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A preliminary study of learnable pictogram languages

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1. Introduction: Pictogram language is a type of communication tool

In 1930, Otto Neurath observed that graphic symbols could become a language with defined meanings that could be learned. In the case of English graphic symbols, people could easily learn to understand them. At first, there were around 850 English words that could be translated into graphic symbols. Since users have learned and developed them, pictographic systems of communication have become popular language in the world today (Hermann, 2003). Furthermore, Maurer (1985) points out that symbolic communication has existed and been developed for some time. Thus, pictogram language can be a learnable communication tool.

The focus of this paper will be on written pictogram languages. The four non-phonetic pictogram languages that will be compared are Blissymbolics, Picture Communication Symbols (PCS), the Elephant's Memory, and ASCII pictograms. Blissymbolics and Picture Communication Symbols (PCS) have been used to provide aphasia patients, or people who have learning disabilities, with a practical means of communication. The Elephant's Memory is suitable for children or adults who would like to increase their creativity. The unique characteristic is that it is the only non-linear pictogram language we have so far. ASCII is used to create emoticons on mobile phones and SMS.

Pictogram languages are starting to play an important role in our daily life for normal people as well as those with disabilities. We would like to understand the kind of problems that users will face when reading/using them. Thus, we would like to start by analysing Blissymbolics and PCS, because the main users of these two pictogram languages have speaking problems and use pictogram languages as their main communication tool. Also, we would like to learn from the Internet feedback on the Elephant's Memory and ASCII which are designed for general use. ASCII is interesting because it has been used to create emoticons, and its use has spread worldwide via the Internet. Knowing how people learn and recognize pictogram languages by analysing the chosen languages would be a useful approach. Since we would like to know how the structures function and how readers feed back, the study will be an intrinsic and extrinsic pictogram language study.

There are conflicting schools of thought as to how learnable or useful are these languages. Muter and Johns (Muter, 1985) stated that pictogram languages might be easier to learn than alphabet based languages in a wide range of situations. In their experiments they used Chinese, Blissymbolics and English characters as examples. They also pointed out that technology might make an increased use of pictograms in the future.

On the other hand, John DeFrancis and J. Marshall Unger argue that pictogram languages are impossible to learn and practice. In their article, 'Rejoinder to Geoffrey Sampson, "Chinese script and the diversity of writing systems"' (DeFrancis, 1994), they asserted that:

> We note too that first languages are naturally ACQUIRED by human beings, unlike second languages and literacy, which must be LEARNED. From these elementary considerations, it is clear that an indefinite increase in the 'expressive potential' of partial writing is impossible: because it is essentially ad hoc, the system eventually becomes unlearnable and impractical… And for the same reason that codes (unlike cipher) are secure unless the codebook is captured, pure or nearly pure logographic writing systems are unlearnable and impractical.

In their paper, they omitted the practical pictogram languages, such as Blissymbolics, PCS or other similar ones which are proving to be so popular and helpful to disabled writers.

2. Examples of non-phonetic pictogram language: Blissymbolics, Picture Communication Symbols, the Elephant's Memory, and ASCII

2.1.Blissymbolics

2.1.1 History

The creator, Charles K. Bliss, created an easy-to-learn international auxiliary language to allow communication between people who do not speak the same language. Since the 1960s, Blissymbolics have become popular as a method of Augmentative and Alternative Communication (AAC) for non-speaking people with a variety of disorders, for whom it can be impossible to communicate by other means. Blissymbolics Communication International (BCI) dates its usage from 1971, and standard Blissymbolics language structure and vocabulary is based on and derived from Bliss' work 'Semantography' (1949). BCI developed Blissymbolics in accordance with the needs of its users, which include:

- National, cultural, and developmental differences;
- The maintenance of the logic of the system;
- The maintenance of Blissymbolics as a multicultural language;
- Sensitivity to the practical and pragmatic needs for communication.

(The fundamental rules of Blissymbolics: creating new Blissymbolics characters and vocabulary, 2004)

By supporting the needs of certain people for daily life and adapting to the development of technology, BCI also helps to create or develop new words and the use of computers as a communication tool. In other words, BCI considers that Blissymbolics is a living language, continuing to create new vocabulary. Therefore, explicit guidelines are necessary to ensure precision and accuracy in those Blissymbolics comprising the BCI Authorized Vocabulary. Moreover, computer implementation imposes certain restrictions which can be met more easily by following an explicit set of guidelines.

2.1.2 Elements

Blissymbolics is an ideographic writing system consisting of several hundred basic symbols, each representing a concept, which can be combined together to generate new symbols that represent new concepts. There had not been enough graphic objects to express new digital information before, so the Blissymbolics system has created new ones, such as 'email'. Most of the objects are created using abstract elements and the system has a robust structure, so that new objects are easy to create and people can read them quickly if they know the rules of the representation. If people can't understand the basic rules or composition the first time, it might be difficult for the readers to understand these ideas, since Blissymbolics is created from abstract graphics. There are some examples of frequent words below. All the figures of Blissymbolics come from *The fundamental rules of Blissymbolics: creating new Blissymbolics characters and vocabulary(2004),* besides Figure 9.

Figure 1 Symbols of Blissymbolics

As you see, Blissymbolics may also appear to be combined with other Bliss-characters to form other words. These kinds of word combinations can help readers to learn them more quickly and effectively. Even people, who just know the basic pictograms, once they know the rules of creating new pictograms, will get the meaning by linking the relationships between pictograms. A 'house' and a 'medical' pictogram, for example, represent a 'hospital', and when a 'house' goes with a 'money' symbol that means a 'bank'.

Figure 2 Symbols-expanding

Blissymbolics consist of black-and-white lines and simple elements without colour and other complexities such as a shadow. Thus it is graphic.

The formatting position on the page is important in BCS. Therefore, size, angle, direction, and position play important roles as well.

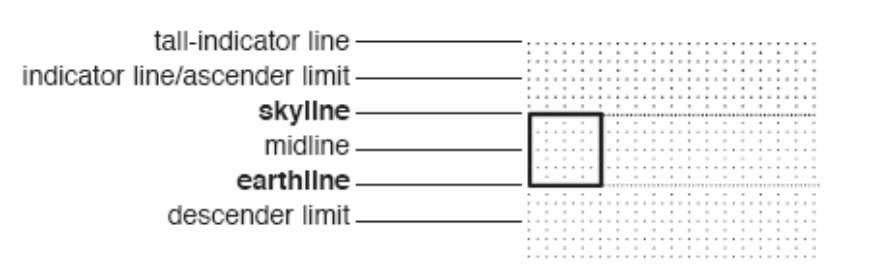


Figure 3 The basic guideline of Blissymbolics symbol

The recent development of BCS software means that if the position or space of a pictogram is incorrect, its meaning can't be recognized by the computer.

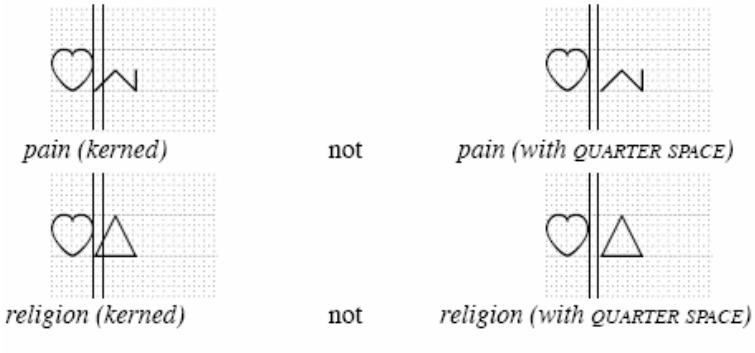


Figure 4 The position of Blissymbolics

Size is another grammatical structure. For example, both sun and mouth are shown as a circle, but the size is the key point that distinguishes them.

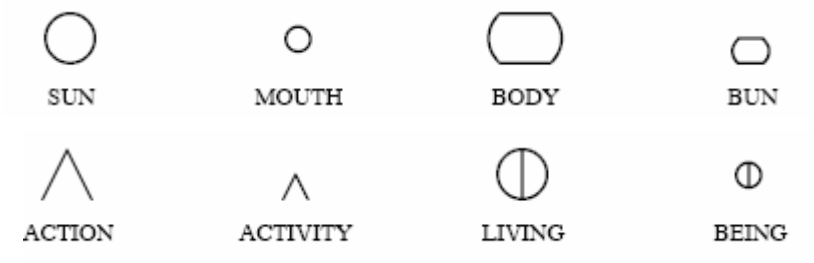


Figure 5 Size of Blissymbolics

In Blissymbolics, additional signs are very important to help create new pictograms, such as punctuation marks, arrows, and ‘ ^ > v < ’. Once we know the rules of size, position etc, when we read the following pictograms, we find that it is easier to remember their meanings The ‘ ⬭ ’ represents the body, and ‘ v ’ shows which part of the body’s being referred.

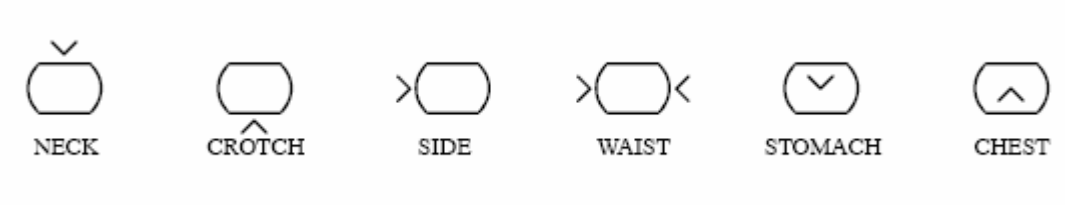


Figure 6 Additional signs of Blissymbolics

Another style of directing relationship between signs is using a set of signs, like ‘)’ and ‘(’.

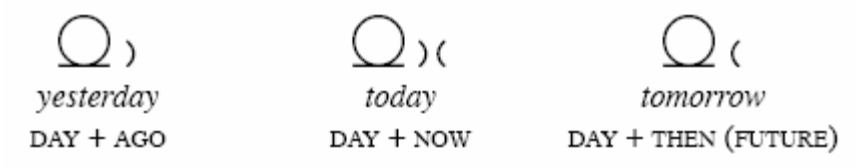


Figure 7 Additional signs of Blissymbolics

2.1.3 Structure

In Blissymbolics, space and position are two key points. Thus, when users present a sentence, each pictogram should be put in its right place. For example, the punctuation marks have to be put in the front of all pictograms.

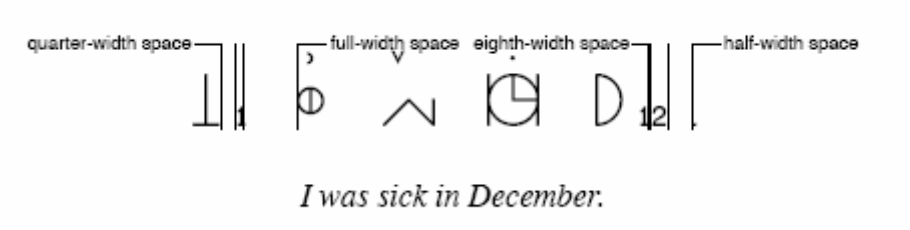
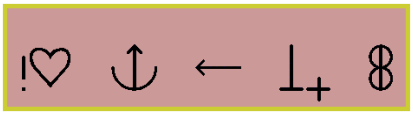
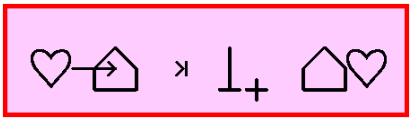


Figure 8 Presentation of Blissymbolics

In this system, its structure is linear but shows expression clearly and directly. For instance, there is a “?”sign in front of a questioning sentence or a “!” at the beginning of a pictogram that express surprise or wonder. It uses combinations of symbols to describe attributes.


Please return my money!


Welcome to my home.

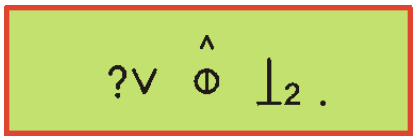

How are you?

Figure 9 The Bliss sentences: http://www.symbols.net/blissymbolics/phrases1/

A sign is shown in front of a sentence and shows its attributes by different marks; in this case it is similar to English. So, the attributes in this system are very clearly organized.

When users want to present comparative ideas, Blissymbolics adds ‘  ’ to this pictogram.

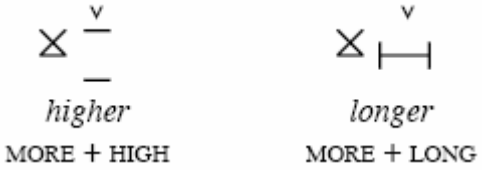


Figure 10 Comparative sings of Blissymbolics

2.2 PCS (Picture Communication Symbols)

2.2.1 History

PCS is an abbreviation of Picture Communication Symbols. It originated in the United States as three photocopy files containing symbols divided into sections, such as people, verbs, descriptive, nouns, and so on. This refers to a set of symbols composed ‘primarily of simple lines with printed words above them’ (Lloyd et al., 1997, p.537). They comprised a pictographic symbol set with a large number of symbols, which would allow the depiction of a broad array of concepts (Mayer-Johnson, 1984, 1985).

The aim of PCS is to provide symbol-based products, training and services for individuals with special needs. Nowadays, approximately 10,000 PCS symbols are available in 40 languages like German and Chinese, and it is used worldwide.

The objective of the system is to enable those persons whose speech is unintelligible or nonexistent to communicate with others. This can involve sign language, the written word, picture symbols, and other aids and techniques. Devices are available that are dedicated to enhance communication. Many of these devices include voice and scanning capabilities. The symbols are more colourful than other pictogram languages although some symbols are black-and-white. Many symbols are more representational, as when human facial expressions are used instead of abstract graphics. For example, when the meaning is, 'like', the symbol is a 'smiley face' not a graphic symbol for 'heart'.

PCS needs software to form sentences, and also "Boardmaker", "Talking Screen" and "Writing with Symbols". Boardmaker is a tool which contains Picture Communication Symbols (PCS) in bitmap format for communication and learning. All the examples of PCS come from http://www.mayer-johnson.com/default.aspx in 2004.

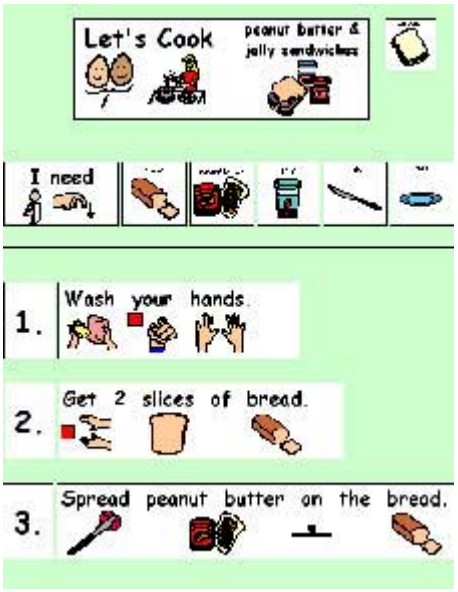


Figure 11 The use of Picture Communication Symbols

2.2.2 Elements

The original Boardmaker programme was developed by staff at the Erinoak Hospital in Canada. There are now approximately 8,000 individual picture symbols available in many different formats. They have been translated into many languages and are being developed constantly. Also, it uses many gestures and arrows to represent ideas. Thus, we can say that PCS pictograms contain both representational and abstract features. For example, 'is' and 'are' might be presented by '='. It can be represented both in computer and printing media. People can use Boardmaker to display their ideas with the pictograms.

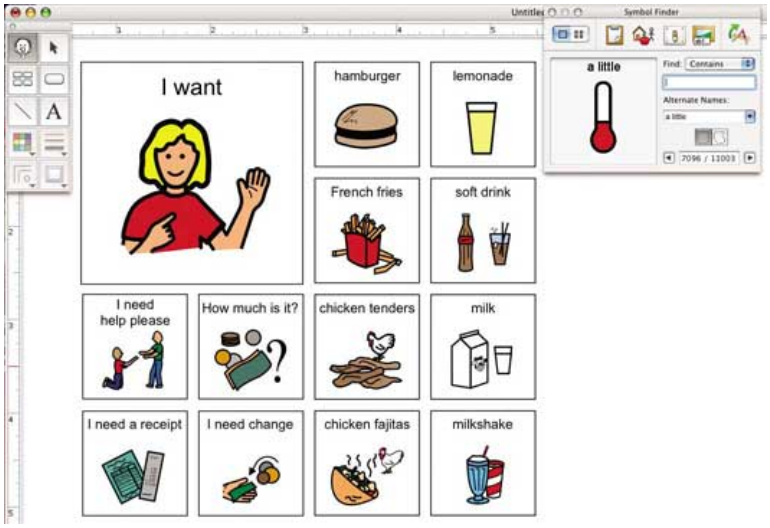


Figure 12 Boardmaker of PCS

As in the example below, if we don't use the individual symbols, the pictograms of football game become two pictograms - football and game.

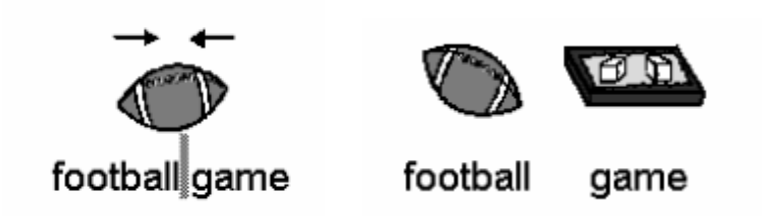


Figure 13 Association with 'words'

PCS is a more effective and user friendly communication tool than other fixed pictogram languages as it offers more choices.

Figure 14 Pictograms with same meanings

Writing with Symbols allows you to mix the symbols from more than one set, allowing you to use the image that the user prefers, rather than being restricted to a single set.

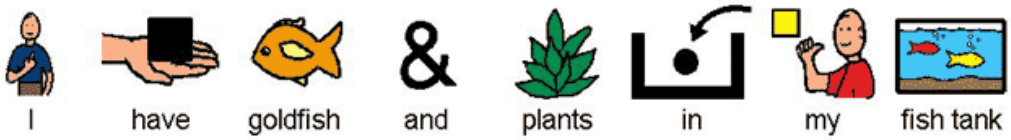


Figure 15 PCS sentence

2.2.3 Structure

The structure is linear, like spoken language, and so it expresses meaning by consecutive symbols. Sometimes one symbol might represent one "meaning" rather than one word. In this view, it is very different from Blissymbolics. For instance, the phrase 'How are you?' is represented by using just one combined picture which consists of a question mark and the graphic for gesture.

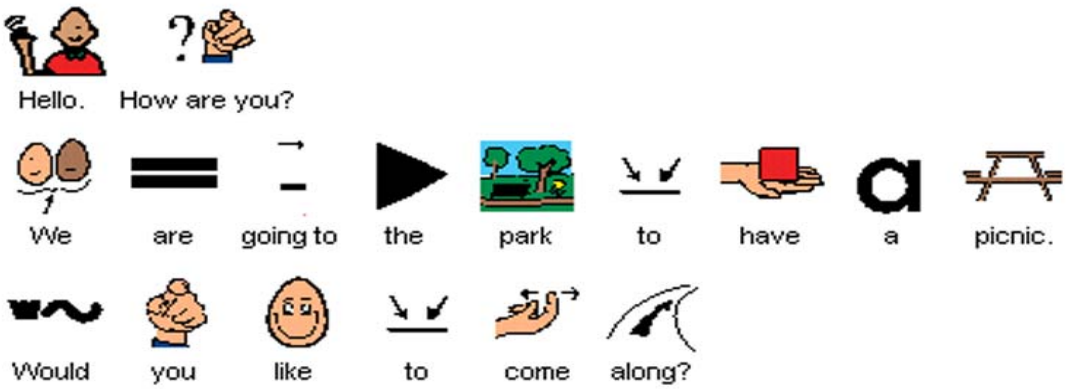


Figure 16 PCS sentences

It also uses arrows to represent time. Using facial expressions or pronunciation to show the emotion of the sentences is its characteristic. For instance, if there is a 'W~' in front of one sentence, this means 'would' and the sentence becomes a question.

The structure of the system basically follows spoken English, but it might be developed or modified to suit another western language easily. It uses lots of gestures so that people who can read gestural language might be able to learn it more quickly. The colourful symbols might be attractive to children, since the symbols are vivid to attract the reader's eyes. PCS could also be presented in black and white, and users can decide what kind of style they want to see.

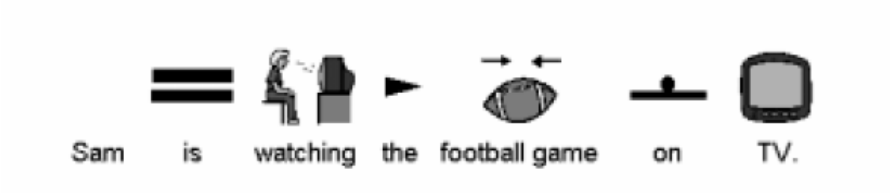


Figure 17 Presentation in black and white

2.3. The Elephant's Memory

2.3.1 History

The Elephant's Memory was created by Timothee Ingen-Housz between 1996 and 1998. Ingen-Housz is a French-Dutch artist who works in the expanding field of media arts. He discovered the Internet and started working on a pictorial language in 1993. After two years, he attended the Academy of Media Arts, Cologne, Germany (Timothee Ingen-Housz , 1999).

In this language system, the keyboard-based software requires the ability to transform graphic objects (in size, orientation, and position) and create hyperlinked documents that are potentially attached to audiovisual files. A global environment harmonizing a tutorial and a functional workspace is then required.

The Elephant's Memory consists of about 200 symbols and icons, which can be combined in order to create sentences.

The aim of the system is "to set up an experimental research environment which gathers a community of users to explore the field of invented languages and the questions orbiting around their form, structure, and development process", especially for children. In other words, it tries to offer students and educators the ability to search for new ways of envisioning communication. They can be rendered on a laptop or projected onto a giant screen, and they will be equally recognizable and identifiable. Their rounded shapes create a homogenous style that sets the visual identity of the language and makes them attractive to children. They can be rendered in a simulated 3D effect to give more solidity and to be manipulated.

2.3.2 Elements

It consists of more than 200 combinable graphic objects so far, and continues to develop. Most of the elements are created from several basic ideas; for instance, a circle means 'all'. When the pictogram is added a 'cross', it means the opposite idea. The example figures of the Elephant's Memory all come from Ingen-Housz, Timothee (1999). The Elephant's Memory.

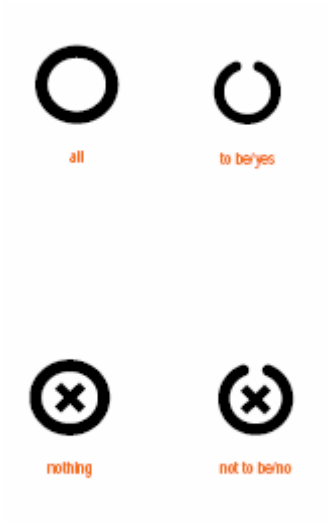


Figure 18 Symbol-expanding

Once the basic pictogram is fixed, more and more related ideas can be developed from the essential one. Housz described these as 'linked logograms'.

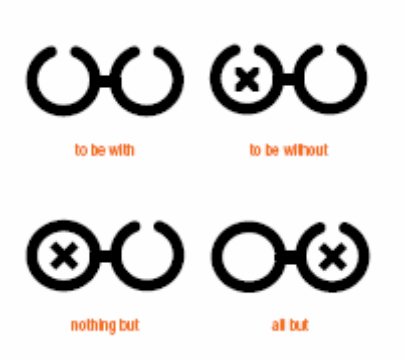


Figure 19 Symbol-expanding

Another way of developing pictograms is to extend the basic ones. So the symbol for 'me' can be expanded to 'you', and 'someone'. 'Me', 'you' and 'someone' are personal pronouns; by modifying 'me', the first personal pronoun, the later ones will be understood easily, because the one I talk to, or the one I face, is 'you'. The third personal pronoun means the one I talk about without facing. This kind of expression of a basic symbol-expanding idea is also used not only in Blissymbolics, but also in Chinese. Therefore, people can learn the elements more quickly and effectively with expanding symbols.

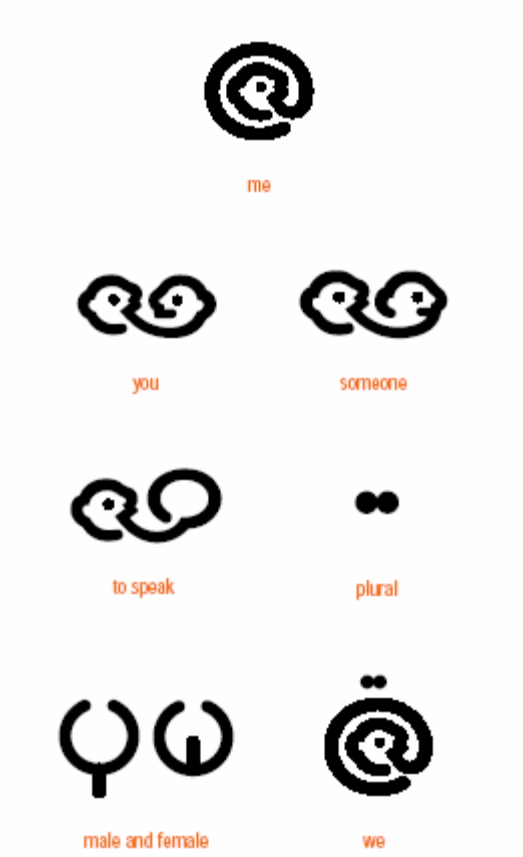


Figure 20 Symbol-expanding

2.3.3 The structure

Ingen-Housz stated that the Elephant's Memory is a non-linear language enabling people to read and write in every direction, starting and ending from any component of a sentence. The messages can be written and read starting from any place in the composition.

Each of the logograms of The Elephant's Memory features an associative structure defined by its form and meaning. In addition, it uses 'position' and 'size' to represent their association. Like the examples below, if the sentence wants to show the personal pronoun 'I', then the pictogram 'I' will be bigger than the other pictograms.

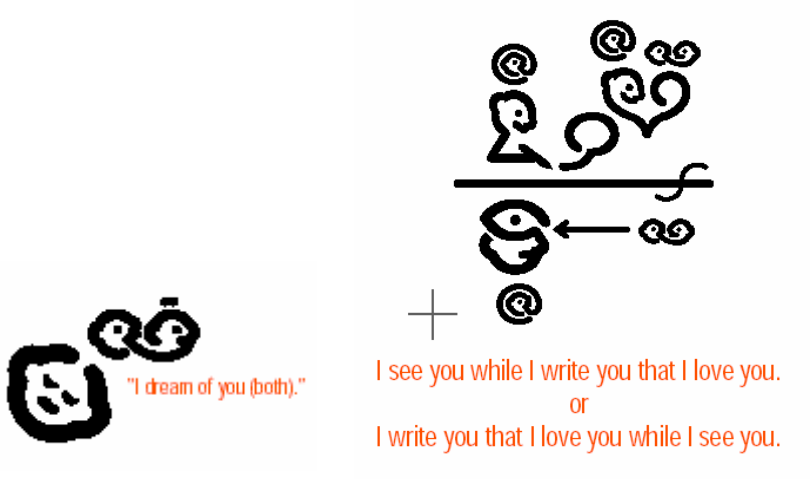


Figure 21 Position and size in sentences

Another example of representing 'to' (or 'by') and 'from' in The Elephant's Memory is given below.

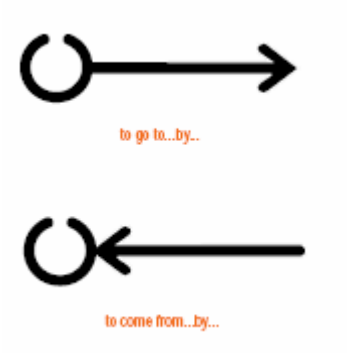


Figure 22 Direction of presentation

The arrow can show the basic idea of direction. This enables the readers to get the hints clearly when they see it in one 'sentence'. The pictogram sentence below shows the way in which 'to' or 'by' is used.

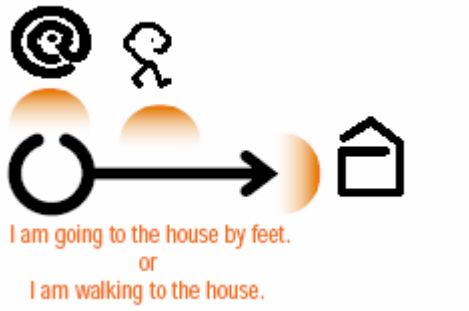


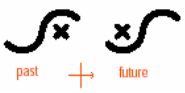
Figure 23 Direction in sentences

In the pictogram language system, the main idea or the most important element in one sentence will be put in the central position, not only made bigger. Sometimes, a verb plays a leading role in one sentence, and the pictogram might be shown both bigger and put in the middle of the 'whole' or the group of pictograms. As when the verb is 'exchange', the pictogram is as below.

Figure 24 'Exchange' pictogram

If the term 'exchange' is more important than the other elements in the sentence or the author wants to stress the verb, it might look like the image below:

Figure 25 'Exchange' in sentence

Both the "The Elephant's Memory" and "Blissymbolics" use direction to express tense. For example, the former system uses the signs  and  to show the tense of past and future. 

The latter system uses ")" and "(" to show the same thing. Two examples explaining the use of tenses in The Elephant's Memory here are 'The house was burning.' and 'I will drive to the forest':

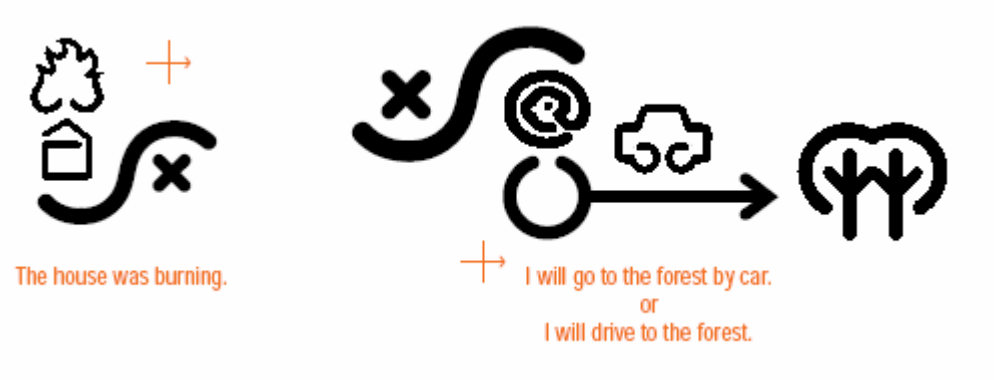


Figure 26 Presentation of tense

From these sentences, a reader can feel that when s/he reads the pictograms, his/her eyes will be attracted to the bold pictogram that shows the verb.. After that, the reader will organize the relationships between the pictograms by direction and size of the pictograms.

To emphasize the importance of the linear effect in the Elephant's Memory, there are some instances which are more complicated than those above. Thus, readers may be affected by the non-linear idea from the pictogram language. The pictogram, which shows 'while' or 'at the same time' is ' ▬ '.

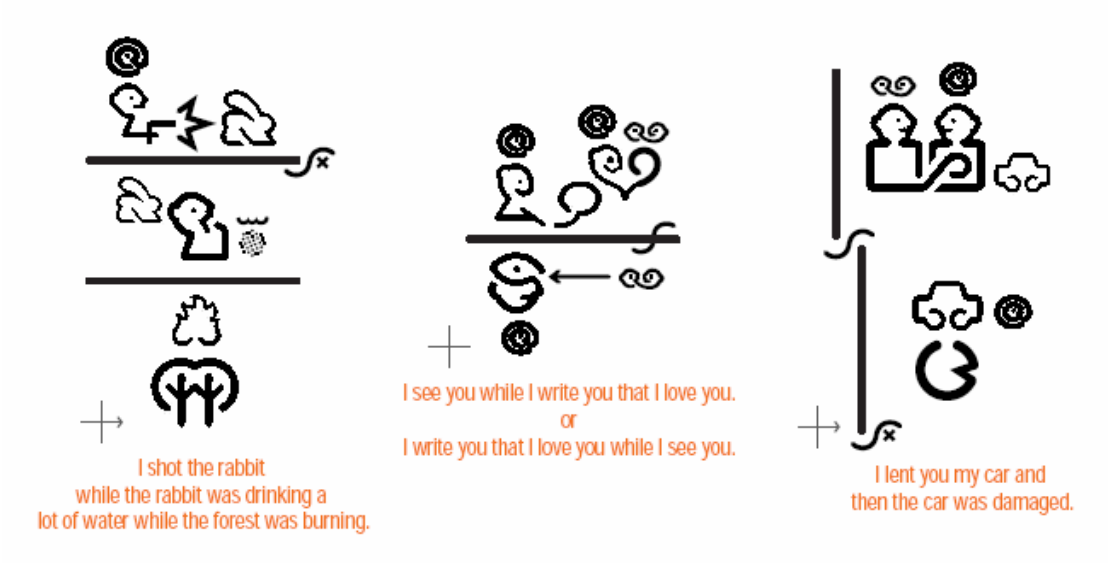


Figure 27 Presentation of 'non-linear' idea

A reader might read each 'level' group of pictograms first, and then combine the ideas together after checking the whole pictogram. In other words, each pictogram will be read at least twice. They will be seen, classified, connected, integrated and checked again at the end. The reader's eyes will not see these pictograms in a 'linear'

way, such as when reading an alphabet paragraph. Therefore, the Elephant's Memory is a good example for discussing linearity in pictogram languages.

The Elephant's Memory doesn't have a written set of syntactic rules, like the Bliss symbols, and it is vaguely defined, which leaves much more room for ambiguity (Hermann, 2003). This is a strength and also might be a weakness. The advantage is that users can create more sentences without a complete fixed rule. On the other hand, it might confuse the readers.

2.4. ASCII/SMS

2.4.1 The history

ASCII/SMS pictograms are based on the use of the standard ASCII characters on the keyboard. At first, it only uses the keys from the normal keyboard to represent characters but this has now progressed so that the use of 'extended' character codes is a common occurrence. ASCII images can be created via software and extended characters can turn up on differing systems (Dougaev 1999; Geroch, 2001).

People have used the keyboard to express art through the given characters since the beginning of computer communication, from the smile ':)' to extreme photo-realistic digitisations of portraits. At first, ASCII/SMS was typed in on a bulletin board. On a bulletin board, there were no other icons to express the users' thoughts or feelings. When emotion pictograms appeared, they helped users to show their emotions. Since users' ideas could be represented more clearly and readers could get more hints from the ASCII/SMS, the character was thought to offer an additional pictogram language function.

2.4.2 The elements

Nanette Wylde is a cultural worker who is interested in language, personality, ideas, systems, perceptions, structures, stories, and context. She teaches electronic arts at California State University. She believed that standard ASCII art is made with characters, such as: 1 2 3 4 5 6 7 8 9 0 a b c d e f g h i j k l m n o p q r s t u v w x y z A B C D E F G H I J K L M N O P Q R S T U V W X Y Z \ | - _ + % @ < ; ! = # . , : > ( ] / & $ ^ ' ` " ~) [{ } ? * . These characters are part of the ASCII (America Standard Code for Information Interchange) keyboard. This part of the ASCII set is called the 'printable set'. Before computers, ASCII art was produced on typewriters and teletype machines, and was also created typographically.

ASCII art is used because "Standard ASCII art is the only type of graphics easily transmitted and instantly viewable on any terminal, reproduction, or communications software." (Geroch, 2001).

Even if people use the same keyboard, they might use different characters to compose the same idea. For example, in the fifth style emotion pictograms, the 'eyes' could be replaced by similar characters. Typing in other languages, such as Chinese (Traditional and Simplified), Japanese, and Korean (Hangeul) may require more than 256 characters, so that even users who are not familiar with other language systems, such as English ASCII, can also use the keyboard to make their own ASCII pictograms.

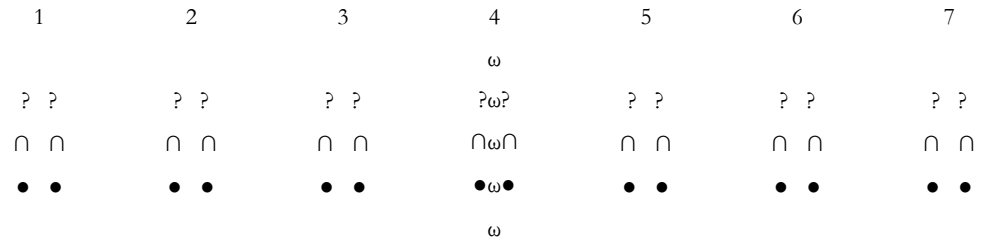


Figure 28 Emoticons

Typing with the same keyboard operations will show the same idea with different characters. For example, people can represent a 'mouth' of a emotion face via ' ' or ' 0 ' or '﹏' or 'ω' or '﹏' or ' □ ', and they might show 'anger' as ' □ ﹏□ ' or ' □ ﹏□ ' or ' □ ﹏□ '.

2.4.3 The structure

ASCII was created and is currently used in the computer or Internet environment. People can design new images by typing on the keyboard. In other words, this ASCII language is completely composed of alphanumerics and certain punctuation.

> ASCII…The most widely used standard for defining the meaning of each the meaning of each of the possible 256 bit patterns is called ASCII (an acronym standing for the American Standard Code for information Interchange). ASCII is a special kind of code that allows us to use binary numbers to represent characters, punctuation, numbers, or even predefined graphics characters.
> (Hannah, S. A. 1994). "ASCII: A character study." Computers in Libraries **14**(9): 26.)

So, the quality of ASCII can contain both a western writing system and a graphical language. The presentation of the structure could be as below:

I am very happy today :)
Let me think a while ^^a…
It was a bad experience @@~

The emotion ASCII pictograms can help users to express their feelings, and reduce ambiguity when they post a sentence on a bulletin board. The most common emotion ASCII pictograms which are typed using an English keyboard are as follows:

: +) = ☺ smile
: + (= ☹ angry
=.=! embarrassment
>O< scream

:D laugh

^^a… thinking

@@~ cry with red eyes

m(O)m kneel

Different keyboard operations can be used to show same idea with different characters. For example, when the Japanese and traditional Chinese systems want to represent 'unhappy' or 'thinking', they can use their characters to compose the emotion pictograms. Users might recognize the emotion ASCII pictograms more easily, since they don't recognise the individual characters, like the Japanese ASCII shown below. Or, because more characters are represented in a pictogram, is it clearer to read the image? We might think about this and develop it into another issue later.

Japanese

he he no no mo he(keyboard)

へ へ

の の

も

へ

Figure 29 Emoticons created by Japanese keyboard

he he no no u nn (keyboard)

へ へ

の の

う

ん

Figure 30 Emoticons created by Japanese keyboard

Traditional Chinese phonetic symbols

□_□

ˇ_ˇ

□_□

Most ASCII pictograms are used as emotion symbols and as an additional function to sentences. However, users might also use ASCII to 'write' a short sentence, but the sentences might be too difficult for readers since they are too ambiguous.

□(@^0^@)□ How are you

(>__<)｛｛ I am so cold

……\(><)/(□o□)(¯□¯) Wow…it happened, my mind is blank

(^﹏^)<(__)> Sorry with a smile

Besides using ASCII to present pictograms, ASCII can be composed of a picture as well. Thus, users' feelings or ideas might be expressed more clearly and exactly. In the instance below, a boy kissed a girl, so readers might feel the idea more vividly than one sentence which is added to an emotion pictogram.

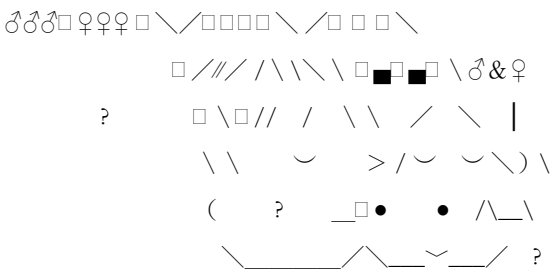


Figure 32 Pictures created by ASCII

To summarize, ASCII pictograms can be added to the end of a sentence, or be shown as a complete image. Users can make pictograms or images with ASCII as they send messages. Position and space alone offer creators a flexible structure when they are expressed through ASCII.

3. Methodology: two approaches- intrinsic and extrinsic

3.1 Intrinsic: Comparative analysis and evaluation of linear and non-linear pictogram languages

People have used visual languages to record information, and for social communication. Many visual languages are based on pictogram and signs, and many of them are still used nowadays. In other words, we have shared some pictograms and structures for a long time. If one part of a system continues to be used, it implies that the communication tool is very easy to learn and has lots of readers. Foster and Afzalnia (2005, p.169-175)

concluded that from the evidence of different countries and cultures (United Kingdom, Korea, and Iran) communication systems can support the standardization of the meanings of symbols.

Moreover, Nakamura, Newell, Alm, and Waller (1998: 71-80) found that the order of symbols in a sentence, which is based on English grammar, seriously affects Japanese speakers. Also, both Japanese and English speakers skip words when comparing reading pictogram language and speaking. This shows that exploring the structure and grammar of pictogram language is necessary as well. This kind of research focuses on linear pictogram languages. When talking about structure, non-linear languages should also be included. Here, the Elephant's Memory is a good example of non-linearity.

To sum up, if we can investigate and research pictograms and structures, we might find common ground between the different pictogram languages. Furthermore, we might evaluate what kind of languages can be easy to learn.

3.2 Extrinsic: Quantitative- Users' feedback

Nowadays, users' feedback and the electronic media (Sasson, 1997) are involved the increasing development of pictogram languages. For instance, Blissymbolics were initially designed by a few experts. Blissymbolics Communication International's (BCI) guidelines consider that they should have more new 'vocabularies' to keep up with this era, so it welcomes feedback and the design of new symbols. The guide book, 'The fundamental rules of Blissymbolics: creating new Blissymbolics Characters and Vocabulary', explains this idea in its introduction:

> This document describes the basic structure of the Blissymbolics language, and outlines both the rules necessary to be followed for creating new BCI Authorized Vocabulary, as well as procedures used for adopting that vocabulary. This reference document will guide anyone wishing to use the Blissymbolics language. Its purpose is to ensure consistency and maintain the integrity of Blissymbolics as an international language.

In other words, a pictogram language will face much more cultural and reading problems without users' feedback. If a pictogram language is to become more successful, and develop as an international language, it is essential that users share new symbol creations and discuss their successes through feedback. However, research projects that focus on pictogram language systems so far still exclude the ASCII system. ASCII has been used to represent pictures and sentences, on the other hand, and it is now used to create new pictograms or exchange ideas between users. This means it can exist as a picture or icon added in a sentence, such as a smiley face being composed of ':' and ')', or it can represent a sentence which is composed of these kinds of pictograms, which are called emoticons.

These emoticons could only be shown in text format before. Nowadays, more and more software environments can transform these black and white ASCII emotion icons into colourful icons. In other words, if users key in these punctuation marks in an e-chat room or online systems, the result is converted from the

original text format like ':)', as it was shown previously, into '☺' automatically and it can be coloured as well. The most popular pictograms are used in emoticons. To make users feel more comfortable and offer them various personal pictograms, pictogram language environments, like MSN, also updates their functions to allow users to save or exchange their own pictograms.

Furthermore, people may express emoticons by using various combinations in different cultures or areas. This situation also affects the database of emoticons. For example, a user can type ':)' and ':-)' to display smiley faces, and ';)' and ';-)' to reveal a blink. whichever version of the former or the latter a user keys in, the emoticons are represented by the same icon in an e-chat window via the database. We might say that pictogram languages have affected each other and might be integrated through a process of exchange.

If the Internet brings pictogram users closer, the software can allow users to change it, and be updated by their feedback. The development of emoticons in MSN messenger is an example. People can type popular text format emoticons like ':)' or pick the emoticon which is an upright icon '☺' in its conversation window. If the users are more familiar with getting a smiley face by keying in ':=)', they can change the settings of smiley face at any time. Since users can manage and change all their emoticons data, everyone can be allowed to create their own smiley icons, even using their own portrait or drawings. Moreover, users can not only exchange or share the emoticons, but also store them for future use.

Users can pick emoticons by clicking on one from the databank or by typing text. If users prefer typing a unique ASCII to get the emoticons, such as '^_____^' to represent a smiley face, they can go back to the database and change the short cut keys to one they are used to. In this instance, the conventions of the principle of pictogram language come from user feedback.

In addition, through interactivity in the Elephant's Memory the emphasis is designed to be fleshed out with various software applications. For example, the pictogram can be shown by a Quick Time movie, Word text, or an image. If pictogram languages can be shown via various media, there will be more chance of interchange and familiarity among users.

To sum up, pictogram languages have expanded variously and have been affected by feedback from users. It is obvious that pictogram language has the potential become much more international, although we have seen that some have structures based on natural languages. In addition, the Internet offers users an opportunity to communicate and exchange thoughts. Some pictogram languages, such as Blissymbolics, that are useful for disabled people, have been developed so that everyone can express their opinion through the creation of new symbols. For these reasons pictogram languages are being used far more frequently. Advice from feedback and the continuation of amendment could help pictogram languages become a writing system which most people can learn easily and quickly in daily life.

4.Conclusion

4.1 Limits and possibilities of the study

Of course, there is no language that can truly be called an 'international' one. Culture, language structure, (Huer, 2000), definition of meanings and inherent ambiguity will make a universal language impossible (King, 2000). Since the development of the new media there are more international communication choices for users. In addition, a strong and deep grammar structure and language intuition can help users learn it without too much difficulty. Thus, if we want to make a pictogram language more learnable, we have to understand the limits and possibilities outlined above. Hermann stated that there hasn't been any research combining computers and original pictogram, and there have not been multiple settings of experiments with comprehension and representation either. From future studies analysing structures and feedback, we might discover how people think about and use pictograms in order to communicate.

4.2 Contribution

The four pictogram languages share certain characteristics, from linearity to symbols themselves. Also, the four languages can be represented by computer. This facilitates a suitable environment in which to set experiments. It is useful to do comparative research into pictogram language learning.

To make pictograms easier to learn, we can integrate pictograms from various languages and get feedback from users. Thus, research on ASCII pictograms should be included. To understand the structure we can compare linear with non-linear pictogram languages, such as the Elephant's Memory. This will offer us far more data regarding approaches to real-world learning. In order to realize the limitations and potential of the individual pictograms and structure, the best approach is to obtain feedback from users.

To conclude, we believe that further research and its results can help pictogram language designers and users to break down communication barriers and promote understanding between different communities.

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