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Interaction between Children with Cerebral Palsy and their Peers 2: Understanding Initiated VOCA-Mediated Turns

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This paper is the second in a series of two that examine interactions between children with cerebral palsy who have complex communication needs and use voice output communication aids (VOCAs) and their naturally speaking peers. The current study expands on the analysis from the companion paper by exploring how problems emerge for naturally speaking children in understanding initiated VOCA-mediated turns. Conversation Analysis (CA) is used as a method for exploring the children's practices in organizing conversations into two dyads. The relationship between the sequential organization of the children's talk and the understanding of initiated VOCA-mediated turns is emphasized. Implications for clinical intervention are discussed.

Keywords: Augmentative and alternative communication; Voice output communication aids; Children; Peer interaction; Conversation analysis

INTRODUCTION

In the field of augmentative and alternative communication (AAC) the role of communication partners in shaping the interaction experiences of children with complex communication needs who use communication aids has been recognized (e.g., Jolleff et al., 1992; Smith, 1994). A primary focus of AAC-based research has been adult–child dyads involving parents/caregivers and professionals. For school-aged children, the emphasis shifts from caregivers to children's peer relationships as important domains of personal development. However, research concerned with interactions involving children using communication aids has only begun to address the nature of children's peer interactions. The current study utilizes Conversation Analysis (CA) as an analytical method to examine two conversational dyads between children with cerebral palsy who use voice output communication aids (VOCAs) and their naturally speaking peers. The findings build on and develop an emerging understanding of aspects of peer interaction presented in the companion paper (Clarke & Wilkinson, 2007). The central focus of the current paper is how problems emerge for naturally speaking peers attempting to understand VOCA-mediated turns that initiate new lines of talk rather than, for example, as responses to another speaker's actions.

Asymmetries in Adult–Child Interaction

A central outcome of the body of work concerned with adult–child interactions involving children who use communication aids has been characterization of the asymmetries of the interactions. Adults are described as possessing a disproportionate degree of conversational power and exerting interactional dominance, while children who use communication aids are reported to take more passive roles in interactions; using their communication aids infrequently (e.g., Light, Collier, & Parnes, 1985a,b,c; McConachie, Clarke, Wood, Price, & Grove, 1999; Pennington & McConachie, 1999; von Tetzchner & Martinsen, 1996). It has been hypothesized that the asymmetries observed in adult–child interactions are, in part,

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a consequence of tension between the inherently slow rate of communication aid use and adults' expectations for conversations to match the tempo of interactions between natural speakers (Light et al., 1985a; von Tetzchner & Martinsen, 1996). Consequently, aided speakers have limited opportunities to contribute through communication aids and may be required to adopt particular strategies in order to initiate and terminate turns (e.g., Light et al., 1985c; von Tetzchner & Martinsen, 1996). With good reason, concern has been expressed that such asymmetries can have negative implications for children's self-expression and language development (von Tetzchner & Grove, 2003).

Children Using Communication Aids in Interaction with their Peers

Children who use communication aids may interact less frequently with peers than with adults (McConachie et al., 1999), and where interaction has been observed, similar asymmetries to those described in the adult–child literature have been identified (Clarke & Kirton, 2003; Clarke & Wilkinson, 2007). For instance, in a study of 12 conversational dyads, Clarke and Kirton (2003) observed that children who used communication aids produced significantly fewer turns categorized as initiations than their naturally speaking peers. The authors noted that the amount and type of communication aid use varied considerably across the sample, with some conversations presenting more balanced patterns of initiation and response.

Responses to the concern that children using communication aids experience limited peer interaction include, for example teaching aided speakers' naturally speaking communication partners (Carter & Maxwell, 1998; Kent-Walsh & McNaughton, 2005), and supporting and developing interactions between aided speakers and peers together (Clarke & Price, 2001; Lillienfeld & Alant, 2005; von Tetzchner, Brekke, Sjothun, & Grindheim, 2005). In addition, programmes have been developed that aim to support and assist children who use communication aids to initiate conversational sequences with peers more frequently, and to convey a greater variety of communicative functions during such interactions (e.g., Buzolich & Lunger, 1995).

Using the principles and practices of Conversation Analysis (CA), Clarke and Wilkinson (2007) explored how VOCA use is incorporated into peer conversations, and the role of the speaking partner in bringing about VOCA use. The authors describe how, typically, VOCA use happens as a result of a speaking partner's use of first pair parts of adjacency pairs (Schegloff &

Sacks, 1973), typically realized as questions and through meta-interactional prompts; that is, turns that make explicit how the organization of the interaction is to proceed (e.g., *Now you ask me a question*). The structural frameworks set up by such turns provide for a specific point of VOCA initiation, a prearranged function for that event (e.g., it will be an answer to the speaking partner's question), the possible subject matter of the VOCA turn, and the possibility of the production of an elliptical rather than a fully sentential next turn. Problems in understanding that emerge during VOCA-mediated turns produced following first pair parts of adjacency pairs and meta-interactional prompts are approached with the knowledge that the turn is likely to relate to the speaking partner's prior turn. Consequently, such frameworks provide a resource for speaking partners in understanding VOCA-mediated contributions. Equally importantly, these organizational frameworks can serve as a resource for aided speakers by providing a local sequential slot within which limited and/or delayed VOCA contributions (e.g., a single letter) may be understood unambiguously.

Conversation Analysis

As an inductive, qualitative method, Conversation Analysis (CA) seeks to reveal the practices that participants use to accomplish interaction (e.g., Hutchby & Wooffitt, 1998). Such practices are distinguished through analysis of the sequential relationship between the participants' actions, on a turn-by-turn basis. The ways in which each speaker designs his or her latest turn illustrate how they understand the previous turn. Equally, each new turn implicates a particular class of next turn (Sacks, Schegloff, & Jefferson, 1974; Schegloff & Sacks, 1973). In this way, participants in talk display those aspects of their co-participants' actions that are relevant to the organization of the conversation. For the analyst, this central tenet of conversational organization provides a means for identifying and explaining relevant features of behaviour based on the participants' actions. As such, the method is particularly suitable for the study of children's conversations, where concerns for third party observer bias are emphasized (e.g., Hutchby & Moran-Ellis, 1998). The inherent and public demonstration of the relationship between a speaker's current turn and the prior turn, and a speaker's current turn and the class of turn it implicates next, is one element of sequentiality in conversation (Heritage, 1984; Schegloff, 1984, 1988). Of particular interest for the current study is the link between sequentiality and understanding in conversation. It has been shown, for

example, that to understand an utterance in conversation, a listener has to understand not just the literal sense of the turn, such as its grammar, but also how it connects with the activity of the talk so far. Problems in understanding during natural speakers' conversations can emerge when the relationship between the latest turn and the prior talk is opaque (Drew, 1997; Clarke & Wilkinson, 2006, see also Clarke & Wilkinson, 2007).

Problems in Understanding Adults' Use of VOCA-Mediated Turns

The CA approach to the study of conversations using communication aids has revealed something of the significance of the relationship between the sequential context in which aided speakers' turns are produced and how they are understood (Collins, 1996; Bloch & Wilkinson, 2004). For example, Collins (1996) describes how referring expressions were used by aided speakers in a variety of ways in addition to identifying referents. Examples included initiating a new topic in conversation. However, aided speakers in Collins' study experienced difficulties showing that they were initiating a new topic and, conversely, relating current talk to prior talk rather than starting something new. The speaking participants experienced problems understanding why the aided speakers' turns were produced at particular points in the conversation. Collins argues that understanding aided speakers' contributions to talk requires an appreciation of the intended function of the aided speakers' actions. The precise point at which aided speakers' actions are produced in relation to speaking partners' actions within a sequence of ongoing conversational events, has important implications for how they are understood in the first instance.

Similar problems have been observed in conversations between adults where one partner has dysarthric speech caused by a progressive condition and uses a VOCA (Bloch & Wilkinson, 2004). For example, Bloch and Wilkinson (2004) illustrate how dysarthric speakers used VOCAs to self-repair unintelligible utterances following their partners' initiation of repair (with naturally speaking participants saying for example, *She did what?*). Despite being able to comprehend the VOCA speech in a literal sense, speaking partners experienced problems understanding the full intended meaning of the turn because the relationship between the VOCA speech and the prior talk was problematic. Similar difficulties arose for one dyad in the study when the VOCA was used to initiate a topic shift. For the participants in Bloch and Wilkinson's (2004)

paper, the problems in understanding were not solely rooted in the low intelligibility of some participants' speech, but also – and importantly – in problematic understanding of the sequential relationship of the VOCA utterance and the prior talk. The authors contend that although VOCA turns may be intelligible to their recipients they are not always understandable.

Summary

Interactions between children using communication aids and their peers are characterized by asymmetries similar to those observed in adult– child interactions. Clarke and Wilkinson (2007) have described how, in children's peer talk, speaking partners can organize specific conversational slots for the production of VOCA-mediated turns. As such, speaking partners provide frameworks within which VOCA-mediated turns may be understood and problems in understanding may be resolved. Analyses of adult aided speakers' interactions have revealed how problems emerge for speaking partners in understanding communication aid-mediated turns, such as those that initiate new topical trajectories for the conversation. Central to the realization of such problems is a problematic understanding of the relationship between aided speaker turns and the prior talk.

By way of comparison with the companion paper (Clarke & Wilkinson, 2007) and CA studies of adult aided speakers' interactions, the current analysis examines aided speakers' turns that initiated new lines of talk. It is notable that the concept of initiation in conversational interaction may be defined in different ways. In this paper, initiated VOCA-mediated turns are seen as turns that are not produced as responses to prior actions, such as the first pair parts of adjacency pairs or prompts for VOCA use (see Clarke & Wilkinson, 2007) but are, for example, intended to bring about new trajectories for the talk. Therefore, the primary motivating question for the analysis concerns how problems in understanding initiated VOCA-mediated turns might emerge in children's peer talk.

METHOD

Participants

The findings are derived from an analysis of two dyads. The participants are referred to as Tina and Lucy, and Jamal and Colin. Tables 1, 2 and 3 summarize the participants' characteristics and those of their school environments.

TABLE 1 Summary of aided speakers' characteristics.

Child	Gender	Age	Diagnosis	Learning disability[a]	Comprehension[b]	Speech intelligibility	VOCA	Access method	Goals of VOCA training[d]
Jamal	Male	7; 11	Severe CP	none	11+ years	profoundly affected[c]	Delta Talker™	Direct via head-mounted infra-red light	Asking peer-directed questions
Tina	Female	14; 10	Severe CP	moderate	7 years	profoundly affected[c]	Delta Talker™	2-switch automatic scanning	Combining actions with pronouns

Note: CP, cerebral palsy.
[a]Functional level of learning disability based on a detailed clinical knowledge of individual children's learning strengths and needs, documented through the annual review of statement of special educational need in collaboration with school staff and relevant professionals.
[b]Comprehension of spoken language assessed using the Test of Reception of Grammar (TROG) (Bishop, 2003).
[c]Speech system limited to open vowels with some approximated consonants.
[d]Summary of expected outcome of intervention documented at the time of video recording.

TABLE 2 Summary of naturally speaking partners' characteristics.

Child	Gender	Age	Diagnosis	Learning disability[a]	Comprehension	Speech intelligibility	Prior exposure to AAC
Colin	Male	7; 5	n/a	None	Age appropriate	Not affected	1 year
Lucy	Female	14; 4	Severe CP	Mild	Age appropriate	Mildly affected[b]	Approx. 5 years

Note: CP, Cerebral palsy.
[a]Functional level of learning disability based on a detailed clinical knowledge of individual children's learning strengths and needs, documented through the annual review of statement of special educational need in collaboration with school staff and relevant professionals.
[b]Mainly intelligible out of context, some omissions/errors in connected speech.

TABLE 3 Environmental characteristics.

Dyad	School	Place of video recording	Length of recording
Jamal and Colin	Mainstream	School office	8 min 54 s
Tina and Lucy	Special	Therapy room	16 min 37 s

Procedures

After having obtained parent(s)/carer(s) consent, the aided speakers were approached directly about possible participation in the study. A member of the school staff and the researcher discussed the study with each aided speaker, including the reasons for the study and the intended video recording. Graphic symbol-based information was provided as appropriate. The aided speakers were informed that they could discuss the study with parent(s)/carer(s) and others before making a decision. If an aided speaker agreed to participate, he or she was asked to name a non-aided speaker with whom to make the video recording. The parent(s)/carer(s) of the nominated peer were contacted by an official from the child's school, on behalf of the study. After parent(s)/carer(s) consent had been gained, the study was discussed with the children individually. Again, a symbol-based information booklet was used to support the discussion and the children's decision making.

The video recording took place in the children's school, but outside the context of the classroom (see Table 3). The researcher set up the camera in the chosen room in such a way that it was fully visible to the children (on a tripod, about 4 m away from them). The children decided how to organize their seating, knowing that they would be conducting a communication-based activity. The episodes of interaction analysed in this paper were those that took place when the children were left on their own for a short period of time, on the understanding that the researcher would return shortly to start the communication-based activity. The video camera was in recording mode during the researcher's absence, and with the children's consent. No instruction was given to the children about what they might do while the researcher was out of the room. If the children questioned this they were told that they could do anything they wanted. Consequently, the children's conversations were conducted in complete awareness that they were being video recorded. The participants were also offered an opportunity to view the video and retain a copy of the recording.

Transcription and Analysis

The conversations were transcribed using CA conventions (Atkinson & Heritage, 1984), and reflect CA's focus on understanding the sequential alignment of participants' actions. Attention was given to participants' non-verbal and verbal actions as well as non-vocal sounds, such as those produced by VOCAs. The transcriptions presented

in this paper also incorporate notational conventions proposed for AAC (von Tetzchner & Jensen, 1996), (see Appendix). During analysis, the transcription was used as secondary representation of the video data, with the video recordings the primary focus of the analysis. Therefore, the analysis presented here was developed through repeated viewings of the video recording made during the adult's absence, with a particular focus on observations of VOCA use during that time. From a CA perspective, participants' turns are viewed as sequential events, so that classes of behaviour such as initiated VOCA-mediated turns were identified and described according to the sequential environment in which they emerged.

FINDINGS

Unproblematic Understanding of Initiated VOCA-mediated Turns

The first example illustrates how an initiated VOCA-mediated turn may be realized without a problem. The extract is taken from the conversation between Tina and Lucy. It includes the notation of bleeps produced by the VOCA as part of its automatic scanning procedure. The presence of scanning bleeps is indicated by a * in the left margin.

Extract 1

```
      01  *  L  what did you colour in
      02  *     (1.8)
      03  *  L  the homework that David gave you
      04  *  T  ((v.slight forward head movement,
                  then head drops forward))
      05  *  L  yeh
→     06  *  T  ⌈((large backward head          ⌉
                 |movement, orients to VOCA|
                 |and hits switches))           |
      07  *     ⌊            (3.6)               ⌋
      08  *  L  you gonna say something
      09  *  T  ((raises eyebrows, head moves
                  forward, remains oriented
                  to VOCA))
      10  *  L  you gonna say ⌈something
      11  *  T               ⌊((head drops))
      12  *  L  yeh
→     13  *  T  (32.0) "picture"
      14  *  L  picture
      15  *  T  ((nods))
      16  *  L  you coloured
          *  L  ⌈in a picture               ⌉
      17  *  T  |((head drops forward,      |
                 |chin on chest,            |
                 |small nod movement))      ⌋
      18  *  L  yeah
```

This extract began with Lucy asking a question, *what did you colour in* (line 01), which she reformulated after 1.8 s by providing a candidate answer saying, *the homework that David gave you* (line 03). Lucy treated Tina's head movements as an affirmation of the candidate, saying *yeh* (line 05). At this point the question and answer exchange was closed, and in spite of the continuing sound of the VOCA scanning bleeps, no strong implication existed for who should take the next turn. It was at this moment that Tina was seen to move her head backward, suddenly stiffening her arms and bringing her torso into a more vertical position while looking at the VOCA and hitting her head switches. These actions took place over a period of 3.6 s. It is possible that Tina was trying to initiate a VOCA turn, or that these actions were a consequence of uncontrollable muscle spasm. Equally, she may have been engaged in other operational aspects of VOCA use that were not necessarily concerned with producing a turn. The presence of ongoing VOCA bleeps may have contributed to this potential ambiguity. Importantly, it was Lucy who oriented to the possibility that this was the start of a VOCA turn saying, *you gonna say something* (line 08), and in so doing she demonstrated considerable sensitivity to Tina's non-verbal actions and the possibilities for talk brought about by these actions. Lucy sought to confirm that this was Tina's intention, asking again, *you gonna say something* (line 10), and treating Tina's subsequent head movement as a confirmation, saying *yeh* (line 12).

Having made public the fact that Tina will produce a VOCA-mediated turn next, Lucy waited in silence while Tina worked with her VOCA for 32 s before producing the single word "*picture*" (line 13). Following the production of the VOCA-mediated utterance, Lucy repeated the word (line 14), and Tina nodded, confirming Lucy's repeat as accurate (line 15). Lucy went on to display her understanding of the single word by locating it within a short phrase saying, *you in coloured a picture* (line 16/17).

Lucy treated "*picture*" as related to the immediately prior question and answer exchange, and as an answer to her prior question, *what did you colour in* (1.8) *the homework that David gave you* (lines 01 and 03). It transpired that this was the correct way to understand Tina's single VOCA-mediated word. Lucy was able to expand on Tina's turn and place it in relation to the prior context. Importantly, Tina was able to use the immediately prior exchange of turns as a local context within which her single word utterance could be understood, and it was the initiation of her turn in the lapse directly following the question and answer exchange (lines 01 to 05)

that provided for its accurate interpretation by Lucy. Here then, orienting to the sequentiality of conversation provided a resource for Lucy to understand Tina, and for Tina to be understood. The significance of the local sequential context as a framework for understanding very minimal VOCA-mediated turns, such as a single letter, has also been observed in other interactions between children using VOCAs and their peers (Clarke & Wilkinson, 2007).

Problems Arising in Initiated VOCA-Mediated Turns

Extract 2 provides an example of the problems that can arise when an initiated VOCA-mediated turn is produced. In this exchange, Lucy experienced significant difficulty understanding how elements of Tina's initiated VOCA-mediated contributions related to each other and the prior talk. The central difficulty lay in Lucy's mistaken assumption that Tina's utterance related to the immediately prior talk. Lucy's orientation to the sequentiality of conversation misled her in her attempts to make sense of Tina's VOCA-mediated talk.

In the conversation immediately prior to this extract, the girls had been talking about what Tina had for dinner on the weekend. The girls constructed a list of food items that included meat, roast potatoes, and carrots. The topic then changed, with Lucy asking Tina about her weekend.

Extract 2

```
    01      L   was you bored at home or was you:
    02          (1.0)
    03      L   did you wanna come back to school
    04      T   ((nods, head falling forward with
                chin down to chest))
    05      L   ((looks away))
    06      T   ((lifts head up looking at VOCA,
                hits switch twice)) *
    07   *  L   ya gunna say something
    08   *      (0.8)
    09   *  L   ya gonna say something
    10   *  T   ((nods looking at VOCA))
    11   *  L   yes
→   12   *  T   (29.7) g -
    13   *      (2.2)
    14   *  L   g
→   15   *  T   (12.4) r - (12.9) e - (12.9) e -
    16   *      (3.2)
    17   *  L   is there two es in it
    18   *  T   ((nods head forward))
    19   *  L   yeah
→   20   *  T   (4.3) n
    21   *      (2.9)
    22   *  L   is that all the word
```

```
→   23   *  T   (0.9) "green"
    24   *      (1.9)
    25   *  L   green
    26   *  T   ((head nods forward))
    27   *      (4.2)
    28   *  L   is it something that you
                (wore/brought)
    29   *  T   ((sideways head movement,
                looking at VOCA))
    30   *  L   you went out and saw a green
                ((raises hand))
→   31   *  T   s
    32   *      (3.4)
    33   *  L   oh
    34   *      (7.5)
    35   *  L   (unintelligible) a picture of green
    36   *  T   ((shakes head, oriented to
                VOCA))
    37   *  L   no
    38   *      (5.4)
    39   *  L   um: (3.0)°I don't know°
    40   *      (2.1)
    41   *  L   do I know what it is
    42   *  T   ((nods))
    43   *      (0.8)
    44   *  L   is it that cardboard thing over there
    45   *      (2.7)
    46   *  L   °no° I know what it is
    47   *  T   ((forward head movement,
                remains looking at VOCA))
    48   *  L   is it (.) i:s it in school
→   49   *  T   "dinner"
    50   *      (2.1)
    51   *  L   gr↑een ↑din↓ner
→   52   *  T   "greens dinner"
    53   *      (2.4)
    54   *  L   f°h (0.2) what ya
    55   *      (2.5)
→   56   *  L   um you had (.) um (2.7) you ha:d veg
    57   *  T   ((large nod forward, chin
                dropping to chest)) (sigh)
    58   *      (1.1)
    59   *  L   oh
```

As with Extract 1, this extract also began with Lucy seeking to make explicit the possibility that Tina was initiating a turn at talk when, on two occasions she asked, *ya gonna say something* (lines 07 and 09). Slowly, Tina spelt out the single word "*green*" (lines 12–23), and Lucy entered the turn to demonstrate her recipience of the turn underway. On one occasion she also entered the turn to clarify the repetition of e (line 15). The issue for Lucy was how she should hear the production of the second e; that is, whether it was produced in error or not, and therefore, whether or not she should hear the next element of the turn as a replacement of the second e or as building on it.

Here, Lucy showed sensitivity to the fact that what she hears from the VOCA may not be the intended output. She appeared to recognize the activity of VOCA use as a potentially problematic issue and the fact that Tina's use of her device may produce difficulties for the conversation overall.

Interestingly, following production of the letter n (line 20), Lucy explicitly oriented to the possibility that this might represent the end of the word when she asked, *is that all the word* (line 22). In so doing, she showed how she was actively monitoring the development of the turn so far and how she had to work to determine the end of the word and the status of the turn towards possible completion.

Having confirmed that "*green*" was the whole word, the interactional questions for Lucy here became: what did "*green*" refer to precisely, and what type of activity was this turn doing? Lucy's orientation to the sequential context as a means for understanding the VOCA-mediated utterance is shown when she spoke next asking, *is it something that you wore/bought* (line 28), (it is not possible to distinguish categorically between the word wore and bought from the recording, therefore both are presented). Lucy was seen to treat "*green*" as new information related to the earlier exchange that was broadly concerned with Tina's weekend activity. For Lucy, a clue to the identification of the meaning of Tina's utterance resided in identifying an accurate noun. By inference, "*green*" was treated as an adjective that serves a noun phrase. The noun was the missing *something* that was worn or bought.

Tina then generated the letter s (line 31) which, in hindsight, we can see was intended to be an addition to the word to alter "*green*" to "*greens*" and, therefore, signal its intended form as a noun (a vegetable) rather than an adjective. Lucy failed to incorporate this new letter into her attempts to guess at Tina's intended meaning, and it appears that she did not know how to relate these elements together. Tina then generated the word "*dinner*" (line 49), and Lucy treated this new word as an addition to the prior VOCA utterance "*green*", but, interestingly, without inclusion of the single letter s. Her difficulty in establishing the relationship between the two elements and the absurdity of their combined meaning was evident in the significant and exaggerated rise and fall in pitch movement in her receipt of the turn so far as she said, gr↑een ↑din↓ner (line 51).

It transpired that Tina had been attempting to return to the prior talk about what she had for dinner. Lucy had significant difficulty understanding the type of activity underway. She treated "*green*" (line 23) as relating to the immediately prior talk concerned with Tina's

weekend and as moving the conversation forward within that theme. She not only misconstrued how the turn was related to the prior talk, but also the syntactic category of the word "*green*", treating it as an adjective when it was intended as a noun. Furthermore, she did not orient to Tina's addition of the single letter s (line 31) as changing "*green*" to "*greens*". This is possibly because the girls had already engaged in work to confirm that green was the completed word (lines 22–26).

This extract provides an example of how initiated VOCA-mediated turns can be problematic for both partners. For Lucy, problems existed in understanding Tina's VOCA-mediated utterances, in part at least because she was unable to understand how they related to prior talk. Tina had problems displaying to Lucy what sequential context, if any, her utterances should have been understood in relation to. These problems precipitated a long and convoluted exchange, in which significant energies were expended in a search for shared understanding. This exchange contrasts clearly with Extract 1, and to examples of VOCA-mediated contributions generated as second pair parts of adjacency pairs or subsequent to meta-interactional turns described in Clarke and Wilkinson (2007).

The final example, taken from Jamal and Colin's conversation, illustrates similar difficulties. Extract 3 documents an episode of interaction right at the end of the recording, just before an adult entered the room. In it, Colin can be seen to have a problem understanding the turn "*Jo is mad*" during its construction and on its final production (line 40).

Extract 3

```
→  01  C  tell me your best song
   02  J  (2.1) * (2.9) *
   03  C  is it ⌈Asha
   04  J      ⌊*
→  05  J  (2.4) * (0.8) * "Asha you make
           me wanna"
   06  C  yeah sing it
   07  J  (4.6) * (1.5) * (1.1) * (1.8) * (1.1) *
           "I can't" ((looks down to his left))
   08  C  ((looking at VOCA and turns to J))
           why not
   09  J  (3.3) * (1.6) * (1.2) "he isn't" *
           (1.0) * (1.5) * (1.2) * (1.4) *
   10  C  he's ⌈not on it anymore
   11  J      ⌊*
   12  J  (0.8) * "it isn't" (1.3) * "on"
   13      (1.6)
→  14  C  ok put a ⌈song on
   15  J          ⌊*
   16  J  "this" ⌈*
→  17  C         ⌊put a different song on there
```

18 J (1.8) * "*Delta Talker*"
19 J ⌈ ((looking down))   ⌉
20 C |((looking at VOCA)) |
21 | (5.1) |
22   ⌈ *   ⌋
23   ⌊((J startles and orients to VOCA))
24 J (1.6) * (1.6) * (1.4) * (2.0) *
       (2.2) * "*Johnny*" (1.0) * (4.1) *
25 J (1.0) * <u>j</u> - (0.9) *
       <u>o</u> - (3.2) * (1.0) *
→ 26 C *what song you* ⌈ *putting on*
27   ⌊ *
28 J <u>a</u> - (0.9) * (1.0) * <u>c</u> - (1.1) <u>k</u> (0.7)
       * (2.0) * (1.7) *
29 C *Jack*
30 J "*goes*"
31   (2.1)
32 C *wh*⌈*at*
33 J   ⌊* (1.2) * (1.9) * (1.3) * (1.2) *
       (0.8) * (2.1) * <u>j</u> - (1.0) * <u>o</u> - (1.1) *
       (1.0) *
34 C *j* ⌈ *u:*
35 J   ⌊* (1.5) * (1.2) * "*is*" (0.5) * (2.0)
36 C *Jo i*⌈*s:*
37 J   ⌊* "*mad*"
38   (0.6)
39 C *ma:*⌈*d kssk*
→ 40 J   ⌊* "*Jo is mad*"
41 C *Jo is mad*
42   (1.0)
→ 43 C *what that's the song you're gonna*
       put on
44 J ⌈ *err:*
45   ⌊((shakes head))
46   ((adult enters room,
       boys turn to adult))

In this extract, Colin asked Jamal to name his favourite song, saying, *tell me your best song* (line 01). Jamal replied that it was "*Asha you make me wanna*" (line 05). When Colin asked him to play it on his VOCA, Jamal replied that he could not. When asked why, Jamal replied with the utterance produced as "*he isn't it isn't on this Delta Talker*." The production of the turn was characterized by multiple silences and Colin can be seen to have treated Jamal's turn as permeable (Lerner, 1996) at three points: First, following "*he isn't*" (line 09), Colin entered the turn in progress to anticipate the completion of the turn, saying, *he's not on it anymore*. Jamal continued with turn production, and Colin's second and third entries into Jamal's turn – *ok put a song on* (line 14) and *put a different song on there* (line 17) – displayed how he identified these points as possible points of turn completion (Sacks, Schegloff, & Jefferson,

1974). Both times, however, Jamal continued to add other items to the turn (lines 16 and 18).

After generating the word "*Delta Talker*" (line 18), Jamal turned away from his VOCA. Then, despite the fact that Jamal was looking down and therefore directing the infra-red pointer away from the device interface, a VOCA bleep was heard. Jamal was startled by this sudden, and perhaps unexpected, noise and he oriented to the VOCA (it is common for children with cerebral palsy to retain a sensitive startle reflex, which is also is present in children without disabilities in the first year and diminishes with maturation). This action signalled that the VOCA activation was likely to have been accidental. Jamal was then observed to work with his VOCA and after 8.8 s he produced the single word "*Johnny*" (line 24). Jamal continued with his turn development, and again Colin treated Jamal's turn as permeable and entered the turn on a number of occasions, in doing so displaying how he was making sense of the turn in progress.

In asking, *what song you putting on*, (line 26) Colin displayed the first of several problems in understanding Jamal's turn. Here he shows that he was trying to understand Jamal's turn by relating the turn to his earlier requests for Jamal to put a song on (lines 14 and 17). Another display of problematic understanding was evident when he asked, *what* (line 32), and finally, in line 43, he again tried to make sense of the repaired, and now possibly complete, utterance, "*Jo is mad*" by relating it to his previous requests for Jamal to play a song on his Delta Talker[TM]. This guess can be seen to be wrong from Jamal's subsequent vocalization and head shake (lines 44 and 45). The sequence then stopped when an adult entered the room. Jamal's actions imply that he had been engaged in producing an initiated VOCA-mediated turn; that is, his turn was not intended to be a response to Colin's earlier requests. As such, it became evident that Colin had been on the wrong track in attempting to make sense of Jamal's turn as a response to his prior requests. It can be seen from Colin's repeat, *Jo is mad* (line 41), that for him, Jamal's utterance in line 40 was intelligible but not understandable (Bloch & Wilkinson, 2004).

As in Extract 2, it is evident that initiated VOCA-mediated turns can create problems for both participants. For Colin, problems existed in understanding Jamal's VOCA-mediated utterance, in part at least, because he assumed it related to his prior talk. For Jamal, it can be seen how difficult it was to display whether his initiated VOCA-mediated turn should be heard as related to some prior talk or, as appears here, as a new direction in the conversation.

DISCUSSION

This paper has been concerned with exploring how problems in understanding initiated VOCA-mediated turns may emerge in children's peer talk. Three extracts from two dyads have been reported, with the aim of providing an illustrative insight into recurring features of the children's interactions. Within each extract a number of interesting organizational features are in operation. Of particular relevance to this analysis was the relationship between understanding and the inherent sequentiality of conversational interaction. It has been observed that initiated VOCA-mediated turns can regularly lead to problems in understanding. A primary cause of such problems is that the aided speakers' peers do not understand the sequential relationship of the VOCA turn to prior talk. The discussion reviews the central findings from the analysis and considers their clinical implications.

Understanding Initiated VOCA-mediated Turns

An appreciation for how the current turn relates to prior talk provides a basis for understanding speakers' turns. Participants are seen to actively orient to this relationship as one aspect of the feature of sequentiality of conversation. Indeed, Extract 1 from the conversation between Tina and Lucy demonstrates how Lucy's orientation to sequentiality provided a resource for understanding Tina's initiated VOCA-mediated turn. In this instance she correctly related Tina's single word "*picture*" to the immediately prior question and answer exchange. However, sequentiality may also provide a barrier to understanding initiated VOCA-mediated turns. Speaking partners can experience significant difficulty in recognizing the content and function of initiated VOCA-mediated turns. These problems come about if, for example, the speaking children attempt, inappropriately, to make sense of the turn in terms of its relationship with the immediately prior talk; that is, they employ the sequentiality of conversational turns as a resource to understand VOCA-mediated turns when, in fact, as initiated turns they may not relate to the speaking child's prior turn. For example, Extract 3 illustrates how Colin treated Jamal's VOCA-mediated utterance as relevant to his prior command to put a different song on his VOCA. Again, although Lucy recognized Tina's actions as initiating a VOCA-mediated turn (Extract 2), she treated the turn as being related to her own immediately prior talk about Tina's weekend. In neither conversation were strategies evident for easily identifying the sequential context to which the VOCA-mediated turn was linked.

On a turn-by-turn basis, variation exists in the specific ways in which problems in understanding initiated VOCA-mediated turns were revealed in these children's conversations. Concerns for the overgeneralization of findings from social interaction research in the AAC field resonate deeply here. Nevertheless, the common cause of difficulty observed in these children's conversations reflects similar reported problems in understanding that have been observed in conversations between naturally speaking adults and: adults with cerebral palsy who use communication aids (Collins, 1996); adults with dysarthria using VOCAs (Bloch & Wilkinson, 2004) and adults with aphasia (Wilkinson, 1999). Collins (1996) and Bloch and Wilkinson (2004) have observed how speaking participants may struggle to make sense of the relationship between elements of VOCA-mediated turns, and that an understanding of how these elements relate to the prior talk is critical to the resolution of these problems.

It is possible that this class of difficulty, observed in naturally speaking participants' talk, is significantly emphasized in conversations using communication aids. This may be the case particularly when VOCA-mediated turns are commonly delayed and/or limited in their production and may go through episodes of self-repair (Schegloff, Jefferson, & Sacks, 1977; Schegloff, 1979); whereby, earlier-produced turn elements are replaced with different ones, a practice that may be ongoing and unclear to speaking partners (Clarke, 2005; Clarke & Wilkinson, 2007). Problems experienced by adult aided speakers in conducting conversation within the timeframe of spoken conversation have been documented (e.g., Higginbotham & Wilkins, 1999; Robillard, 1994). Interestingly, Robillard (1994), an adult aided speaker, recounted difficulties in reporting on prior topics or making contributions that did not relate to the immediate conversational context specifically because of the time and effort required in communication aid use. It would seem that, in addition to common concerns for time and timing in conversations per se, it would be beneficial for researchers and interventionists to examine the relationship between time, timing, and sequentiality of conversation as a significant feature of interpersonal interactions.

Asymmetries in Interaction

Asymmetries in interaction, similar to those observed in adult–child interaction (e.g., Light et al., 1985a,b,c; Pennington & McConachie, 1999; von Tetzchner & Martinsen, 1996) have been observed in children's conversations

(Clarke & Kirton, 2003). Clarke and Wilkinson (2007) have described how asymmetry can develop through speaking partners' uses of first pair parts of adjacency pairs, typically realized as questions, and through the use of meta-interactional prompts. Nevertheless, aided speakers in these conversations did initiate VOCA-mediated utterances. As noted, however, these utterances regularly led to problems for both participants. In contrast, it is possible that aided and naturally speaking partners may find an advantage in speaking partners providing specific locations for VOCA use. Indeed, it is possible to hypothesize that, for the speaking children participating in such conversations, an interactional motivation exists for their use of questions and meta-interactional prompts; that is, by organizing VOCA use in certain sequential locations, it may be easier for speaking partners to understand the VOCA-mediated turns that are produced and for aided speakers to produce easily understandable contributions.

In adult – child interactions, adults are often described as holding an unequal amount of conversational power and exercising interactional dominance. Children who have been provided with communication aids are commonly described as passive participants who seldom use their communication aids. Concern has been expressed that asymmetries in interaction may limit opportunities for aided speakers' self-expression and language learning (von Tetzchner & Grove, 2003). These concerns are clearly justified. However, within the context of children's peer interactions, it would appear that further research is needed to uncover the nature of these asymmetries and the reasons for their emergence. Buzolich and Lunger (1995), for example, suggested that the value which a young aided speaker placed on peer interaction might involve more complex issues than matters of conversational control. As such, it may be that issues of conversational power and dominance are more multifaceted than might be assumed. The current study suggests that close examination of what aided speakers and their partners visibly do while interacting and the problems they encounter can be a useful way to investigate and address issues of asymmetry.

Clinical Implications

A challenge exists for professionals in assessing children's existing competencies and identifying functional communication needs (Light, 1989), and for developers of AAC technology in optimizing the usability of their systems (Clarke & Wilkinson, 2005; Higginbotham & Caves, 2002). Consequently, interventions that are not based on evidence from real-life VOCA use may be established on limited or inaccurate interpretation of the problems faced by aided speakers during interactions. For school-aged children, the influence of models of communicative competence has shifted attention away from assessments conducted in controlled environments to an emphasis on functional communication and the impact of communicative context and communication partners on interaction methods (e.g., Light, 1989).

As previously noted, within the AAC field, research concerned with the interaction styles of adults and children who use communication aids has interpreted and valued findings based on the opportunities for communication and language development such interactions provide. In particular, it is adults' dominance and aided speakers' apparent passivity that interventionists seek to challenge. It is notable that increasing the frequency with which aided speakers initiate and develop turns using their communication aids, and the range of communicative functions used by aided speakers, are common goals in published intervention studies (e.g., Buzolich & Lunger, 1995). Although the desire to encourage initiation is a very relevant goal for intervention, this paper has shown how speaking partners' orientation to the sequentiality of conversation may restrain the effective use of initiated VOCA-mediated turns. Future intervention concerned with increasing the frequency of aided speakers' initiation will benefit from considering, at an individual dyad level, exactly what this might involve for both partners, beyond specific vocabulary items for initiating talk or opening a topic. The question of how passivity may be experienced and combated requires an understanding of how interaction is accomplished in its fullest sense, including for example, the relationship between the sequentiality of conversational interaction and aided speakers' deployments of non-verbal resources in interactions (Clarke, 2005). In the current study, the detailed analysis of sequences of turns, and the description of interactional actions that are oriented to as relevant by the participants themselves in naturally occurring interactions, has provided insight into some strengths and difficulties exhibited both by participants with cerebral palsy and by their peers. As such, a CA approach, including the collection of naturally occurring conversational data, provides an ecologically valid vehicle for the assessment of children's communication skills, and shows significant potential as a method which answers the call for research to explore the functional communication skills of aided speakers (Light, 1989).

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APPENDIX Transcription Notation

The transcriptions presented in this paper combine the AAC convention proposed by von Tetzchner and Jansen (1996), and conventional CA transcription proposed by Gail Jefferson (see Atkinson et al., 1984).

Natural speech	Naturally spoken elements are italicized.
"*VOCA speech*"	Words and sentences produced with digitised or synthesized speech are italicized and placed in quotation marks.
N-A-M-E Spelling	Spelling is underlined and has hyphens between letters.
n	Single letter names are underlined.
*	Audible bleep generated by the VOCA, typically indicating VOCA activation.
⌈ ⌊	A large left-hand bracket links an ongoing utterance with an overlapping. utterance or non-verbal action at the point where the overlap/simultaneous non-verbal action begins.
⌉ ⌋	A large right-hand bracket marks where overlapping utterances/ simultaneous non-verbal actions stop.
=	An equals sign marks where there is no interval between adjacent utterances.
(.)	A full stop in single brackets indicates an interval of one tenth of a second or less in the stream of talk. A number in single brackets indicates the length, in tenths of a second, of a pause in the talk.
oh:	A colon indicates an extension of the sound or syllable it follows. More colons prolong the stretch.
,	A comma indicates continuing intonation.
↑↓	Marked rise and fall in intonation is indicated by upward and downward pointing arrows immediately prior to the rise or fall.
°no°	Degree signs indicate a passage of talk which is quieter than surrounding talk.

TALK	Capital letters indicate talk delivered at a louder volume than surrounding talk.	⌈yes	Text in double brackets represents a gloss or description of some.
h,heh	Indicates discernable aspiration or laughter. More hs signal longer aspiration/ laughter.	⌊((nods))	Non-verbal aspect of the talk.
fu(h)n	An h in single brackets marks discernable aspiration or laughter within a word in an utterance.	(*dog*)	Single brackets containing either a word, phrase, or syllable count (if utterance is very unclear) and italized mark where target item(s) is/ are in doubt.
°h	Discernable inhalation (the more hs the longer the inhalation).	→	An arrow alerts the reader to key points in the interaction.