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Communicative Competence of Oral Deaf Children While Explaining Game Rules

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Abstract

Classrooms are characterized by interactions in a range of genres. The concise language required by expository interactions can be challenging for children who have atypical language, including children who are deaf and hard of hearing (DHH). This study compared the way three groups of upper primary school students (aged 8–13 years) taught a peer to play a new unfamiliar board game: (a) DHH "experts" teaching a "novice" hearing peer; (b) hearing experts teaching a DHH novice; and (c) a hearing expert teaching a hearing novice. All DHH students were enrolled in mainstream schools and used spoken language as the main mode of communication. All three groups were able to convey game rules and purpose, and navigate clarifications. Differences emerged in the accuracy of the use of referents when instructing their peers how to play the game. The specific content vocabulary and the need to emphasize new concise information also challenged the DHH children. This study highlights the importance of including expository tasks in language support and intervention for children who are DHH.

Introduction

Many of the significant interactions that occur throughout a child's day can be described as conversational discourse. Through conversation, children and young people build relationships with family, peers, and teachers. These interactions provide rich opportunities to support the development of pragmatic skills. Research investigating the development of pragmatic skills in children and young people who are deaf and hard of hearing (DHH) has almost exclusively focused on the conversational genre, either in a contrived context using a barrier game (Ibertsson, Hansson, Maki-Torkko, Willstedt-Svensson, & Sahlen, 2009; Jeanes, Neinhuys, & Rickards, 2000; Lloyd, Lieven, & Arnold, 2005), or during free-flowing spontaneous conversation (Most, Shina-August, & Meilijson, 2010; Paatsch & Toe, 2014; Toe & Paatsch, 2013; Toe, Beattie, & Barr, 2007). These studies have established that young people who are DHH exhibit a range of well-established conversational skills including sophisticated turn taking skills, and the capacity to initiate topics and to ask questions. Earlier studies have also identified several challenges that are observable when young people who are DHH interact with hearing partners, primarily relating to the way they seek to repair the conversation (Jeanes et al., 2000; Most et al., 2010; Toe et al., 2007; Yont, Hewitt, & Miccio, 2002). More recent studies have focused on more subtle pragmatic skills such as eye gaze, contingency, repair, and acknowledgement, important skills that support the collaboration and co-construction of conversation (Church, Paatsch, & Toe, 2017; Paatsch, Toe & Church, 2017; Sandgren, Andersson, van de Weijer, Hansson, & Sahlén, 2014).

Schools and the work place demand that children and young people master a range of interactional genres. An important genre for these settings is expository discourse, the language used to convey information (Bliss, 2002). Expository discourse can involve providing factual descriptions or explanations of events (Westerveld & Moran, 2011). Practical examples include outlining a design-brief in an assignment, introducing a peer to a new game, or instructing a peer to use a new computer application. Expository discourse has greater linguistic complexity as it often requires the interlocutors to use more precise language and to closely monitor understanding in their interactive partner (Nippold, Hesketh, Duthie, & Mansfield, 2005). Specifically,

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expository discourse commonly includes rarely used words that contain more complex morphology that often requires the use of specific content vocabulary (Nagy & Townsend, 2012). Typically, the lexical demands of expository discourse depend on prior knowledge and the use of vocabulary that enables the description of objects and interactions. Furthermore, production of expository discourse requires the instructor to emphasize to the listener the new information that is being presented (Lundine & McCauley, 2016; Nippold, 2010). As a consequence, the demands of this type of discourse are heightened, requiring and revealing syntactic competence in a way that conversational discourse may not (Nippold, Mansfield, Billow, & Tomblin, 2008).

Researchers have compared expository discourse and conversational discourse in hearing children, adolescents and adults with language impairments using a task where participants were invited by a researcher to describe their favorite game or sport, including a description of how to play the game (Nippold et al., 2005). The participants in their study were not DHH but had clinically assessed language delays or differences. Nippold identifies this group as children or young people with language impairments. Nippold and her colleagues analyzed the samples of conversational interactions in terms of syntactic complexity and compared them across the different age groups. Results showed that the expository task stimulated even the youngest children (aged 8 years) to use a range of nominal and adverbial clauses, thus revealing that young children were capable of employing quite sophisticated levels of syntax. Overall, syntactic complexity in this expository task continued to develop throughout childhood, adolescence and into adulthood. Some syntactically complex forms were only observed in the expository genre and were never seen in conversational exchanges in the study by Nippold et al. (2005).

There is also research evidence that shows that young people with atypical language may be additionally challenged by expository discourse. In a later study, Nippold and her colleagues (2008) compared hearing adolescents with typical language development with hearing adolescents with language impairments. Focusing on syntax with both groups of language users, they compared language samples obtained in an expository task (explaining your favorite game or sport) with a conversational task. Findings indicated that the conversational task did not challenge the participants to produce more complex syntax to the same degree as the expository tasks. In addition, adolescents with typically developing language produced more complex sentences and used more relative clauses than did these young people with language impairments. Their study highlights the value of expository tasks for identifying language support needs in some young people with language differences and delays.

There is significant merit in exploring the way that young people interact in the context of an expository activity. Many of the studies described so far have adopted a descriptive task rather than an authentic interaction, yet the classroom is characterized by two-way expository discourse as students negotiate their way through learning activities. Such interactions seem likely to not only elicit more complex language use, both pragmatically and syntactically, but also to present some additional challenges for both interactive partners.

Marschark and Everhart (1999) investigated the problem-solving skills of both deaf and hearing students while playing the game of "Twenty questions." This study was focused on the game itself as a problem-solving task rather than on the expository task of explaining the game, however, its findings may have some relevance to the present study. The "Twenty Questions" game is most efficiently played if the participants understand how to use "constraint seeking" questions such as "Is it an animal?" Markschark and Everharts' overall findings were that deaf students were less efficient than hearing students in terms of the strategies they employed for solving the twenty questions "problem." Younger deaf students were less likely than hearing students to use constraint seeking questions. This difference was mediated by game playing experience. Deaf children with more prior game playing experience showed similar problem-solving skills to hearing children. Although Marschark and Everhart were not focused on the nature of the interaction about the game or any of the expository skills used to play it, their findings may have implications for expository tasks presented to children who are DHH. In particular, prior experience or effective modeling of a game might impact on the way children and young people tackle the task of teaching a friend a game or explaining how to play a game.

Sorsana, Guizard and Trognon (2013) investigated 10 trios of children with normal levels of hearing aged 4–6 years in a context where one child had learned the rules of a game then had to explain those rules and demonstrate how to play the game to two other children. From a pragmatic perspective, this expository task required the speaker to: carefully consider the perspective of the listener; check for understanding; provide clarification; read nonverbal messages that indicate understanding; and encourage their interactive partners to seek clarification. To "successfully" explain a game or procedure they must carefully select specific vocabulary and syntactic structures that support their listeners' understanding. According to Sorsana et al. (2013) "the explanatory discourse is aimed at providing or modifying 'representations of the world' in the interlocutor's mind. In order to do this, both linguistic, cognitive, as well as interpersonal skills are mobilised" (p. 1455).

In Sorsana et al.'s (2013) study, the researchers had developed a game with 11 rules for the purpose of the study. They wanted to ensure that all of the participants had never played the game before. One child was selected to become the game expert and was taught the game for up to an hour in a small group with other "experts." The researchers identified the socio-cognitive and pragmatic demands for the experts in relation to the task of teaching the two other children ("novices") the game. The experts had to: (a) present the rules of the game (11 in total); (b) answer requests for clarification; (c) start the game; (d) intervene in case of novice errors; and (e) be impartial (p. 1459, Sorsana et al., 2013). Results from this study showed that the young children acting as experts recalled, on average, seven out of eleven rules and presented them to the novices in a systematic order. Novices asked for few clarifications during this introduction but sought many more clarifications during the game. The expert children answered approximately 90% of the questions asked by novices. Sorsana et al. (2013) conclude that the young children in their study (aged 4–6 years) displayed a wide range of both socio-cognitive and pragmatic skills in these expository interactions, despite the complexity of the game. Despite their young age, these children were able to demonstrate a wide range of linguistic, logical and social knowledge that facilitated interaction in an expository interaction both with familiar and unfamiliar partners.

The work of Nippold et al. (2008) and Sorsana et al. (2013) highlights the importance of venturing beyond conversation to explore pragmatic skills in children and young people in more challenging genres. Research has shown that many children and young people who are DHH and use cochlear implants have

delayed vocabulary skills (Lund, 2016). Consequently, it seems likely that expository tasks, with all of their additional complexities, may prove challenging for DHH students who use spoken language and interact with hearing peers in inclusive settings. To our knowledge, there has been very little work undertaken in expository interactions between young people who are DHH who use spoken language and their hearing peers. The current study used a similar task to Sorsana et al. (2013), teaching upper primary school students (aged 8–13 years) who are DHH to play a new unfamiliar game and then asking them to teach a peer to play that game. The DHH students all used spoken language and were enrolled in mainstream schools in Victoria, Australia that also included a specialist facility or special unit for students with hearing loss. These children had hearing parents and had not had the opportunity to develop sign language skills though natural interactions with competent signing family members. Researchers have suggested that children who have not been raised in a sign rich environment may exhibit evidence of linguistic deprivation (Humphries et al., 2012) and this could impact on their cognitive development. Lieberman, Hatrak and Mayberry (2014) reported that when children are provided with a sign language from birth they had more frequent and more successful peer interactions than previous studies with children who used spoken language. The way that sign facilitates both peer interactions and cognitive development is of great interest but it was not a factor that was directly explored in this study. The participant group in the current study was selected to explore how children who are DHH interact with their hearing peers in an inclusive setting that relies on spoken language. These children are learning in this context and would encounter expository interactions every day in their classrooms. We were interested in understanding both the strengths and challenges in this context in order to guide teachers in their classroom support of these students.

The study was designed so that three groups could be compared: (a) DHH "experts" teaching a "novice" hearing peer; (b) hearing experts teaching a DHH novice; and (c) a hearing expert teaching a hearing novice. The study aimed to understand how interactions between children who were DHH who use spoken language and their hearing peers were similar or different to interactions between two hearing peers. Two games were used in this study, a very simple board game consisting of five rules and a much more complex card game consisting of 16 rules. This paper will report on the interactions that took place between participants instructing, learning, and playing the simple board game.

Specifically, the design of this study allowed for the investigation of the following research question: What are the similarities and differences between hearing children and children who are DHH who use spoken language as they negotiate the pragmatic demands of oral communication in an expository genre?

This research question has been broken down further into three sub-questions:

1. What are the similarities and differences in the way hearing and DHH experts teach novices a board game in regards to conveying the key game elements of game purpose and game rules?
2. What are the similarities and differences in the way hearing and DHH game experts and novices negotiate the clarification of game rules?
3. What are the similarities and differences in the use of referents in hearing and DHH experts' language as they instruct a novice using the expository genre?

Method

Participants

Sixty-eight children (33 girls and 35 boys) aged between 8 years 2 months and 13 years 3 months (mean age = 10 years, 10 months, SD = 1.09 years) participated in this study. Twenty children had hearing loss ranging from mild to profound and all used spoken language as their main mode of communication. Forty-eight children had normal levels of hearing. Participants were organized into 34 sets of pairs, with 20 dyads comprising one child with hearing loss and one child with normal levels of hearing (DHH/H dyad) and 14 dyads comprising two children with normal hearing (H/H dyad). All dyads comprised a pair of self-selected friends and in most cases, were matched by gender and year level at school. At the time of data collection, no formal measure of spoken language was collected for any of the participants.

All children were selected from two regular primary schools in Melbourne, Australia, ranging from Year 3 to Year 6 (aged 8–13 years). Many of the teaching practices employed in these two primary schools incorporate inquiry-based learning involving small-group co-operative learning situations and high levels of student-to-student interaction. A common pedagogical feature of these learning environments is the use of games and similar activities to support students to construct their own understanding of a wide range of concepts in domains such as literacy and numeracy. This "hands-on" approach to learning is student centered and demands considerable interaction between students, often in an expository genre.

Deaf/hearing dyads

Table 1 shows the 20 DHH/H dyads according to year level, gender, and age of each member of the dyad. Nine dyads consisted of two female children, nine consisted of two male children, while two dyads were a mix of male and female children. Nine male and 11 female children had a hearing loss, and 11 male and 9 female children had normal levels of hearing. Children were aged between 9 years and 13 years 3 months (mean age = 11 years 1 month, SD = 0.94 years).

Pure-tone-average thresholds and the sensory devices used by the children with hearing loss are also presented in Table 1. Hearing levels were calculated using pure-tone-thresholds averaged across the three frequencies 500, 1,000, and 2,000 Hz in the better ear. Pure-tone-average figures for children using cochlear implants were taken from the most recent pre-operative audiogram. Three of the children had a mild hearing loss, four had a moderate hearing loss (between 40 and 70 dB HL), and 12 children had a profound hearing loss. Pre-operative audiograms were not available for one of the children (Child in Dyad 9) using cochlear implants because they had been implanted in a country other than Australia. It was assumed that, considering their year of implantation, this child would have had hearing levels of 90 dB+ HL. Thirteen children were unilateral cochlear implant users and seven children were fitted binaurally with behind-the-ear hearing aids. Despite no individual data regarding date of implant and hearing aid fitting being available at the time of data collection, the co-ordinator of the specialized unit reported that all children were fitted with hearing aids and/or implanted before the age of 3 years.

The 20 children with hearing loss were fully mainstreamed in these two primary schools with teacher of the deaf support from a specialized unit for children with hearing loss. Typically, there may be up to 30 students with hearing loss who are

Table 1 Details of the 20 DHH/H dyads according to year level, age, and gender of each member of the dyad. Sensory device and pure-tone-average thresholds (at 500, 1,000, and 2,000 Hz) for each participant with hearing loss is also outlined

Dyad	Year level at school	Gender within dyad	Age of DHH child (year:month)	Age of hearing child (year:month)	Device used by deaf child in each dyad	Pure tone average (dB hearing level)
1	5	F	11:4	11:6	CI	117
2	5	F	12:1	11:4	CI	105
3	5/6	M	12:1	12:0	CI	120
4	5/6	M	11:4	12:9	HA	32
5	5	M	11:6	11:6	CI	97
6	4	M	11:3	9:0	CI	120
7	4	F	10:8	10:2	CI	98
8	4/5	F	10:8	11:0	HA	57
9	4	M	12:4	10:6	CI	ND[a]
10	6	F	13:3	12:0	HA	35
11	4	F/M	11:10	9:7	CI	120
12	5	F	12:5	11:5	CI	95
13	5	F	12:10	12:7	HA	45
14	4	F	11:2	10:6	CI	117
15	4	F	10:5	10:3	HA	50
16	4	M	11:5	9:10	CI	110
17	5	M	11:1	11:10	HA	37
18	3	M	9:3	9:8	CI	99
19	3	M	10:3	9:7	HA	69
20	3	F/M	9:5	9:4	CI	112

[a]Denotes participants with no data (ND) available.
CI = cochlear implant; HA = hearing aid.

enrolled in these schools who receive this specialist support from itinerant teachers of the deaf who work within these units. Some students with hearing loss will attend regular classes full-time with some in-class support from the itinerant teacher of the deaf. Other students may be withdrawn from the regular class for short periods of time to work in small groups and/or individually in the specialized unit with the itinerant teacher of the deaf on specific goals outlined in the student's individual learning plan/individual education plan (ILP/IEP). All children used spoken language for communication and had intelligible speech. Speech intelligibility was not formally measured but judged by the researchers who both had over 20 years of experience in deaf education. All DHH participants could freely interact using spoken language with their hearing peers during casual conversation and their speech was easily transcribed by a research assistant. Some of these students may have been the only student with hearing loss in the class, while others may have been in a class with a small number of students with hearing loss. In general, the majority of these students would have been enrolled in these schools from the first year of schooling (aged 5 years) and attended an early intervention center prior to school. Individual details of the participants are presented in Table 1.

Hearing/hearing dyads

Table 2 shows the 14 H/H dyads according to year level, gender, and age of each member of the dyad. Six dyads consisted of two female children, seven consisted of two male children, while one dyad was a mix of male and female children. This group of primary school-aged children was aged between 8 years 2 months and 12 years 3 months (mean age = 10 years 5 months, SD = 0.97 years).

Procedures and Materials

All participants were sought from two regular primary schools with specialized units/facilities for children who are DHH. In the first instance, child and parental consent was obtained for each participant with hearing loss. These participants then nominated a friend from their class with normal hearing to be their partner in the instruction-giving task. Once student and parent consent was obtained from these selected friends then an additional age-matched pair of hearing students was invited to participate in the study. Consent was then sought from each of these children with normal hearing and their parents. Instruction-giving data were collected on 20 full sets of DHH/H dyads and 14 H/H dyads.

Two games were used for this study, *Rat a tat Cat*®, a complex card game, and a simple board game, *Secret Square*®. All dyads played both games. In this paper, findings from the simple board game will be presented and discussed, while details of the findings from the complex game will be reported in a subsequent paper. Prior to commencing the data collection, all participants were shown an image of the game *Secret Square*® and asked if they had ever played the game. No child had previously seen or played the game prior to the commencement of the study. *Secret Square*® is a very simple game that involves four main rules: (a) the game begins with one player placing 25 picture squares onto a table in five rows of five squares; (b) this player then hides a colored token under one of the picture squares while the other player is not looking; (c) the other player then tries to find the token by asking yes/no questions about the picture; and (d) after each question/response cycle, picture squares that do not meet the criteria are removed from the table. For example, if the player asks "does it fly?" and the response is "yes," then all picture squares related to flying remain on the table and all other squares are removed. This process continues until the player asking the questions finds the colored token. In order to add a competitive component of the game, the authors included an extra rule to take the total to five main rules. This rule included scoring the number of questions asked and the player who asks the least number of questions wins the game.

Table 2 Details of the 14 H/H dyads according to year level, age, and gender of each member of the dyad

Dyad	Year level at school	Gender within dyad	Age of hearing child 1 (year:month)	Age of hearing child 2 (year:month)
1	5	M	11:1	12:1
2	4	M	10:9	9:11
3	6	F	12:3	11:2
4	5	F	10:5	10:9
5	3/4	M/F	9:9	10:8
6	4	M	9:10	9:10
7	4	M	9:10	9:9
8	4	F	10:10	10:5
9	5	M	11:2	11:1
10	5	F	11:11	12:1
11	3	M	8:7	8:2
12	4	F	9:8	9:3
13	5	F	10:4	10:4
14	5	M	10:7	10:7

One participant from each of the dyads was invited into a quiet room and taught the game by one of the researchers for approximately 20 min or until the child felt confident with the rules of the game and demonstrated that they could play it with confidence. A child's level of understanding of the game was determined by their ability to carry out the instructions and rules of the game as each member of the pair took their turn. This child (the expert) then invited their partner (the novice) into the same room and taught them the game and played it through to completion. Experts and novices were randomly selected so that there was an equal distribution of hearing and DHH novices and experts across the two games. These interactions between the expert and the novice were videotaped and then transcribed using the Systematic Analysis of Language Transcripts (SALT: Miller & Chapman, 2000) program.

The transcriptions of interactions were coded by the two researchers who were familiar with listening to the speech and language of students with hearing loss. Interactions were first coded according to four broad behaviors: (a) purpose of game stated; (b) number of complete rules and partial rules provided by the game expert (either spontaneously or in response to their partner seeking clarification); (c) clarifications sought by the novice from the game expert; and (d) whether the game expert checked for the novice's understanding. Further coding of the interactions by the experts in each dyad was also undertaken to investigate the language used by these children when instructing their partner how to play the game. In particular, broad measures of language included number of complete words in the interaction, number of different words (a broad semantic measure), and type token ratio (TTR; an index of lexical diversity). These measures were generated by the SALT program. Furthermore, the use of referents by the experts was also conducted because of the importance of this aspect of the language required in expository discourse. Expert utterances were scrutinized for referent errors where the referent was unspecified. Unspecified referents included: (i) unspecified pronouns (e.g., "find this under one of them," where the item is not previously identified and no visual referent is provided), (ii) deleted pronouns (e.g., "so I have to take blue off"), (iii) nonspecific referent (e.g., "So you say is it something"), and (iv) incorrect referent (e.g., "OK, you can hide the number", while referring to a counter).

Initial coding of the four broad behaviors and the use of referents was undertaken by the researchers for 10 of the 34 dyads at the same time as they sat together to ensure consistency with an understanding of each code. The remaining 24 dyads were then coded independently by each of the researchers then compared, resulting in an inter-rater agreement of 96% for the broad behavior measures and 94% for the use of referent measures. For codes that differed, the two researchers sat together to code these interactions again until an agreement was reached.

The design of this study enabled the comparison of three groups of experts: (a) DHH children who instructed their hearing partner in the DHH/H dyads (n = 11); (b) hearing children who instructed their DHH partner in the DHH/H dyads (n = 9), and (c) hearing children who instructed their hearing partner in the H/H dyads (n = 14).

Results

How the Experts Explained the Game

Purpose of the game

All games have an end-point and way of determining the winner. To win the game of *Secret Square*®, you need to be the person who asks the least number of questions. This rule is not explicitly stated in the rules that accompany *Secret Square*® but was included to provide a winning aspect of the game and to add a greater sense of competitiveness. This additional rule was clearly outlined to the participants by the researchers. Participants were instructed that every question asked was worth one point and the person with the lowest number of points after each person completed their turn would "win the game."

Each interaction between game expert and novice was coded according to whether the purpose of the game was conveyed to the novice at some point during the interaction. Figure 1 shows the number of experts who conveyed the purpose of the game in each group: (a) DHH expert/hearing novice; (b) hearing expert/DHH novice; and (c) hearing expert/hearing novice.

Figure 1 shows that of the three groups, DHH experts were the least likely to inform their novice partner of the purpose of the game with only 36% doing so. In contrast, hearing experts were the most likely to inform DHH novices of the game purpose (77%) than were hearing experts who were teaching a hearing friend (57%). The overall number of experts conveying the game purpose was surprisingly low (56% of experts). This may reflect the fact that the recording of the number of questions was not a particularly salient aspect of the game for this group of upper primary students and they were more focused on playing the game rather than how to win it.

For those experts who did inform their novice partners of the purpose ($n = 19$), it is interesting to examine how they went about this task. Most of the experts (14 of 19), regardless of whether they were hearing or DHH, stated the purpose of the game upfront while explaining the rules before they commenced playing the game. Although there were several hearing participants who omitted the purpose of the game, those that included it, did so in an efficient manner. For example, one Year 4 hearing student took only 7 turns to explain to her hearing friend that "this is Secret Square…and you're trying to ask the least questions you can." Similarly, a Year 5 hearing student stated the purpose of the game to his DHH friend within the first utterance stating that;

> Well with secret square you have 25 of those little pictures on the table…you have to get points…and the person with the lowest score wins.

In contrast, some of the DHH experts who included the game purpose used quite convoluted language, taking several turns and many utterances to convey this important piece of information. For example, one Year 4 DHH student took 13 turns to explain to her hearing friend the key rule to winning the game. She explained that:

> You have to put this red thing (holds up the counter) under one of these, so example you put it there and then you have to ask questions (like does)…because you have to get lower.

Another Year 4 DHH student explained the purpose of the game to his hearing peer within the first turn. However, the following transcript shows the awkwardness and lack of specificity of his explanation language.

> do you know, show you how, it take twenty-five counters like these {shows picture of squares on front of game box} pictures and then make it into groups, …and then you have a red counter, and then so you have to look around and then so can't peek, so you hide it anywhere, and have to ask questions like does it made from metal, say yes or no, so if you got the wrong questions get the point…if you know what is it you got some. Pretend you got five questions I give you five, if you got six and you got five you are the winner so five you got to get the less points of questions.

Five hearing experts elected to teach the rules and the game purpose while playing the game, rather than state everything before commencing play. This appeared to be quite an efficient strategy, avoiding confusion and extended turns of long sequences of utterances.

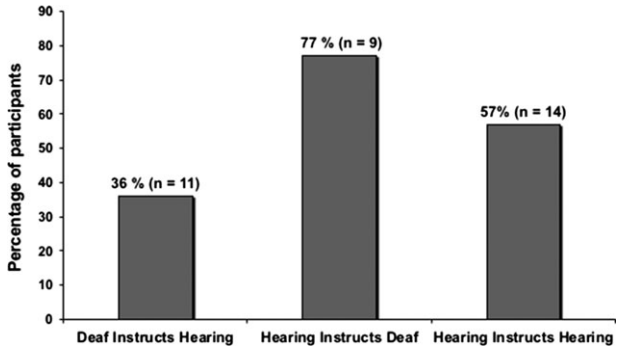

Figure 1 Percentage of experts who stated the purpose of the game when instructing their novice friend.

The rules of the game

There were five rules that children needed to know in order to play Secret Square®. These were identified in advance and clearly conveyed to all expert participants by the researcher who was teaching them the game. The experts also played the games with the researcher several times to consolidate their understanding. The transcribed interactions from the videos were analyzed to ascertain how many rules each expert conveyed to their novice partner. These results are presented in Figure 2. Both groups of hearing experts conveyed more rules to their partners than did the DHH experts, however, an ANOVA showed that there were no significant differences between the three groups in terms of the number of complete rules ($F(2,31) = 1.48$ $p = .243$) or partial rules ($F(2,31) = 2.086$ $p = .141$) that were provided.

Experts differed in the way they conveyed the game rules in seven distinct ways (see Table 3). Some provided exclusively verbal rules without any demonstration, either prior to commencing or during play. Others provided verbal instructions that were accompanied by demonstrations of the rule either prior to commencing the game or during game play. A smaller number of participants provided rules through demonstration only. An analysis of how the rules that were provided by each group of expert instructors is presented in Table 3.

Some interesting patterns are evident in the data in Table 3. All three groups of experts explained the rules of the game prior to commencing the playing of the game, either verbally or combined with demonstration. The use of exclusively verbal instructions prior to starting the game did not appear to differ between the hearing and DHH participants, despite what might

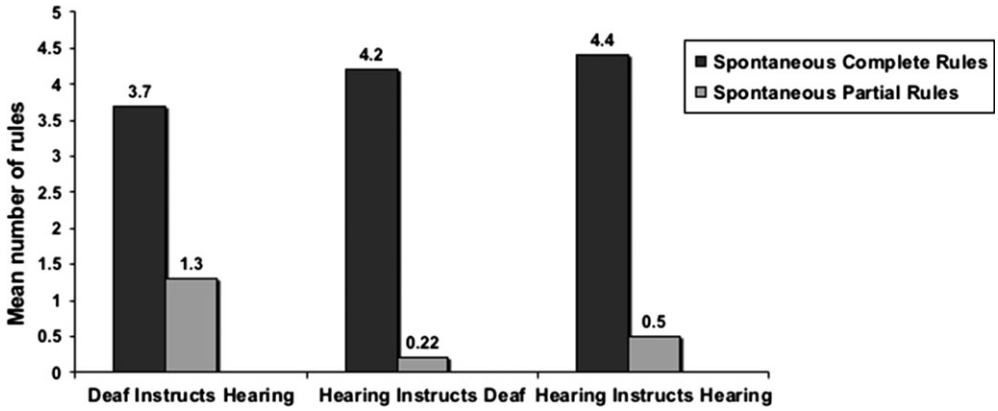

Figure 2 Number of rules conveyed by experts to novice players. Total possible rules = 5.

Table 3 Analysis of the way rules were provided by experts to novices in each of the three groups of participants

Rule instruction	DHH to H (n = 11) Possible rules = 55 4 missed = 51 total	H to DHH (n = 9) Possible rules = 45 5 missed = 40 total	H to H (n = 14) Possible rules = 70 2 missed = 68 total
Verbal prior	19 (37%)	15 (38%)	29 (43%)
Verbal during	4 (8%)	3 (7%)	4 (6%)
Demonstrated + verbal prior	17 (33%)	16 (40%)	30 (44%)
Demonstrated + verbal during	9 (18%)	5 (12%)	1 (1%)
Demonstrated prior	0	0	0
Demonstrated during	2 (4%)	1 (3%)	4 (6%)
Missed rules	4	5	2

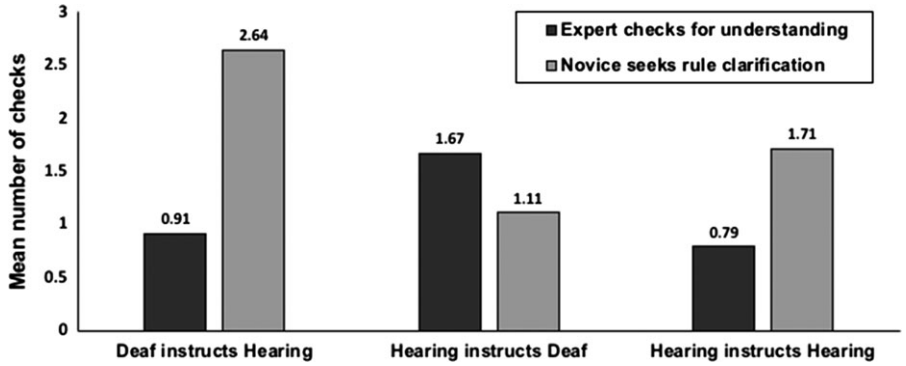

Figure 3 Number of clarifications sought by novices and number of times experts check for understanding.

have been expected. A small difference was observed in regard to provision of rules during the game. DHH experts were more likely to use a combination of verbal and demonstrated rules during the game (18%) than hearing experts instructing deaf novices (12%). For example, one Year 4 DHH expert explained to their hearing novice that they needed to turn around while he hid the colored token. He used a number of verbal and visual demonstrations to explain this rule including pointing, gestures and picking up the token and putting it under the square to show what is required. He also used a number of nonspecific referents stating that "you can't peek (uses hands to show), just look over there (points), look away, don't look at this (holds up the coloured token)". Hearing experts teaching hearing novices virtually never adopted this approach when teaching their partner, the rules (only 1%).

Clarifications

In order for players to successfully complete an expository task, such as instructing how to play a game, there are a number of pragmatic skills that are required. Specifically, a novice needs to seek clarification to ensure that they understand the rules of the game, while the expert needs to check their partner's understanding of these rules. As such, transcribed interactions were analyzed according to the number of: (a) clarifications sought by the novice from the game expert and (b) the number of times the game expert checked the novice's understanding of the game. Results in Figure 3 show that when the hearing novices were instructed by the DHH experts, they appeared to seek more clarifications compared to when they were instructed by hearing experts. An ANOVA, however, showed no significant differences between the three groups of experts ($F(2,31) = 2.305$ $p = .12$). Hearing novices tended to seek similar types of clarification from both the DHH experts and the hearing experts including the number of tiles to place out at the start (e.g., *so you've got to get 25 was it?*), the type of questions they could ask (e.g., *are they yes or no questions?*), and the process of removing the tiles once the expert gave a response to their question (e.g., *So if it does have blue or something like you take that away and see if it's under there?; So do I take all the creatures away?*).

Further inspection of the data shows that when hearing experts instructed DHH novices they tended to check for understanding more often compared to when they were instructing hearing novices. In addition, hearing experts tended to ask for understanding of the novices in a similar way, regardless of whether the novice was hearing or DHH. These were often articulated with general questions such as "is there anything that you didn't get?" or "do you understand?" and "do you get it?" or with a statement of the rule that was followed by "OK" with rising intonation such as "you've got to put one underneath here, okay?" and "the one with the least amount of points wins, OK?". Despite observed differences in the number of times experts checked for understanding reported in Figure 3, an ANOVA found no significant differences between the three groups ($F(2,31) = 1.096$, $p = .35$).

The Language Used by Experts

Expository tasks demand more explicit language from the speaker in a partnership (Nippold et al., 2005). It seems highly likely that there is a relationship between the way a child describes the game rules and how easy it is for their partner to understand those rules and learn how to play the game. The clarity and efficiency of the game description will involve the vocabulary selected, the syntax of the sentences constructed

Table 4 Excerpts from transcripts of a Year 5/6 DHH expert instructing a Hearing novice and a Year 5/6 Hearing expert instructing another Hearing novice

Excerpt 1. DHH expert (DHHE) instructs hearing novice (HN)	Expert 2. Hearing expert (HE) instructs hearing novice (HN)
DHHE: *(um) You need twenty-five cards and you've got to find (um) this {gets counter} and you've got to ask yes or no questions only.*	HE: *Oh, what we have to do, is we have to put twenty-five squares out and then one of us will hide the chip first (um) we have to hide the chip under one of the squares.*
DHHE: *And (um) every time you say a question you get a point and you have to try and get the lowest questions and whoever's got the lowest wins the game.*	HE: *And you've got to ask questions, but they can only be yes or no answers, like is it under an animal, and if I say no you've got to take all your animals away.*
DHHE: *And you have to have questions and if I say no you take all whatever they are, like if I say is it an animal and I say no, or you say no (um) you take all the animal/s off (and try and get) and you have to try and find this under one of them then you're not allowed to look when the other person's trying to put it under something*	HE: *So, they'll be gone, and then does it have red on it and if I say yes we take away everything without red on it.* HE: *Okay?* HN: *Yep.* HE: *And each question you ask you get one point.* HN: *Okay.* HE: *We just put out twenty-five square/s.* (counts out squares) HE: *Okay, so you've got to turn around.*

and the way the rules are organized for delivery from expert to novice. Scrutiny of the game instruction transcripts identified some language differences between the three groups of children. Table 4 presents two excerpts from transcripts of dyads of Year 5/6 students that highlight some of these differences. The first excerpt involves the DHH expert instructing their hearing friend. The second excerpt involves the hearing expert instructing another hearing friend.

Both excerpts show that the experts were able to articulate the rules of the game but there were notable differences in the clarity and organization of the information. Excerpt 1 shows the DHH expert's lengthy description of how to play the game with use of inaccurate vocabulary (e.g., "cards" rather than "squares") and use of pronouns without prior reference (e.g., "this" and "it"). In contrast, Excerpt 2 shows the hearing expert introducing key vocabulary (e.g., "squares" and "chip") and the main rules of the game in an efficient, more concise way. In addition, the hearing expert also appears to check that the hearing novice has understood the description of the rules as they are introduced.

To further explore the differences between the three groups of experts, we initially compared some of the very broad language measures that were available through the SALT analytic tools. These measures included; total words, the number of different words, and the TTR (the total number of different words divided by the total number of words). Results show that there were few differences for the three groups of experts on these very broad measures of language when teaching their novice friend the game. Table 5 presents the three language measures: total words, number of different words, and TTR for the three groups.

An ANOVA was used to further analyze the data. Results showed no significant differences between groups on each of these three measures indicating that the three groups of experts used a similar number of words ($F(2,31) = 0.476$, $p = .626$), a similar variety of words ($F(2,31) = 0.005$, $p = .995$), and had very similar TTR ($F(2,31) = 0.571$, $p = .571$) when they are both describing the game rules and teaching their novice partners how to play *Secret Square*®. As indicated by the excerpts of transcripts in Table 4, however, there were differences between the experts and the way they described the game rules. Further close scrutiny of the transcripts revealed some key differences in the way experts used referents when they were describing the game

Table 5 Total words, number of different words and the TTR for the three groups of experts

	Broad language measures		
Groups	Total words from Expert	Total number of different words	TTR
DHH expert instructs hearing novice	322	95	0.38
Hearing expert instructs DHH novice	371	96	0.35
Hearing expert instructs deaf novice	303	96	0.39

rules. A referent is the concrete object or concept that is designated by a word (e.g., using the word "chip" or "counter" to refer to the red plastic disc that is hidden under the squares in the game of *Secret Square*®). When the children who are DHH were the experts they appeared to use incorrect referents when explaining how to play the game. For example, they either used an unspecified referent where a specified referent was required (e.g., "you have to find it" or "so you say is it something") or, on occasions, omitted the referent all together (e.g., "so you pick…").

Further analysis of the transcripts was then undertaken to focus on the use of referents. The number of times that an incorrect referent was used was tallied for each expert's interactions as they instructed and demonstrated the game. A mean score for incorrect use of referents was calculated for each of the three groups. Results are shown in Figure 4.

An ANOVA indicated that there was a significant difference between the groups on this measure ($F(2,31) = 14.871$, $p = .000$). Post hoc comparisons using the Tukey HSD test showed that the mean scores for the use of incorrect referents by experts who were DHH were significantly higher than mean scores for use of incorrect referents by each of the two groups of hearing experts. There were no significant differences in the use of incorrect referents between the two hearing groups of experts (hearing expert instructs DHH novice and hearing expert instructs hearing novice). Experts who were DHH were much more likely to substitute an unspecified referent for a specified referent than were either of the hearing experts when

instructing their partners how to play the game. Further scrutiny of the data suggested that there were several common types of referents that were incorrectly used by the DHH experts. These included four main types: (a) unspecified pronoun (e.g., "find this under one of them," where the item is not previously identified and no visual referent is provided); (b) deleted referents (e.g., "so I have to take blue off"); (c) nonspecific referent (e.g., So you say it is "something" or "this stuff," or "take this whatever," where no visual referent is provided); and (d) incorrectly labeled referent (e.g., "OK, you can hide the number" when referring to the counter).

Results of the coded incorrect use of referents by each group of experts are shown in Table 6.

Inspection of data presented in Table 6 shows that the most common type of referent error made by DHH experts was to delete the referent completely. This was often where the word "counter" or "chip" could have been used or in reference to the "squares." This type of error rarely occurred when hearing experts were instructing and teaching their partners to play the game.

Discussion

Expository tasks have been shown to be more challenging than conversational interactions for both typically developing children and children with atypical language such as a language impairment (Nippold et al., 2005; Sorsana et al., 2013). DHH children who use spoken language and have cochlear implants are one population who have language delays (Lund, 2016). There are few published findings that relate to the way children and young people who are DHH interact with hearing peers in the context of an expository task. This study invited pairs of children to teach their partner a new game, Secret Square®. These videotaped interactions were transcribed and analyzed to explore the similarities and differences between hearing children and children who are DHH as they negotiate the pragmatic demands of oral communication in an expository genre.

Game Purpose and Game Rules

This study focused on the pragmatic elements of the interactions. Specifically, it explored whether there were similarities and differences in the way that hearing and DHH experts teach novices a board game in regards to conveying the key game elements of game purpose and game rules. Transcripts from the three groups of experts (1. DHH expert teaching hearing novice; 2. hearing expert teaching DHH novice; and 3. hearing expert teaching hearing novice) showed that each of the three groups frequently omitted the purpose of the game (i.e., to locate the token with the least number of questions asked). This is possibly because this rule was added by the researchers and was not a salient feature of *Secret Square®*. There were differences between the three groups of experts. As a group, the DHH experts were the least likely to inform their partner of the game purpose (36%) while hearing experts instructing a DHH friend were the most likely to include this key element (77%).

Of greater interest, were the differences between the groups in terms of the language used to convey the purpose of the

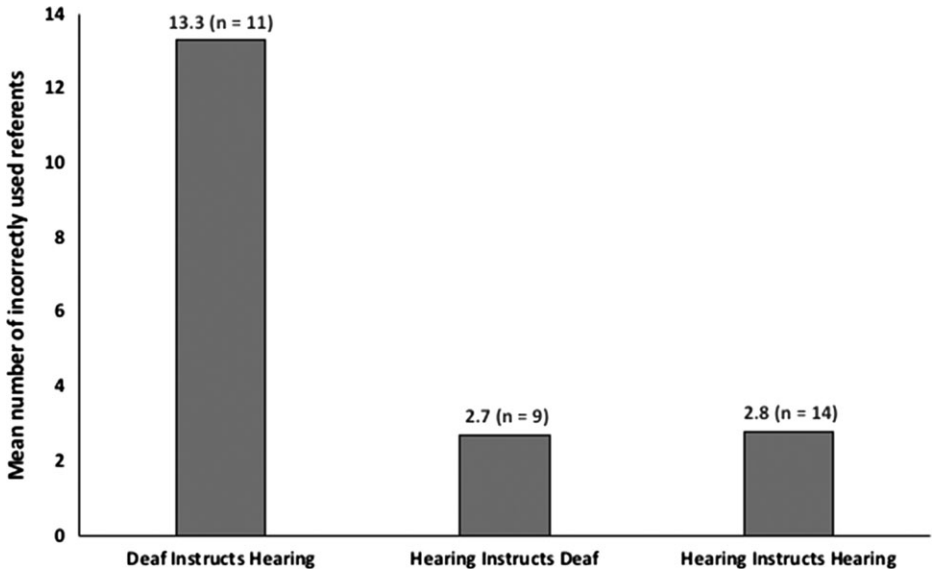

Figure 4 Mean number of incorrectly used referents for each expert group.

Table 6 Means and (standard deviations) for referent errors made by experts

	Referents			
Groups	Unspecified pronoun	Deleted referents	Nonspecific referent	Incorrectly labeled referent
DHH expert instructs Hearing novice	2 (2.1)	6.8 (4.2)	2.8 (3.1)	1.5 (1.4)
Hearing expert instructs DHH novice	0.3 (0.7)	0.8 (1.3)	1.4 (1.4)	0.5 (1.1)
Hearing expert instructs hearing novice	0.2 (0.4)	1.3 (1.5)	1.1 (1.7)	0.2 (0.2)

game. Many of the hearing experts used succinct instructional language and small number of turns to convey the game purpose, while DHH experts offered quite convoluted descriptions and many more turns to let their partner know that the player with the least number of questions wins the game. This finding is consistent with some of the work of Nippold and her colleagues (2005, 2008). They observed the way that the precise demands of expository task such as describing the rules of a game challenged hearing children with language impairments. In our study, children who were DHH appeared to be challenged by the game instruction task, either omitting the game purpose or conveying it with imprecise and convoluted descriptions.

This study also compared the way the game rules were described by each of the three expert groups. There were five rules that novices needed to learn to be able to play Secret Square®. There were no differences between the three groups of experts in terms of the number of full or partial rules that were conveyed. All three groups of experts appeared to understand the importance of rule knowledge to enable their partner to play the game. All three groups favored an approach that involved verbally describing the rules prior to commencing game play. If rules were explained during play, the experts who were DHH were much more likely to combine both verbal and visual demonstrations, such as pointing, picking up the squares to show a color or type of animal, or showing how to hide the token, than the hearing experts. Hearing experts relied almost exclusively on verbal rule descriptions.

The findings of this study suggest both hearing and DHH children understood that teaching a friend to play a game required the game expert to convey key elements such as game rules and game purpose. However, the experts varied in both the efficiency of the language used and whether it was accompanied by visual demonstrations. Children who were DHH used less efficient language but they were more likely to support their description of the rules with visual demonstrations. From a pragmatic perspective, a possible explanation for the additional visual demonstration is that DHH experts were aware that they needed to add clarity to the rules they were describing and used the visual modality as an extra support for their partner. Not only is this a natural fit for a DHH instructor but also suggests that they were thinking about the needs of their listener/game partner.

Clarifications

This study also sought to investigate whether there were similarities and differences in the way hearing and DHH game experts and novices negotiate the clarification of game rules. Sorsana et al.'s (2013) study found that typically developing preschoolers navigated quite successfully through the process of both asking for clarifications (novices) and responding to questions (experts), especially during the playing of the game. Less clarifications were sought or responded to during the giving of initial game instructions. The frequency and type of clarifications were analyzed in our study. Hearing novices sought more clarifications when their expert was DHH than if the expert instructing them was hearing although the differences were not statistically significant. This may relate to the clarity of the expository language that was used by DHH experts. When aspects of the instructions are unclear, novices appear to be more likely to seek clarification. Further studies with larger samples are needed to investigate this finding.

We also explored the way that experts checked for understanding in their game partners. This is an important pragmatic skill, particularly in the context of small group learning tasks in the classroom. We found a difference in the frequency of checks for understanding from hearing experts. They were more likely to check for understanding if the novice they were instructing was DHH, however in this small study the difference did not reach statistical significance. There were very few differences observed in the way hearing experts checked for understanding. They tended to use general questions such as "do you understand" or "OK?", regardless of whether their partner was hearing or DHH. In our study, hearing friends appeared to display some sensitivity to their partners, adjusting their approach with more checks for understanding if that partner was DHH. Perhaps, they were able to take on the perspective of the listener and were keen to adapt their instructions to the needs of their partners. Alternatively, this observed behavior might have resulted from a biased perspective of the hearing partners. They knew their game partner was DHH and may have assumed they would not understand them, hence the more frequent checks for understanding.

Novices who were DHH were less likely to seek clarifications than hearing novices. This finding is consistent with other explorations of pragmatic skills in the context of referential communication tasks using barrier games. Children who are DHH frequently ask for less clarifications than their hearing peers do in barrier games (Jeanes et al., 2000; Lloyd et al. 2005). Viewed through a pragmatic lens, there are several explanations for this tendency not to ask for clarification. In this study, the upper primary students who are DHH may not understand that clarifications are pragmatically appropriate. They may be less aware than their hearing peers of the role that clarifications play in learning something new. Alternatively, they might avoid asking for clarifications because they believed that they should be following the instructions provided by their peers. It is also possible that they prefer to simply "hope for the best" rather than seek clarification in order to avoid any embarrassment created by seeking clarification because of previous negative experiences. If they had previously sought clarification in similar interactions and either received no response or been told "not to worry about it" by hearing peers they might be discouraged from seeking clarifications in future.

Another factor that might have impacted the findings of this study relates to the amount of experience that the children who were DHH might have had with both the playing of board games and with explaining the rules of these games. Marschark and Everhart (1999) found that the amount of previous game experience impacted on the problem-solving skills of DHH participants in the Twenty Questions game. It seems likely that the quantity of experience with the expository task of explaining how to play a game could also have impacted the findings of this study. Australian primary classrooms adopt constructivist pedagogies and use a wide range of collaborative tasks and games for learning literacy and numeracy, therefore it seems likely that these fully included participants had experience with playing games in the classroom. It is possible, however, that these DHH participants rarely volunteer to explain learning tasks or games to their peers when in class. While they might have considerable game playing experience they might have less "game explaining" experience and this could have impacted on the outcome of this study. Further research could explore interactions in the classroom "in situ" to understand both the nature of these interactions and their pragmatic demands. In our study, considerable time was spent with each participant to explain the rules of the game and to practice playing the game several times. The expository task was well

modeled for each participant in an effort to ensure that each participant was confident with the task of teaching their friend how to play the game. Prior game playing experience was not measured but would be a valuable item for inclusion in future expository task research.

Some of the differences observed between the hearing/DHH pairs and the hearing pairs of students raise the question of the impact of friendship on the quality of the interaction. Even though each participant in the study had been asked to nominate a friend to share the game with, it is possible that the depth of friendship varied with the children who were DHH not being as well connected to their hearing partner as were the pairs of hearing friends. People who do not know each other well may exhibit awkward or less effective interactions. The term friend was not defined for the participants or vetted by their teachers. They were just asked to select a friend. Wauters and Knoors (2007) studied social integration of deaf children in inclusive settings in the Netherlands. They found no differences between deaf children and their hearing peers in terms of peer acceptance or social status, however children who were DHH differed on some measures of social competence, with lower prosocial behavior and more socially withdrawn behavior. These findings may have implications for the present study. Like Wauters and Knoors' study, the children who were DHH in our study were learning in schools with a strong focus on inclusion and it seems likely that they were also well accepted by their peers. If this was the case, then it suggests that the differences between the pairs in terms of social competence identified by Wauters and Knoors might explain the differences observed in this study rather than it being caused by superficial friendships.

Use of Referents by Experts

The third and final area explored in this study related to whether there were similarities and differences in some aspects of language use by experts as they instructed a novice using the expository genre. Nippold and her colleagues (2005, 2008) examined the syntactic complexity in the expository prose of children and young people and found less complex syntax in children with language impairment compared to typically developing children. In our study, we compared some very broad language measures available through SALT (Miller & Chapman, 2000) and found no difference between the three groups of experts in terms of the volume or diversity of language used to instruct. Further scrutiny of the transcripts showed that differences were present and analysis of the way referents were used appeared to be a productive line of inquiry. We found that experts who were DHH were much more likely to use incorrect referents such as substituting the wrong word (Square for counter), omitting referents completely, introducing an unspecified pronoun, or substituting a generic word such as "stuff" for the referent. Difficulties with using specific and concise communication have been identified by other researchers. Jeanes et al. (2000) found that children who were profoundly deaf were much less likely to make specific clarification requests as compared to their hearing peers. Both signing and oral deaf children tended to rely on general requests for clarification. Moreover, Jeanes et al. noted that the oral deaf pairs of interlocutors in their study tended to use less precise language as they negotiated their way through the referential communication activities.

Imprecise or inaccurate referents in expository interactions that involve teaching someone how to play a game are very likely to challenge the partner who is learning the game. Pragmatically, it should prompt more clarifications and questions from partners and this was seen in our study, although the differences were not big enough to reach statistical significance. This finding does raise questions about the role of vocabulary knowledge in expository interactions. It seems likely that the DHH participants in this study could not automatically retrieve the correct word for the counter they were hiding so either omitted it or incorrectly named it. Lund's (2016) meta-analysis of DHH children with cochlear implants suggests that they are one group who often exhibit vocabulary delays. Thirteen of the 20 DHH participants in this study used cochlear implants. Other studies have shown that improving vocabulary knowledge in children who are DHH significantly increases many aspects of spoken language performance (Paatsch, Blamey, Sarant, & Bow, 2005).

Pragmatically, the poor use of referents by children who are DHH raises further questions. It is hard to know how well the children in this study understood the impact of their imprecise use of referents on their partner's understanding of the game. Had they realized the potential difficulties created we might have expected to see more checks for understanding by the DHH experts.

Limitations

This study was motivated by a desire to explore how children who are DHH negotiate expository tasks with their hearing peers and classmates. Our focus was on the students who are included in regular classrooms where spoken English is the only mode of classroom communication, hence we chose to compare DHH/hearing and hearing/hearing dyads to understand their similarities and differences. In hindsight, it would have been very valuable to include an additional group of participants where deaf experts instructed deaf novices. This group would have provided us with insight into how hearing status impacts on the expository interaction and to see if deaf dyads negotiated the task differently and possibly more efficiently than deaf/hearing dyads. In future research, we will certainly include this group.

In addition, it would have been valuable to know more about the language skills of the participants in this study. No language assessments were undertaken with the study participants, yet vocabulary knowledge appeared to play a significant role in providing clear game explanations. More detailed understanding of the differences in language skills within the DHH group may have helped us analyze the way they described the task to their partners.

Extrapolation of the findings of this study is limited by the study's participant group. The findings are most relevant to children and young people who are DHH, use spoken language and are learning in inclusive settings. This study's participants did not use sign language for communication in their school setting and it seems very likely, considering the visual nature of sign language, that children who sign may have negotiated the expository task differently. This study was undertaken with small numbers of participants and a larger study of expository skills in children and young people who are DHH is warranted. A larger study would need to include the comprehensive assessment of participants' language skills to assist with understanding the impact of vocabulary and syntactic development on expository interactions.

Conclusion

The findings of this study provide us with direction for supporting children who are DHH to understand the distinctive features

of expository interactions. There were many positive findings. Upper primary-aged children with hearing loss in this study understood that they needed to convey key features of the game they were teaching their peers, such as the game purpose and the game rules. They were also able to check for understanding as an expert and seek some clarifications when learning a game as a novice. Similar to previous studies in the conversational genre (Paatsch & Toe, 2014; Toe & Paatsch, 2013), children who are DHH had a good grasp of the broad pragmatic skills required in this expository interaction. The area where they appear to need more targeted intervention is in developing specific language skills in an expository context. Children who are DHH would benefit from more authentic experiences requiring the use of specific referents to support the development of more concise syntax and vocabulary.

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Conflict of interest

No conflicts of interest were reported.

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