Evaluation of the Waggoner Computerized Color Vision Test
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METHODS (cont.)

Procedures
- Tests were administered in a dark room (for the anomaloscope and the WCCVT) or under a standard daylight light box (for visual acuity, the Ishihara test, the HRR test, and the D-15 test).
- Visual acuity was determined binocularly with a 40cm Traditional SLOAN Runge Pocket Near Vision Card.
- A visual acuity of at least 20/40 was required, which all participants satisfied.

METHODS (cont.)

HRR Test
- Each plate includes 0, 1, or 2 shapes (circle, triangle, or cross) that are visible only by differences in the colors of dots.
- A participant reported the number, the identity, and the location of shapes.
- A normal trichromat should not miss any of the 6 screening plates. If a participant failed 1 or more screening plates, diagnostic plates followed.

RESULTS

- Out of 305 participants, 290 were normal trichromats and 15 were color vision defectives based on the anomaloscope results.
- All of the normal trichromats were classified as normal by the WCCVT and D-15 test, whereas 1 and 8 normal trichromats were classified as color vision defective by the Ishihara test and HRR test, respectively.
- All the 4 tests classified 3 “very mild” color vision defectives as normal trichromats, who were detected only by the anomaloscope. The WCCVT and the HRR test correctly identified the remaining 12 color vision defectives, whereas the Ishihara test missed 1 more and the D-15 test missed 5 more.

CONCLUSIONS

- Among the four color vision tests evaluated, the D-15 test is inferior in sensitivity and the HRR test is inferior in specificity. The WCCVT and the Ishihara test perform well in both of these measures. Considering the ease of administration, the WCCVT seems very promising as a color vision screening test.
- The limitation of the current study is the scarcity of color vision defective participants. In order to assess performance of color vision tests, it is critical to have more color vision defective people, ideally we should have a similar number of normal trichromats and of color vision defectives.

METHODS

Participants
The sample consisted of 305 participants, 101 of which were male (33\%) and 204 were female (67\%). The mean age was 21 (SD=6.6). Approximately 35\% were Hispanic, 25\% Asian, 25\% White, 2\% Black/African-American, 1\% Native Hawaiian or Pacific Islander, and 10\% Mixed/Other.

PURPOSE

To evaluate whether the recently developed WCCVT can accurately screen color vision deficiencies.
In order to do so, we will compare the sensitivity and the specificity of the WCCVT to those of well established color vision tests: Ishihara Pseudoisochromatic Plates Test (24-plate edition), 4th edition Hardy Rand and Rittler (HRR) test, and the D-15 test.

METHODS

INTRODUCTION

• People with normal color vision are called normal trichromats and they have three types of cones in their retina (L-cones, M-cones, & S-cones). People with congenital color vision defects either have anomalous cones or lack one or more types of cones.
• Anomalous trichromat has 3 types of cones, but one is anomalous
• Protanomal has anomalous L-cones
• Deuteranomal has anomalous M-cones
• Dichromat lacks 1 type of cones
• Protanope lacks L-cones
Protanomal has anomalous L-cones
Deuteranomal lacks M-cones
Protanope lacks S-cones
Protan and deutan defects are collectively called red-green color vision deficiencies because they have difficulty distinguishing these middle- to long-wavelength regions. Up to 8\% of population can be affected by protan and deutan defects. Thus, color vision screening is a very important public health issue.
Traditional color vision tests are expensive, require a highly skilled examiner, and/or require a specific lighting condition. The recently developed Waggoner Computerized Color Vision Test (WCCVT) overcomes these difficulties because it is administered through the Internet. The WCCVT can also screen for less common tritan defects, whereas many traditional tests only screen for red-green color vision defects.

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• Protanomal has anomalous L-cones
• Deuteranomal has anomalous M-cones
• Dichromat lacks 1 type of cones
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