Language Representation on Dynamic Display AAC Devices: How do you choose?

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1.0 Introduction

Communication is considered to be an essential human need and therefore regarded as a basic human right. Nobody should be denied the opportunity to communicate to the best of their ability (National Joint Committee for Communication Needs of People with Severe Disabilities, 1992). As identified by Light (1989), some primary functions of communication include: expressions of wants and needs, exchange of information, social closeness and social etiquette. When the individual’s primary mode of communication (e.g. verbal or written) is not adequate to meet all functional and participatory needs, Augmentative and Alternative Communication may be used to support communication and bridge these gaps.

1.1 What is Augmentative and Alternative Communication (AAC)?

Augmentative and Alternative Communication (AAC) refers to a group of methods, strategies and/or techniques that support the use of functional and effective communication (Beukelman & Mirenda, 2005). It is an area of specialised clinical and educational practice that provides communication options and interventions for people with complex communication needs. Approximately one in five hundred people have complex communication needs in Australia (Perry, Reilly, Bloomberg & Johnson, 2002).

People with complex communication needs (i.e. speech and/or language difficulties) can use AAC to enhance existing communication methods or to replace absent speech. AAC can help people express themselves, have social interactions, participate in their community and provide opportunities to develop language (Beukelman & Mirenda, 2005). However, the main objective behind AAC is to support and enhance participation in all environments and to develop communicative competence to help an individual attain a high quality of life (Beukelman & Mirenda, 2005; Light 1997).

AAC can support communication for a wide range of individuals with varying diagnoses and complex communication needs. A review of the literature revealed an increase in speech production and communicative success with the use of AAC for children with autism spectrum disorder and pervasive developmental disorders (not otherwise specified) (Schlosser & Wendt, 2008). AAC has also been shown to successfully facilitate the language development of children with Apraxia of Speech (AOS), by providing them with increased opportunities to initiate and maintain communication.
Improved quality of communication has also been observed in adults with aphasia and range of neurological conditions (Jacobs, Drew, Ogletree & Pierce, 2004; Beukelman et al., 2007).

### 1.2 Types of AAC

AAC systems include symbols, aids, strategies and/or techniques, used by people with complex communication needs to allow more effective communication (Speech Pathology Australia, 2004). The integrated use of these systems work to supplement an individual’s use of body language, speech or writing for conveying messages. These AAC systems can be broadly categorised as “unaided” or “aided” and further categorised into high or low technology systems.

**Unaided AAC** incorporates communication strategies that do not require the use of communication resources external to the individual. Some examples of unaided AAC can include facial expression, body language, natural gestures and key word sign (previously Makaton) (SPA, 2004).

**Aided AAC** refers to resources used to assist communication. Aided AAC includes both low technology (low-tech) systems (e.g. object symbols, communication boards, scrapbooks) and high technology (high-tech) systems (e.g. speech output devices, desktop/portable computers and mobile technologies). High-tech AAC can be presented on static or dynamic displays (SPA, 2004).

On **static display devices**, language is organised into a grid format that corresponds with the number of icon windows of the device (such as the Go Talk 9+ pictured on the right). Most of these devices allow for recorded speech to be stored within the device and activated by pressing on the word/symbol. Often several layers of messages can be programmed for different pages, which are specific to particular communication settings/activities (Beukelman & Mirenda, 2005).
With dynamic display systems, page links are used to navigate and select symbols/words. Vocabulary items are usually organised in a ‘branch’ or ‘page tree’ structure whereby the main page provides access to various other pages. The user navigates to and from the various pages to locate words, phrases or messages. Pictures/symbols are often used to represent each word/phrase/message. Spelling pages are also available. Software is usually run on tablets and computers (Beukelman & Mirenda, 2005).

1.3 Why develop this resource?

At the current time in Australia, the release of new portable technologies has stimulated professional and community interest in AAC (McBride, 2011). Due to the increased ease of access and availability for devices such as the Apple iPad, there is an increased range of possible options to meet augmentative communicative needs (McBride, 2011). However, this wide range makes determining the most suitable and appropriate option for an individual a relatively complex process (Hill, 2010). In line with Speech Pathology Australia's (2004) recommendations and integration of evidence-based practice, it would be ideal that a systematic and principle-based approach be taken to select and match individual needs and wants with the ideal AAC system.

An evidence-based, assistive technology specific, theoretical model developed to complement the holistic approach of the World Health Organisation International Classification of Functioning, Disability and Health (WHO-ICF), is the Matching Person and Technology (MPT) model (Scherer, 1994; Hill, 2010). The MPT addresses the environmental, personal and technological factors that should to be considered when assessing a person’s need for AAC (Scherer & Craddock, 2002). This model prioritises the primary, secondary, and tertiary components that should be considered during the process of selecting a complete AAC system. These components are detailed in the figure below:
The Matching Person and Technology (MPT) model outlines that language-based characteristics are identified as primary considerations in the decision-making process when selecting an appropriate AAC system for a person with complex communication needs (as indicated in yellow shaded box in the above diagram).

To add further to the theoretical perspective of the MPT, McBride (2011) states that it is important to consider other language-based features of an AAC system such as the organisation of vocabulary and linguistic complexity (i.e. levels of grammatical content). It is said that whether a communication app for mainstream technology or communication software for traditional AAC devices is appropriate for an individual should be determined by incorporating a strong understanding of these MPT
components, language features and the communication needs and abilities of the potential user (McBride, 2011).

2.0  Considering primary components of the Matching Person and Technology (MPT) model within high-tech, dynamic display AAC language systems

2.1  Component One: Language Representation Methods

In reference to high-tech AAC, language systems utilise one or more of the following three language representation methods (LRMs): (i) single meaning pictures, (ii) alphabet-based methods and (iii) semantic compaction (Hill, 2010). The three AAC LRMs may operate in isolation or simultaneously depending on the language systems and the appearance of the visual overlay or display (Hill, 2010). Each of the three LRMs can be defined, characterised and identified within the high-tech, dynamic display AAC language systems is discussed and compared within the following sections and Table 1.

2.1.1  Single-Meaning Pictures

As the name suggests, one picture is used to represent one word or a phrase in a client’s AAC system. Vocabulary can be represented via personal photographs, pictures and/or published symbol sets such as Picture Communication Symbols (PCS Mayer-Johnson), Minspeak Icons (Semantic Compaction Systems) & Symbolstix (N2Y Inc.).

Due to the nature of single meaning pictures, this LRM may be employed for people with complex communication needs that do not have full command of spelling or literacy skills (ASHA, 2013). However, a major consideration of single meaning pictures is volume; as symbol-based vocabularies potentially will need to be vast to meet communication needs (Harris, Ryder, & Totten, 2010). For example, a normally developing three-year-old would require a symbol set of approximately 1000-1100 pictures (ASHA, 2013; Harris, Ryder, & Totten, 2010). To apply this knowledge to a high-tech, dynamic display AAC, a system that can display 50 symbols at a given time,
would require at least 22 pages to represent this vocabulary (ASHA, 2013). Further characteristics of this LRM can be seen outlined in Table 1 on pages 10-11 of this resource.

2.1.2 Alphabet Based Methods

There are four methods for alphabetic language representation in high-tech AAC language systems: (i) spelling (letter-by-letter typing for each word), (ii) word prediction (user starts to spell a word and the system provides a list of possible options based on input), (iii) whole words (pre-programmed or stored from previous entries) and (iv) abbreviation-expansion (two to three letter abbreviations can access whole word/phrases (ASHA, 2013)).

Alphabet based methods can be useful for literate AAC users as they are not dependent only on limited, anticipated and/or pre-programmed responses within the AAC device (Drager, Finke & Serpentine, 2010). Therefore, it can be a highly flexible method that allows equal access to core and fringe vocabularies (as discussed on page 12). Further characteristics of this LRM can be seen outlined in Table 1 on pages 10-11 of this resource.

2.1.3 Semantic Compaction

‘Minspeak’ is the semantic compaction system commonly used in Australia (Harris, Ryder, & Totten, 2010). Within a semantic compaction system, pictures take on multiple meanings, which when linked together in short sequences, create words, phrases and sentences (ASHA, 2013).

2.2 Component Two: Vocabulary

2.2.1 Core Vocabulary

Core vocabulary consists of only approximately 200 words, but makes up approximately 80% of the words we use to communicate (Cannon & Edmond, 2009). Core vocabularies typically consist of functional words and phrases that are used for
basic wants/needs, brief social exchanges and other information necessary across multiple environments (Glennon & DeCoste, 1997). The main aim of core vocabulary is to provide the AAC user with the ability to communicate successfully about a large range of topics with a condensed set of symbols (Drager, Finke & Serpentine, 2010).


2.2.2 Fringe Vocabulary

Fringe vocabulary consists of words/phrases that are unique, in that they meet the specific communication needs and interests of a particular AAC user (Harris, Ryder, & Totten, 2010). Therefore, fringe vocabularies are rich in content and contain topic-related words that are useful to an AAC user’s daily activities and environments. Many AAC language systems contain some pre-programmed fringe words/phrases. However, for fringe vocabularies to be highly useful and meaningful they should be selected in collaboration with the AAC user and/or “informants” (i.e. parents, spouse, adult son/daughter, carer/s, teachers, speech pathologists) who are familiar with his/her interests and common communication contexts (Beukelman and Mirenda, 2005). Examples of fringe vocabulary may include the names of specific people, locations, and activities, as well as preferred expressions (Glennen & DeCoste, 1997).
2.3 Component Three: Method of Utterance Generation

2.3.1 Spontaneous Novel Utterance Generation (SNUG)
Spontaneous, novel utterance generation (SNUG) allows individuals to access individual words and commonly used phrases. SNUG enables individuals to spontaneously say exactly what they want to say. The ability to independently select self-created utterances closely mimics how children develop language and how adults use language in everyday situations (Hill, 2010).

2.3.2 Pre-stored sentences
Pre-stored sentences allow short phrases/messages to be stored and accessed through a single hit. Pre-stored messages can be accessed quickly and loaded with pertinent information about a specific topic (e.g. Pre-storing an entire script for calling the doctor). Comments, interjections, remarks, and conversational fillers can also be pre-stored to provide for turn-taking and topic maintenance during conversations (Hill, 2010).

3.0 Additional language-based considerations within high-tech, dynamic display AAC language systems

3.1 Organisation of Vocabulary
For an AAC user to gain communicative benefit from a language system, vocabulary items need to be organised in a way that is effective and efficient to find and use (Drager, Finke & Serpentine, 2010). Organisation is particularly important as the user’s vocabulary grows to include an increasing amount of words and phrases that need to be stored (Beukelman & Mirenda, 2005). There are multiple vocabulary organisation methods for high-tech, dynamic display systems that operate, such as: semantic, grammatical, activity/environment based, alphabetic, frequency/importance of use, and visual scene displays.
‘Activity/environment based’ created in Symbol talker A in Grid 3

‘Grammatical based’ in TouchChat HD with WordPower

‘Alphabetic’ in Predictable

‘Visual Scene’ in Compass
4.0 References


Melbourne, Victoria: La Trobe University, School of Human Communication Sciences.


