Veli-Pekka Räty

Aku’s Software

Multimedia in Rehabilitation of Disabled Children
For rehabilitation of children and young adults we developed 14 new computer programs. We placed emphasis on interactive multimedia plays and games.

The development and production was experimental. It was done in close collaboration with speech therapists. To find out the experiences, speech and occupational therapists that have used the programs were interviewed.

The multimedia programs were useful. These kind of motivating and rehabilitative programs had not been available before. The programs could be modified to use the most common alternative and augmentative communication methods used in Finland, i.e. Blissymbols, pictographs, and Picture Communication Symbols (pcs). The possibility to use various controls and to record one’s personal sounds enhanced the modifiablity. We succeeded to include encouraging and motivating feedback. The common characteristics of the most important programs were motivation of the therapist and the child, colors, good sounds and feedback, possibility to use various controls and flexibility in the therapist’s work.

The children were motivated to work and play with game-like computer programs. Thus, the therapists’ work was eased. There was no need to get involved with computer technology while working with the child. The therapists and children could work together since the programs gave rehabilitation material for the therapists and an interesting game for the child.

The programs were interactive. The children could control the programs in their individual way. They did not have to play in a certain way or follow a certain path with the programs. Instead, they could make their own story and play.

From the therapists’ point of view the programs were co-creative. They were programs with which they could create a motivating, interactive and rehabilitative situation.
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This is a summary of my Licentiate of Arts Thesis for the Department of Graphic Design of the University of Art and Design. It includes the full abstract and goals and abridged methods and results from my thesis. Also, the appendix shows descriptions of each multimedia program we produced. A demo version of the programs—Aku’s Demo—accompany this text. Note that the demo and the individual programs were designed for the Macintosh computer.

I am aware that this summary of the original text leaves many questions to be asked. Should you like ask more, I would be happy to continue conversation on these or other computer games.

Pispala, 24 June 1996

Veli-Pekka Räty
The study concentrates on the usability of multimedia and its usefulness. Computers and multimedia programs are used at school. However, the programs available have very different characteristics.

My goal is to find those characteristics of a computer program that can be used to make rehabilitation and learning more efficient. Another concrete goal is to find characteristics to identify a “good” program for rehabilitation. Thus, choosing computer programs for daily work would be easier than nowadays.

This information can also be exploited in design and production of new computer programs. Even though individual computer programs will get old, the knowledge on producing and using good programs has strength. When characteristics of a “good” program are known they can be included in new designs. Hence, production costs can be lowered. This way, the possibilities, acceptability and usability of new technology can be expanded and enhanced.
In my study, I was looking for answers to the following questions.

1. What kind of benefit can be gained for severely disabled children and young adults from using multimedia?
   1.1 How does multimedia affect the disabled child’s communication and other social abilities?
   1.2 How does multimedia affect the therapists’ – especially speech therapists’ – work?

2. What are the characteristics of multimedia? How can they be exploited in this context?
   2.1 What kind of programs motivate children and therapists to use the programs? What kind of content should they have?
   2.2 What kind of visual material the multimedia programs should have for this user group?
   2.3 How does the interactivity of the programs affect?
   2.4 What kind of multimedia programs are the most important?
METHODS

Computer programs were produced together with Etelä-Häme Regional Centre for Disabled, Folkhälsan’s Communication Centre, and VTT Information Technology.

At VTT, I was the project manager and was in responsible to produce software for our partners in 1991–1992 and manage the production in 1993. Our partners were speech therapist Sirkku Hildén and special speech therapists Gitta Lönnqvist. Research students Juha Kaario and Bruce McClure and myself were producing the programs.

After the development phase, since 1993, I have been working independently with this study.

Target group

The target group and users of the computer programs were severely disabled children and young adults (aged from 2 to 26) with disabilities in mobility and children and young adults with Down syndrome (aged from below a year to 25). The children were selected according to the interests of the speech therapists designing the computer programs.

New computer software

The study began by creating 14 new computer programs for rehabilitation (see Appendix). The software was designed, created, used, and tested with children during the production period of almost three years.
The characteristics of our computer software are summarised in the table below. You can see the programs’ application areas, visuals, colors, sounds, control devices, interactivity, adaptivity, and co-creativeness.

<table>
<thead>
<tr>
<th>story/adventure</th>
<th>game</th>
<th>communication drill</th>
<th>writing</th>
<th>drawings</th>
<th>PCS</th>
<th>Pics</th>
<th>Blisssymbolics</th>
<th>text</th>
<th>black and white</th>
<th>color</th>
<th>pre-recorded sounds</th>
<th>sound recording</th>
<th>direct selection</th>
<th>scanning</th>
<th>passive</th>
<th>interactive</th>
<th>(+)</th>
<th>(+)</th>
<th>(+)</th>
<th>adaptive</th>
<th>(+)</th>
<th>(+)</th>
<th>co-creative</th>
<th>(+)</th>
<th>(+)</th>
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<th>(+)</th>
</tr>
</thead>
</table>

The table contains various columns and rows, each representing different elements and their respective features. The features include application areas, visuals, colors, sounds, control devices, interactivity, adaptivity, and co-creativity. Each column provides a list of activities, and the rows indicate whether each activity has a specific feature. The table helps in understanding the comprehensive capabilities of the software programs.
The most important ones of Aku’s Software were four multimedia programs: Aku’s Morning, Picture Lotto & Memory, Picture Reveal, and Similar Pictures. The common characteristics of all of these were good motivation of the children and therapists, use of colors, good usage of sounds and feedback, possibility to use a variety of controls, and flexibility in the therapist’s work. Aku’s Morning was a story or a small adventure that fitted child’s way of thinking and play. The other three programs were game to practise alternative and augmentative communication symbols.

These four programs were interactive. The child can control the programs the way he wants and is able to. There is no one way to play with the programs. Instead, he can make his own story and game. Similar Pictures was more of a straightforward drill after the child has selected the pictures for his game.

From the therapists’ point of view, the programs were co-creative. Such programs which can give a motivating rehabilitative situation and potentiality for interaction and rehabilitation.
APPENDIX
Aku’s morning

Funny story of a child’s morning. The story of waking up goes on by pointing things on the screen. There are no “wrong” choices. Instead, original choices create funny happenings.

The program was awarded in the Contest of Rehabilitative Computer Programs in April 1991.

The program is in color.

Input devices
Mouse or other input device

Software requirements
HyperCard 2.1

Manuscript & pictures
Outi Kamutta-Roikonen

Programming
Bruce McClure & Juha Kaario
Picture Lotto & Memory Game

Traditional perception game where picture pairs are visible. The task is to find pairs. pcs, pic and Blissymbols can be used, 20 different each.

Memory game is similar to Picture lotto, but the pictures are upside down. You point a picture which will be visible for a short time. At the same time you hear a sound related to the picture. You need to find and remember the right pair. When the pair is found the two cards disappear from the screen. The game continues until all pairs are found.

The game can be used also with one switch with scanning. The scanning speed can be varied.

When two players are playing, the program is fairer than the ordinary game. The turn will change always even if a pair is found.

The program is in color.

Input devices  Mouse or other; also possible to use switches.
Software requirements HyperCard 2.1
Hardware requirements Macintosh with sound input for recording.
Alternatively a Macintosh with external sound recording such as the MacRecorder.

Manuscript  Sirkku Hildén
Programming  Juha Kaario
The screen shows a black and white picture “hidden” in the grey background. When you point the picture it changes to color and you hear a sound related to the picture. You hear the sound again if you point the picture again. The picture can be moved across the screen with your input device.

There are altogether 60 pictures: PCS, PIC and Blissymbols, 20 each. Pictures are selected from a separate menu on top of the screen. The menu can be hidden. You can record your own sound to each picture. It can be heard when you point the colored picture. Sounds can be switched off. The program can be used also with one switch.

Menus are used to select the input device, switch sounds on/off, and select blinking with pictures. With one switch, the scanning speed can be varied.

The program is in color.

Input devices
Mouse or other; also possible to use switches.

Software requirements
HYPERCARD 2.1

Hardware requirements
MACINTOSH with sound input for recording.
Alternatively a MACINTOSH with external sound recording such as the MACRECORDE.
What Do You Want to Do?

pic charts of 2 x 2, 3 x 2, 3 x 3 and 4 x 4 can be selected. Each picture has its own sound which can be heard when selected from scanning.

Single, column, and row scan are available. Scanning speed can be varied. Sounds while scanning can be switched off.

The program is in black and white.

Input devices
The user has a mouse switch or another switch
The facilitator uses a mouse or other pointing device

Software requirements
HyperCard 2.1

Manuscript
Gitta Lönnqvist based on the idea of Venla Kurki

Programming
Juha Kaario
The program has 30 pics that appear one by one on the screen. Each picture has a sound which can be heard when one points any part of the screen (excluding the buttons on the screen). A new picture appears when pointed for the second time. The pictures can be browsed through using the arrow buttons on the lower part of the screen.

You can record your own sound for each picture.

The program uses black and white pictures.

Press the Switch

Input devices
The user has a mouse switch or another switch.
The facilitator uses a mouse or other pointing device.

Software requirements
HyperCard 2.1

Hardware requirements
Macintosh with sound input for recording.
Alternatively a Macintosh with external sound recording such as the MacRecorder.

Manuscript
Sirkku Hildén based on the idea of Venla Kurki

Programming
Veli-Pekka Räty & Juha Kaario
Speaking Word Processor

Word processor for motorically and visually disabled persons. The program scans and reads aloud the items on the letter chart. One switch can be used to select letters. The program reads out the selected letter. You can also listen to the text written before.

This is a Swedish speaking version which uses the Infovox speech synthesizer.

Finnish speaking version can be made with the software based speech synthesizer MacInPuhe. Other language versions can be made with the Apple software speech synthesizer or the Infovox software or hardware.

The program is in black and white.

Input devices
The writer uses one switch.
The facilitator uses a keyboard and a mouse.

Software requirements
HyperCard 2.0

Manuscript
Gitta Lönnqvist
Programming
Veli-Pekka Räty & Juha Kaario
The player fires a missile towards the rocket with the mouse switch or a separate switch. The task is to hit the rocket before it flies off from the screen.

The program gets more difficult after each hit as the rocket flies faster. After a miss its speed decreases.

The easy or difficult game can be selected from the menu. With the easy game it is enough to press the button whenever the rocket is flying. With the difficult one you have to hit at the right moment.

The program is designed for practising dexterity.

The program is in black and white.

**Input devices**
- Mouse switch or another switch

**Software requirements**
- HyperCard 2.1

**Manuscript**
- trad.

**Programming**
- Juha Kaario
Similar Pictures

The topmost cards of two picture stacks are visible. The program scans through the stack on the right. The task is to hit the mouse button when both stacks have similar pictures. The player is rewarded with a star. Nothing happens when pressing the button with dissimilar pictures. Pictures have an attached sound which can be switched off.

Pictures are the same as with the Picture Reveal (20 pictures). The pictures are selected before beginning the game. The pairs in the stacks can be 1) pcs, 2) pcs and Blissymbols or 3) Blissymbols only.

There is a more difficult level with smaller pictures. They can also be placed to the corners of the screen to practise, e.g. attention. The scanning speed can be varied.

The program is in color.

Input devices
Mouse button or other switch

Software requirements
HyperCard 2.1

Manuscript
Gitta Lönnqvist

Programming
Juha Kaario
The player tries to catch the fly with the frog. The task is to hit the fly before it flies off from the screen.

The program gets more difficult after each hit as the fly flies faster. After a miss its speed decreases.

The easy or difficult game can be selected from the menu. With the easy game it is enough to press the button whenever the fly is flying. With the difficult one you have to hit at the right moment.

The program is designed for practising dexterity.

The program is in black and white.

Input device: Mouse button or separate switch
Software requirements: HyperCard 2.1
Manuscript: trad.
Programming: Juha Kaario
Sounds and Symbols

Game for perception. The player hears a sound. The task is to match the sound to the right one of the three symbols. There are eight different sounds and picture plates.

This program got the second prize in the Competition for Rehabilitative Computer Programs in April 1991.

The program is in black and white.

“Everyday and common sounds and descriptive symbols have been the starting point for the design. The program develops perception. Realization brings joy.”

— Antti Porkka

Input devices                Mouse or other pointing device
Software requirements       HyperCard 2.1
Manuscript & pictures       Antti Porkka
Programming                Bruce McClure, Juha Kaario & Veli-Pekka Räty
“A come-out program for wheelchair users and children living in institutions. The purpose is to show that it is always worth leaving loneliness and bravely go out and work with other people. You can fail also, but must not worry about it alone. Getting to know and being with people is the most rewarding you can reach.”

“The name of the program suggests that its happenings could come true any day. Tuesday is everyday. It has no character.”

– IIRO KÜTTNER, ELINA HAKALA

Tuesday

The program was awarded in the Competition for Rehabilitative Computer Programs in April 1991.

The program is in black and white.

Input devices
Software requirements
Manuscript & pictures
Programming

Mouse or other pointing device
HyPERCARD 2.1
Iiro Küttner & Elina Hakala
Bruce McClure & Juha Kaario
"The goal of the program is in experiences. The player ‘colors’ the black and white drawing on the screen and can see each color appear like magic. The player may thus experience the same joy as an able bodied child with a coloring book.

– LAILA NEVAKIVI

The program got the second prize in the Competition for Rehabilitative Computer Programs in April 1991.

The program is in color.

**Input devices**
Mouse or other pointing device

**Software requirements**
PLUS 2.0

**Manuscript & painting**
Laila Nevakivi

**Programming**
Bruce McClure
Word processor with the most common functions only. The font and text size can be changed. Ordinary editing functions are available. The text can be saved and restored. Easy to use – few menus to use. The program is in black and white.

Simple Word Processor

Input devices: Keyboard and a mouse or other pointing device
Software requirements: HYPERCARD 2.1
Manuscript: Veli-Pekka Räty
Programming: Veli-Pekka Räty
Four groups of main concepts are presented using Blissymbols. With the mouse button you can select any main group, e.g. food. The selection results in a new group of four symbols related to the main concept. With a mouse button you can select any of these, e.g. ice cream.

The program scans and the mouse button is used to select. Voices can be selected to appear with each picture while scanning or only when selected. All sounds can be switched off also.

Scanning speed can be varied.

The program is in color.

**Concept Groups**

Input device
Mouse button or a separate switch

Software requirements
HyperCard 2.1

Manuscript
Gitta Lönnqvist

Programming
Juha Kaario