# Visual Information Design of Digital Picture Cards: A Computer-based Therapy for Aphasics

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**Abstract**

*With the advent of artificial intelligence and its applications to all aspects of daily life, an old saying that a pictures is worth of a thousand words will indeed have a broader and deeper impact on human quality of life, especially to those who have lost partial or total ability to articulate ideas in any form. How can people with aphasics acquire language skills? If aphasics do not process either partial or total ability to verbalize their ideas in words, how can hey study language? Language is generally defined as the aspect of human behaviour that involves the use of vocal sounds in meaningful patterns and, when they exist, corresponding with written symbols to form, express, and communicate thoughts and feelings.*

*In this paper, we have focused our research on the picture cards for current computer-based therapy. On the basis of data used and collected, we began with an assumption that pre-conditions of digital picture cards were the essential step to the development of the language training software for aphasics. We proceeded to explore the impact of the visual information design of digital picture cards on those who have varying degrees of aphasia.*

## 1. Introduction

It has been estimated that about one million people in the United States of America and fifty thousand people in Japan suffer of aphasia [1]. Aphasia is an impairment of language, which affects the production, or comprehension of speech and the ability to read or write. The majority of aphasics are the victims of stroke or accidents. Although they cannot speak, most of them want to, depending of the degree of aphasia [2].

The research conducted by Goldstein has discouraged teaching aphasic patients to speak by using language material for elementary school children, or deaf and mute patients [3]. In our own study, we also found that those aphasics who had partially recovered their use of language were uncomfortable learning even the simplest parts of speech from speech therapists (ST) who were usually younger the patients were.

As of today, we have identified hundreds of aphasia rehabilitation materials in have categorized the materials into five groups. They are: workbooks, cassette tapes, paper picture cards, real things, and computer based therapy. All these materials can be used individually or collectively. Of all the materials, computer-based therapy is considered one of the notable tools among the ST, medical specialists, and recovered aphasia patients. In this paper, we have focused our research on the picture cards for current computer-based therapy.

## 2. Computer-based Therapy

The computer-based therapies actively studied and designed from 1980's when computers were imported to the hospitals and the rehabilitation centers. Review of the literature has indicated the computer-based therapies can effectively assist the language learning process among aphasia patients and was attractive part of the researchers and therapists. However, Robertson (1990) observed that computer-based therapies lacked theoretical underpinning, and that quality of the software and the design were often poor [4].

Although there are many more variety of computer-based therapeutic approaches to and systems for the treatment of aphasics, one can not find significant changes in the field of visual information design of digital picture cards. A Computerized Visual Communication Systems (C-VIC) using icon symbols (1999) was developed as an alternative communication system and was used as a therapeutic tool for those who suffer severe degree of aphasia. The icon vocabulary of PCS (Picture Communication Symbols) was organized hierarchically representing different lexical categories [5]. Another example is called PICDIC−2 (2002), which is constructed in three stages by using PIC symbols[1]. Those stages are: Selection of symbols, discriminations training and communication training [6][7]. C-VIC and PICDIC−2 are both used in black and white, non-animated digital picture cards, similar to some of the latest computer-based therapeutic applications normally do.

With limitations to the communication of ideas and thoughts in verbal form, aphasics will have to communicate and study a language by means of non-verbal models. These include signs or pictures, which need to blend with both analogical and digital codes if the desire to acquire a language or language or languages [8]. Therefore, we believe that the picture cards play and important role in the language-training program and that these cards can be designed to be more entertaining, functional and useful.

[1] Pictogram Ideogram Communication (PIC) symbols are one of the research fields of AAC (Augmentative and Alternative Communication) and this research is developed at ASHA (The American Speech-Language-Hearing Association) Canada, Europe, America take a leading part of this research.

## 3. Possibilities of Digital Picture Cards

The traditional approach to speech language pathology is to test with an attempt to develop a re-teaching syntax without any regard to pragmatics. An aphasic is typically asked to look at a picture and to describe what he or she sees in the picture. Recent research in the field, however, seems to point out that the best opportunity in the process of developing a re-teaching syntax is to create related situations or relevant contexts in which it is natural to use a particular syntactic form and to incorporate this form in an appropriate context to assist aphasics to improve their speaking fluency.

Picture cards, like signs, are designed for a communication and therapy materials. During this research, we conducted interviews with medical doctors (MD's), ST's, and those who had recovered from aphasia in order to find out more about what they need in order to facilitate the treatment of aphasia. We came to a three-point elicitation of materials for the future development of Digital Picture Cards.

Universality and Abstract: Pictures, like signs, do not exist in isolation. They are always exists within overall systems, or codes, that determine their meanings and uses. Also, pictures are universally obtainable, but additional visual information is often required because cultural differences may have different connotative meanings associated with the pictures, especially when the pictures connote festivals, foods, and national holidays [9]. As it was previously mentioned C-VIC and PICDIC-2 is a communication tool for those who have difficulties to verbally communicate. Pictorial signs are simple and they carry abstract images which are easier to identify. However simplicity of picture cards and their distractive characteristics of age and culture boundary free also make it difficult for the picture cards to be empathy-focused. Menn showed that the more "animated" an undergore was, the more likely the respondent used a syntactic form or an emotional expression to make it [10].

Added Value: Speech therapists often include the use of picture cards when they make efforts to encourage the aphasia patients to speak. Light jokes and humorous in the stories used for the process seem useful as they are easier to understand and they make the speech-learning and communication environment more friendly [11]. Including humorous is not easy and sometimes it is not appropriate but part of the therapies could include available added value, such as sound effects, colors and other graphical elements.

Animation with Scenario: Sugiura (2002) stated that animated study materials, such materials of real life recorded by video camera, may enhance the rate of appropriate information transmission among the non-fluent aphasics [12]. According to our research, we did not find Digital Picture Cards with illustrated animation. By means of illustrated animation, verb parts can be highlighted without the use of arrows (arrows are normally used to point out how the objects move). We produced ten sets of two kinds of Digital Picture Cards; each set uses the same graphical images. Those formats are non-animated and animated cards.

## 4. Concluding Remarks

On the basis of data collected and analyzed and in order to research the effectiveness of visual expression of Digital Picture Cards, we proposed an animated of digital picture cards as computer-based therapy for the treatment of aphasia. The addition of visual information design to digital picture cards could be an effective method to improve speaking fluency among aphasics.

Our research seemed to support that animation approach provided not only meanings of the words used in the core-story but also the relationships between and among these words. Furthermore, the animated approach tended to make the speech-training process for aphasics more relaxed and comfortable. This more enjoyable setting seemed to stimulate their creativity.

To support our preliminary findings from this research project, we intend to replicate the animation approach in Michigan, the United States of America in late August 2002. We believe that a cross-cultural comparison will lend more credence to this project.


## Acknowledgements

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## Reference


[1] The Ministry of Health and Welfare Fact Sheet 2001

[2] The National Aphasia Association in New York states, Aphasia Fact Sheet, 2001 http://www.aphasia.org/NAAfactsheet.html

[3] Goldstein K, "Language and Language Disturbances", Grune and Stratton, Inc., New York, 1942.

[4] Code&Muller, "Treatment of Aphasia: From Theory to Practice" pp.251-284

[5] Hiroyo Yoshihata, Rumi Honda, keiko Okita, Toshiko Watamori, "Computerrized visual communication as an alternative communication system and therapeutic tool for people with severe aphasia", Bulletin of Hiroshima Prefectural Collage of health and Welfare 4 (1) pp129-135, 1999 (Japanese)

[6] Kazuko Fujisawa, "Communication with Visual Symbols, Practical Use of JPIC", Brain Publisher, pp. 1-6, pp. 184-193, 2001

[7] GODAI Embody Co.,Ltd http://www.mentek-godai.co.jp/

[8] Sara Trenholm, "Human Communication Theory", Prentice, 1988

[9] Roxanna M Johnson, "The Picture Communication Symbols Guide", Mayer-Johnson Co. 1996

[10] Lise Menn, "Syntax and Pragmatics: Using Syntactic Structures in Appropriate Contexts", 28th Annual Conference of the Japanese Association of Speech, Language and Hearing Workshop on Aphasia, 2002

[11] David Kurlander, "Time Skelly, Davi Salesin, Comic Chat", Computer Graphic Proceedings, Annual Conference Series, 1996

[12] Sugiura Takako, Kyoko Iitaka, "Study on Teaching Materials of Speech for Aphasia, Compare the Video Clips and Pictures using Computer", Japanese Speech-Language-Hearing Association, 2002