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Conversation Patterns between Children with Severe Speech Impairment and their Conversation Partners in Dyadic and Multi-person Interactions

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Active engagement in interactions is crucial for the development of identity, social competence, and cognitive abilities. For children with severe speech impairment (SSI) who have little or no intelligible speech, active participation in conversations is challenging and can be critical for their social inclusion and participation. The present study investigated the conversational patterns emerging from interactions between children with SSI who use aided communication and typically speaking conversation partners (CPs) and explored whether active participation was different in interactions with different numbers of partners (dyadic versus multi-person interactions). An unusually large multilingual dataset was used ($N = 85$ conversations). This allowed us to systematically investigate discourse analysis measures indicating participation: the distribution of conversational control (initiations versus responses versus recodes) and summoning power (obliges versus comments). The findings suggest that (i) conversations were characterized by asymmetrical conversational patterns with CPs assuming most of the conversational control and (ii) multi-person interactions were noticeably more symmetric compared to dyadic, as children's active participation in multi-person interactions was significantly increased. Clinical implications and best practice recommendations are discussed.

INTRODUCTION

In typical development, children construct a sense of themselves through their interactions with others (Clarke and Kirton 2003), and, at the same

time, they may be appraised through their active engagement in interactions. These processes inform the development of their identity, well-being, social competence, and cognitive abilities (e.g. Sundqvist *et al.* 2010). Conversational interactions provide an important context for many aspects of development: emotional, cognitive, and social (Hughes and de Rosnay 2006; Togher 2013). By implication, anything that constrains or limits a child's ability to actively engage in interactions with key conversational partners during these formative years represents a potential risk factor for development. For some children, the presence of a severe speech impairment (SSI) secondary to conditions such as cerebral palsy puts them at risk of atypical interaction experiences from infancy (Pennington and McConachie 1999, 2001).

Over the past 5 decades, considerable strides have been made in exploring tools and strategies to minimize the impact of SSIs (Stauter *et al.* 2017; Lynch *et al.* 2018), drawing most notably on developments in speech/communication/conversational technologies (Light and McNaughton 2014). Augmentative and alternative communication (AAC) refers to any form of communication that supplements natural speech, where intelligibility is compromised (Beukelman and Mirenda 2013). A common distinction is between communication modes that are unaided (i.e. require no additional equipment or tools, such as manual signing, gestures, or facial expression) and aided modes, where an additional physical resource is used as a communication aid, such as pictures, alphabet boards, displays or books of graphic symbols, or computerized devices that generate speech output. The focus of this article is aided communication supports.

For children with SSI, the use of aided communication can be critical in developing and enhancing language and communication skills (Clarke and Price 2012), but using these speech substitutes also presents challenges in interaction (Clarke and Wilkinson 2007, 2008). Although it is tempting to view aided communication systems as a simple replacement for unintelligible speech, there are many additional challenges that are unique to this form of communication. The vocabulary that a child must use expressively exists externally in a physical aid and must be represented in some concrete form (Romski *et al.* 1997). Vocabulary is chosen and organized by others and may represent a very imperfect match with the internal lexicon that children develop based on their immersion in a speaking world (Nelson 1992). The steps between the conception of a communicative intention and its expression are complicated by the need to search and navigate through available vocabulary possibilities (Oxley and Norris 2000), often against a backdrop of physical impairments that greatly constrain the ease with which symbols can be accessed (Light and McNaughton 2014). Communication is effortful, cognitively demanding (Murray and Goldbart 2009), and therefore slow, with rates of communication even for skilled individuals often as low as 2–10 words per minute, which often misrepresents the child's expressive aptitude (von Berg *et al.* 2009).

Long pauses may reflect a child's search for a specific lexical item or may be a consequence of significant physical difficulties in selecting a specific symbol.

A child may 'know' what he or she wishes to say, but may not be able to find the appropriate symbol within their aided system, either because it has not been provided or because the child does not know where it is stored, or even because the symbol representing that lexical item cannot be interpreted (Smith 2015) (e.g. see Supplementary Appendix Figure A1). Choices may be made reflecting 'good enough' matches, and/or a child may attempt to use unaided modes such as gesture or pointing to guide a conversation partner's (CP) attempts at interpretation. Given the often under-specified and ambiguous potential meanings of graphic symbols (von Tetzchner 2015; von Tetzchner and Stadskleiv 2016), CPs may play a uniquely important role in interpreting and co-constructing what a child might mean.

In light of these additional demands, it is not surprising that the structure of interactions involving aided communication has been found to demonstrate certain features. They are often described as asymmetric, with the conversational floor dominated by conversational partners using natural speech (Light *et al.* 1985; Clarke and Kirton 2003; Dahlgren-Sandberg and Liliedahl 2008; Clarke 2016), with uneven turn-taking patterns, extended repair sequences, and a repetitive distribution of participants' conversational roles (Clarke and Kirton 2003; Lund and Light 2007; Sundqvist *et al.* 2010; Chung *et al.* 2012). Speaking partners have been found to more frequently initiate conversational exchanges, use many questions, commands, and requests for clarification, choose most topics, and control how the conversation progresses (Pennington and McConachie 1999; Smith 2015). In contrast, children using aided communication assume relatively passive roles, exerting little conversational control (Andzik *et al.* 2016). They have been described as producing a high proportion of yes/no responses and providing limited new information, avoiding replying to non-obligatory turns, and rarely producing initiations, entrusting interactional responsibility to CPs (Chung *et al.* 2012).

In part, these conversational patterns may reflect attempts to avert communication breakdown when partners cannot easily understand children's communication signals (Kent-Walsh *et al.* 2015) or when they have difficulties coping with the slow tempo of interaction (Light and McNaughton 2014; von Tetzchner 2015). These characteristics have been reported even in interactions where typical communicators are asked to use aided communication (Smith *et al.* 2016), suggesting that aided forms of communication carry unique interaction demands that affect all participants. For this reason, Clarke and Wilkinson (2008) suggest that rather than focusing on individuals who use aided communication, the emphasis should be on interactions involving aided communication.

These findings have led to the development of interventions to enhance active participation in conversations using aided communication (Kent-Walsh *et al.* 2015). A good conversation is defined as one that is balanced, with relatively symmetrical turn-taking patterns, and a varied/changing distribution of participants' conversational roles (Pennington *et al.* 2009). Some interventions have focused on teaching aided communicators how to start and to

develop conversations (Lund and Light 2007) and how to convey a wider variety of communicative functions, such as to ask a question or to solve communication breakdowns (Halle *et al.* 2004; Allen *et al.* 2017). Other studies have focused on training CPs to encourage children's active participation in conversation, by creating opportunities for children to initiate discussion (e.g. Kent-Walsh *et al.* 2015; Sennott *et al.* 2016).

Although the findings in relation to conversation structure and symmetry have been relatively consistent across a range of groups using aided communication, it is worth noting that (i) the data available are relatively sparse, with most studies based on either single cases or small *N* and (ii) the interactions described typically comprised dyads, most often involving an adult and a child. There is, then, a need for more data, and a greater focus on multi-person interactions (conversations between a child and more than one CP) as well as dyadic interactions (conversations with a single CP). In this study, we were interested specifically in exploring whether the conversational patterns previously reported would stand up to scrutiny in a larger cohort of children using aided communication and the extent to which these patterns are consistent across dyadic to multi-person interactions. The aim was to examine the conversational patterns occurring when children using aided communication engaged in dyadic and multi-person interactions in order to (i) expand our understanding of turn-taking and topic initiations (questions, commands, and comments) in aided communications and (ii) to explore the impact of multi-person interactions on the conversational contributions of participants using aided communication. As we have access to international data, we were also able to explore the same variables across a range of language groups.

METHOD

The data for the current study were drawn from the international project, Becoming an Aided Communicator (BAC) (von Tetzchner 2018). Ethical approval for the study was obtained from the relevant health or educational ethics board of each national site.

The current study reports on a subset of the BAC data ($N = 85$ conversations), specifically corpora of conversations with parents, teachers, or peers. A total of seven countries were represented in the data set (Brazil, Canada, Finland, Germany, Netherlands, Norway, and UK). The number of participants and sample size allowed systematic exploration of the conversational patterns and the distribution of conversational control in both dyadic and multi-person interactions.

Participants

Participants were children and adolescents who used communication aids ($N = 35$) and their CPs ($N = 84$). For analysis purposes, a peer, parent, or professional was identified as taking the role of primary CP (CP1) with the aided

communicator. Multi-person interactions occurred when an additional parent, professional, or researcher contributed as a secondary CP (CP2).

Children who use aided communication/aided communicators. The current study reports on data from a total of 35 children who use aided communication (aided communicators), as a consequence of SSI, with 33 children having a diagnosis of cerebral palsy): 19 girls and 16 boys aged 5 years; 3–15: 8 years (years; months), with a mean age of 11 years; 1 (standard deviation [SD]2; 8) (for more details, see Supplementary Table S1 Participant characteristics/demographic details). Participants were recruited through the health care and special education systems in each of the countries and regions between 2008 and 2014. Participants met the following inclusion criteria: (i) were between 5 and 15 years of age; (ii) had speech production that was very difficult to understand or absent (i.e. achieved a rating of III or IV on the Viking Speech Scale, Pennington *et al.* 2013); (iii) had language comprehension considered adequate or near adequate for chronological age as determined by each participant's classroom teacher; (iv) had used aided communication for a minimum of one year; (v) had normal hearing and vision (with corrective technology as required); (vi) were not considered by their teachers to have an intellectual disability; and (vii) did not have a diagnosis on the autism spectrum. Supplementary Tables S1 and S2 contain data on performance on assessment measures, where they were available.

Communication aids are not unitary and a process of feature matching to find a best fit for a child is a regular intervention process. In this data set, all children had used more than one aid. Most began with pictures, all had progressed onto a graphic system and a smaller proportion used a combination of a graphic system and written words, and about one-third of the group relied mainly on spelling. Speech generating devices and communication boards were most commonly used. For a comprehensive description of the aided systems used in this study, see von Tetzchner (2018).

Conversation partners. Each aided communicator had a conversation with at least one of the following three CP1s: a parent, a peer, and a familiar professional (teacher or teaching assistant). In total, there were 48 participants in the partner group, comprising 31 peers, 6 parents, and 11 professionals. Criteria for selection of CPs were (i) use of natural speech, (ii) familiarity with the aided communicator and the child's communication system (i.e. had experience in communicating together). Mothers functioned as CP1s in all parent–child interactions. Peers were friends whom the aided communicators knew well and were identified by them as a preferred CP. Of the 11 professionals who participated, 2 were teachers; the remaining 9 were special needs assistants. Dyadic interactions comprised aided communicator and a single CP (peer, parent, professional). Multi-person interactions occurred spontaneously. In multi-person interactions, the conversational partner allocated to have the role of the main CP in the conversation is considered the CP1, independently of the amount of talk-contribution across the interaction.

Procedure

The task reported here explored conversations between the child-aided communicators and conversational partners about a predetermined topic. The topic was introduced by the researcher and then the child and the partner were asked to communicate about the topic with no further instruction. If the conversation did not commence, a prompt was provided by the researcher. Each aided communicator conversed about one or more of the following five topics: (i) *What would you do if you were very rich?* (ii) *What would you like to do when you grow up and become an adult?* (iii) *What is your favourite television programme?* (iv) *Talk about things you like to do* (vi) *Talk about something you like to talk about* (see Supplementary Table S3). The length and complexity of interactions varied across the cohort. All conversations were video recorded. This was to support the transcription of the interaction and capture all elements of interaction, e.g. verbal and non-verbal. Prior to any data coding, all conversations were transcribed orthographically. All researchers were competent English speakers/writers and several researchers were multilingual, so each country's research team took responsibility for transcribing into their own language and then into English. A different researcher on each team then translated back from English to the source language, enabling any points of variable interpretation to be highlighted and debated by the research team, and ensuring as closest transcription and interpretation integrity as possible. All research teams also used a transcription protocol with AAC conventions for multimodal communication (von Tetzchner and Basil 2011) to support consistency. Transcripts also included annotated field notes.

Across all conversations, the average time was seven minutes, but depended on individual and situational characteristics (e.g. the conversation stopped if a topic ended naturally). Complex interactions that included an off-topic discussion led by the primary conversational partner were included for analysis. This type of conversational behaviour was considered to reflect the partners' communication style of talking and was interpreted as indicating that they had control over the topic of the conversation and therefore could change the topic. However, coding was stopped when the topic was changed by the secondary conversational partner or the researcher.

Coding

For analysis, the different number of conversational partners and the varied style of interaction between the aided communicator and the partner/s resulted in coding to three interaction groups (e.g. see Supplementary Appendix S1):

- dyadic interactions ($N = 39$): Interaction and conversation between an aided communicator and one conversational partner;
- distinct multi-person interactions ($N = 32$): Distinct dyadic and multi-person conversations in the interaction. The main conversation was with one partner (dyadic), with sporadic short conversation/s with more than one partner (multi-person);

- Non-distinct, multi-person interactions ($N = 14$): Robust interaction between the child-aided communicator and all conversational partners, so that a dyadic conversation between the child and the main partner could not be discerned from the whole interaction (multi-person interaction throughout).

In all three interaction groups, the aided communicator conversed with different CPs on various topics (for topic details, see *Procedure* above), generating 85 conversations for coding and data analysis. Supplementary Table S3 details the spread of CPs, interaction groups, and topics across the aided communicator conversation data.

A discourse analytic approach was adopted (Farrier *et al.* 1985). Prior to analyzing aided conversations, the segmentation of interactional flow and consequently the 'discourse unit' (e.g. verbal utterance, non-verbal conversational elements/referring expressions) was determined as the basic unit of analysis. Due to the aided communicators' ***SSI***, speech was not prioritized over other forms of multimodal communication. Therefore, 'discourse units' were identified as all conversational elements which could develop or sustain the topic of conversation and serve as initiations or responses. This included verbal utterances (both through speech-use and aided communication), deictic and symbolic pointing, facial expressions, gestures, vocalizations, and other non-linguistic cues. Verbal utterances and non-verbal referring expressions that could not be understood by the transcriber but were interpreted as meaningful by the CP, as evidenced by partner's reply to the aided communicator's utterance, were also included in the analysis. Including all modes of communication in the present analysis, allowed us to investigate how creative use of multiple modes impacted on CP's responses and therefore influenced the structure and flow of conversation. Discourse elements that established social closeness but frequently conveyed an unclear message that could not be interpreted by the partner, like laughter/smile and eye contact, were not categorized as 'discourse units' that could promote the conversation by serving as initiations or responses, and hence were not included in the analysis.

The coding was based on a discourse analysis system adapted from Blank and Franklin (1980; Farrier *et al.* 1985) and was employed to elucidate patterns of conversation control in interactions between aided communicators and their CPs (Müller and Soto 2002). In this system of analysis, each participant was considered to assume two main communication roles during the conversation: the role of initiator commenced an exchange, and the role of responder replied to an initiation. Initiations were coded as either 'Obliges' or 'Comments' in order to signify the extent of summoning power, (i.e. the degree to which there was an explicit demand for the interlocutor's response). Obliges were initiations that unambiguously summoned or required a response and were usually produced through questions or commands. An initiation was coded as a comment if a response to it was optional, thereby denoting a weaker summoning power. Furthermore, comments could be followed by a further optional reply.

To indicate the extent of conversational control, replies to initiations were coded either as 'Responses' or as 'Recodes'. Contrary to 'Responses' which constituted plain replies to initiations, 'Recodes' were replies in which a responder also resumed control of the discourse by initiating the next turn (i.e. the person assumed the role of both the responder and initiator in the same utterance). For example, responding to a question with a question (usually clarification questions) was coded as recode. The following examples (Participant 17, Topic: To do if rich, AC for the aided communicator, CP for conversation partner) is a series of exchanges which have been coded for summoning power and conversational control (for a more extensive example, see Supplementary Appendix S2):

CP: What would you do, if you were rich? (Initiation-Oblige)
AC: 'House' (Response)
CP: You would buy a House? (Initiation-Oblige)
AC: noooooo (Response)
AC: 'with Nico' (Initiation-Comment)
CP: with Nico? (Response-Recode)
CP: you would buy a house with Nico? (Initiation-Oblige)
AC: nods, yes (Response)
AC: Taking shower with Nico, laughs (Initiation-Comment)
CP: wow (Response)
AC: please stop! (Initiation-Oblige)

Reliability

To ensure intra-rater reliability and coding consistency: (i) the first author coded all data using an agreed framework; (ii) after completing the first round of coding and finalizing the framework a code manual was developed, the coding was revisited to check for consistency; (iii) the second author independently coded 5 per cent of the data (agreement on approximately 80 per cent of the data); (iv) following discussion, the primary and second author agreed on a process for obtaining consensus for the data that both had coded; (v) the first author re-coded and did a final coding consistency check for the entire dataset; and (vi) the second author independently coded 5 per cent of the data and inter-rater reliability was confirmed (agreement on 99 per cent of the data).

Data analysis

Data analysis was conducted into two stages. First, frequencies of occurrence for each unit of analysis (e.g. initiations, responses) were obtained from each interaction sample, for all participants. The frequencies calculated included the number of obliges, comments, responses, and recodes produced by each aided communicator and each CP within each group (i.e. each dyadic and multi-person interaction). In multi-person interactions, the proportion of CPs'

initiations and responses (and their respective subtypes) was obtained for each CP separately; the combined CPs' proportionate input was then summed to measure all CPs' cumulative summoning power and therefore perceived conversation control.

Secondly, to be able to describe and compare patterns of performance across group types (dyadic versus multi-person interactions) and to account for the fact that the conversations varied in length, we aggregated findings across the three group types (dyadic interactions, distinct multi-person interactions, non-distinct, and multi-person interactions). Group mean frequencies and percentages for each type of utterance (oblige, comment, response, and recode) were calculated. Percentages were used to capture the relative distribution of different utterance types, given the varied length of conversations, and therefore the differing total number of utterances for all participants in each conversation. Comparisons relating to conversation control and summoning power among the interaction groups were made using Pearson's chi-square test for categorical variables. Due to the large number of excerpts coded and analysed ($N = 85$), statistical inferences and conclusions can be drawn from these results.

RESULTS

The results reported here include data from 85 conversations between 35 children who use aided communication and their CPs in a range of interactional settings: (i) dyadic between child–CP ($N = 39$); **(ii)** distinct multi-person, where the secondary CP's contribution could be easily separated from the dyadic conversation between the child and the CP1 ($N = 32$); and (iii) non-distinct, multi-person interactions ($N = 14$), where the dyadic conversation could not be discerned from the whole interaction. To gain a better idea of the general patterns of conversational control (comparison of initiations **versus** responses **versus** recodes) and summoning power (comparison of obliges **versus** comments) in dyadic conversations, results from the first two types of interactions (aided communicator interacting with CP in dyadic conversations and aided communicator interacting with CP1 in multi-person conversations) were combined ($N = 71$) and presented in the first section below. We then examined the effect of the different number of CPs on conversational patterns ($N = 85$).

Dyadic conversations

Dyadic conversations had a mean duration of approximately 6.4 minutes over 41 turns. Quantification of conversational turns indicated that CPs took more turns in conversation than aided communicators (mean turns per conversation: $x = 16.5$ and $x = 13.6$, respectively). Average scores for the distribution of conversational control and summoning power by partner (conversation partner/CP **versus** aided communicator/AC) are shown in Figure 1. A review of

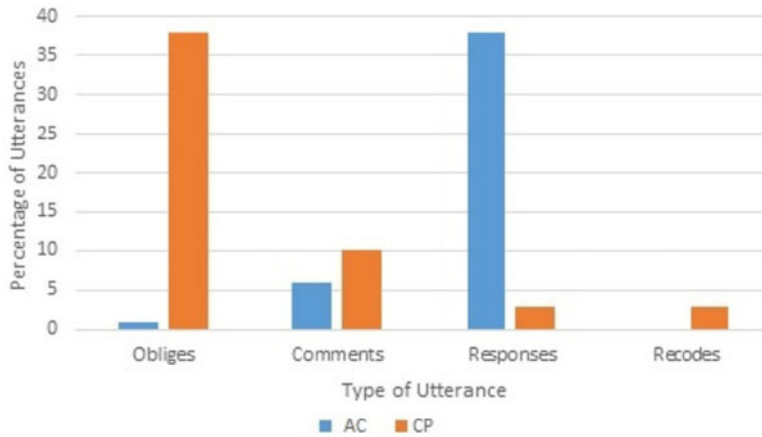

Figure 1: Distribution of conversational control and summoning power by partner in dyadic conversations (AC [with SSI]; CP, conversation partner).

Figure 1 suggests that CPs produced more initiations and recodes than aided communicators, and hence exerted a higher degree of conversational control. This was particularly true for CP recodes, which were four times the number of child recodes. Many of the recodes produced by CPs (approximately half) were clarification questions. In line with this finding, child comments were systematically followed by CP recodes (clarification questions) rather than by CP responses, and frequently the number of child comments was equal to the number of CP recodes.

By comparison, responses were mainly produced by aided communicators, rather than CPs. Compared to CP responses, child responses were short and frequently non-verbal. The mean number of child responses was equal to the number CP obliges, indicating a 'question and answer' pattern with CP questions and child answers, respectively. At times, the number of CP obliges was greater than the number of child responses, where a CP's obliges failed to initiate an exchange and the CP used more obliges to elicit a response from the child. Also, it was noted within the transcriptions that the aided communicators sometimes appeared hesitant to initiate conversations. For example, drawing from the field notes available, when participant 12 was asked to discuss 'something she liked to talk about', she 'seemed to be willing to talk with the CP (professional—teaching assistant) but looked at the assistant like waiting for his initiative'.

The quantification of initiations indicated that on average, a CP within a child/CP dyad produced 10 times more initiations (obliges and comments) than the aided communicator. As for summoning power, most of the CPs' initiations were obliges rather than comments. Obliges were usually in the form of questions and rarely imperatives. When the aided communicator did not reply to the first CP oblige/question, the oblige was usually followed by one or more obliges rather than comments until a response was given. By contrast,

aided communicators rarely produced obliges, whilst comments were preferred as initiations instead. Most aided communicators used comments either (i) to introduce a new topic (CP comments were usually remarks about the topic under discussion) or (ii) to provide complementary information on what the CP had just said.

Child obliges were rare: across the 71 excerpts of dyadic conversations, only two instances were recorded where an aided communicator produced more than one oblige during the conversation with the respective CP. In the first case, the child produced many obliges by asking wh- questions and in the second, the child asked many repetitive questions which were either identical (e.g. 'Do you take C?' was asked three times) or very similar to each other (e.g. 'Do you take English?', 'Do you take Science?', 'Do you take C?', 'Do you take Biology?').

Dyadic versus multi-person interactions

Multi-person conversations had a mean duration of approximately 7.8 minutes over 49 turns. The turn taking imbalance of dyadic conversations was more profound in multi-person conversations, with CPs taking even more turns than aided communicators (mean turns per conversation: $x = 22.8$ and $x = 12.15$, respectively).

Similar to dyadic conversations, an asymmetrical pattern of control (e.g. initiations **versus** responses) was also prevalent in multi-person interactions (see Table 1). However, this kind of asymmetry was less clear than in dyadic conversations. Our results indicate that, while a 'question and answer' pattern was mostly encountered in dyadic interactions, with the aided communicator assuming the role of responder in the conversation, aided communicators were more involved, with more initiations and especially comments, in interactions involving more than one CP. This was especially true for comments and responses in all multi-person interactions: having more than one CP resulted in more comments (X^2 (2) =0.189, chi-square p <0.0005) and fewer responses by the aided communicator (X^2 (2) =0.960, chi-square p <0.0005). Most notably, the number of comments by aided communicators in multi-person interactions (both in distinct and non-distinct), was equal or similar to the number of comments produced by CPs (8 per cent) in dyadic interactions.

Furthermore, compared to dyadic interactions, partners produced more comments (X^2 (2) =0.237, chi-square p <0.0005) and fewer obliges (X^2 (2) =0.708, chi-square p <0.0005) in multi-person interactions, that is, the number of CP comments was equal to or exceeded the number of obliges. A Spearman's correlation test indicated a moderate relationship between an increase in CP comments and a greater number of aided communicator initiations (obliges and comments) (r_s =0.49, $N = 117$, p <0.0005). The total number of CP initiations was stable across all interaction contexts considered, but CPs produced significantly more responses (X^2 (2) =0.159, chi-square p <0.0005) and fewer obliges (a reverse

Table 1: Distribution of conversational control and summoning power by partner, number of conversation partners and type of interaction

	Dyadic interaction		Multi-person interaction (distinct)				Multi-person interaction (non-distinct)	
Type of utterance	Dyadic conversation		Dyadic conversation		Multi-person conversation		Multi-person conversation	
	AC	CP	AC	CP1	AC	CPs	AC	CPs
Obliges								
Mean	0	11	0	10	0	13	0	8
Percentage	1	42	2	34	1	34	1	29
Comments								
Mean	1	3	2	4	2	6	3	6
Percentage	4	8	8	13	7	14	8	16
Responses								
Mean	12	0	11	1	12	3	6	6
Percentage	40	2	36	4	31	8	20	18
Recodes								
Mean	0	1	0	1	0	2	0	2
Percentage	0	3	0	3	1	4	0	8

AC (with SSI), CP. 100% are all the types of utterances produced by both AC and CP/s in each type of conversation (first two columns for dyadic, next two columns for multi-person, non-distinct etc.). 'Mean' represents mean frequency of occurrence of each type of utterance (oblige, comment etc.) in each type of conversation (first two columns for dyadic, next two columns for multi-person, non-distinct etc.). The shaded area of the table aims to help the reader to more easilly group the AC and CP numbers for each of the different types of conversation.

'question and answer' pattern) in distinct and non-distinct, multi-person interactions, than within dyadic interactions.

DISCUSSION

The analysis provided in this article has been drawn from 85 conversations between children with SSI who used aided communication and typically speaking CPs and has focused on identifying conversational patterns in dyadic and multi-person interactions. Using a discourse analytic approach and a quantitative analysis, we investigated the detailed sequential organization of the conversations. The findings have illuminated a number of conversational practices of theoretical and clinical interest, and the discussion draws together key themes for further consideration.

Quantitative analyses of the conversational turns indicated that CPs tended to take more turns in conversation than aided communicators, clearly mirroring existing findings (Light *et al.* 1985; Pennington and McConachie 1999). The turn-taking imbalance of dyadic interactions was also evidenced in multi-person interactions, with CPs taking even more turns than in dyadic interactions. It should be noted that in multi-person interactions, conversational input (initiations, responses, and recodes) coded to CPs was not always related to the conversation with the aided communicator but sometimes reflected the conversation between the main and CP2s.

Within the dyadic conversations involving children using aided communication, initiations (obliges and comments) were almost exclusively produced by CPs. Furthermore, summoning power was not distributed equally, even though the context was one of free conversation. Müller and Soto (2002) also reported that almost all obliges in the interactions they analysed were produced by CPs, while comments were almost equally distributed across their participants. In contrast, we found that although children using aided communication produced more comments than obliges, they did not approach the level of comments produced by CPs. The results of the current study thus reinforce earlier findings that aided communicators may be perceived as adopting a relatively passive role in conversation (usually of the 'responder', with more comments and few obliges), frequently waiving non-obligatory turns (Light *et al.* 1985), while speaking partners appear to exert most of the control over the flow of conversation (Pennington *et al.* 2009) and use more obliges to encourage aided communicators to participate in real time (Clarke and Wilkinson 2007, 2008).

The lower number of child obliges was not unexpected, as obliges (questions and requests) can be particularly challenging to produce for people who have multiple disabilities (Norén and Pilesjö 2016) or for those using modes of communication that have low assertability (i.e. can be easily ignored or overlooked). Conversational obliges are often the focus of interventions (Schlosser and Sigafoos 2002), to improve communicators' ability to get involved in conversation, control their interaction and increase independence (Light and Binger 1998). In the present study, conversation partners may have relied quite heavily on obliges as a conversational strategy (Pennington and McConachie 1999), either because their previous comment did not elicit any response from the child or as a means to avoid the perceived awkwardness caused by the child's silence during the course of the conversation. Comments do not require children to respond, and therefore may not be consistently successful in encouraging them to take a turn in the discourse. The higher frequency of obliges by CPs may suggest that they recognized the importance of providing sufficient interaction opportunities to include aided communicators in conversations. In aspiring to achieve this participation, they may also have sought to minimize potential inter-turn gaps (the *projectability* of turn succession described by Liddicoat 2004) while also seeking to achieve a continuous flow of turns within the discourse (*progressivity*, as described by Lerner 1996).

As for the type of obliges, CPs were much more likely to produce questions (both open-ended and yes/no questions), rather than instructions and commands. This pattern contrasts with the findings from a classroom-based study of interactions involving children using aided communication (Chung *et al.* 2012). It is possible that providing instructions or making comments may be more appropriate in a classroom context, unlike the informal conversational contexts analysed here.

Children using aided communication produced few initiations in the dyadic interactions described here; however, in interactions when there was more than one CP, they produced more initiations and more comments, while their use of obliges remained at the same low level across all contexts. The more frequent comment use by children using aided communication was not confined to multi-person, non-distinct interactions, but it was evidenced even when the secondary CP did not have a contribution throughout the conversation (multi-person distinct). Contrary to dyadic settings, the multi-person interactions (distinct and non-distinct) may support more active involvement of the aided communicator (Barbieri 2015). Conversational partners also produced fewer initiations and obliges in multi-person settings, and like the aided communicators, a more frequent use of comments was also observed in CP turns in multi-person interactions. The increase in comments was mainly because conversational partners were commenting to each other, that is, CP1 to CP2 and vice versa.

The results may reflect that in multi-person interactions, adoption of a less active and controlling role in conversation by the CP (production of fewer obliges) and the maintenance of an ongoing continuous discourse through CP comments could encourage aided communicators to engage more in the conversation and produce more comments. This is in line with the results of the positive correlation between the number of child initiations and the number of CP comments. Given the amount of time needed by aided communicators to construct utterances during face-to-face interaction (mean duration in our data: approximately seven minutes over 45 turns), the increased engagement of children in multi-person interactions could also be related to children feeling less obliged to participate and having more time to prepare their utterances in this context due to (i) the increased number of CPs, as the load of interaction is distributed across more interlocutors or (ii) the decreased number of CP obliges, contributing to a more easy-paced conversation. This is consistent with findings from other studies, reporting that co-construction is effective when CPs allow aided communicators sufficient time to respond (Brekke and von Tetzchner 2003), and that fast-paced discussions without sufficient time delay can discourage aided communicators from making initiations (Batorowicz *et al.* 2014). Therefore, multi-person interaction settings could be deemed more relaxed environments than the dyadic settings, where aided communicators have more time to prepare their utterance. The brief durations and the relatively contrived conversations in these interactions are possible limitations

of the study, yet they tend to arise in these settings due to the difficulties of communication in an aided communication environment.

Responses were predominantly produced by aided communicators, with CPs taking the role of the initiator and not the responder. Answering questions, rather than *asking* questions (obliges) or introducing new topics to the ongoing conversation (obliges or comments) is a common communication pattern for young aided communicators (Pennington and McConachie 1999; Clarke and Kirton 2003; Clarke and Wilkinson 2008; Pennington *et al.* 2009; Sundqvist *et al.* 2010). It was also found that responses of aided communicators were fewer than the accumulated number of CP obliges and comments. These results suggest that not only did the children in dyadic interactions produce mainly responses, but also that they frequently did not produce responses that were optional and answered only when required to do so (Light *et al.* 1985). Contrary to dyadic interactions, aided communicators produced progressively fewer responses in multi-person settings. This finding, combined with the increased number of child initiations, and especially comments, in multi-person settings, support the importance of multi-person environments for encouraging children's active engagement in conversations. On the other hand, CPs were found producing more responses in multi-person rather than in dyadic interactions. This increase could be attributed to both the increased number of child comments and the increased number of non-child initiations (i.e. initiations produced by other interlocutors of the multi-person setting) requiring a response.

While children who used aided communication produced no recodes, CPs produced almost as many recodes as responses. The frequent use of recodes by CPs points to the importance of recodes (i) as a positive strategy for helping aided communicators to elaborate on brief, frequently one-word, utterances and preserve the flow in conversation and (ii) as a primary strategy for regaining control of the conversation.

The former function of recodes has been identified in other studies in the literature: when children with SSI who use aided communication produce utterances other than simple affirmations, rejections, and acknowledgements, CPs frequently have difficulty in understanding these and, in turn, produce requests for clarification (Pennington and McConachie 1999). This repair strategy is used to solve problems of speaking, hearing, and understanding and reflects the demanding nature of communication through aided means. In the present study, some aided communicators communicated with single words rather than with sentences and therefore had to find the appropriate word to effectively help the CP to infer the intended meaning, while CPs took the main responsibility for the outcome of repair (Clarke and Wilkinson 2008). The response–recode (R–R) linguistic form has been considered a socially appropriate method for attaining conversational balance (Farrier *et al.* 1985), and, especially the clarification questions, an effective technique for eliciting accurate responses (Grove and Tucker 2003).

However, recodes should be used in moderation, as they allow the responder to assume conversational control, and therefore excessive use of recodes by the CP could be deemed as directive and corrective by the aided communicator with a negative effect on the child's confidence in producing meaningful utterances (O'Keefe and Dattilo 1992). For example, Brekke Brekke and von Tetzchner (2003) found that the narrative competence of aided communicators improved when CPs avoided repeating child utterances unless it was for clarification. In line with this interpretation of recodes were instances in our data where the CP asked a clarification question with a known answer. Interestingly, the number of CP recodes was often equal to the number of child comments ($N = 18$ conversations), especially in conversations where there was a strong 'question and answer', asymmetric pattern. The frequent use of CP recodes in response to comments from aided communicators might further indicate CPs' tendency to take over conversation control. The follow-up utterances add to the number of turns taken by CPs and accentuates the asymmetrical turn taking between CPs and aided communicators, with CPs taking more turns than children (Pennington and McConachie 1999).

Children with SSI were consistently not producing recodes, irrespective of the context (dyadic or multi-person). On the contrary, CPs produced more recodes in multi-person interactions, especially in non-distinct interactions. This increase of CP recodes indicates the need for CPs to clarify the content of what was produced (either by children with SSI or other secondary CPs) and, subsequently, maintain the control they exert over dyadic conversations in multi-person settings.

Discourse analyses of children who use aided communication and their CPs' interactions and types of utterances revealed asymmetric conversational patterns that converged with previously documented findings (Pennington *et al.* 2009; Chung *et al.* 2012; Andzik *et al.* 2016). While CPs took a leading, directive role and controlled the conversational floor, by producing many initiations and recodes and few responses (Pennington and McConachie 1999), further turn sequence analysis showed that some of these patterns were highly predictable (e.g. CP question/oblige +child response, child comment +CP recode), indicating the extent of dominance and conversational control exerted by CPs' conversation style (e.g. Jolleff *et al.* 1992). The asymmetry is observed in both dyadic and multi-person interactions, yet it is stronger in the former. Multi-person interaction has a positive effect on all key speakers as it promotes a more active engagement in the conversation and therefore more symmetric patterns of interaction. That is, when more CPs are actively involved in the interaction, children with SSI show more engagement in the conversation.

Reasonably, concern has been expressed that such asymmetries can have a negative impact on children's self-expression and language development (von Tetzchner and Grove 2003). The findings of the present study highlight the need to support children with SSI who use aided communication to become

active communicators who initiate communication and participate in symmetrical conversations producing a full range of conversation skills (Batorowicz *et al.* 2014). Personal assistants, teachers and peers without disabilities, with appropriate training, can increase expectations for communication participation, promote initiations from aided communicators and provide high quality and diverse interaction opportunities in different settings (Pennington and McConachie 1999; Chung and Carter 2013; Andzik *et al.* 2016). The significance of this study can be applied to a range of settings, such as at home and during community activities and school. Assistants, teachers, and speech and language therapists might consider replacing commonplace dyadic interactions with multi-person discursive exchanges. This goes beyond recognition of secondary CPs simply as listeners by treating them as an integral component of the interaction that has the power to facilitate the augmented output from the child. For researchers and to inform clinical practice, we suggest that a thorough framework for communication disability must be developed, with reference to properties that address the reality of communicative interaction (Barnes and Bloch 2019) for aided communicators. In particular, the slow temporal organization of turn-taking ('dynamic' property, Levinson 2016), the diverse modalities of communication, including vocalizations, speech, gestures, facial expression, and body positioning ('multimodal' property, Enfield and Sidnell 2017), the interlocutors' expectations within communicative situations, like the expectation of a reply ('accountable' property, Enfield 2013) and the facilitatory role of multi-person contexts ('collaborative' property, Enfield and Sidnell 2017) should be taken into account and incorporated into an applied clinical protocol for assessment and/or interventions.

Finally, we cannot end the discussion without considering the influence individual communication aids may have had on the interactions. All interactions included in this data set were conversations mediated by aided communication (Clarke and Wilkinson 2008). Each aid was personalized for the individual child and suited their physical abilities, offering different interactional mechanisms, for example, access, looking behaviour, voice output, question forms. Further research could explore the impact of these available resources, as well as aided communicators' individual differences (e.g. participant personality, familiarity with the topic, and experience of the interlocutor) on individual interactions and active participation (Perkins 2007).

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SUPPLEMENTARY DATA

Supplementary material is available at *Applied Linguistics* online.

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