System and Software to Improve Visual Acuity

Tech ID: 25271 / UC Case 2015-940-0

BRIEF DESCRIPTION

Brief Description:

UCR researchers have developed a perceptual-learning software that utilizes psychophysics tools to train the human eye towards sharper visual acuity. By conducting familiarization tasks followed with orientation-discrimination training, older subjects as well as those suffering from amblyopia and strabismus, demonstrated significant improvement in contrast sensitivity. Not to mention, stark progress was evident within just several training sessions with permanence of approximately 3 months. This software is capable of relieving vision deterioration sans invasive, often unpromising surgeries, and has generated great interest and enthusiasm amongst the general populace.

FULL DESCRIPTION

Background:

Cognitive decline with aging includes changes in, among others, executive funuction, attention, as well as significant changes iin vision and visual processing that has impact on the health and well being. Studies have suggested that these changes in vision may be due to decreased cortical inhibition in the visual cortex. Of the changes in vision and visual processing, declines in contrast sensitivity is the most pronounced and has significant impact on visual function including the ability to detect and resolve detail. Decline in contrast sensitivity for moving stimuli is suggested to have a neural component.

Technology:

Prof. Andersen and his research team at UCR examined whether behavioral training or perceptual learning can be used to improve age-related declines in contrast sensitivity. The patented technology was developed based on this study in which participants - older and younger adults - were trained over 7 days using a forced choice orientation (of a pattern) discrimination task with stimuli that varied in contrast with multiple levels of additive noise along with the pattern. Custom experimental software has been developed in MATLAB including the utilization of Psycophysics Toolbox extensions.

Images

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OTHER INFORMATION

KEYWORDS

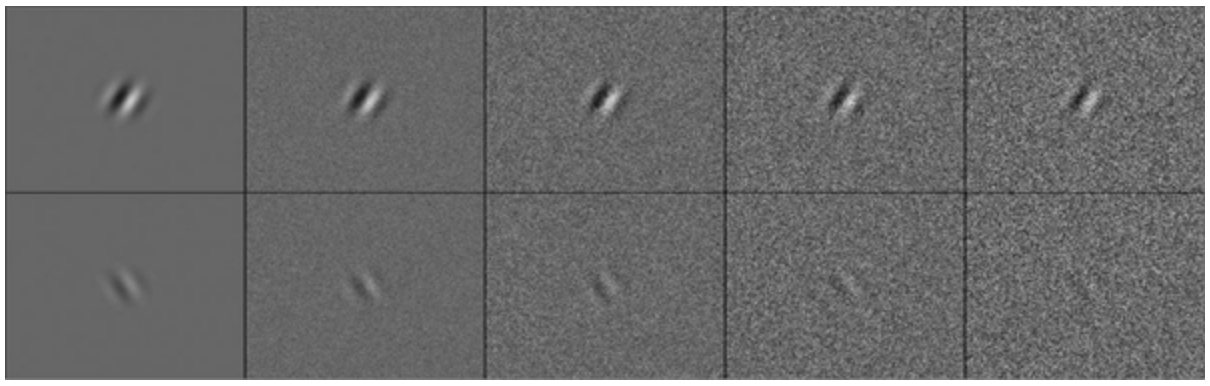
perceptual learning, contrast sensitivity, vision training, vision improvement software, improving vision, psychophysics tools

CATEGORIZED AS

- **Computer**
  - Software
- **Medical**
  - Disease: Ophthalmology and Optometry
  - Software

RELATED CASES

2015-940-0



The images above provide an example of contrast and noise levels used in the experiment. Gabor patches are displayed at 75% contrast in the top row and at 25% contrast in the bottom row. Stimuli were presented in five blocks (examples shown from left to right). There was no noise in the first block, but starting with the second block, stimuli were presented in Gaussian noise, with the noise level increasing in each subsequent block.

ADVANTAGES

The important benefits of this innovation are:

- The perceptual training exercise is short duration - 7 days - compared to many perceptual learning studies that are of longer duration, in some cases up to 30 days.
- Results indicate that older adults, following training performed as well as pre-trained college age participants with improvements in the ability to see patterns in low contrast and in the presence of visual noise.
- A surprising finding was that visual acuity improved for older as well as younger adults.
- Stark progress was evident with the short training session - with permanence of approximately 3 months.

APPLICATIONS

Targeted towards end users as standalone app or software to:

- Address cognitive decline in older adults.
- Provide perceptual learning for younger and older adults.
- Improve contrast sensitivity in aging population

Can be a preventative or therapeutic program that healthcare providers could potentially recommend as an alternative before moving to more costly and invasive procedures

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,149,795	12/11/2018	2015-940

STATE OF DEVELOPMENT

The team has designed, developed and tested the system and competent software for use in PCs that is easily portable to other platforms.

RELATED MATERIALS

- Improving Vision Among Older Adults: Behavioral Training to Improve Sight

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