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Computer Aided Vision Therapy

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"CAVT"

Computer Aided Vision Therapy

Research: Bruce W. Hamerl
Advisor: Dr. Paul Kohl, Optometrist

April 19, 1991

Grade ___

Introduction and Objectives

CAVT (Computer Aided Vision Therapy) is a Vision Therapy system which utilizes computer technology. It consists of an adjustable stereoscopic head, an Apple computer, and the software to drive it. CAVT was designed to help the VT Practitioner motivate their patients while enhancing existing VT programs.

System Requirements

1) Apple Macintosh Plus Computer or greater.
   A) Recommend 2mb RAM.
   B) Recommend minimum 20mb HD.
   C) Operating System 6.01 or greater.
2) Stereoscopic Head adjustable for height and distance.
3) Software:
   A) HyperCard 1.21 or greater.
   B) CAVT Programs.
CAVT Capabilities

1) Antisuppression Training:
The patient is instructed to play any of a number of popular video games. Suppression is monitored using red-green glasses and r-g acetate over the VDT. The clinician may adjust the contrast of the video screen to increase or decrease the difficulty of the task.

2) Vergence Ranges:
CAVT has taken a stereoscope head and adapted it for use with a VDT. Each eye views a separated graphic target which can be manipulated in various ways.
A) The BI or BO menu allows the clinician to test and build vergence ranges by simply clicking on the desired demand from the BI, BO, or RECORD menu's.
B) The Continuous Test Mode allows the clinician to change vergence demand in real time. By changing the speed at which the mouse is moved the clinician varies the vergence demand smoothly or by jumps.
C) CAVT has the capacity to record and play back a sequence of vergence demands. This allows the clinician to set up a training session before the patient arrives. The record may be cleared at any time.

3) Stereopsis:
Three dimensional targets of various sizes and complexities have been created using lateral disparity. Activities involving stereomobilization and temporal summation are easily accomplished.

4) Stereoscope Parameters and Variables:
A) The stereoscope parameters which can be modified are lens power, ocular separation, and accommodative demand.
B) CAVT calculates the shaft setting, target separation, and the ortho separation for the specific stereoscope parameters chosen. This allows the clinician to acquire a greater understanding of the interrelationship between accommodation and convergence.

5) Figure Ground Concepts:
Figure-Ground interactions can be controlled and exploited by choosing different combinations of targets and background patterns.

6) Sensory Motor Integration:
MacPaint is a drawing program which allows the clinician to set up an endless variety of visually guided activities (fine motor skills, laterality, mazes, tracing, cheiroscopic drawing, etc).
CAVT INSTRUCTIONS

If you are unfamiliar with the Macintosh Computer system or the HyperCard program please consult the appropriate users manual for additional information. The CAVT program is a HyperCard Stack containing 4 cards. By clicking buttons and choosing from a variety of menu items a clinician can operate the program with a minimum amount of study and aggravation. Run the CAVT program while reading the instruction for best comprehension. When you insert the program disc two icons will appear (HOME, RESOURCES). Opening the icon HOME will begin the CAVT program.

************************************************************************
OPENING SCREEN CARD 1
Consist of 4 buttons and 2 menu's
************************************************************************

BUTTONS

BUTTON ONE
Reserved for future program development.

VT PROGRAM
Takes you to the main program (CARD 2).

INFORMATION
Provides system information and software credits.

QUIT
Quits HyperCard.

MENU'S

APPLICATIONS
Clicking on a specific menu item suspends HyperCard and open an external program. Quitting that program returns you to HyperCard.

STACKS
Clicking on a specific menu item opens another HyperCard Stack. To return to CAVT use the navigation command GO HOME.
BUTTONS

"ON/OFF"
Located in the lower right hand corner. Clicking this button displays or hides all menu items and 12 icons (picture buttons). The icons across the bottom of the screen are uses to select stereoscope targets.

COMMAND, STEREOSCOPE, BO, BI, RECORD
The labels found above the various menus are buttons. Clicking on these buttons will display or hide the corresponding menu.

MENU'S

A) COMMANDS
Contains 11 menu items {CAVT program functions}.

1) QUIT HYPERCARD:
Quits HyperCard.

2) GO TO FIRST CARD:
Takes you to card 1 {the opening screen}.

3) STEREOSCOPE PARAMETERS:
Changes the accommodative demand or customizes the CAVT program to a specific stereoscopic head. Follow the instructions as they appear.

4) STEREOSCOPE CALCULATIONS:
Opens another HyperCard Stack. This Stack will help you determine the vergence demand on existing stereoscope cards. To return to CAVT use the navigation command GO HOME.

5) EXTERNAL PROGRAMS:
Takes you to Card 1 to make the appropriate menu selection.

6) INFORMATION:
Gives a brief description of the CAVT program and the abbreviations used.
7) CONTINUOUS TEST:
Follow the instructions as they appear. Moving the mouse to the left increases BI demand while moving the mouse to the right increases BO demand. Clicking the mouse button will record the present vergence demand. Pressing the "Shift Key" will end the test.

8) STEREOCARDS:
Presents two stereopsis stereocards. Use the buttons on the bottom of the screen to switch cards and return to the main program.

9) CLEAR RECORD:
Removes any vergence value found in the record menu.

10) GRAPHIC BACKGROUND:
Presents 40 background patterns. Click on the desired pattern.

11) GRAPHIC CONTRAST:
The target is located on a 32X32 matrix of white and black dots. Clicking this menu item changes all white dots to black and all black dots to white.

12) GRAPHIC OUTLINE:
The 32X32 matrix can be modified by clicking "Graphic Outline" repeatedly.
a) The matrix may become transparent. This will allowing the target to interact directly with the background.
b) The matrix may become opaque. This will create a buffer between the target and background.
c) The matrix may become opaque with a black outline. This will minimize figure ground interaction and provide a good fusion lock.
B) STEREOSCOPE
This menu displays the following information:
1) Stereoscope Parameters 3) Ortho separation
2) Shaft setting 4) Target Separation

C) BI & BO
These menu's changes the vergence demand with a click of the mouse. By clicking on a specific vergence demand within the BI or BO menu's another value is added to the record menu.

D) RECORD
Stereoscope vergence demand may be changed by clicking on the desired record value. Items may be added to the record by clicking on the BI or BO menu items or clicking the mouse button during continuous testing. The values within the record menu may be cleared by clicking the Clear record item found in the command menu.

************************************************************************
CAVT SCREEN CARDS
Consist of 2 buttons
************************************************************************
These cards are accessed by opening the command menu on card 2 and selecting "STEREOCARDS".

NEXT BUTTON: is used to go to the other stereocard.

HOME BUTTON: is used to go to card 2 {CAVT program}
Epilogue

Computer technology is not something to be feared, but to be embraced. Optometry as a profession will not survive unless we as practitioners accept the challenge to incorporate and exploit technological advances as they become available.

Many thanks to Dr. Kohl, my parents and my future wife Diana for their encouragement and support.

The password to enter the program is "Diana". For further information or comments please contact Bruce W. Hamerl at your convenience.