

OMB Control #0693-0043
Expiration Date: 03/31/2022
NIST Generic Clearance for Usability Data Collections

Visual recognition of lighted character signs in aviation

FOUR STANDARD SURVEY QUESTIONS

1. Explain who will be surveyed and why the group is appropriate to survey.

NIST is seeking approval for a demographic questionnaire related to the study described below.

The Sensor Science Division (SSD) of the Physical Measurement Laboratory (PML), of the National Institute of Standards and Technology (NIST) is proposing to conduct a study of the visual recognition of lighted character signs used in aviation. The purpose of the study is to improve the specifications for the lighted character signs used at airports. Vision experiments using respondents will be conducted in this study, and demographic information (age, gender, and ethnicity) will be collected from the respondents to be used for data analysis. Participants in the study will be recruited from employees and guest researchers at NIST who have visual acuity of 20/20 or better, as well as from pilots who are members of Air Line Pilots Association. This study is planned for two years, and we expect a total of 50 participants with diversity in age, gender, and ethnicity.

The group is appropriate because responses obtained from trained pilots will have first-hand knowledge as well as a practical experience using the lighted character signs. The experimental results will be analyzed against the demographic information collected to identify any trends in the results.

As a part of this study, participants will be required to complete the demographic questionnaire which is collecting three points – gender, age, and ethnicity. NIST will use a pseudo-randomly assigned participant number for each participant, which will be associated with responses to the demographic information as well as results from the study. NIST will not include any personally identifying information in our results.

2. Explain how the survey was developed including consultation with interested parties, pre-testing, and responses to suggestions for improvement.

The demographic questionnaire was developed by the PI and co-PIs. The questionnaire was designed to collect only the content necessary for this collection. NIST will use a pseudo-randomly assigned participant number. NIST will keep no key that links a participant to the demographic information collected or results from the study.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than

all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

The demographic questionnaire will be provided to the respondent during the instructional period of the study. Each demographic questionnaire will be assigned a random identification number for each participant that provides their age, gender, and ethnicity. There will be no key identifying the participants by the assigned random identification number. Participation of the participants is expected to be 100%. If the respondent chooses not to provide his/her demographic information, we will have him/her withdraw from participating in the experiment.

Participation in this study is voluntary and a respondent may choose not to participate at any time during the study, without penalty. The participants will sign an Informed Consent Form, which provides all the details regarding this study. A copy of the Informed Consent has been uploaded into ROCIS as a part of the submission package.

For this study, respondents will participate in vision experiments conducted in a long (30 m) dark room laboratory at NIST. Visual acuity of the participants will be tested first using a simple vision test. Glasses or contact lenses are acceptable. If a determination is made that finds a participant unacceptable, they will be removed from the study without penalty.

Participants will be seated at the viewing position in the dark-adapted lab for 5 minutes. After adaptation to the dark environment, the participants will be asked to look at lighted sign "X" (formed by many lighted dots), to determine if he/she recognizes the character "X" or not. The participant will provide a YES or NO answer that will be given verbally to the investigator, who will record responses in an Excel spreadsheet.

Respondents will perform visual observations for several different luminous intensity levels of the lighted "X" sign, and threshold brightness levels at lower end and higher end will be determined. Such visual observation will be done for ten different intensity levels, and this experimental session will be repeated for several different conditions/designs of the lighted X sign, and the total time for each participant will be about one (1) hour.

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

The information collected in the demographic questionnaire will be analyzed using the collected demographic information to determine or define any trends in results with respect to age, gender, and ethnicity. It is likely that there are some trends, for example with age, because it is known that the visual response changes more or less as people age. Given such results, the results of the study can be reported publicly in scientific journals and/or presented to standards developing communities.