INFORMED CONSENT FOR PARTICIPANTS IN RESEARCH PROJECTS INVOLVING HUMAN SUBJECTS

TITLE OF PROJECT: The Effect of Age on Dark Focus Distance and Visual Information Transfer Rate

PRINCIPAL INVESTIGATOR: Thurmon E. Lockhart, PhD, Grado Department of Industrial and Systems Engineering, Virginia Tech

I. Purpose

The purpose of this project is to examine the influence of age on dark focus distance and its relationship to the readability of the visual display.

II. Procedures and Project Information

A. Participant Selection

This study will include participants aged 20 years and older. There will be four age groups: younger (20-44 years), middle-aged (45-59 years), old (60-74 years), and older (over 75 years). Participants will be screened and excluded from participation based on the presence of eye disease, color blindness, eye surgery, or optic nerve damage that may affect sensory perception in the eye. The participants must also have normal or correct-to-normal vision in at least one of the eyes.

To ensure the qualification of the participant, a screening session will be held prior to the actual test session, which will take place after the participant has signed an IRB-approved informed consent form and completed a questionnaire regarding his/her personal information. In addition, a test of static visual acuity and color blindness will be performed for each eye, using the Bausch & Lomb Vision Tester. Then, the static contrast sensitivity will be performed, using the Vistech Contrast Sensitivity Chart.

B. Time Requirements

The study will require no more than two hours of the participant's time.

C. Study Procedures

This research will be divided into two experiments.

In Experiment I, the accommodative status of dark focus at the fovea will be assessed objectively using the modified autorefractor, a newly developed method to continuously monitor the accommodation process. Participants will be asked to sit at the modified autorefractor station with a separate desk for the PC to prevent the light from affecting the participants. The height of the chair and the chin rest of the modified autorefractor will be adjusted for each individual. After paricipants have found a comfortable sitting posture, the view window of the modified autorefractor will be moved to the appropriate position relative to the eyes. Afterwards, participants will be asked to keep their right eye open and the measurement ring of the modified autorefractor will be positioned at the center of their retina. Before each trial, the participant's head will be positioned upright by observing the actual head inclination angle between the horizontal and the ear-eye line. Participants will complete a series of trials on the modified autorefractor as their gaze is directed horizontally to a fixation target on the wall. Accommodative responses (amplitude and velocity) of each participant's right eye will be

measured objectively under nighttime condition (0 lux) with the modified autorefractor, while the other eye is covered. Dark focus will be measured in the dark after a period of ten minutes so that the participant will be fully dark adapted. Three measurements of thirty seconds for each trial will be taken. Results of five consecutive seconds out of thirty seconds on each measurement will be selected and averaged. During these visual tasks, participants will be asked to look at the same position: the middle spot of the fixation board at the horizontal eye level. A one-minute break will be given to the participants after each trial.

In Experiment II, the visual information transfer rate will be determined when viewing a target at three different distances: 52 cm, 73 cm, and the individual's dark focus in random order. A set of randomized English alphabet characters will be presented on a visual display with a luminance level of 20 cd/m^2 and ambient illumination level of 4 lux. Characters will be white on a black background, in Arial font, and all characters will be capitalized, with a height of 3.3 mm (10 points). To assess the visual information transfer rate, participants will be asked to read a set of characters aloud with their fastest rate for three seconds. Three measurements of inforamtion transfer rate at each viewing distance at random will be made. Results obtained from each viewing distance will be collected and averaged. The amount of information gained for individuals at 52 cm and 73 cm will then be determined and compared with the amount of information gained at their dark focus distance.

III. Risks Involved in Participation

The risks associated with this study are minimal. The participant could potentially have minor eye fatigue, as similar to that encountered while driving.

IV. Benefits from Participation

No direct benefits of participation are promised, however, the results of the research may lead to better understanding of the dynamic aspect of dark focus of the human eye. The main objective of this study is to explore the effects of age on dark focus distance and its relationship to the readability (measured as number of bits/sec gained) of the visual display. The results of the study will be applied to product design and development, and will be used to understand how viewing distance can affect the individual's reading performance.

V. Extent of Anonymity and Confidentiality

All data will be coded and will contain no personal information pertaining to the participants. Participant information will not be seen by anyone other than the researchers involved in the project.

VI. Freedom to Withdraw

Participants are free to withdraw at any time during the study.

VII. Compensation

Compensation of $10/hour will be supplied to participants. A maximum of $20 will be paid for the participation.

VIII. Participant Responsibilities

Participants will be asked to perform the experimental tasks to the best of their ability.

IX. IRB Review of Research

The Virginia Tech Institutional Review Board (IRB) for Projects Involving Human Subjects, has reviewed this proposed study, and has determined that it is in compliance with federal laws and Virginia Tech policies governing the protection of human subjects in research. However, you should recognize that the review does not constitute an endorsement of the research, and that it is up to you to determine whether you are willing to participate in the study after having been informed of the risks, benefits, and procedures involved in this study.

X. Participant's Permission

I have read the Consent Form and conditions of this project and have addressed all concerns with the research staff or the principle investigator. I have had all concerns addressed appropriately and hereby acknowledge the above and give my voluntary consent to participate in this study.

_____ Date:_____

Participant Signature

Participant Project ID Code: _____

The research team for this experiment is led by Dr. Thurmon Lockhart. He may be contacted at the following address and phone number:

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In addition, if you have any detailed questions regarding your rights as participant in University Research, you may contact the following individual:

Dr. David M. Moore
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