Sutherland House School

Voice Output Communication Aid

Research Project

How does access to a computer based voice output communication aid (VOCA) system change the language and communication of children with both autism and severe expressive language disorder in class curricular activities?

Methodology Working Paper

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Sheffield Hallam University

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NORSACA
quality of life for people with autism

NORSACA

NORSACA is a regional charity working with people affected by autism. NORSACA operates from several sites in Nottinghamshire and Derbyshire. Our services also extend to adjacent counties where appropriate. We offer diagnosis and assessment of children; family support; a post-16 college; residential, day and outreach services for adults; publications, training, seminars and conferences for parents, carers and professionals.

For further information on NORSACA and Sutherland House School please visit our website: www.norsaca.org.uk

Sutherland House School

Sutherland House School is a non maintained special school run by NORSACA. It provides day education for up to 94 pupils with autism, aged 3 to 19 years. It operates from five sites in and around Nottingham. Pupils come from a wide catchment area, including the counties of Nottinghamshire, Derbyshire, Lincolnshire, Leicestershire and Rutland.

The school provides each pupil with a programme of learning which is tailored to his/her individual needs. There is a strong emphasis on developing language and communication, and the personal and social skills which will help pupils to achieve the highest level of independence possible.

The school was given an overall rating of 'outstanding' when last inspected by Ofsted in October 2007. From September 2008, the school will have Specialist School Status with a specialism in Communication and Interaction.

Sheffield Hallam University

The Autism Centre is based within the Division of Education and Humanities, Faculty of Development and Society, at Sheffield Hallam University. The Centre is an evolving and developing organisation dedicated to enabling people with autistic spectrum disorders, parents, families and professionals to access information about the autistic spectrum. The Autism Centre provides a programme of workshops, talks and lectures for professionals and families; research into all aspects of autism; accredited courses; papers and publications.

Methodology Working Paper
Sue Chantler, Dr Nick Hodge, Dr Lisa Reidy

Title of project

The impact of computer based, voice output communication aids (VOCAs) on the language and communication of children with autism.

Research Questions:

- **How does access to a computer-based output communication aid (VOCA) change the language and communication of children with both autism and severe expressive language disorder in class curricular activities?**
- **Does access to a computer based VOCA change speech output and expressive language complexity in children with autism and severe expressive language disorder?**
- **How do children with autism experience access to computer-based VOCAs in controlled and free-choice settings?**
- **How is their experience evaluated by their communication partners; including families, carers and staff?**

Research Aims: To

- provide research and descriptive data from our work with children with autism and severe language disorder and computer based AAC[i], to inform practice in this under-researched and controversial area.
- use a type of VOCA which can be economically created using educational and communication software run on school based hardware (in the context of the end of CAP[ii] funding and the prohibitive cost of dedicated aids).
- enable the views of the students, their parents and staff within the research process evaluation of the intervention
- use a form of intervention that can be replicated by staff in other schools. The project will build a core of resources which others can try, in the context of wide professional interest in this area.
- provide a basis for later longitudinal or larger scale studies.
- promote practice relevance at all stages, by recruiting a multidisciplinary advisory group for the project and by disseminating information about our work throughout the project process.

Pilot study. The original pilot study showed many strong design points. These include:

- both qualitative and quantitative data collection methods
- the fine-graded categorisation of language and behaviours, the inclusion of a standardised checklist/profile
- multiple data sources i.e. questionnaire and diary records from parents and staff, an attempt to collect data on children's preferences
- a clear pre- and post-intervention design with baseline data collection
- inclusion of a non-treatment condition
- measures of reliability for coding videoed assessments

Most of the above design points will be retained in the new study.

Sample size. This follow-up project would have been strengthened by an increased sample size. However, the difficulties in achieving this are acknowledged and a sample size of three is entirely consistent with previous published studies in this area i.e. AAC/VOCA interventions in autism (Lancioni et al., 2007).

Study design. Some of the best publications in this area (e.g. Olive et al, 2007; various recent publications by Sigafoos), utilise a multiple baseline/multiple probe design. This design allows the examination of treatment effects on multiple behaviours for individual participants: thus it is appropriate for the present study involving three participants. A standard version of this design introduces the intervention at staggered start times for the different participants and effects are shown when observed changes coincide with the interventions. Such a design, as compared to a standard design whereby participants receive baseline and intervention at the same point in time (ie No Treatment/Treatment), would show more clearly the effects of the intervention (Independent Variable) and guard against confounding variables.

In using the proposed design, there would be no requirement for an untreated condition (as was used in the pilot design). This would mean that a multiple baselines design may be easier to implement than the pilot design i.e. only one class subject per child would be studied. Varying the start time of the intervention also allows the primary investigator to focus on one child at a time to implement the intervention; a practical advantage given the time and resources available.

A key point for consideration, however, is that the child's experience of VOCA is not limited to the particular context of study i.e. the classroom situation. The children will have previous experience of VOCA use and will also be receiving ongoing input with the VOCA in the communication aid group and in individual sessions. In this respect, the present study contrasts with other published work in which exposure to VOCA is confined solely to the context of study. However, it is

argued by the research team that such tight control over VOCA use is not possible within the school context and there are clear ethical implications in withholding access to intervention for the purposes of this research. Thus, in order to ensure rigour in our design and to meet the standard for publication, we will take a full and detailed measure of the children's VOCA use in the other contexts (e.g. number of sessions attended, length of sessions) and this can be incorporated in our analyses, if appropriate.

Other forms of intervention. Children within the new study will also be receiving SLT input outside of the sessions monitored as part of the new study. This could introduce a potential confound: any improvements in the child's communication may be resulting from intervention delivered outside of this study. However, the multiple baselines/staggered start design should serve to control for such extraneous intervention effects.

Timeframe for study. It is proposed that the intervention (I) will run for 9 weeks with, in addition, sufficient initial sessions per child to collect reliable baseline data (see Table 1 below). The baseline sessions would continue for each child until it is possible to form a representative overview of the child's communication skills in that particular context, in the absence of the VOCA.

Intensity of intervention. This is reported to be poorly controlled or not reported in other studies (Olive et al., 2007). In the new study, intervention will take place weekly. Collecting data in this regular pattern over a 12 week time period will provide useful 'longitudinal' data that allows time mapping of intervention effects. For example, such a timeframe may indicate the length of time taken by the different children to show positive gains and whether there is an 'optimal' level of VOCA learning and use for each child.

Data collection. Children will be videoed in the weekly classroom session for a 15-20 minute period. In each session, this will be focused on the 'talking activity' which will provide a consistent and reliable context for studying the child's communicative behaviour (as similar prompts and elicitors are likely to be used by staff across these activities).

Although videoed material will be the main source of data, staff project diaries will also be used throughout the intervention and baseline period. Staff will be encouraged to record instances of language use which they deem to be novel or unusual, based on their knowledge of the child's communicative abilities..

Communicative behaviours (Dependent Variable). Recent review articles (e.g. Lancioni et al., 2007) indicate that many studies in this area focus solely on requesting behaviour. A small number of other studies also record broader indicators of social and communicative behaviour e.g. facial expressions, reduction in aberrant behaviours, improved word comprehension (Brady, 2000:

child learns to understand others' use of words in their VOCA). The pilot study monitored the following:

- Total amount of vocab used: sign, symbol, speech or VOCA
- Communication: range and frequency of verbal and nonverbal communicative acts, based on Pragmatics Profile of Everyday Communication Skills in School-Age Children (Dewart & Summers, 1995)
- Communicative acts categorised as 1) spontaneous or prompted: 2) directed to self or other

This appears sufficiently comprehensive in scope and consistent with recent published research (Olive et al., 2007). In particular, there are recent calls for more research on speech development in the context of VOCA intervention and speech output was recorded in the pilot design; a clear design strength. The new study will therefore code for the same communicative behaviours as in the pilot study.

Coding of communicative behaviours. A further design strength is that the communicative behaviours coded in the pilot study derive from an empirically-derived conceptual framework (i.e. Pragmatics profile). This may aid the justification for focusing on these aspects of communication when writing up the research. This may also aid in achieving a reliable coding scheme. As part of the pilot study, clear operational definitions of the behaviours to be coded, together with examples, have been generated. Good inter-rater agreement was achieved on the pilot by using this coding scheme. This scheme will thus be retained for the present study but there will be scope for elaboration on codings and a refinement of the scheme as part of ongoing data collection.

Child's focus of attention. The child's participation, as measured through their focus of attention, was also recorded in the pilot study although not included in the write-up. RC recoded the child's direction of attention at regular points throughout the video (e.g. to self, task, partner, teacher). This could also be coded from video samples in the new study. In discussion, however, the research team acknowledged the difficulty in identifying the child's focus of attention with accuracy and reliability.

Reliability of intervention procedures. "Fidelity of treatment checks" have been conducted in some highly rigorous studies in this area (e.g. Olive et al., 2007). In this particular study, an independent coder scored % of intervention steps implemented correctly. For the new study, the primary investigator will be conducting a number of induction sessions for staff involved in the research so all are fully briefed on how the intervention will be implemented. The individual sessions for the child (a context not used for data collection) will also provide further opportunities for briefing staff on intervention procedures. This process will be fully documented in order to provide sufficient details for publication.

Content of VOCA. The study will use a complex dynamic screen vocabulary package called Ingfield Dynamic Vocabulary (IDV) run on software called The Grid 2. The vocabulary is a well known communication resource developed by Janet Larcher. It has a progression of pre-made vocabulary pages for school age children. These pages aim to give children without speech a rich access to language. IDV includes the language for rhymes, book sharing, games and humour such as jokes and sound effects. Either the pre-made or amended pages will be used for the communication activities, as appropriate.

Giving children the opportunity to use such a rich system for communication may reveal the use of novel and generative output. In contrast to many published studies in which the systems are extremely simple (e.g. 4-8 items), this system may 'challenge' the children to build their language skills. Indeed, anecdotal evidence of creative language use through VOCA has suggested this may be the case. Thus, the project will aim to record instances in which the children generate novel, more complex language through access to VOCA, thereby revealing a generative capacity for language use rather than solely passive communication (e.g. Von Tezchner & Grove, 2003) Staff project diaries will be used to record any such instances occurring outside of the videoed interaction.

Parental input. There is a strong call in the literature (e.g. Lancioni et al., 2007) for social validation data. Even the most rigorously designed studies acknowledge having collected only minimal anecdotal data from parents and children. Therefore, the new study will collect data from parents pre- and post-intervention. A questionnaire will be devised which draws on the conceptual framework of the Pragmatics Profile and thus reflects the coding of the communicative behaviours within the study. Questions will be modified from the standardised version of the profile in order to be appropriate to the communicative level of the children and only relevant questions will be selected from the published schedule. To derive more qualitative data about parent's views and expectations about the intervention, open-ended questions will also be included and data analysed for themes. The research team recognise the value of parental input but are also keen to minimise demands on parents. Therefore, the questionnaire will be designed to be as concise as possible. The same questionnaire will be administered at the two timepoints (pre- and post), thereby permitting direct comparison of responses. It is likely that questions will be given as an interview rather than as questionnaire to be completed directly by the parents.

Children's views. Data will be collected from three sources in order to inform our understanding of the child's experiences and preferences:

1) the children will be offered the choice of using the VOCA in the lesson setting. The choice which will be offered to the children will be made during the lessons but at a post-intervention stage of the study. In this phase of data gathering the children will be in the subject lessons used as the focus for VOCA use and their VOCAs will be available in the room.

They will be offered a visual choice on a choice board in the format of 'VOCA Yes' or 'VOCA No' and the children's choices will provide data about whether or not they choose to use the VOCA in the lessons.

2) the ways that the children choose to use the VOCAs in the Communication Group sessions will be recorded, as a means of gathering data about each child's preference. It is anticipated that the last section of every third Communication Group will allow the children to use their VOCAs in whatever way they wish. Data will be generated through a combination of the on-going staff observation diaries and sample video recordings and will employ the concept of 'being with' the child (Morris, 2003) as a means to gather information through observation about their preferred choice of activity

3) the children all take part in 'tutorial' sessions with their key workers as part of their weekly timetable. These sessions are child-led and individualised. Each child is able to choose whatever activity they wish within the setting for the sessions. The VOCA can be available for use along with other activities, through the usual choice making activity. Data generated will focus on whether or not the child chooses to use the VOCA in preference to other activities which can include other IT materials such as using the computer.

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[i] *AAC:* Augmentative and alternative communication. *AAC includes all aids to communication from PECs to sign to high tech aids. In this study our focus is electronic aids which use computer technology.*

[ii] *CAP:* Communication Aids Programme*. Government fund set up to provide aids for children. This fund closed in March 06.*

Summary of Design

Initial phase of data collection: parental questionnaire
Baseline data collection (see Table 1, below): 20 minute video samples, staff project diaries
Intervention data collection (see Table 1, below): 20 minute video samples, staff project diaries
Final phase of data collection: parental questionnaire; administration of child choice paradigm to be monitored throughout

Table 1. Schedule of weekly baseline and intervention sessions for the three children

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18
Child 1	B	B	B	I	I	I	I	I	I	I	I	I						
Child 2	B	B	B	B	B	B	I	I	I	I	I	I	I	I	I			
Child 3	B	B	B	B	B	B	B	B	B	I	I	I	I	I	I	I	I	I

B= baseline
I = intervention