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Handwriting-in-interaction between people with ALS/MND and their conversation partners

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## **Abstract**

The aim of this study was to examine the use and practices of handwriting-in-interaction by people with amyotrophic lateral sclerosis/motor neuron disease (ALS/MND). Handwriting has previously been described as a viable and practical means of augmentative and alternative communication, particularly for adults with acquired progressive dysarthria and intact upper limb control. To date, however, there is extremely limited evidence documenting how handwriting is used within a conversational context. The analysis in this paper features data from two people with ALS/MND in conversation at home with their spouses. It is shown how recipient animation of an authored written contribution is an important element of handwriting-in-interaction, particularly in how the recipient reveals his or her stance or reaction to whatever has been written.

## Introduction

In the UK, motor neuron disease (MND) is the general term for a group of conditions featuring a premature degeneration of motor nerves (neurons). The most predominant form of MND is amyotrophic lateral sclerosis (ALS). People with ALS typically develop weakness and spasticity of muscles and, over time, become increasingly paralysed. The majority report early symptoms in their limbs but approximately 30% experience initial changes in the bulbar region of the brain stem resulting in speech deterioration (dysarthria). Regardless of the early location of symptoms, over time all areas of the body are affected. Overall, it is reported that dysarthria occurs in 80%-95% of people with ALS at some point in the progression of the disease (Beukelman, Fager, & Nordness, 2011; Tomik & Guiloff, 2010).

One of the most widely implemented interventions for people with dysarthria, arising from ALS, is the provision of augmentative and alternative communication (AAC) strategies and tools (Hanson, Yorkston, & Britton, 2011). For example, Yorkston (1989), Doyle and Philips (2001) and Murphy (2004) describe case studies featuring people with ALS, all of whom utilise a variety of low and high technology AAC systems throughout the early, middle and late stages of their condition.

In line with wider technological advances, AAC options for people with ALS have changed profoundly over the past decade and continue to evolve, for example, in the use of eye-gaze as a control strategy (Ball et al., 2010) and brain-computer interfaces (Huggins, Wren, & Gruis, 2011; Silvoni et al., 2009). Despite these opportunities for AAC use gained by advances in technology, non-electronic systems still play a significant role in supporting day-to-day communication and interaction, including the use of handwriting (Iacono, Lyon, & West, 2011).

## **Handwriting as a form of AAC for people with ALS**

Handwriting is one of the most fundamental non-electronic AAC systems available to people with acquired neurological motor speech disorders. Its use in face-to-face interaction is particularly advocated for people with intact linguistic abilities and good upper-limb/hand control (Mathy, Yorkston, & Gutmann, 2000). Despite its familiarity as a mode of communication there is very little evidence available about how handwriting is used as a form of AAC. Where evidence does exist it tends to address the development and teaching of writing skills by children rather than the everyday use of writing by adults with acquired disabilities (Koppenhaver & Williams, 2010). Similarly, Iacono et al.'s (2011) review of AAC literature shows that non-electronic aids have rarely been included in studies in which people with acquired disabilities have been participants. This is despite the fact that people who lack speech skills to meet their daily needs are more likely to access non-electronic than electronic AAC (Russell & McAllister, 1995).

There is a small body of evidence demonstrating that people with ALS can and do make use of handwriting as part of their communication repertoire. For example, four out of fifteen participants in research by Murphy (2004); three out of four cases presented by Doyle and Philips (2001), and all twelve individuals with bulbar ALS in a study by Mathy (1996) were reported to make use of pen and paper to communicate in face-to-face settings. Studies that report on the use of handwriting tend to say little about *how* it is used although Mathy (1996) notes that all participants who used writing in her research did so for quick basic needs and wants, with half of the group relying on handwriting for all communication activities (except telephone use) such as telling stories, providing detailed information etc.

It has been recognised also that different physical profiles amongst people with ALS are associated with different levels of handwriting use. A retrospective study, investigating the natural course of 110 people with ALS, identified six different groups with specific reference to speech intelligibility, hand function and mobility (Mathy, et al., 2000; Yorkston, Strand, Miller, Hillel, & Smith, 1993). Twenty four percent of people with ALS were classified within two groups: ‘Poor speech, adequate hand function, and adequate mobility’ and ‘Poor speech, adequate hand function, and poor mobility’. It is within these two groups, representing almost a quarter of participants, that Yorkston et al. highlight the value of handwriting as a form of AAC.

Despite acknowledgement that handwriting has value as an AAC strategy for people with ALS who preserve adequate hand function, a detailed understanding of how handwriting is actually brought about and used as a modality for everyday interaction remains largely unreported. Such insight may be important in order to appreciate how people with progressive conditions, and their communication partners, adapt to AAC use and how handwriting is used in everyday communication situations beyond clinical encounters between health professionals and patients.

### **Conversation analysis and AAC-in-interaction**

Conversation analysis (CA) is the systematic, data driven study of naturally occurring talk-in-interaction. It treats conversation as the most common site for human interaction, providing an opportunity for analysts to establish how participants in conversation organize and control their lives together through communication. Rather than focussing on words or sentences, CA considers turns and series of turns, called ‘sequences’, as the main units for analysis.

Critically, CA focuses on how each turn in a conversation is treated and understood by its recipient rather than by an independent observer or researcher. For the study of AAC-in-interaction, CA provides a unique set of qualitative analytical principles that can complement quantitative forms of analysis. Turn taking organization is seen as the key feature contributing to the way sequences in conversation are organized (Sacks, Schegloff, & Jefferson, 1974). Work on turn organization deals with how turns are designed and allocated by participants in interaction, both verbally and non-verbally (Goodwin, 1981). CA methods and principles have previously been advocated for understanding AAC-in-interaction (Higginbotham, Mathy-Laikko, & Yoder, 1988; McKinlay & Newell, 1992) and demonstrated with reference to voice output communication aid use by children (Clarke & Wilkinson, 2007, 2008), adults with developmental disabilities (Collins, 1996; Collins, Markova, & Murphy, 1997) and adults with ALS/MND (Bloch, 2011; Bloch & Wilkinson, 2004).

Wilkinson, Bloch and Clarke (2011) have recently explored a series of episodes in social interaction where people with communication disorders, including a woman with ALS, use graphic symbol resources in constructing their contributions to the interaction. Such resources include symbol or orthographic based high technology AAC systems as well as pen and paper. The analysis highlights notable practices in the participants' use of eye-gaze in relation to the construction and distribution of turns. For example, during development of the 'graphically constructed' contribution the co-participant typically directs his/her eye gaze to the location where the contribution is being produced (e.g., communication aid or table top) rather than the person's face, which is more typical of spoken interaction. The analysis also highlights the integration of different modalities, such as speech and writing, and

shows that recipients of graphic utterances regularly produce a verbal formulation of what has been written. Importantly, this verbal formulation is shown to reveal a recipient's understanding of what has been written, which may or may not match the intended meaning. Such findings suggest that a closer, detailed analysis of graphic resource use in interaction, and particularly recipient response, may reveal further insights into the mechanisms behind handwriting as a form of AAC.

### **Authoring, animation and affective stance**

To further examine how handwriting is used in interaction we may usefully consider different speaker/listener roles that conversation participants may perform in non-speech impaired conversation.

Previous work by Goffman (1981) proposes that common-sense categories of 'speaker' and 'hearer' (or listener) may be too crude in the analysis of face-to-face interaction. Goffman points to a wider range of roles available to interactants including 'author' and 'animator'. The former describes the act of creating a turn or contribution in interaction, and the latter refers to the act of realising or producing that contribution (Goffman's so called 'sounding box'; 1981, page 144). In many cases an individual speaker may simultaneously take the role of both author and animator (for example, expressing a personal opinion). However, there are also instances where these roles may be distributed across people, time and modality. Such a distinction can be seen, for example, when an actor verbally recites the written lines of a play, or when a communication-impaired participant authors a contribution through pointing to symbols, with that contribution being followed by a recipient 'animating' it by speaking the symbol name aloud (e.g., one person points to the symbol 'car' and the communication partner says the word car).

A second aspect of speaker/listener roles that is relevant to the use of handwriting-in-interaction considers how a recipient displays a reaction to a prior turn. In this paper the term ‘affective stance’ is used to refer to the types of emotion that a recipient might display in response to a prior turn or contribution. Clearly, not all turns in conversation generate a display of emotion, but such responses are undoubtedly part of our everyday interactive repertoire (Wilkinson & Kitzinger, 2006). Displays of affective stance have parallels with Goffman’s (1978) ‘response cries’ such as the showing of surprise or amazement in response to unexpected news. Displaying an appropriate emotional response is an inherent part of communication, with recipients often taking cues for a suitable display of affective stance not only from what has been said, but also how it has been said, and how it looks (e.g., the speaker’s facial expression and body posture). One potential problem that may be identified with handwritten contributions in interaction is that they may lack many of the features required for recipient recognition of affective stance. In other words, an issue for participants in handwritten mediated interaction, particularly the recipient of the handwritten contribution, concerns how they manage the accomplishment of a shared affective stance, given the likely reduced pool of resources with which people with ALS may signal an intended affective standpoint when using handwriting.

This paper aims to investigate specific features of handwriting-in-interaction that participants treat as relevant to the on-going conversation. It explores in detail how handwriting is used on a turn-by-turn basis, and as such seeks to capture subtle practices in writing-in-interaction as a form of AAC that, to the best of our knowledge, have not been considered in previous work in this field. A more detailed understanding of handwriting in interaction has the potential to be informative about the relationship between the use of different communication modalities such as

gesture, gaze and AAC systems. It also may contribute to our knowledge of wider AAC use particularly in circumstances where the recipient plays an active role in redoing or translating words or symbols associated with other non-electronic communication systems such as symbol boards.

## **Method**

### **Data collection, selection and method of analysis**

The data presented here form part of a broader funded research study examining the effects of progressive neurological disorders on interaction between family members. Following UK National Health Service (NHS) research ethics committee and research governance approval the participants described below consented to participate in a study examining the effects of acquired dysarthria and AAC use on everyday conversation. They were recruited through their local NHS speech and language therapy services.

The couples, involving one person with ALS related dysarthria and a significant other (for example, spouse or son/daughter), were loaned video camera recording equipment, and were asked to record themselves for approximately 30 minutes within an agreed one-week sampling period. It was requested that the recording take place during a regular opportunity for everyday conversation (e.g., at a meal or coffee time). The researcher was not present during the video recordings, and no specific instructions were given as to topic of conversation or particular use of AAC. This process was repeated at three monthly intervals (+/- one week) over a maximum 18-month period.

In addition to the video data collection, the Frenchay Dysarthria Assessment (Enderby & Palmer, 2007) was administered to the participants with dysarthria within

one week of each recording. The Amyotrophic Lateral Sclerosis Severity Scale (Hillel et al., 1989) was also used to provide an overall rating of communication severity based on the perceptions of the participants themselves.

The video recordings were digitized to facilitate repeated-viewing via a PC. Each video recording was then initially examined for potentially interesting interactional phenomena. Two out of eight participants with ALS were observed to use handwriting regularly, but not exclusively, in their conversations. Subsequently, a series of seventy extracts featuring the use of pen and paper for interaction purposes were identified. These extracts were transcribed using CA conventions (Jefferson, 1984). A closer analysis of handwriting-in-interaction followed with on-going refinement of the transcripts. The conversational exchanges then underwent an in-depth analysis, which focused on explicating the sequential context in which the phenomenon was occurring that is, where in the turn taking the use of handwriting came about, the interactional work that was being achieved, and the orientation of the participants towards the use of handwriting. Finally, five extracts were selected as representative examples of the handwriting use in these couples' conversations. This overall analytical procedure follows established CA methods reported previously in this journal (Bloch & Wilkinson, 2004; Clarke & Wilkinson, 2007, 2008).

## **Participants**

The two participant couples are identified in the text by the following pseudonyms: Rose and Tom, and Joan and Ali.

Rose, 79, was diagnosed with MND 18 months prior to this study. She was recorded in conversation with her husband, Tom, 82. At the time of recording their first video Rose presented with a mixed spastic-flaccid dysarthria characterized by a

harsh voice quality and mild hypernasality. The emergence of mild articulatory weakness was also noted with mildly reduced tongue movement. From video one Rose's speech ability was rated at level six on the ALS Severity Scale – 'Repeats message on occasion'. A Frenchay assessment of conversation intelligibility (Enderby & Palmer, 2007), was rated at grade b: 'speech abnormal but intelligible: patient occasionally has to repeat'. By the time the second and third video recordings were made (three and six months following the initial recording), her ALS Severity Scale rating was five – 'Frequent repeating required'. Rose did not display or report any language and/or cognitive problems which may have affected her ability to participate in conversation. Tom had no reported or observed communication problems.

Joan, 68, who was diagnosed with MND 12 months prior to the study, was recorded in conversation with her daughter, Ali, 37. Throughout the study period Joan presented with a severe mixed spastic-flaccid dysarthria characterized by aphonia, poor breath support and overall articulatory weakness. Aside from gross vocalization, Joan's speech was non-functional, and was rated at level two on the ALS severity scale: 'Loss of useful speech, vocalizes for emotional expression'. No language or cognitive problems were reported or observed. Ali had no reported or observed communication problems.

### **Analysis and findings**

Each transcribed extract below features the use of handwriting by the person with ALS and is used to show how the participants orientate to that handwriting. The analysis provides a particular focus on recipient uptake of the handwriting contribution, and in Extracts three, four and five, the display of affective stance or emotion of the recipient toward the handwritten message. That is, the ways in which a conversation partner deals with a written contribution once it has been produced.

Extract 1 provides an overview of some basic features of writing in interaction. Following a lapse in the conversation Tom begins the sequence below by gazing and pointing to the television and video player across the room (line 01). He then makes references to videos bought for Rose by other family members (lines 02 - 03).

*Insert Extract 1 about here*

Following Tom's reference to the videos that "the family bought for you", Rose, at line 04, vocalizes and nods. This possibly acknowledges Tom's prior turn and provides an opportunity for him to continue talking (Schegloff, 1982). There is then a short silence before Rose vocalizes again, whilst gazing to Tom, and points her index finger to her head (line 08). Three actions then follow simultaneously. Tom continues to talk with a reformulation of his prior turn, he directs his gaze to Rose, and Rose gazes down to the table to pick up a pen to start writing. This marks the beginning of her handwritten contribution despite Tom's ongoing talk at line 12.

Rose's main writing activity lasts for at least 11 seconds (line 13) during which time Tom gazes to the pad. At line 15 Tom initiates further talk with ongoing reference to watching the videos. It is during this turn that Rose stops writing, gazes to Tom and lifts up the pad. On finishing his own talk (line 18) Tom then reaches to hold the pad and looks at the writing. After a short silence Tom reads aloud "watch em when the girls come down" concluding with "yeah". On hearing Tom's reading Rose withdraws the pad to place it back on the table, produces a minimal agreement token "m" and returns to an upright sitting position before Tom continues to talk about using the video player.

Through this sequence a number of features characteristic of writing in interaction can be identified. Firstly, there is the act of authoring itself. Following an

attempt to obtain Tom's attention (lines 07-08) Rose directs her gaze away from Tom and towards the pen and pad. She then engages in writing for a considerable amount of time before re-engaging with Tom (via eye gaze) and physically directing him to what she has written. This engagement/disengagement with AAC and between participants appears distinctive particularly with reference to eye-gaze as a turn regulating device (Goodwin, 1980). It is also evident that Tom produces talk co-occurring with Rose's writing (line 15). This type of talk co-occurring with AAC use is a relatively common feature in AAC-mediated interactions (Bloch, 2011, Clarke and Wilkinson, 2007; Collins, 1996). In this instance Rose does not treat Tom's talk as relevant to the interaction although examples can be found in which, for example, paired turn exchanges, such as a question and answer, appear during AAC message construction (Bloch and Wilkinson, 2004). Secondly, Tom animates the written contribution. Rose and Tom jointly attend to the writing before Tom reads aloud and animates what Rose has written. Through his verbal production of the written contribution, that is his animation of it, Tom provides evidence of its legibility, and makes public for both of them his reading of its intended meaning. This is analogous to the use of verbal orthographic (spelling aloud) strategies in dysarthric speech interaction during which the recipient regularly repeats back what he/she has just heard (Bloch, 2005; Bloch and Beeke, 2008; Collins & Markova, 1995). Thirdly, there is what may be described as post-animation uptake, that is, a display of how the recipient (in this case Tom) treats the handwritten contribution once it has been read. Here, Tom produces a post-animation uptake saying "yeah" that provides an acknowledgement and probable claim of understanding (Svennevig, 2004). Rose's termination of the writing process and her own apparent alignment with Tom's

animation and uptake provide evidence that her handwritten contribution has been received unproblematically.

Extract 2 provides an excerpt from an interaction between Joan and her daughter, Ali. Joan is sitting in an armchair with a pen and pad resting on the arm of the chair. Prior to the talk in this extract, Joan and Ali have been discussing the effects of ALS on Joan's daily activities. Joan has just made reference to problematic breathing before her husband enters the room. On his departure the conversation continues.

In this extract there is also one handwritten contribution. Of particular note, as with Extract 1, is the animation of the written contribution in lines 16-17. Ali is shown firstly to read Joan's writing aloud before subsequently displaying her reaction towards what has been written.

*Insert Extract 2 about here*

Following her husband's departure from the room (line 08) Joan initiates verbally. Her vocalisation and hand movement (lines 09 - 10) are followed by Ali in line 11 with an affirmation and also a possible reference to what was being talked about prior to the interruption.

Joan then begins her AAC contribution. This is achieved through two purposeful movements. Initially she gazes down at the pen (line 12) and then reaches for the pen (line 13). As Joan reaches down, Ali also gazes to the pen before returning her gaze to Joan's face. With both participants having orientated to the pen and paper, this synchronicity of movements establishes the act of writing as the next potential activity. Joan now writes for approximately 17 seconds. During this relatively long silence in the talk, even by the standards of graphic contributions (Wilkinson, et al.,

2011), Ali does not speak. Once Joan has finished writing she moves the pad from the arm of the chair towards Ali. As the pad is lifted towards Ali, Joan directs her gaze to Ali's face.

Again, it is Ali's next action, as recipient, that offers one of the most significant characteristics of writing-in-interaction observed in these participants' conversations. Having seen the pad being moved by Joan, Ali looks at the writing for two seconds before providing a verbal display of legibility. In this first instance her verbal contribution provides a legibility receipt through her verbal formulation of the written contribution. Further, she does not just read aloud what is on the pad but transposes Joan's written "me" to a verbal "you" (line 17). This feature is considered further in the Discussion.

Ali's reading display is then ratified by Joan (line 19). Initially she removes the pad from Ali's view. By withdrawing the pad, as with Rose in Extract 1, Joan is showing that further reference to the pad is no longer necessary and that its work has now been done, thus marking a progression from the written contribution (see Extract 5 for a marked contrast in which reference to the pad remains relevant). Then she provides a vocal and non-verbal affirmation of Ali's reading. It is now that Ali displays a reaction towards Joan's prior written contribution. Her first move is to align with Joan's negative assessment by agreeing (line 20), this is then upgraded (Pomerantz, 1984) with a more explicit agreement "yeah, oh definitely" (line 22).

In summary, Extracts 1 and 2 illustrate the core organizational practices in the use of handwritten contributions in these couples' conversations; how the contribution is authored, how the recipient animates the contribution, and how the recipient responds to that contribution. In what follows a sub-set of three further interactions are examined in which an additional feature is apparent. Handwriting remains the

main modality but there is a close relationship between recipient reading and the display of affect.

Immediately prior to the start of Extract 3, Ali and Joan have been talking about on-going developments in Ali's sister's (and Joan's daughter's) attempts to move house.

*Insert Extract 3 about here*

At the start of the extract Ali makes tentative claims to knowledge about her sister's house sale. Following Ali's reference to an estate agent's visit, Joan nods and verbalises (line 04) displaying both her agreement with Ali's claims, and showing that Joan herself also has knowledge of the topic.

Ali then proceeds to introduce the issue of house value. She begins by stating that she does not know what was offered (line 07) before replacing "offer" with a more general "say". With no immediate uptake by Joan at line 08, Ali then rephrases her query into a more direct "what was it worth" (line 09). Just after the beginning of this reformulation by Ali, Joan begins to initiate her written contribution. She begins by looking down toward the pad (currently balanced on the arm of the chair) before gazing at it, steadying it with her left hand and beginning to write.

The writing activity takes approximately 15 seconds during which both participants gaze at the pad. During this period it appears that Ali, by not making further contributions, recognises Joan's activity as a valid one in relation to the interactional task in hand. Joan then leans forward whilst moving the pad forward towards Ali. As the pad moves Ali also leans forward to read the written contribution.

It is at this point that Ali begins to animate Joan's written contribution. Her turn at lines 13-15 comprises three concurrent activities. Firstly, in reading aloud Ali is displaying to Joan what on the pad she has found legible. Secondly, Ali is animating

what Joan has authored. In this instance, as with the previous extracts, the animation translates a written contribution into a verbal one. Thirdly, and most relevantly for this analysis, Ali clearly displays her stance towards what has been written whilst she is reading it. This display of emotion is prominent in the animation of “five” as part of “two two five”. A marked contrast between two forty and two-two five is displayed through increased stress at word beginning, a rise and fall in pitch and elongation of the vowel sound. Such prosodic markers have been found to signal heightened emotive involvement in conversation (Selting, 1994). Ali also raises her eyebrows and looks at Joan in what appears to be an astonished face. In this instance, Ali’s emotion is seeable and hearable as one of surprise at reading what, she herself goes on to state, is a comparatively low valuation for the property. Following her immediate reaction to Joan’s written contribution Ali makes additional comments about the impact of this valuation (see lines 18, 21, and 23).

To summarise, Joan’s written contribution is newsworthy and timely in terms of its sequential placement. It treats Ali’s turn at line 09 as the first part of an interactive sequence and provides an appropriate second part response, in this case two different house price valuations. Ali’s treatment of this written response provides a clear receipt of it as something newsworthy, that is, something that Ali did not previously know. Additionally, Joan’s written contribution is constructed such that it allows for the possibility of reading it in a way that highlights a contrast. The ‘x was y + the other was z’ formulation (“one was two forty the other was two two five”) enables Ali to display her own evaluation of the contrast both prosodically and facially. Interestingly, Joan does not offer any clues as to her own stance through her written contribution even though the opportunity is available via facial or graphic expression such as writing in capitals, using exclamation marks, or highlighting by underlining

the second, lower valuation. The written contribution is a type of turn that may reasonably evoke an affect display, but its author gives no explicit clue to that.

It is through this animated reading and display of stance that Ali reveals Joan's written contribution as newsworthy. What is of particular note here is that the reading and display of stance occur concurrently. That is, the animation of Joan's written turn is meshed with an affect display by Ali.

A similar practice is observed in Extract 4 in the conversation between Rose and Tom. Just prior to this extract Rose has told Tom that no photographs were taken at a recent New Year's Eve event. Tom then proceeds to make reference to Rose being missed by others in her role as a party photographer.

*Insert Extract 4 about here*

During Tom's turn at line 08, Rose gazes down, picks up a pad and pen and begins to write. As she writes Tom initiates talk at lines 13 and 15 but these turns are both abandoned before completion.

At line 14 Rose tears a page from her pad and lifts it up towards Tom. There is a one second silence whilst Tom looks at the page before he produces his next utterance. Initially, he reads aloud the first four words of Rose's written contribution. Next, he smiles and laughs, and then he displays agreement apparently with the unanimated element of the written contribution that appears to provoke his laughter. He then proceeds reflect the humour in Rose's writing to continue the non-serious talk "°hev-rybody says (.) where's missiz david bailey↑". This humour is based on reference to David Bailey, a famous British fashion photographer.

So, as with Ali in Extract 3, as Tom reads aloud Rose's writing he concurrently displays a stance response, in this case the treatment of Rose's writing as humorous. A further feature here is that Tom does not read aloud the full written contribution, but only the first four words, "I'm known as missiz", before laughing and showing agreement. This contrasts with the prior examples in which the full written contributions are verbalised.

In the final extract Ali and Joan are talking about school choices for Ali's son and the possibility of a scholarship opportunity. While this exchange shares the features observed in Extracts 3 and 4 (authorship, animation and the recipient of the written contribution displaying a stance toward the written words), it is distinguished from other examples shown here because Joan, the author of the written contribution, displays her own stance towards what she has written before Ali's animation of the written contribution.

*Insert Extract 5 about here*

At the beginning of this extract Ali makes reference to her "first choice" (line 01) before raising a series of queries about a scholarship at Sandown College. At line 17 she then poses a potential problem if her son gave up swimming, presumably risking the terms on which a scholarship might be offered. At this point Joan verbalises and lifts and shakes her hands from side to side. It is unclear as to what this gesture might refer but Ali offers a candidate understanding with "how much?" (line 22) in which she treats Joan's prior vocalisation and gesture as a possible question relating to the amount of money associated with the scholarship.

Immediately following Ali's candidate "how much?", Joan picks up the pad and pen signalling the beginning of a written contribution. She then proceeds to write for approximately 19 seconds before lifting the pad up and moving forward to Ali

(line 23). In anticipation of a physical exchange of the pad, Ali also moves forward at this point momentarily reaching over to take the pad but then returning her hand as Joan withdraws the pad. Rather than handing the pad over, Joan holds it at eye level and looks at what she has written before verbalising and smiling. This smile continues as she looks to Ali and hands the pad over. It is through Joan's smile, its association with what has been written, and the unusual temporary withdrawal of pad transfer, that Ali may begin to formulate her own stance towards Joan's action.

Ali's first display, as she takes the pad from Joan, is to smile herself. This alignment with Joan's stance is further evidenced through her enquiry "oh wha av you written?" (line 27) which incorporates laughter tokens. Ali's frown and open mouth posture whilst reading is followed by an on-going smile and laughter by Joan. In sum, both participants appear to be treating the current activity as non-serious. The nature of this humour is now revealed through Ali's animation of the written contribution. Here she reads aloud a misspelt version of the word "scholarship" (line 30) exaggerating the spelling error with an emphasis on the word initial "sh". Joan's response (line 32) is to smile and wave her hand before Ali pursues the humour by feigning ignorance of the misspelt word's meaning by first asking what a "sh..:cholarship" is. She then produces a full repeat of the written contribution, together with on-going humour, with "how do they work out who has a sh..:cholarship".

On-going laughter (lines 35-36) further supports the notion that this episode is being treated as humorous by both participants. Finally, at line 39, Ali moves to treat Joan's writing as a valid enquiry by providing an answer.

There are a number of parallels between the exchanges in this extract and those presented earlier: the written contribution is initiated by Joan as the person with

dysarthria; Ali, as recipient, waits for the contribution to be constructed, and in this case without speaking; Joan presents the message on the pad to Ali, and Ali orientates to the pad as a recipient. However, the talk in this extract is also distinct for several reasons.

Joan's smile and withholding of the pad (line 25) marks what she has written, for Ali, as worthy of attention beyond simply the content of the writing. These actions provide cues as to one way in which the written contribution may be treated. Further, Ali's humorous orientation to the written contribution is built on Joan's prior actions. Finally, Ali's treatment of, or stance towards, the written contribution is based not solely on what has been written but rather the way it has been written and Joan's apparent orientation to her spelling error as a possible source of humour.

In conclusion, this extract highlights one way in which stance in handwritten mediated interaction can be initiated by the person with dysarthria and not just the recipient as shown in the previous extracts, albeit in relation to a spelling error rather than the propositional meaning of the handwritten note.

## **Discussion**

This paper has applied the principles of Conversation Analysis to examine practices used by participants in the design, delivery and receipt of handwritten contributions. Through such an analysis, attention has been drawn not only to how handwritten contributions are constructed but equally to the ways in which recipients respond to them. In what follows we consider the function of these animations, displays of stance and the implications of our analytical findings.

### **The functions of animation following handwritten contributions**

Given that the author presumably knows what has just been written, co-participant reading of the written contribution out loud invokes a central conversation analytical question concerned with action and recipient design: ‘why that now?’ (Schegloff and Sacks 1973, page 299). In other words what does reading aloud accomplish in these interactions?

In the Extracts here, animations of written contributions perform a number of functions. In particular they register an explicit receipt of information, in a way that differs from interaction between speaking participants and from examples of repetition in conversation involving people without communication disabilities. In spoken conversation, the way the listener has understood the turn they are listening to is normally implicitly displayed in the design of their own turn when they speak next, so that as the conversation progresses each turn displays the speaker’s understanding of the prior turn (Sacks et al., 1974; Heritage, 1984). It has previously been shown that in non-speech disordered talk-in-interaction, full or partial repetition of a prior spoken turn by the recipient of that turn is regularly used to display a candidate (i.e., possible) hearing or understanding (Koshik, 2005). Such candidate hearings often function as repair initiators in which the prior speaker of the prior turn then has the opportunity to accept or reject the candidate. In a study of 285 repair sequences, for example, Svennevig (2008) finds candidate understanding displays three time more common than other forms of other-initiation of repair (such as ‘huh?’ ‘what?’ or ‘pardon?’). Full repeats of prior turns may also be used to respond to a question, specifically showing the action of the question to be problematic, that is, what is meant by its asking (Robinson and Kevoe-Feldman, 2010). In three of the five extracts here (1, 2 and 3) the reading aloud turn is followed by a confirmation by the

author. In the final two extracts (4 and 5), however, the post-authored animation clearly deviates from what has been written, either through a partial reading followed by laughter (Extract 4), or the selection of just one word (Extract 5). The implication is that handwriting-in-interaction may often be characterized by three part sequences in which an authored handwritten contribution (part 1) is read aloud in next turn (part 2) and then confirmed in the following turn (part 3), but that there may also be more complexity through which the animated element is used to display humour, teasing etc.

We have observed also that recipient display of a handwritten contribution is not always simply a case of reading aloud exactly what has been presented. It appears that there may be different classes of animation in these conversations. That is, two extracts are notable here in that both feature first person pronouns in the written form: “I’m known as Mrs David Bailey” (Extract 4) and “it’s the breathing that stops me doing things” (Extract 2). In extract 4, Tom reads “I’m” as it is written but, in Extract 2 rather than just reading what Joan has written word for word, Ali transposes the first person form “me” to the second person “you”. With limited evidence at this stage we can only speculate as to why some animations retain the original pronouns and others not but this does raise interesting questions about how readings or re-doings are used.

Overall, there is clearly more at stake here than just repetitions or, to be more accurate, translations, of a prior written contribution. In all cases the animation of a written contribution offers the author an insight into what has been read and how it has been understood.

### **Displaying affective stance**

Three of the extracts presented in this paper feature a clear display of affective stance following a handwritten contribution. In Extracts 3 and 4, the recipients’

affective stance is immediate and explicit, produced concurrently as the written contributions are read aloud. Ali's animation of Joan's "two-two-five" is accompanied by prosodic and facial features that reveal her display of 'astonished' stance (Extract 3), whilst Tom's amused affect (Extract 4) is revealed through his mid-turn laughter as he reads Rose's comment about being known as Mrs David Bailey. Furthermore, there are no obvious clues given by the authors that may indicate their own stance to what they have written. Rather, the stance taken by the recipients of the written contribution is based solely or at least primarily, it seems, on their reading of the note. In Extract 3, for example, Joan does not provide a stance toward her written contribution through her facial expression or in the way in which she writes 'two-two-five' on the page. It is Ali who initiates how she herself treats this as newsworthy and of shock value. A contrast is provided in the final Extract (5). Here, Joan misspells "scholarship" and treats this apparently as a source of humour by smiling before she allows Ali to read it.

Unlike speech, the use of handwriting-in-interaction brings into play a highly visible mechanism for both the production of writing and notably its initiation and transfer from author to recipient. In each extract presented the author self-initiates writing by gazing down to a pad and bringing a pen to paper. The orientation of gaze and body towards the pad has functional parallels with other pre-beginning behaviors (Schegloff, 1996) such as in-breaths that can mark the beginning of a verbal speech turn (see also Clarke and Wilkinson (2010) for discussion of pre-beginnings in VOCA mediated talk). On completion of the writing, the pad is then handed over or shown to the recipient to be read, although, as noted in Extract 1, it is possible for the conversation partner to see the content of the writing in progress if physical orientation permits. In addition, a distinction can exist between the written message

construction and its delivery. For example, in Extract 5 (lines 23-25), Joan completes her writing and then lifts the pad up and forward. At the same time Ali begins to move her hand over to take the pad. However, in then retaining the pad, reading it silently herself, laughing and smiling before looking to Ali and handing the pad over, Joan temporarily withholds the transfer from author to animator and, in doing so, generates an opportunity to display her own affective stance (humour) to some aspect of what has been written. This display of stance is clearly oriented to and aligned with by Ali as shown through her own smile and next turn talk “‘h wha av you written?’”. The significance of withholding the delivery of the completed written message is that it highlights a temporal feature of the handwriting-in-interaction, affording the author the opportunity to provide some type of ‘comment’ on the way in which the written contribution might be treated *before* the recipient is able to read it. In this case Joan’s smile displays in advance her own orientation to the fact that the spelling is wrong and therefore how the spelling error is to be understood. Ali’s subsequent smile and gentle chiding aligns with this. Joan’s smiling allows her to imbue her contribution with a paralinguistic cue that reflects her own take on the pitfalls of writing in interaction. Here then reflecting on the writing process becomes a topic for the conversation itself.

The use of handwriting in interaction will vary across each conversation and each dyad but the analysis here shows that participants are clearly organized in their orientation to the initiation, production and animation of handwritten contributions. Furthermore, the unproblematic display of affective stance is shown to be a regular feature in the recipient animation of handwritten contributions, even where there is no obvious such display from the author.

## **Implications**

It has already been noted that, despite the high demand for non-electronic aids, the research literature has tended to focus on electronic systems (Iacono, et al., 2011). As a low-tech AAC system, the use of handwriting for face-to-face communication, despite its familiarity and apparent simplicity, is worthy of investigation. Displays of recipient affective stance may be one area to which clinicians and others may want to attend when discussing the role of handwriting, drawing attention not just to the individual with ALS but, crucially, the conversation partner. Goffman's (1981) author/ animator distinction may facilitate discussion about the importance of conversation partners, and how they might usefully respond to a handwritten contribution. The suggestion here is that clinicians may want to consider how participants themselves use handwriting as form of AAC as well as more obvious physical access issues in the management ALS related communication problems.

In conclusion, there appear to be a scarcity of problems with handwriting in interaction in these participants' conversations. Of the seventy handwriting sequences in the full data set, there were only three that featured any sort of problem (including the 'scholarship' Extract 5 above). The other two problematic sequences are both characterized by difficulties in recipient understanding of, what turn out to be, a correctly spelt word and sentence. In both cases the author initiates the repair sequence by signalling a problem with what has just been animated. The troubles are then resolved, in one instance, through additional contextual information provided by the author in verbal form, and in the other through redirection to the trouble source (a misread sentence). This latter strategy is particularly interesting in that, as a permanent physical record, the written message remains available for viewing by both participants and so can be used as a repair resolution resource if required.

We can only offer tentative hypotheses as to why handwriting-in-interaction appears less problematic than other forms of AAC. It is possible that handwriting is a more familiar modality with clearer transition boundaries (e.g., the physicality of handing over a pad). Or it may simply be an artefact of study participant selection/recruitment. If an individual has acceptable pre-morbid handwriting skills that are unaffected by his/her neurological condition then the assumption may be that such skills can reasonably contribute to multi-modal interaction.

Finally, we are aware that there is much more to be said about the sequential and prosodic properties of these data: participant orientation to co-occurring talk and writing; the sequential organization of the written contribution, animation, receipt of the animation and the animator's response to the turn that they themselves have just animated. These properties are the subject of ongoing research.

Establishing how handwriting is used by a person with dysarthria may only be fully understood with reference to the way in which reciprocity is displayed by the conversation partner. As such, further research and clinical practice will benefit from emphasis on the actions of both partners in interaction rather than just the person using AAC.

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## Appendix

### Transcription Notation

The transcriptions presented in this chapter combine the AAC conventions proposed by von Tetzchner and Basil, (2011), with conventional CA transcription proposed by Jefferson (1984). Some new conventions are provided for indicating spoken stress and increased volume to account for overlaps between the combined transcription systems.

<i>Natural speech</i>	Naturally spoken elements are italicised.
[	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
(0.6)	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
<u>stress</u>	Double underlining indicates emphasis
°no°	Degree signs indicate a passage of talk which is quieter than surrounding talk
+talk+	Plus marks either side of letters indicate talk delivered at a louder volume than surrounding talk
h,heh	Indicates discernible aspiration or laughter. More 'hs' signal longer aspiration/laughter
fu(h)n	An h in single brackets marks discernible aspiration or laughter <i>within</i> a word in an utterance
°h	Discernible inhalation (the more hs the longer the inhalation)
[yes [((nods))	Text in double brackets represents a gloss or description of some non-verbal aspect of the talk

Extract 1

- 01 Tom ((gazes and points to TV across room)) *now we got some o those*  
02 *looking at down there at those (.) videos we got some o those*  
03 *that (.) the family bought fer you fer er:*  
04 Rose [or: ar ] (0.2) *eh:*  
05 [ ((nods)) ]  
06 (0.6)  
07 Rose [*eh* ]  
08 [((gazes to Tom)) ] ((points index finger to head))  
09 Tom [*y'know in the other room int they the er: videos that (.) for you*  
10 |((gazes to Rose))  
11 Rose [((gazes to table and picks up pen to start writing))  
12 Tom [*while you're watching then I can watch my westerns.*  
13 Rose | ((writes for 11.0))  
14 Tom [ ((gazes to pad))  
15 Tom *oh: I just thinking °oh:° (.) dunno how long mary[ 'll be ere but watch*  
16 Rose [((gazes to Tom and  
17 lifts pad))  
18 Tom *watch em when the family's here.* ((reaches to steady the pad and  
19 gazes at writing for 1.0))  
20 Rose [((points to writing with finger, gazes to Tom and withdraws pad)) ]  
21 Tom [*watch em when the girls come down yeah* ]  
22 Rose ((leans down to put pad down on table)) °m° ((sits back to upright  
23 position))  
24 Tom *well you know how to work the video now*  
25 Rose ((nods))

Written contribution: “watch them when the girls come down”

Extract 2

- 01 Joan ((mimes being short of breath)) *ar:*
- 02 Ali *yeah, you need to stop (.) en let yourself calm down*
- 03 Joan ((nods))
- 04 Ali *yeah (0.4) just calm down and then when you got enough time to do*
- 05 Joan ((nods))
- 06 Ali *yeah*
- 07 ((Joan's husband enters the room and talk addresses the videoing  
08 before he leaves))
- 09 Joan: *er:m (1.5) [((lifts palm upwards, gazes to Ali then drops hand)) ]*  
10 *[ e:ya :*
- 11 Ali: *yeah, so you don't ((shakes head)) at the [moment you don't ]*
- 12 Joan: *[er: ((gazes to pen)) ]*
- 13 *[((reaches for pen)) erm ] ((writes for 17.0)) =*
- 14 Ali: *[((gazes to pen then back to Joan)) ]*
- 15 Joan: *=((moves pad over to Ali and gazes to Ali))*
- 16 Ali: *((shifts forward in chair to look at pad for 2.0)) it's the*  
17 *breathing that stops [you doing things ]*  
18 *((gazes to Joan))*
- 19 Joan: *[((withdraws pad)) ar: ((nods)) ]=*
- 20 Ali *=((nods)) yeah.*
- 21 Joan: *((puts pen and pad down, leans back in chair and gazes to Ali))*
- 22 Ali: *yeah, ↑oh definitely ((nods))*
- 23 *(0.4)*
- 24 Joan: *ar:*

Written contribution: "it's the breathing that stops me doing things"

Extract 3

- 01 Ali *so*↓ (0.2) *I mean I presume I haven't seen a board up or anything but*
- 02 Joan *ah: uh*
- 03 Ali *parently the-they had* [estate agents there: ]
- 04 Joan [ ((nods)) *ar:* ]: ((nods))
- 05 Ali *this week*
- 06 (0.4)
- 07 Ali *I don't know >what did they off<-what did they say.*
- 08 Joan *uh:* ((gazes across room))
- 09 Ali *what* [was it *worth*]
- 10 Joan [*ur:* ((looks down to pad)) ] ((holds pen to pad)) *ur*
- 11 ((writes for 15.0)) [ ((leans over with pad & gazes to Ali))
- 12 Ali [ ((gazes to pad))
- 13 Ali ((reading aloud)) *one was two forty the other was*
- 14 *t*[wo *t*[wo *↑fi:↓ve*
- 15 [((eyebrows lift)) ((gazes to Joan with astonished face))
- 16 Joan [((withdraws pad)) ((leans back))
- 17 Joan ((nods))
- 18 Ali ((holds astonish face)) °*h:*: [:: ((drops astonish face)) *crikey*
- 19 Joan [*ar*
- 20 Joan *ar:*
- 21 Ali ((drops mouth and gazes at Joan)) *that's not good is it*
- 22 Joan ((shakes head)) *no:*
- 23 Ali ((gazes at Joan)) (1.0) *curikhey thought it be least be two fifty*
- 24 Joan ((nods)) *m:*
- 25 Ali ((pulls astonished face)) *bet simon was gutted*

Written contribution: “one was 240 the other was 225”

Extract 4

- 01 Tom *see that's where you-we were missed*
- 02 Rose °yeah° ((nods))
- 03 Tom *coz they always rely on (.)*[rose ]*ya know*
- 04 Rose [yeah ]
- 05 Rose *m* [ : ]
- 06 Tom [taking ]*photos of everybody en*
- 07 (1.8)
- 08 Tom *out on new* [year's eve, it iza (0.3) *shame really* ]=
- 09 Rose [((gazes down)) ((picks up pen and pad)) ]
- 10 Tom =*[nobody took cameras that's a surprise. ]*
- 11 [((gazes at Rose writing)) ]
- 12 Rose ((writes for 6.0))
- 13 Tom °h but er
- 14 Rose ((writes for 6.0)) [((tears page from pad)) ]((lifts page to Tom))
- 15 Tom [ I bet er:: ]
- 16 Rose ((points to page))
- 17 Tom ((views page for 1.0)) *i:m known as* [ missiz ha-eh-ha ↑*that's true!* ]
- 18 Rose [ ((smiles)) °eh he° ]
- 19 Tom °(h)ev-rybody says (.) *where's missiz david bailey*↑
- 20 Rose °ah hey°
- 21 Tom *with her camra. ah: yeah they look forward to you taking the*
- 22 *pictures.*

Written contribution: "I'm known as Mrs David Bailey"

Extract 5

- 01 Ali *so that would be my first choice.*
- 02 Joan *uh:*
- 03 Ali *I mean sandown college is (0.3) hide nor hare (0.2) until I know (.)*
- 04 *[what sort] of scholarship (.) he wud be offered.*
- 05 Joan *[uh: ]*
- 06 Ali *un*
- 07 Joan *m=*
- 08 Ali *=how much it would end up leaving us.*
- 09 Joan *m:*
- 10 Ali *I don't ↓kno:w (.) en I mean d-if he get a scholarship does*
- 11 *that mean °h for the whole time he's there?*
- 12 *(0.2)*
- 13 Ali *or is that ju-to be renewed every year?*
- 14 Joan *((looks down to pad briefly then up to Ali and nods)) m:*
- 15 Ali *I mean if its renewed every year ((looks aghast)) god knows.*
- 16 *(1.0)*
- 17 Ali *and if (john suddenly) gave up swimming*
- 18 Joan *[u:: uh ]*
- 19 *[ ((lifts and shakes hand from side to side)) ]*
- 20 Ali *((smiles))*
- 21 Joan *er: ((picks up pad and pen))*
- 22 Ali *((gazes at Joan)) how much?*
- 23 Joan *uh: ((writes for 19.0)) ((lifts pad up and begins to move forward))*
- 24 Ali *((momentarily moves hand across to take pad))*
- 25 Joan *((holds pad up to eye level and looks at writing)) ahuh ((smiles))*
- 26 *((looks to Ali and hands pad over))*
- 27 Ali *((smiles and takes pad)) °h wha av you written? ((frowns and opens*
- 28 *mouth whilst reading))*
- 29 Joan *ahu ((continues to smile))*
- 30 Ali *sh::[cholarship ]*
- 31 *[((gazes to Joan)) ] ((gazes back to pad))*

- 32 Joan ((smiles and waves hand))
- 33 Ali *wassa sh:cholarship? °h huh* ((reading)) *how do they work out who*
- 34 *has a sh:cholarship* ((smiles, gazes to Joan, and returns pad))
- 35 Joan *a:ha ha hu*
- 36 Ali [+huh+ huh huh huh pu-°+heh+ ] *put-y-ha-glassis on*
- 37 Joan [((picks up and points to glasses)) ]
- 38 Joan ((looks at writing and starts to correct spelling))
- 39 Ali +um+ *well you apply for them, they work out what they're going to*
- 40 *put towards different things*

Written contribution: “how do they work out who has a scholarship”