. Although the authors did not specifically ask the teachers of the control groups exactly how the children in those groups learned, it is known that none of the teachers in the control group implemented philosophical group discussions or any other programme based on discussion or quality questioning with the children in the control group. It is also known that none of the teachers in the control groups received training to implement philosophical group discussions according to P4C with the children in the control group.

7. Results

The data was analysed using the statistical package SPSS 22 for a repeated-measure ANOVA to determine if there was a difference in the mean scores of the intervention group and the control group in the pre-test/post-test scenario, and an F

ratio was computed to determine whether the differences among the means represented true values (Gay, Mills, & Airasian 2006). The results of this study were presented anonymously, without names or any information that would identify the kindergarten or individuals according to the general recommendations for ethics in educational and social research (Cohen et al. 2007).

The descriptive statistic of dependent variables and interactions for the intervention and control group in the pre-test/post-test are shown in Table 2. The variables used were: Dependent variable: incoherent response, "I don't know" or no answer at all, direct description of the picture, association based on reality, connection between the words, sense-making explanation, answer "Because of that", and talkativeness.

Table 2. Pre-post standardised scores for intervention (N = 58) and control (N = 67) groups

	Intervention group						Control group					
	Pre-test		Post-test		Change		Pre-test		Post-test		Change	
	M	*SD*	*M*	*SD*	M difference	*p*	*M*	*SD*	*M*	*SD*	M difference	*p*
1. Incoherent response	0.2	0.5	0.1	0.2	–0.1	0.1	0.4	0.6	0.8	1.5	+0.4	< .05*
2. "I don't know" or no answer at all	2.6	2.1	1.1	2.1	–0.5	< .05*	1.9	2.2	2.5	2.9	+0.6	< .05*
3. Direct description of the picture	7.2	3.2	3.5	3.6	–3.7	< .05*	4.6	2.7	3.1	3.1	–1.5	< .05*
4. Association based on reality	0.8	0.9	0.1	0.4	–0.7	< .05*	0.9	1.1	0.3	0.6	–0.6	< .05*
5. Connection between the words (analogy, comparison, contrast, justification)	2.0	1.9	5.8	5.2	+3.8	< .05*	3.1	2.3	2.2	2.5	–0.9	< .05*
6. Sense-making explanation: causal connection, understanding about mental states	0.1	0.4	8.3	4.2	+8.2	< .05*	1.4	1.4	5.0	3.6	+3.6	< .05*
7. Answer „Because of that" (as a concept)	0.6	1.2	7.6	3.8	+7.0	< .05*	2.8	2.4	4.9	3.6	+2.1	< .05*
8. Talkativeness (number of words)	80.9	32.7	212.1	156.9	+131.2	< .05*	90.2	32.8	133.7	90.8	+43.5	< .05*

Note. Significance (2-tailed) level *$p < .05$.

Independent variables: Philosophical discussions according to the programme P4C. Relationships across the assessment pre-test and post-test were not expected to be linear for any dependent variable. Table 2 presents the interaction effects for groups in the post-test for six dependent variables (incoherent response, "I don't know" or no answer at all, connection between the words, sense-making explanation, answer "Because of that", and talkativeness).

The repeated-measure ANOVA showed that there was a statistically significant difference between the mean scores of the two groups when comparing the pre-test and post-test on two types of reasons, $p < .05$. The analysis showed that under "reasons" the increase in the sub-type "connection between the words" for the intervention group (change of mean difference was +1.1) was significantly greater than for the control group, where no increase occurred, on the contrary a decrease was observed (change of mean difference was – 0.4), $F = 36.61$, $p < .05$ (see Table 2).

In relation to the sub-type "sense-making explanations", the increase for the intervention group was significantly better (change of mean difference was +10.9) than the control group's (change of mean difference was + 3.1) $F = 81.96$, $p < .05$. Differences occurred for these two sub-types because of the intervention group's poorer results in the pre-test and better results in the post-test (see Table 2).

In relation to the sub-type "Direct description of the picture", there was a decrease in both groups, in the intervention group the change of the mean difference was – 3.7 and in the control group – 1.5 (see Table 2), $F = 10.42$, $p > .05$.

In relation to the sub-type "association based on reality", no differences occurred when comparing the groups in the pre and post-test (see Table 2), $F = 0.007$, $p = .95$ but both groups made a similar decrease (change of mean difference in intervention group was – 0.7 and in control group – 0.6). The first hypothesis was confirmed because there was a strong effect in the pre-test/post-test interaction for the whole sample in relation to the sub-types "connection between the words" ($F = 36.61$, $p = < .05$) and "sense-making explanation" ($F = 81.96$, $p = < .05$), and the intervention group showed a positive increase for all three reason sub-types and a decrease for one no reason sub-type.

Observations of the use of the phrase "because of that" comparing the intervention and control group showed significant differences (see Table 2). The increase in the use of the phrase "because of that" to express reasoning in the intervention group (change of mean difference was +6.9) was significantly greater than in the control group (change was +2.1), $F = 71.73$, $p < .05$. The hypothesis was confirmed – children in the intervention group gave more responses containing "because of that" than children in the control group ($M = 7.5$, $SD = 3.8$, $M = 4.9$, $SD = 3.6$) based on the results of the post-test. Differences in the pre-test ($p < .05$) occurred because of the intervention group's poorer results. There was a strong positive effect in the pre-test/post-test for the interaction over the whole sample ($F = 71.73$, $p = < .05$).

There was a statistically significant difference between the mean scores in the comparison of the pre-test/post-test for the sub-type of "no reasons" where

children answered "I don't know" or did not answer at all (see Table 2). In the pre-test, no significant differences occurred in the whole sample, but in the post-test there was a significant difference, $F = 54.95$, $p < .05$. A change showing better cognition was observed in the decrease (change of mean difference was – 0.5) in the answers "I don't know", "I just know that" and silence in the intervention group. The control group, by contrast, increased the rate of these answers and often kept silent, there was no positive gain observed (change of mean difference was + 0.6). The hypothesis was confirmed – the children of the intervention group answered "I do not know" and "I just know that" less often and were silent less than the children in the control group ($M = 1.1$, $SD = 2.1$, $M = 2.5$, $SD = 2.9$) based on the results of the post-test. Differences in the pre-test ($p < .05$) occurred because of the intervention group's poorer results. There was a strong positive effect in the pre-test/post-test for the interaction over the whole sample ($F = 54.95$, $p = < .05$).

There was a statistically significant difference between the mean scores comparing the pre-test/post-test in terms of talkativeness (see Table 2). The children's talkativeness in the intervention and control groups did not differ significantly ($p > .05$) according to the results of the pre-test, but in the post-test there was a significant difference ($p < .05$). The increase in talkativeness in the intervention group (change of mean difference was +131.2) was significantly greater than in the control group (change of mean difference was +43.5). The hypothesis was confirmed – the children of the intervention group were more talkative than the children in the control group ($F = 22.08$, $p < .05$). Based on the post-test results the children in the intervention group spoke often using more words ($M = 212.1$, $SD = 156.9$) than the children in the control group ($M = 133.7$, $SD = 90.8$).

There was a statistically significant difference between the mean scores when comparing the pre-test and post-test in terms of incoherent responses in the whole sample (see Table 2). The differences in the pre-test ($p < .05$) occurred because of the intervention group's better results. Improved cognition was observed via a very small decrease (change of mean difference was – 0.1) in incoherent answers from the intervention group. The control group, by contrast, increased the number of incoherent answers – no positive gain was observed (change of the mean difference was + 0.4). The hypothesis was partially confirmed – the children in the intervention group gave less incoherent responses than the children in the control group ($M = 0.1$, $SD = 0.2$, $M = 0.8$, $SD = 1.5$) based on the results of the post-test. There was a strong effect in the pre-test/post-test in the interaction over the whole sample ($F = 5.89$, $p = < .05$), but the increase in incoherent responses in the intervention group was not statistically significant.

8. Discussion

The main aim of this study was to investigate the effects of philosophical group discussions using the P4C programme on children's verbal reasoning skills,

talkativeness and frequency to answer incoherently or just "I do not know" if they were asked to reason their opinion. The implementation of approaches based on group discussions and questioning techniques have shown a positive effect on verbal reasoning skills. Therefore, there is a need for an evidence-based and complex programme based on discussion and questioning techniques to provide children with better verbal reasoning skills to cope with life. We recall the above-mentioned, that verbal reasoning skill is the precondition for attaining the four main language skills: speaking, listening, reading and writing. In the following the hypotheses are discussed and examples from the post-test with the intervention group for each dependent variable are provided.

Hypothesis 1 was confirmed. As predicted, children in the intervention group gave more reasons than the children in the control group if they were asked to reason their opinion after the eight-month implementation of philosophical discussions based on P4C. This is consistent with the investigation by Daniel et al. (2012), who also found that implementing philosophical discussions according to P4C helps children of 5 years of age to produce more responses at a higher cognitive level – children's responses used a logical connection between words and the children used analogy, comparison, contrast and inferences in their responses. As expected, the researcher's open-ended questions as a central approach in philosophical discussions based on P4C, consistent with previous studies (Gillies & Khan 2009, Zucker et al. 2010, Walsh & Blewitt 2006), can act as a trigger for children to produce more reasons and different types of verbal reasoning. It could be assumed that the combination of the researcher's open-ended questions and group discussions together helped produce verbal reasons.

In terms of "association based on reality" (e.g. "In television courageous men dare to be with crocodiles and lions"), the intervention and control groups did not differ, the first reason could be that this is the lowest type of reasoning investigated in this study and it is available to the majority of children at the age of 5. The second reason could be that the children would often like to give answers they think adults are expecting instead of saying their own opinion, which is typical among children of this age (Kikas 2008). The children were very keen to demonstrate what they have learned in their responses (e.g. "I went to a running competition and I ran very fast."), because they are often trained to do that, or to say what is the right thing to do in the present situation (e.g. "You must go to the hospital, it's going to need a plaster") if they were asked to reason their opinion. It could be assumed that the children's knowledge in kindergarten is predominantly controlled instead of discussed, but more research is needed to confirm this assumption.

According to the results of this study, we suggest that philosophical discussion based on P4C has a positive effect on the development of two types of reasoning because the intervention group showed considerable progress in terms of the "Direct description of the picture (no explanation)" (e.g. "She jumps down and goes to play"), and the children having significantly less instances of "no reasons" in the intervention group compared to the control group. It could be assumed that

the children in the intervention group had that kind of habit of answering argumentatively instead of demonstrating their knowledge or describing what they can see in the picture (e.g. "He jumps from high up into the water"), they had practiced reasoning as a model in the philosophical group discussions. The children in the intervention group knew that the researcher often asks about reasons and less about descriptions, and that therefore, the attitude of the researcher also influenced the children's responses during the testing.

Hypothesis 2 was confirmed. As expected, the children of the intervention group gave more responses using the phrase "because of that" when they were asked to reason their opinion (e.g. "Because he thinks all the time that nothing happens to him.") according to the second type of reasoning than the children in the control group. It could be assumed that the combination of group discussion as an active-verbal-social process (Sperber & Mercier 2010), questioning techniques (Justice et al. 2010, Lee et al. 2012), scaffolding (Vygotsky 1978 2014) and arguing once a week over eight months via philosophical discussions according to the P4C programme (Daniel et al. 2012) allowed children to practice reasoning at his or her own potential cognitive level supported by adults and peers, and that these approaches implemented simultaneously caused a positive effect in terms of an increase in two types of reasons according to Sperber and Mercier (2010).

Hypothesis 3 was confirmed. As expected, the children of the intervention group answered "I do not know" (e.g. "Don't have any ideas") and were silent less than the children in the control group when they were asked to reason their opinion. According to previous results (Cabell et al. 2015, Walsh & Sattes 2005), it seems to be very important to combine different approaches and implement these simultaneously – asking open-ended questions and talking about topics that interest children personally – that is why the children of the intervention group were less silent and gave less empty answers (e.g. "I just know that"). The control group did not show any positive improvement. The first reason for this could be that they had had less opportunities to participate in group discussions on topics that interested them personally (Goh et al. 2012, Jacoby & Lesaux 2014), which is very good for learning verbal reasoning skills (Taggart et al. 2005), or the second reason could be that the children were not encouraged enough. Because the children in the intervention group were encouraged simultaneously in three ways: encouraging open-ended questions, pre-philosophical exercises, and agreement before each philosophical discussion according to P4C (Fisher 2007, Zoller 2008).

Hypothesis 4 was confirmed. As expected, the children of the intervention group became more talkative than the children in the control group when they were asked to reason their opinion. According to previous findings, there can be three reasons why the talkativeness of the intervention group increased. First, the researcher's open-ended and context based questions, second, the discussions were based on the children's responses (children initiated the discussion), and thirdly, discussions based on the children's own experiences and beliefs increased their talkativeness. It seems to be important to implement these different approaches simultaneously – as carried out in this study according to P4C – to raise the

children's talkativeness. We speculate that the programme was effective because of the three approaches (open-ended and context based questions, children initiating the discussion, discussions based on the children's own experiences) used simultaneously, but more research is needed to determine if they are all necessary because earlier research (Cabell et al. 2015, De Rivera et al. 2005, Koerber et al. 2005, Lee et al. 2012) has indicated that these kinds of approaches implemented separately have shown some positive effects on the talkativeness of children.

Hypothesis 5 was partially confirmed. We expected that the children of the intervention group would maintain a better focus on the context, and therefore, give less incoherent responses (e.g. The child answered to the question "Would you be brave if you went alone along the street? Why?" as follows: "No. Because then cars can break") than children in the control group when they were asked to reason their opinion. However, a change towards better attention on the context, due to exercises before the philosophical discussion as we expected, could probably produce only a very small decrease in the type of "incoherent responses" in the intervention group. The reason for this could be that an effect does not apparently occur in young children without instruction immediately before the conversation, and because the exercises encouraging executive functions were only carried out before the philosophical discussion and not before the testing, but we only analysed the data from the testing. A better effect on cognition among young children might perhaps be seen if these exercises were implemented immediately before the testing as found by Becker et al. (2014).

9. Limitations and future directions

First, the children in this study were tested individually and the results provide an overview of how each child reasons independently and with the help of a researcher. Sperber and Mercier (2010) pointed out that children reason better in group discussions. In the future, it would be necessary to examine and compare the children's explanations to determine whether the child does reason better in philosophical group discussion or individually.

Second, it is also necessary to point out the limitations related to the context in which we studied the effect of verbal reasoning. According to Vygotsky (1934/2014), the results of the study cannot be generalised because different types of concepts behave differently in the same tasks, including the same ones that require logical operations, concepts may exist at one and the same point in time for one and the same child, but may occur at different levels of development. Everyday and scientific concepts of development are indeed related, but are not comparable one-on-one (Vygotsky 1934/2014), therefore, we cannot draw parallels between concepts emerging from everyday issues and scientific concepts.

Third, in the present study, the intervention group probably had more opportunities to participate intensively in group discussions in which the number of participants were not greater than 13. Future experiments should find out the

effects of the increase in verbal reasoning using equal numbers of participants in the control and intervention group activities.

Further, it was decided, in order to provide consistent quality, that the same person must test the whole sample consisting of 125 children and also carry out all the philosophical group discussions weekly with 5 groups through eight months. Although the audio-recordings were controlled by an independent expert who gave her acceptance of their reliability, the children in the intervention group could be in a privileged position during the post-test compared with the children in the control group. It would probably be more objective to use different people for different procedures to provide an equal chance for all participants.

Another limitation was that we did not use complementary instruments to find out, for example, the socio-economic indicators that could also influence the outcomes. Finally, we have to stress that the small sample did not allow us to process the data according to gender.

In addition, it would be necessary in the future to carry out a follow-up study to identify whether the positive effect on verbal reasoning skills indicated in this study has remained. It would be essential to find out if the positive results from this study have also remained two years later if the children in the meantime did not participate in any philosophical discussions.

10. Conclusion

The results of this study indicate that philosophical group discussions based on P4C could accelerate children's ability to reason verbally. The main results indicated that philosophical group discussions, guided according to P4C, significantly increased the children's responses containing logical comparison, analogy, contrast, justification, causal connections and the wording "because of that" according to the two types of reasoning in the intervention group, and that P4C also increased the children's talkativeness, but decreased the amount of incoherent responses, responses like "I don't know", and direct descriptions of the picture presented in the tests. Some essential teacher activities and approaches were considered for encouraging the development of verbal reasoning skills in children 5 to 6 years old, when implemented simultaneously: asking open-ended, context based and child-directed questions, the use of topics that interest children personally, scaffolding and arguing in group discussions. Regularly implemented philosophical group discussions according to P4C, based on the children's own experiences, collectively formulating, defending and exploring each other's viewpoints, negotiating and composing new meanings, makes sense when teaching verbal reasoning skills. Supporting teachers in the effective use of questioning and implementing discussions free of evaluation is worthy of attention.

These results provide further evidence that philosophical group discussions based on P4C could be part of early childhood education as a method for increasing children's potential for future academic and professional success. Supporting

the development of verbal reasoning helps children become more talkative, reasonable and thoughtful, which are qualities necessary for success in the global requirements for socialisation today (Richland & Burchinal 2013).

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APPENDIX A

An example question from YCVR test

Test phase (scenarios with illustrations)	1. Tina rides her bicycle on its rear wheel, she has done it hundreds of times and never falls over. Is Tina brave? Why? 2. Marko rides his bicycle on its rear wheel and falls over often, but stands up and tries again. Is Marko brave? Why? Consider: What do you think now? Who is brave: Tina or Marko? Are they equally brave? Or is one bolder than the other? Why do you think so?

Psychological and linguistic features of senior pre-schoolers reasoning in spontaneous speaking. Difficulties which appear in children in the process of semantic perception and production of reasoning. Listening comprehension and production of reasoning.Â We consider that the use of asyndeton by children is related with the next, at first, conjunctional complex sentences require considerably more exact, deeper and more bright verbal registration of idea, establishing of reason and result connections; secondly, pre-schoolers do not own the language means, necessary for combination of composition-semantic parts of reasoning. Philosophy for Children: Reasoning. Edited by Stephanie Massey (The University Of Notre Dame Australia). Related categories.Â The interventions were dialogic, inquiry-based, and inspired by the Philosophy for (...) Children Programme, a participatory thinking skills approach with documented higher-order cognitive outcomes, such as developed argumentation skills, in other target groups. Philosophical dialogues were conducted once a week in the two groups, totalling 12 dialogues per group. Group argumentation development was measured through compared scores from structured observations of filmed dialogues early and late in the intervention. Many preschools have programs to help children prepare for the transition into preschool. You can also talk with your childâ€™s teacher if you have concerns or want ideas to help your child handle the change. Play ideas for encouraging preschooler cognitive development.Â Itâ€™s a good idea to let your child take the lead with play, because children learn best when theyâ€™re interested in an activity. This way, you can use your childâ€™s interests to help your child learn something new through play. Your child will generally let you know if they need help, so try not to jump in with solutions too early. And during any kind of play, you can ask your child to describe whatâ€™s happening. This is a great way to show interest and also encourage your child to practise language skills. However, Philosophy for Children programs have shown themselves to be remarkably successful in drawing virtually all students in the classroom together in inquiry. Teachers are often surprised, and pleased, to see many of their most reticent, â€œunderachievingâ€ students actively join in the discussion of philosophical ideas. Nevertheless, because they lack background in the formal study of philosophy, many teachers are reluctant to encourage the philosophical thinking of their students. Their fears, however, are exaggerated. Familiarity with some of the standard philosophical literature might be Developing the reasoning skills of pre-schoolers through philosophy for children. E SÃ¤re. Tartu University, 2018.Â IMPROVING PRE-SCHOOLERSâ€™REASONING SKILLS USING THE PHILOSOPHY FOR CHILDREN PROGRAMME; pp. 273â€“295 Full article in PDF format| DOI: 10.3176/tr. 2016.3. 03. E SÃ¤re, P Luik, T Tulviste. Stratigraphy of cultural interaction in eurasia based on computing of folklore motifs; pp. 217â€“227. Y Berezkin, V Kotnik, P Luik, E SÃ¤re, T Tulviste, L Å perkovÃ¡, IMPROVING PRE-SCHOOLERSâ€™REASONING SKILLS USING THE PHILOSOPHY FOR CHILDREN PROGRAMME; pp. 273â€“295 Full article in PDF format| DOI: 10.3176/tr. 2016.3. 03. P Luik, E SÃ¤re, T Tulviste.