

Symbol Systems

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Introduction

Before describing and comparing symbol systems used by the non-speaking population in Great Britain there are one or two issues that are worth discussing. The first can be illustrated by an anecdote as follows:-

In the summer of 1993 I spent a week in the Czech Republic giving talks on Augmentative and Alternative Communication, amongst other things. One day, after a large lunch at the Ministry of Education, a colleague and I were preparing for our afternoon presentations. We looked around for the toilets. Ahead were two likely-looking doors, one marked 'Z' and the other marked 'M'. My colleague looked desperate. Suddenly I remembered that I had with me some overhead projector sheets of basic Blissymbols carefully translated into Czech. I looked these out and we found the following:



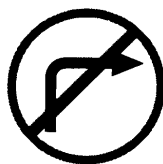
With great relief my female colleague rushed confidently in through the door marked 'Z'.

The important point here is that letters of an alphabet are only meaningful to people who speak and read the language to which the letters are referring. Spoken or written words do not hold universal meaning, but only act as a reference system for people who have learned that particular language. There is nothing in the sound or shape of the word 'žena' that would help non-Czech speakers to guess that it meant 'woman'.

To illustrate this further, most British travellers in Greece would have difficulty interpreting the street sign,

Απαγορεύεται η στροφή δεξιά

without it being accompanied by its international symbol,



In this case, not only are the words less universally understood than the symbol, but the alphabetic system is unfamiliar too. As children, most of us are lucky enough to learn to read and write our own language without too much difficulty. It then becomes hard to remember what it must be like not to be able to cope easily with the written word. It is only when faced with an alternative alphabet such as Greek or Arabic script that we remember just how arbitrary the shapes which represent the sounds of our language are. There is no reason why 'M' should represent a humming sound made with closed lips, or the shape 'F' should stand for a hissing sound with the upper teeth on the lower lip. An important aspect of augmentative communication symbol systems is that the shapes attempt to directly represent the meaning of the concept behind the word without resorting to the highly abstract level of sound relationships.

These illustrations may help to explain why it is that many non-speaking children are able to cope with learning what at first may appear to be quite complex symbols, despite persisting difficulties in reading and spelling. They are able to make the link between the symbol and the idea or object that it represents without having to add on a whole extra level of sound-letter relationships that make considerable extra cognitive demands on them.

The ability to read and write is a cultural expectation in the Western world and, as such, an important skill in the development of independence, personal esteem and in the pursuit of learning. There are, however, many children who as a result of the brain damage underlying their disability will find reading extremely difficult. Some may never learn to read while others may advance towards reading readiness very slowly. It is for these children and adults that communication through some means other than the conventional written or spoken word becomes imperative. There is no evidence that the introduction of a symbol system will hinder

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the development of reading skills and indeed many would argue that there are several underpinning skills towards reading that are positively encouraged by the use of a symbol-based system (James 1993; McNaughton 1993).

The History and Development of Symbol Systems

The use of symbol systems as a substitute for speech or as a support for poorly intelligible speech began to develop in the 1970s, initially with the development and extension of Blissymbols from the original work of Charles Bliss. As the success of the early symbol users began to become apparent and its use began to spread amongst the non-speaking non-reading physically disabled population, the need for such graphic systems was increasingly recognised and other systems were developed to fulfil the needs of those potential users with more severe learning difficulties.

These graphic or 'aided' systems are now used fairly extensively throughout the world and new developments have taken place in different countries to fulfil their own particular cultural and linguistic needs. As already discussed, the symbols represent meanings, not sounds, and therefore, while the vocabulary available in a system will reflect cultural needs to some extent, the systems are not restricted to a particular language. From a practical point of view, however, it is usually easier if one has access to dictionaries in one's own language.

There are quite a number of popular and fairly versatile communication systems which have been developed in the English-speaking world, mainly in North America (e.g., PCS, Picsyms, Bliss), the United Kingdom (e.g., Rebus, Makaton, Sigsymbols) and Australia (e.g., Compic). In Britain, some of the most widely used systems are probably Bliss, Rebus, Makaton (in which the early vocabulary is taken from Rebus) and PCS (Picture Communication Symbols). These are the main systems that will be discussed here. Many communication aids can be used with a range of symbol systems, but some come with their own set of symbols. *TouchTalkers* were originally designed to be used with Minspeak symbols and *DynaVox* uses Picsyms (renamed Dynasyms). These systems will also therefore be discussed.

Some Important Features of Symbol Systems

It is important when deciding on a system for a particular individual not to be too easily influenced by external factors such as the system that several other users are using, or the one for which there already happen to be teaching materials on the clinic or classroom shelves. Each potential communicator will have his own individual strengths and needs and these must always form the central part of the decision making process. All systems have their particular advantages and disadvantages and these must be matched to the cognitive, linguistic, sensory and physical abilities of the candidates. For some this will mean that a simple, concrete, picture-based set which may not have much flexibility and potential for expansion but is highly transparent (guessable) will be suitable, for others it may be particularly important to offer a system that has the potential to grow with the user and to convey a wide range of abstract concepts and fairly full grammatical structure. When looking at systems, therefore, we need to look at their:

1. **Construction** – visual clarity and ease of reproduction. Many people with physical and learning difficulties also have visual perception difficulties. Creators of symbol systems need to consider the best way to clearly depict each concept without making the resultant symbol too busy and perceptually confusing. Also, while symbol communicators may be physically unable to draw the symbols themselves, it may be worth considering whether it is useful if the instructors and carers can quickly and easily draw out the symbols e.g., to write up the user's news, caption his work, etc..
2. **Level of symbolic representation** – the degree to which the symbols effectively convey the concepts they represent and the level of iconicity in the representations. These strands are not always compatible, as the more pictorial (iconic) symbols tend to depict one particular example of a meaning only, e.g., if the word 'to save' is depicted by a pictorial symbol of coins dropping into a money box then this cannot effectively be used to mean *to save from drowning*. A slightly more abstract symbol representing the concept, *to keep for the future* would validly convey the whole meaning of the word. This is an important point that needs to be considered when matching particular individuals to appropriate symbol systems. As stated by Sevcik, Ronski and Wilkinson (1991):

“With symbolic representation, the freedom from an image-based referent increases the power for generalisation and permits the user to move beyond direct correspondences between the medium and its representation to broader internal representations.”

The extent to which a potential symbol user will be able to learn less concrete symbolisations, however, will depend on his or her developmental level (see Appendix).

- 3. Flexibility** – the potential for vocabulary expansion and grammatical structure, i.e. the ability to generate new meanings and to convey shades of meaning on a chart with an inevitably limited vocabulary selection. For example, the symbol for drink on a particular user's chart may usually be interpreted as 'I want a drink'. In order to convey information such as, 'I had a drink on the outing', or 'I don't like orange juice, I prefer Coca Cola', he or she needs to have access to specific symbols such as a Past Tense indicator, Negative, and ways of indicating more specific information concerning the drinks.

Symbol Sets and Systems

Augmentative communication systems vary along a continuum from simple, finite sets of pictorial symbols to fairly flexible and linguistically more sophisticated systems (Vanderheiden and Lloyd, 1986; Schlosser, 1996). The former may be of particular use to people with severe learning difficulties or a severe acquired language disorder in that they usually consist of fairly clear, concrete pictures with which everyday needs and wishes can be conveyed. Ease of recognition (often described as 'high iconicity' or 'transparency') reduces the cognitive load imposed in learning the symbols. They do not, however, have clearly defined rules for expansion of vocabulary and grammar to allow ideas such as verb tenses, descriptive terms or spatial concepts to be conveyed and do not easily join together to form sentence sequences. At the other end of the symbol continuum (but still considerably easier to learn than the sound-based representation of meaning found in traditional orthography) are systems such as Blissymbols which allow a wide range of meaning, both concrete and abstract, to be conveyed and which have the potential for personally constructed grammatical sequences with which higher functioning non-readers can participate in quite high level communicative interaction.

The simplest level of **picture sets** will often be home-made, either photographs or clear, coloured pictures. Commercially produced sets such as **Pick 'n Stick** stickers (from Winslow) are also available and have an alternative black-and-white version that might be more suitable for some adults.

There are several pictographic symbol sets and systems which could all be said to offer a relatively similar basic level of pictographic representation. These are Rebus, Makaton, PCS and Picsyms. These have, however, all been expanding recently and not all in the same direction:

Picture Communication Symbols (PCS) (available from Winslow, Boardmaker software available from Don Johnson) consists of three large ring-binders of around 3,000 symbols. These are divided into sections headed Social, People, Verbs, Descriptive, Nouns and Miscellaneous and a few on Food and Leisure. On the whole, the symbols are clear with some objects depicted as black silhouettes, but some are fairly busy, visually, and some of the vocabulary seems very American. Auxiliary verbs (e.g., is, was, had, did) are not included and there are no rules for marking tense. Strictly speaking, therefore, PCS is a large symbol set, rather than a rule-governed system. PCS, however, provide the library of symbols that comes with Boardmaker software, in which they are available in either colour or black and white. The conversion of the symbols into colour has greatly increased their visual clarity and the versatile nature of the Boardmaker program has made these symbols a popular choice for a range of uses beyond the production of communication charts. They are increasingly being used to support non-readers, who are not necessarily non-speakers, e.g. on symbol timetables, environmental labels, symbol posters and instruction sheets, and in a wide range of speech and language therapy intervention materials.

Rebus (Rebus Glossary available from LDA, Rebus software from Widgit) was developed in this country from the original American Peabody Rebus Reading Programme. A glossary with supplement, of about 950 symbols in total, has been available for many years. Recently a working group has been expanding the system to include vocabulary for topics such as Cooking and Shopping, Personal Care, the Outdoor World and various aspects of the National Curriculum. There are currently over 1,600 symbols available in a computer software package for Archimedes and PC compatibles. The symbols are clear and simple on the whole. The working group are open to ideas for new vocabulary from professionals around the country (contact Widgit Software) and have a flexible attitude to personal extensions for individual needs.

Makaton Symbols (available from Makaton Vocabulary Development Project) were originally based on the Rebus Glossary. Almost all the original 350 symbols are therefore the same as Rebus. Recently the Makaton Vocabulary Development Project has also been extending its range of symbols to allow access to the National Curriculum. Currently the subject areas covered are English, Maths, Science, Geography, History and Technology. The symbols are clear and bold, but attempts have been made to represent some fairly complex vocabulary and the resulting symbols are often extremely abstract and specific e.g., to maths or science. There are about 1,000 symbols in total at present.

Picsyms (available from Winslow Press) were originally produced in a book containing around 840 symbols. These have a fairly systematic logic underpinning the representations and guidelines are suggested for personal development of further vocabulary. The conventions used, however, can at times reduce the visual clarity of the symbols making them somewhat perceptually confusing, for example, the major focus of the symbol is often depicted in continuous lines against a background of modifying information depicted in dotted lines. The Picsym vocabulary has been extended to provide the Dynasyms used with the DynaVox range of speech output communication aids.

At a slightly higher level of symbolic representation is Bliss:-

The Blissymbol Communication System (available from Blissymbol Communication UK) originates from the work of Charles Bliss whose intention was to create an international written language that could be used for a number of trans-linguistic purposes. His work has been developed and expanded from headquarters in Canada over more than 20 years to provide a flexible and creative system of communication for non-speaking children and adults. It is particularly suitable for people with cerebral palsy who may continue to find reading and spelling difficult but who nonetheless require a system of communication that will expand beyond the more concrete levels of most pictorial symbol systems and allow access to a linguistically flexible means of communication. There are several ways in which the vocabulary available on a user's display can be extended despite severe physical limitations. There is also a careful logic throughout the system which means that as the vocabulary requirements of a particular user increase so they can build on their existing knowledge of more concrete symbols and learn the more abstract ones with less cognitive effort than would be needed to learn more arbitrary representations. This is because Bliss combines elements already learned to create new meanings. The symbol for *bank*, for example, is a combination of the symbols for *building* and *money*, while the symbol for *day* consists of the symbol for *sun* over the symbol for *earth*. Bliss also has the facility for creating grammatical sentences using tense markers and indicators for plural, adjective, possessive, etc., if required. There are around 2,500 symbols in the Blissymbol Reference Guide plus strategies for the user to alter and expand meanings, providing an extremely open-ended system.

These then are some of the most popular systems currently being used with various population groups in Britain, several (Rebus, Makaton and PCS) competing at the more pictorial end of the symbolic representational scale and one (Bliss) that bridges the still wide gap between pictorial symbol communication and conventional literacy

There are increasing numbers of non-speaking people now being introduced to speech output communication aids. Some such aids, which are produced by Liberator Ltd. in the UK, e.g. *TouchTalker*, *DeltaTalker* and *Liberator* come with a system known as Minspeak:-

Minspeak Symbols (or 'Minsymbols') are used in a rather different way to the systems already described. They were developed specifically to give access to a large range of pre-stored synthetically spoken words and phrases but using a finite number of keys (128 maximum). Each key or location on the overlay has a symbol or 'icon' assigned to it. Users learn to make connections between two or more icons in order to create new meanings using a range of attributes and associated features of each icon. An example might be the icon *apple*, which might stand for *food*, *red*, *round*, or even *temptation*. To produce the sentence *I'm not hungry*, the user might learn to press the icon *apple* followed by the icon of a ribbon tied in a *knot*. This can create an interesting way for older users, with already well-developed inner language and life experience, to set up mnemonic associations that will help them recall the icon sequences. In using the system as it stands, however, it is important to be aware of the distorted understanding of basic concepts that this could possibly have for some people with learning difficulties or language disorder. A second and possibly more important point is that, as multimeaning symbols endowed with a range of personally learnt associations, they cannot be used to convey meaning on a 'silent' communication chart, as the communication partner would have no way of knowing which of the range of meanings was intended in a given sequence. (For interesting discussion and comments by Margareta Jennische see McNaughton, 1992).

Some Comparisons between Systems


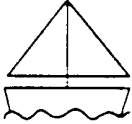


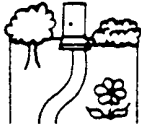






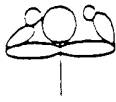
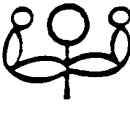





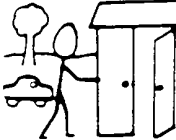
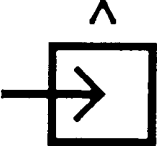




Samples of vocabulary from four of the more commonly used systems in Britain are given in Figures 1 and 2. The symbols were chosen to give examples of some of the following points:

- 1 Many Rebus and Makaton symbols are similar because the early Makaton symbols were based on Rebus. Makaton uses stronger, bolder lines.
- 2 Some pictorial symbols are overcrowded and visually 'busy', e.g. PCS symbols for *garden* and *to enter*. On the whole Rebus and Makaton symbols are clearer and simpler than PCS, although the

use of black silhouettes in PCS, e.g. *boat* makes a few of the symbols very clear and the addition of colour to the PCS library on Boardmaker has enhanced their clarity. Blissymbols are very stylised and therefore less pictorial but clear and easy to reproduce. Visual clarity will be an important consideration for people with a visual impairment.

3. Abstract vocabulary is always difficult to depict. Some systems resort to traditional orthography at times, e.g. *for* in PCS, which seems to contradict the main reason for using symbol systems, i.e. for use by those who are not able to cope easily with reading.
4. Where the main attribute of a concept is easily illustrated symbols are often similar across all four systems, e.g. *strong*, *through*.
5. With pictorial symbols it is not always possible to encapsulate the full range of meaning, so one typical situation may be illustrated, e.g., *to need* in PCS; *for* in Rebus; *to wash* in PCS, Rebus and Makaton. This means that the symbol is less conceptually complete or valid and consequently

Fig. 1 Comparison of Symbol Systems – Words / concepts which are fairly easy to depict

Word	PCS	Rebus	Makaton	Bliss
<i>boat</i>				
<i>garden/yard</i>				
<i>bank</i>				
<i>strong</i>				
<i>to wash</i>				
<i>to enter</i>				
<i>through</i>				

less versatile. Some systems provide different pictorial symbols for different situations, e.g., *to wash hands* and *to wash face*. For some symbol communicators with severe learning difficulties these very pictorial examples will be necessary but they will, of course, take up more space on a chart

6. The only system which is able to offer really open access to vocabulary, including some very abstract concepts, is Bliss. In order to interpret some of the symbols, however, the user needs to understand the underlying symbol elements, e.g., *suddenly* is made up of *time* + *lightning* (*sky* + *electricity*). Bliss is therefore most suitable for more able children and adults who may in time require a wide and flexible vocabulary. For less able individuals ease of learning and recognition will be more important.
7. Bliss has markers for word classes (verb, adjective, etc.), e.g., *to enter*, *strong*, which allows more versatility and makes the system more truly linguistic. This may be important for more able communicators, but is less likely to be relevant to those with severe learning difficulties.
8. Some symbol dictionaries offer two different sizes of symbols, others suggest they are enlarged or shrunk from the Master Set to suit each user. The symbols in Figures 1 and 2 have been adjusted to matching sizes.

Fig. 2 Comparison of Symbol Systems – Some More Abstract Concepts

Word	PCS	Rebus	Makaton	Bliss
<i>animal</i>				
<i>danger</i>				
<i>suddenly</i>				
<i>to need</i>				
<i>not</i>				
<i>for</i>	<i>for</i>			

Multimodal Communication

All of us use a range of modalities with which to convey meaning and, while for most of us our primary linguistic mode of communication is through speech, we would be poor communicators without the supporting role of facial expression, gesture, body movement and, particularly where the communication partner is not present, the alternative linguistic modality of the written word. Symbol users also should be encouraged to use a range of communication modalities, for example, a symbol chart backed up by gesture, or a combination of symbols and words or letters if appropriate. Most speaking people have the freedom to communicate at all times whatever the circumstances, and they experience tremendous frustration when that possibility is temporarily removed, due to excessive noise or a bout of laryngitis, for example. Efforts should be made to ensure that non-speakers also have a primary means of communication in all situations. Those children and adults who use a high-tech. communication aid must, therefore, have some back-up for when the machinery breaks down or the batteries need charging and for specific environments where it is not feasible for them to use their machine. It is strongly recommended, therefore, that all symbol users continue to have a chart or communication book in addition to any technology they may acquire.

Thought needs to be given as to how best these low- and high-tech. aids can complement each other. Clearly it is to the user's advantage if the same symbol system can be used on both chart and machine. This is usually fairly straightforward. Rebus, Makaton and PCS can all easily be used on most of the communication aids aimed at beginners or those requiring a limited number of messages only, particularly where a single hit will produce a message. Bliss lends itself well to more extended use where symbols can be combined to produce a large set of multi-hit messages (MacDonald 1989 and 1990). This might include some of the special Bliss strategies such as *opposite meaning*, *combine*, *command / request*, *similar to*, *negative*, or action and tense markers. Using Minspeak symbols, however, as the selection set on a voice output communication aid means that a user cannot have the same symbol system on both their machine and their communication chart. For this reason, even on Minspeak-based machines, many therapists and teachers are opting to use whatever symbol system the user is employing on his or her chart to also represent the messages stored in his or her machine.

Concluding Points

1. Graphic symbol systems offer a particularly suitable medium of communication for non-speaking children and adults with additional physical disability.
2. Indication may be by pointing with a finger, eye-gaze, a head-pointer, or switches on a communication aid.
3. Symbol systems are much more powerful than pictures but they may initially require more effort to learn.
4. Symbol communication can be slow due to physical limitations but it is much faster than spelling out every word.
5. An appropriate word or phrase usually accompanies each symbol on a display, so that they can be understood relatively easily by strangers.
6. Symbols can be used effectively on many communication aids.
7. It is now possible to buy computer software with which to print out symbols from most graphic symbol systems.
8. To allow every user to reach his or her full potential the system must be carefully and appropriately matched to their needs.

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APPENDIX – Symbolic Development

As children develop they are increasingly able to understand that representations of decreasing perceptual similarity to the original object may act as a symbolic reference. This is important when assessing young children, or adults with severe learning difficulties for augmentative communication.

The following hierarchy was based on the work of Cooper, Moodley and Reynell (1978) and Judy DeLoache (1987) (see MacDonald and Rendle (1994) and is confirmed from research by Mirenda and Locke (1989).

1. **Real objects and large dolls** – The child begins to extend his focus beyond himself, to recognise the significance of commonly used objects and to play with these in pretend sequences.
2. **Photographs** – Clear coloured photographs are recognised as exact representations of the real item.
3. **Miniatures / small doll materials** – These will differ significantly in size and possibly in other visual features from the real item.
4. **Coloured pictures** – Two-dimensional, but still fairly realistic.
5. **Line drawings (realistic / sketches)** – Visually less realistic, but still very picture-like.
6. **Line drawings (minimal and stylised)** – Simplified outlines as, for example, in pictorial Blissymbols. Perceptual and conceptual development should allow children from this stage to become increasingly able to understand logically related symbol referents.
7. **Written words** – Completely abstract symbols which relate to sounds rather than meaning.

Symbol Systems – Addresses

Blissymbol Communication UK, ACE Centre, Waynefleete Road, Headington, Oxford OX3 8DD. Tel. 01865 764958

Don Johnson Special Needs, 18 Clarendon Court, Calver Road, Winwick Quay, Warrington WA2 8OP. Tel. 01925 241642

LDA (Learning Development Aids), Duke Street, Wisbech, Cambs. PE13 2AE. Tel. (0945) 63441

Liberator Ltd., Whitegates, Lincs. NG33 4PA. Tel. 0800 622457.

Makaton Vocabulary Development Project, 31 Firwood Drive, Camberley GU15 3QD.

Widgit Software, 102 Radford Road, Leamington Spa, Warwicks CV1 1LF. Tel. 01926 885303

Winslow, Telford Road, Bicester, Oxon. OX6 0TS. Tel. 01869 244 644.