

Visual Activities Questionnaire (VAQ)

Please cite the questionnaire as follows.

Sloane, M.E., Ball, K., Owsley, C., Bruni, J.R., Roenker, D.L. The Visual Activities Questionnaire: Developing an instrument for assessing problems in everyday visual tasks. *Technical Digest, Noninvasive Assessment of the Visual System, Topical Meeting of the Optical Society of America*, January, 1992.

Visual Activities Questionnaire (VAQ)

On the next few pages you'll read some statements about problems you may encounter during activities which involve your vision. Read each statement carefully. Then indicate how frequently you have the problem, by choosing the one word beneath the statement that best applies to you and your situation. Please answer all the questions **as if you were wearing your glasses or contact lenses (if any)**.

For example:

I have difficulty seeing to drive at night.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

Let's assume that after reading this statement, you decide that you **sometimes** have difficulty seeing things when you're driving at night. Therefore, on the line beneath this statement, you would put an "X" next to the word **sometimes** to indicate that this is the word that best indicates how frequently you have this problem. If you never drive, you would put an X in the box marked **DO NOT DRIVE**.

Please be sure to answer each question, taking as much time as you need. All your answers are entirely confidential. In order for this survey to improve our knowledge about vision problems and how they affect daily activities, your answers must be as accurate and candid as possible. Remember, if you wear glasses or contact lenses, please answer all of the following questions as though you were wearing them.

Please go to the next page and begin the questionnaire.

1. I have problems adjusting to bright room lighting, after the room lighting has been rather dim.

never_____ rarely_____ sometimes_____ often_____ always_____

2. I have trouble noticing things in my peripheral vision.

never_____ rarely_____ sometimes_____ often_____ always_____

3. I have trouble finding a specific item on a crowded supermarket shelf.

never_____ rarely_____ sometimes_____ often_____ always_____

4. I have problems with lights around me causing glare when I'm trying to see something.

never_____ rarely_____ sometimes_____ often_____ always_____

5. I tend to confuse colors.

never_____ rarely_____ sometimes_____ often_____ always_____

6. I have trouble locating a sign when it is surrounded by a lot of other signs.

never_____ rarely_____ sometimes_____ often_____ always_____

7. I have problems reading small print (for example, phone book, newspapers).

never_____ rarely_____ sometimes_____ often_____ always_____

8. I have trouble reading a sign or recognizing a picture when it's moving, such as an ad on a passing bus or truck.

never_____ rarely_____ sometimes_____ often_____ always_____

9. When pouring liquid, I have trouble judging the level of the liquid in a container, such as the level of coffee in a cup.

never_____ rarely_____ sometimes_____ often_____ always_____

10. I have trouble reading the menu in a dimly lit restaurant.

never_____ rarely_____ sometimes_____ often_____ always_____

11. I have trouble seeing moving objects coming from the side until they are right in front of me.

never_____ rarely_____ sometimes_____ often_____ always_____

12. It takes me a long time to adjust to darkness after being in bright light.

never_____ rarely_____ sometimes_____ often_____ always_____

13. When I'm driving, other cars surprise me from the side, because I don't notice them until the last moment.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

14. I have trouble driving when there are headlights from oncoming cars in my field of view.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

15. I have difficulty reading small print under poor lighting.

never_____ rarely_____ sometimes_____ often_____ always_____

16. I have problems locating something when it's surrounded by a lot of other things.

never_____ rarely_____ sometimes_____ often_____ always_____

17. The color names that I use disagree with those that other people use.

never_____ rarely_____ sometimes_____ often_____ always_____

18. I have problems carrying out activities that require a lot of visual concentration and attention.

never_____ rarely_____ sometimes_____ often_____ always_____

19. When I'm walking along, I have trouble noticing objects off to the side.

never_____ rarely_____ sometimes_____ often_____ always_____

20. It takes me a long time to find an item in an unfamiliar store.

never_____ rarely_____ sometimes_____ often_____ always_____

21. Sometimes when I reach for an object, I find that it is further away (or closer) than I thought.

never_____ rarely_____ sometimes_____ often_____ always_____

22. I have difficulty noticing when the car in front of me is speeding up or slowing down.

never_____ rarely_____ sometimes_____ often_____ always_____

23. It takes me a long time to adjust to bright sunshine after I have been inside a building for a lengthy period of time.

never_____ rarely_____ sometimes_____ often_____ always_____

24. When driving at night, objects from the side unexpectedly appear or pop up in my field of view.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

25. I have difficulty distinguishing between colors.

never_____ rarely_____ sometimes_____ often_____ always_____

26. I bump into people in a busy store because I have problems seeing them in my peripheral vision.

never_____ rarely_____ sometimes_____ often_____ always_____

27. I have difficulty doing any type of work which requires me to see well up close.

never_____ rarely_____ sometimes_____ often_____ always_____

28. I have trouble adjusting from bright to dim lighting, such as when going from daylight into a dark movie theater.

never_____ rarely_____ sometimes_____ often_____ always_____

29. When driving at night in the rain, I have difficulty seeing the road because of headlights from oncoming cars.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

30. When riding in a car, other cars on the road seem to be going too fast.

never_____ rarely_____ sometimes_____ often_____ always_____

31. I find it difficult changing lanes in traffic because I have trouble seeing cars in the next lane.

never_____ rarely_____ sometimes_____ often_____ always_____

DO NOT DRIVE

32. I have problems judging how close or far things are from me.

never_____ rarely_____ sometimes_____ often_____ always_____

33. It takes me a long time to get acquainted with new surroundings.

never_____ rarely_____ sometimes_____ often_____ always_____

Please make sure that you have not skipped any items.

Thank you for your cooperation!

Information about the Visual Activities Questionnaire (VAQ)

Please refer to the summary of the VAQ (on following pages) for a discussion of its purpose, development, reliability and validity:

On the first page of the VAQ are the instructions to the subject. These instructions are the ones we used in developing the instrument, and also in our studies on older drivers. Depending on your own application of the VAQ, you may want to revise these directions. However, users should keep in mind that these are the directions used in establishing its reliability and validity, and changes in the instructions could theoretically affect these psychometric properties. We chose these particular instructions because the vast majority of our older adult subjects had no difficulty in understanding what they were asked to do. Users of the VAQ are also advised that changes in the wording of the individual items could also affect the psychometric properties of the VAQ as described in the attached summary. In addition, we have found that alternative wordings (e.g., "X is more of a problem than it used to be") lead to uninterpretable data (e.g., for many older adults, most activities are more of a problem than they used to be).

We selected a large, bold-face font for the individual items to enhance readability, since many of our subjects have mild to moderate vision impairment. The VAQ was designed so that the subject can read it to him/herself and check off responses. However, on very rare occasions in our own work, the VAQ had to be orally administered by an interviewer because the subject was either illiterate or had severe vision impairment and could not see to read. In these cases, the interviewer read the items out loud to the subject, and then checked off the subject's responses as they were orally communicated. Because this happened only infrequently, we have not systematically evaluated the differential effects of self- vs. oral-administration on VAQ performance.

The instructions ask the subject to answer the questions "as if you were wearing your glasses or contact lenses (if any)". The reason we use this wording is that we are interested in visual performance problems the subject encounters as s/he routinely goes about everyday life. Most subjects who have glasses wear these glasses for routine activities, and thus it made sense to have subjects address the items in this fashion. For example, most older adults who have reading glasses do indeed wear them for near tasks such as reading. Thus, in answering the questions on near tasks, we wanted the subject to answer as if s/he had these glasses on. (In pilot testing an earlier version of the VAQ, we found that if we did not include the phrase "as if you were wearing your glasses or contact lenses (if any)", then subjects were often confused about what we meant, and tended to respond to the items as if they were not wearing their habitual optical corrections.)

Scoring the VAQ:

Listed below are the eight areas of visual function evaluated by the VAQ, along with the item numbers from the VAQ which fall within each area. The VAQ's purpose is to generate a composite score for each visual function area, which summarizes the subject's responses to the items addressing that visual function. To score an individual item on the VAQ, the following

scale is used: never=1, rarely=2, sometimes=3, often=4, always=5. If "do not drive" is checked, then that item is not considered further in computing the subject's composite score for that visual function. The composite score for a visual function is defined as the mean response for the items listed for that visual function.

| <u>VAQ Visual Functions</u> | <u>Items to be used to Compute Composite Score</u> |
|-----------------------------|--|
| Color Discrimination | 5, 17, 25 |
| Glare Disability | 4, 14, 29 |
| Light/Dark Adaptation | 1, 12, 23, 28 |
| Acuity/Spatial Vision | 7, 10, 15, 27 |
| Depth Perception | 9, 21, 32 |
| Peripheral Vision | 2, 11, 19, 26, 31 |
| Visual Search | 3, 6, 16, 20, 24 |
| Visual Processing Speed | 8, 13, 18, 22, 30, 33 |
| □□□□□ | |

Reference Citation:

Sloane, M.E., Ball, K., Owsley, C., Bruni, J.R., Roenker, D.L. The Visual Activities Questionnaire: Developing an instrument for assessing problems in everyday visual tasks. *Technical Digest, Noninvasive Assessment of the Visual System, Topical Meeting of the Optical Society of America*, January, 1992.

The Visual Activities Questionnaire: Developing an Instrument for Assessing Problems in Everyday Visual Tasks

Michael E. Sloane^{1,2}, Karlene Ball³, Cynthia Owsley^{2,1}, John R. Bruni³, and Daniel L. Roenker³

¹Dept. of Psychology
Univ. of Alabama at Birmingham
Birmingham, AL 35294

²Dept. of Ophthalmology
Univ. of Alabama at Birmingham
Birmingham, AL 35294

³Dept. of Psychology
Western Kentucky Univ.
Bowling Green, KY 42101

Introduction and Background

This paper describes the development of a questionnaire for assessing an individual's problems in performing visual activities typical of everyday life. We were particularly interested in an instrument which would be useful with the elderly population, because eye disease is especially prevalent in this age group (Leibowitz *et al.*, 1980), and even in the absence of significant eye disease, older adults can still experience losses in visual function (Owsley & Sloane, 1990). This type of instrument could be useful from a number of perspectives. **First**, in many research settings it is desirable to have some sort of metric for assessing the extent to which a subject is having problems in everyday visual tasks. Ideally it would be best to obtain performance measures on the visual tasks under study, but the reality is that this is not possible in many studies. Thus, researchers often resort to asking subjects about their self-perceived problems in performing the activity in question, but without a valid and reliable instrument, subjects' answers are often useless from a scientific standpoint. Examples of settings in which a psychometrically solid questionnaire might be helpful are: evaluating the effects of a treatment or procedure (e.g., cataract surgery) on visual functioning; assessing how self-perceived visual difficulties relate to an adverse outcome such as a vehicle crash or a fall; and gathering information about visual tasks especially difficult for certain subpopulations of older adults (e.g., those with age-related maculopathy). A **second** way a questionnaire may be useful is in collecting epidemiological data on visual problems in the elderly population. Epidemiological studies on eye health and visual functioning are costly, and from the standpoint of actually carrying out the project, these studies are not particularly challenging or stimulating for research oriented clinicians (see Ederer, 1983). Coren and Hakstian (1987; 1988) have suggested that a suitably constructed questionnaire could be a much cheaper way to obtain some types of epidemiological data. A **third** way in which a questionnaire instrument might be useful is in developing hypotheses about the mechanisms underlying vision problems in the elderly. When visiting the laboratory or clinic, older adults often articulate visual problems, and a questionnaire could provide them the opportunity to do so in a systematic fashion. **Fourth**, a questionnaire might also be useful to clinicians since subjective information from the patient can yield clues about an undiagnosed disease process or condition.

The first questionnaires or "inventories" designed to assess health and functional status in the adult population did not specifically target visual problems (e.g., Maddox & Douglas, 1964; Bergner *et al.*, 1981; Parkerson *et al.*, 1981). But more recently, several instruments have been developed that focus on vision. Coren and Hakstian (1987) developed an inventory for measuring visual problems with three scales covering acuity, color vision, and binocular function. Their questionnaire had a number of positive features. Rather than asking for abstract judgments about the quality of the respondent's vision, questions were behaviorally based in that they asked about potential problems in typical visual tasks ("Do you find most book print too small to read easily without glasses or contact lenses?" Five point response: Never to Always). The questions had good validity when compared against actual laboratory tests of vision, with coefficients ranging from 0.59

to 0.82. Internal consistency coefficients for each scale were also high, ranging from 0.86 to 0.94. Although this instrument appears to be based on sound psychometric principles, there are a few reasons why it was not ideal for our purposes. First, it was evaluated with respect to young adults only, whereas our target population is the elderly. Second, they excluded individuals who reported knowledge of specific visual problems as communicated to them by an eye care specialist. This was done so that the validation process was not confounded by information provided by a clinician, rather than being based exclusively on self-perceived problems in a visual task. However, in studying the elderly population, we are faced with the fact that most older adults do visit an eye care specialist and in many cases will be informed that they do have an ophthalmic condition. Furthermore, it seems to us that the validity coefficients of such an instrument should take into account the patient's beliefs about his/her eye health. Third, the Coren and Hakstian instrument included questions on only 3 aspects of vision, whereas we wanted to evaluate a wider spectrum of visual functions.

Kosnik *et al.* (1988) developed a questionnaire for assessing problems in daily visual activities. Consistent with our own goals, their instrument covered many aspects of visual function, used a behaviorally based question format, and was developed using an older adult sample. However, a close look at the Kosnik questionnaire indicated several potential problems. The most serious problem was that the questionnaire can not be used to discriminate types of visual function loss, i.e. most visual functions loaded on the same factor. In addition, the validity and reliability of the instrument were never established.

In a recent abstract Mangione *et al.* (1991a) described a questionnaire called the "Activities of Daily Vision Scale". This instrument has five subscales which center on activities deemed to be visually important and potentially difficult for patients with cataract (their population of interest). These activities include night driving, day driving, distance vision, near vision, and glare disability. They report that the instrument has high internal consistency reliability and criterion and content validity. This scale has been used to evaluate improvements in older adults' ability to perform visual activities following cataract surgery (Mangione *et al.*, 1991b).

We will now describe our own efforts to develop a questionnaire instrument for assessing older adults' problems in everyday visual activities. Our goals were to develop a reliable instrument which had criterion reference and construct validity and that did not require a lengthy period of time to complete. Hereafter we will refer to our instrument as the Visual Activities Questionnaire, or VAQ.

Development

We first identified ten target areas of visual functioning to be assessed by the VAQ: vision under low illumination, peripheral vision, visual processing speed, visual search, acuity (both near and distance tasks), color vision and contrast sensitivity, disability glare, light and dark adaptation, depth perception, and motion/dynamic sensitivity. These areas were selected since they are known to be affected by the aging process and by various disease processes. After identifying these target areas, we prepared ten questions in each of the ten areas. These items were not actually questions, but were phrased as statements (e.g., "I have problems seeing when I'm driving at night"). Subjects had to choose a response on a five point scale by indicating never/rarely/sometimes/often/always (scored 1 to 5). Items were behaviorally based in that they referred to actual visual activities and tasks, rather than to abstract visual capabilities. A given visual activity could be referred to in several target areas. For example, the driving task makes use of a number of visual functions including peripheral vision, glare sensitivity, and visual processing speed to name a few. Thus, questions on driving were represented in several different target areas. We avoided wording such as "activity X is more of a problem than it use to be", since this is almost always true for an older respondent.

These 100 items were more items than we wanted to eventually incorporate into the final VAQ, but this approach helped determine inter-item reliabilities so that we could eventually delete items which provided redundant information and which did not strengthen the group of items representing a given visual function. Preliminary testing also permitted us to eliminate items with ambiguous/confusing wording. In structuring the questionnaire, the items were presented within the questionnaire in a constrained order. Items from the same visual function category (e.g., peripheral

vision) and items asking about the same visual task (e.g., reading) were not presented in close proximity to each other. This questionnaire was administered to 221 adults (mean age = 55, range 17 to 89) who were recruited through the Primary Care Clinic of the UAB School of Optometry and the Vision Laboratory of Western Kentucky University (90% of sample was age 55 or over).

Factor analysis was used to evaluate content validity and to determine which items grouped together on the basis of subject responses. Eight factors emerged and the following visual function names were applied to these factors: peripheral vision, acuity, visual search, depth, color, adaptation, glare, and processing speed. For each factor we identified which items within that grouping had the highest correlation to the factor or "composite" score. (The composite score for a factor grouping was defined as the mean response for the items in that factor.) To pare down the size of the questionnaire, we then retained those items on the questionnaire which had the highest correlation with the factor, and had the lowest correlations with the other factors. This procedure eventually resulted in an instrument one-third the length (33 items) of the original questionnaire. Table 1 lists the correlations among the eight factor composite scores. The mean value and standard error of each factor composite is in the bottom row. The Cronbach alpha coefficients, which represent the internal consistency reliability for each factor grouping of VAQ items, appear on the diagonal (in parentheses). All coefficients were high and exceeded 0.80. Our next step was to confirm this factor structure on a new sample of 314 older adults. This sample was recruited from the population of licensed drivers aged 55 and over (mean age = 72, range 56 to 98) who lived in Jefferson County, Alabama. The factor structure of the VAQ was verified with this sample, and the Cronbach alpha coefficients were similarly high on all eight factors (over 0.80). Thus the shortened version of the VAQ possessed similar psychometric characteristics as the original 100 question version, but was more practical since it required less time.

The criterion validity of the VAQ was evaluated in two ways. First, a battery of actual visual function tests were carried out on a group of 294 subjects who also filled out the VAQ (shortened version). These individuals (mean age 71, range 56-90) were recruited from the population of licensed drivers aged 55 years or over in Jefferson County, Alabama. (This is the same sample as described in Ball *et al.*, submitted manuscript, 1991). The tests administered consisted of: letter acuity, contrast sensitivity, stereoacuity, color discrimination, disability glare, processing speed, selective attention, size of the useful field of view, and visual field sensitivity (central 30 and peripheral 30-60). Because of space limitations, details about these tests are not presented here, but have been previously described in Owsley *et al.* (1991) and Ball *et al.* (submitted). For each VAQ factor grouping, we computed the mean response for the entire sample on that factor grouping and then divided subjects into two groups -- those falling within 2 standard errors of the mean ("no problem" group) vs. those 2 standard errors away from the mean in the "negative" direction (i.e. those expressing difficulty with the tasks in question; "problem" group). We then compared the "no problem" and the "problem" groups with respect to their performance on the various visual functional tests mentioned above. For most factors, those older adults who stated on the VAQ that they had difficulty with a given visual task, also tended to display a deficit in several aspects of visual functioning, when compared to older adults who stated on the VAQ they had no difficulty with the task in question. (Performance in the disability glare test did not relate to any of the VAQ factor composites).

Another way of examining the criterion validity of the VAQ is to examine the correlations between each of the visual functional tests and the composite scores on each of the eight factor groupings of VAQ items. These are listed in Table 2. Only significant r 's are listed. There are two noteworthy features. First, most VAQ composites correlated with several aspects of visual function. This is not really surprising since the activity addressed in each VAQ item represents a complex visual task which relies on many different aspects of visual function. Thus, it would be naive to expect each composite to correlate with only one visual function. Second, for most of the eight VAQ composites, the highest correlation typically occurred with a visual function test which measured a key aspect of the task in question. For example, the color composite correlated most highly with color discrimination ability (D-15); the acuity composite correlated most highly with measures of spatial vision (acuity, contrast sensitivity, stereoacuity); the peripheral vision composite correlated most highly with visual field sensitivity. At first glance, the correlations in Table 2 may seem low,

but we do not find them surprising. People base their opinions about whether they are having visual activity problems on many sources of information, ranging from their expectations about what is "normal" for their age, to their obvious failures to perform a visual task successfully (e.g., bumping into obstacles during mobility). In addition, perceived social desirability can be a factor. Many older individuals place great emphasis on appearing socially "acceptable" and refrain from reporting they have a behavioral difficulty or health problem, fearing that they may appear "feeble". Thus, there are a host of reasons why criterion validity on a vision questionnaire especially designed for older adults is unlikely to be extremely high. The criterion validity of the VAQ (as listed in Table 2) is comparable in magnitude to that reported for the Mangione *et al.* (1991a) instrument (0.37) .

Summary

We have developed a questionnaire instrument designed to assess the extent to which an individual has problems in everyday visual tasks. The VAQ is especially designed for the older adult population, who are at a higher risk for ocular disease and visual impairment than are younger adults. Our research indicates that the VAQ has good reliability, reasonable validity given the complexity of self-report judgments about health and behavior problems, and is relatively brief to administer since it contains only 33 items. Our data indicate that older adults who report that they have visual difficulties when administered the VAQ, tend to have visual deficits as measured by visual functional tests. Therefore, the VAQ may prove to be a useful instrument in clinical and epidemiological vision research.

References

- Ball, K., Owsley, C., Sloane, M.E., Roenker, D.L., Bruni, J.R. (submitted manuscript, 1991) Paper available from authors.
- Bergner, M., Bobbitt, R.A., Carter, W.B., Gilson, B.S. (1981) *Medical Care* 19, 787-805.
- Coren, S., Hakstian, A.R. (1987) *Applied Optics* 26, 1468-1472.
- Coren, S., Hakstian, A.R. (1988) *Perception and Psychophysics* 43, 115-120.
- Ederer, F. (1983) *Epidemiological Reviews* 5, 51-66.
- Kosnik, W., Winslow, Kline, D., Rasinski, K., Sekuler, R. (1988) *Journal of Gerontology* 43, P63-P70.
- Leibowitz, H.M. *et al.* (1980) *Survey of Ophthalmology (Supplement)* 24, 335-610.
- Maddox, G.L., Douglass, E.B. (1964) *Journal of Health and Social Behavior* 14, 87-93.
- Mangione, C.M. *et al.* (1991a) *Clinical Research* 39, 100A;.
- Mangione, C.M. *et al.* (1991b) *Clinical Research* 39, 604A.
- Owsley, C., Ball, K., Sloane, M.E., Roenker, D.L., Bruni, J. (1991) *Psych. and Aging* (in press, September issue).
- Owsley, C., Sloane, M.E. (1990) In F. Boller, J. Grafman (Eds.) *Hndbk of Neuropsych. Vol 4.* Elsevier, pp. 229-249.
- Parkerson, G.R. *et al.*(1981) *Medical Care* 19, 806-828.

Acknowledgements

This research was supported by NIH grants AG04212, EY06390, AG05739, and EY03039; the AARP Andrus Foundation; a Department Development grant from Research to Prevent Blindness; and the Rich Retinal Research Foundation. We thank P. Alverson, M. Graves, M. Lewellen, and T. Threlkeld for assistance with data collection, and the UAB School of Optometry and the Alabama Department of Public Safety for help with subject recruitment. T. Threlkeld's participation in this project was made possible by the NIH Minority High School Student Research Apprenticeship Program (RR03001-09).

Table 1: Correlations Among the Eight Factor Composite Scores, with Cronbach Alpha Coefficients in Parentheses on the Diagonal. (Mean Composite Score and Standard Error of the Mean for the sample are in the last two rows.)

| | Color | Glare | Adapt | Acuity | Depth | Periph | Search | Speed | |
|----------------------|-------|-------|-------|--------|-------|--------|--------|-------|--|
| Color | (.86) | | | | | | | | |
| Glare | .39 | (.98) | | | | | | | |
| Adaptation | .46 | .69 | (.87) | | | | | | |
| Acuity | .43 | .66 | .66 | (.89) | | | | | |
| Depth | .49 | .57 | .59 | .60 | (.86) | | | | |
| Peripheral Vision | .57 | .58 | .58 | .49 | .73 | (.86) | | | |
| Search | .59 | .69 | .69 | .67 | .73 | .76 | (.88) | | |
| Processing Speed | .54 | .65 | .66 | .65 | .74 | .75 | .82 | (.82) | |
| Mean Composite Score | 1.84 | 2.80 | 1.57 | 2.96 | 1.73 | 1.81 | 2.37 | 2.16 | (Note: Response scale is 1 to 5; see text) |
| Stand Error of Mean | .06 | .06 | .06 | .06 | .05 | .05 | .05 | .04 | |

Table 2: Correlations between the Visual Functional Tests and the VAQ Factor Composite Scores (Validity). Only significant correlations are listed ($p < .05$). The disability glare test did not relate to any of the VAQ Factor Composites.

| Visual Function Test | VAQ Factor Composites | | | | | | | |
|------------------------|-----------------------|-------|-------|--------|-------|--------|--------|-------|
| | Color | Glare | Adapt | Acuity | Depth | Periph | Search | Speed |
| Acuity | | .14 | .15 | .19 | .14 | | .14 | |
| Contrast Sensitivity | .19 | .17 | .28 | .37 | .31 | .24 | .31 | .29 |
| Stereoacuity | .11 | | .22 | .27 | .26 | .15 | .23 | .17 |
| Color Discrimination | .28 | | | | | | | |
| Humph Cen 0-30 deg | .13 | | .19 | .22 | .24 | .31 | .21 | .22 |
| Humph Periph 30-60 deg | .15 | .12 | .22 | .21 | .21 | .26 | .18 | .16 |
| Processing speed | | | | | .17 | .12 | | .19 |
| Selective Attention | .14 | | | .14 | .16 | .19 | .21 | .16 |
| Useful Field Size | .14 | | | .15 | .21 | .17 | .19 | .24 |