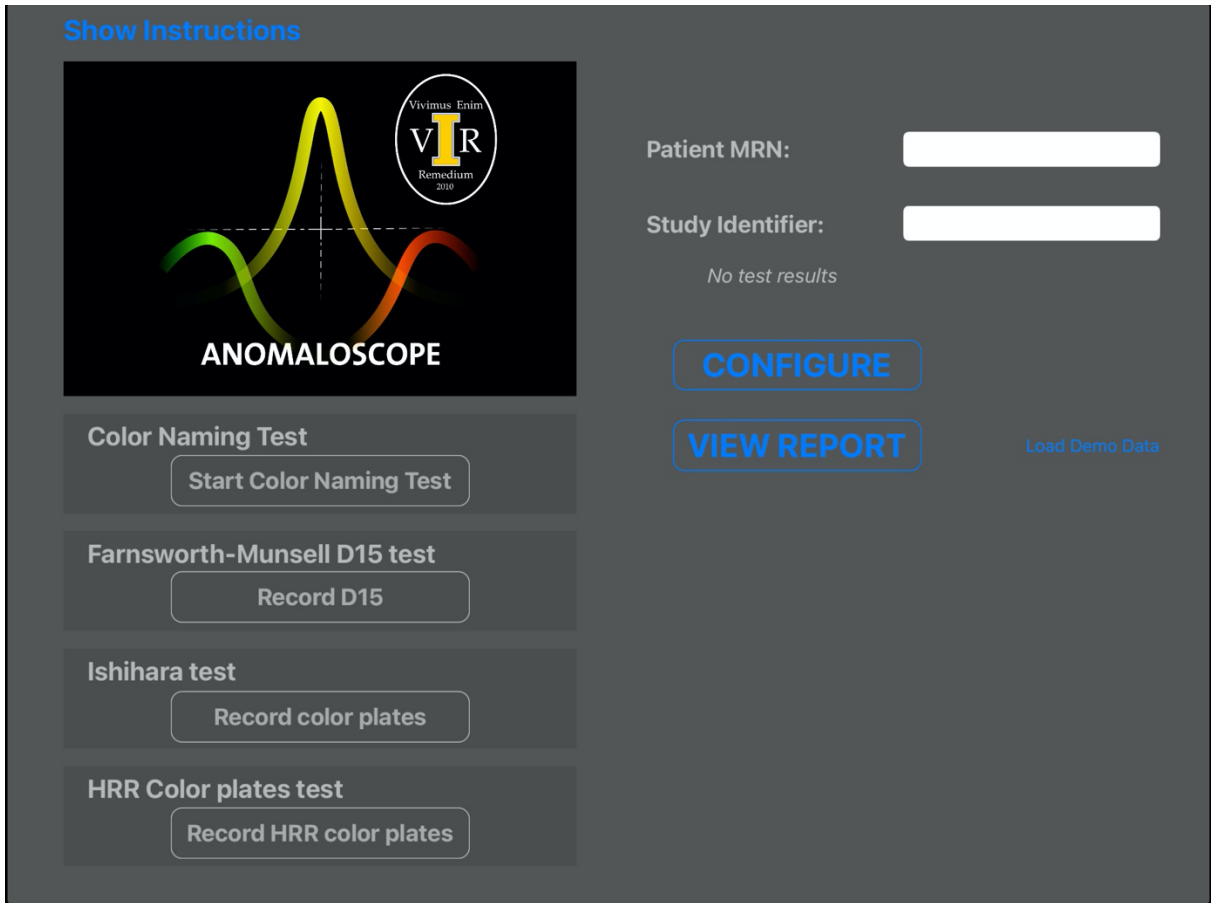
Iowa Color Vision Test Instructions

Main Screen

The main interface to the Iowa Color Vision App is the launching point for all of the testing modalities. These are listed along the left side of the screen. The basic tests include a color naming test, as well as support for recording the results from the Farnsworth-Munsell D15 test, the Ishihara pseudo-isochromatic plates book, and the Hardy-Rand-Rittler pseudo-isochromatic plates collection. Along the right half of the interface are fields to specify the MRN and/or study identifier for the person being evaluated. One of these must be specified before the test interfaces are active, as indicated by the buttons switching from a grayed-inactive state to their active state with a blue accent.

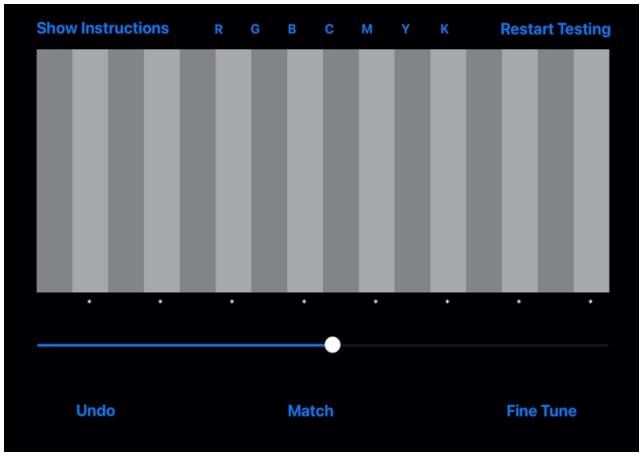
A summary report may be generated based upon the data collected for the current participant using the "View Report" button. This report is generated in PDF format, with each test recorded for the participant on it's own page. You can access the PDFs in the Files app on the iPad, in the ColorVision folder. This folder is located in the "On My iPad" location within the Files app.

[Can provide more details on accessing the PDFs in a later version]



Color Naming Test

The goal of the Color Naming test is to provide a relatively simple interface to evaluate a participant's ability to discriminate and identify a set of colors. This test uses a set of six standard colors, red (R), green (G), blue (B), cyan (C), magenta (M), and yellow (Y). The figure below presents the basic interface of the Color Naming test. The alternating stripes in the center represent two distinct colors – in this case two shades of gray. Each colored stripe is repeated – with an asterisk below the color that does not vary. These may be a shade of gray, or may be one of the RGBCMY colors.



Instructions for the Test Taker

During this test, you will be presented with a set of alternating vertical stripes. You should attempt to match the brightness of the two sets of stripes using the provided slider, such that the stripes vanish and the screen is a uniform color. If the stripes can vanish, then select "Match". If you cannot get the stripes to match, or if the stripes are a color, please give the iPad to the Test Supervisor. A Fine Tuning mode is available to help perfect the match and make the bars vanish.

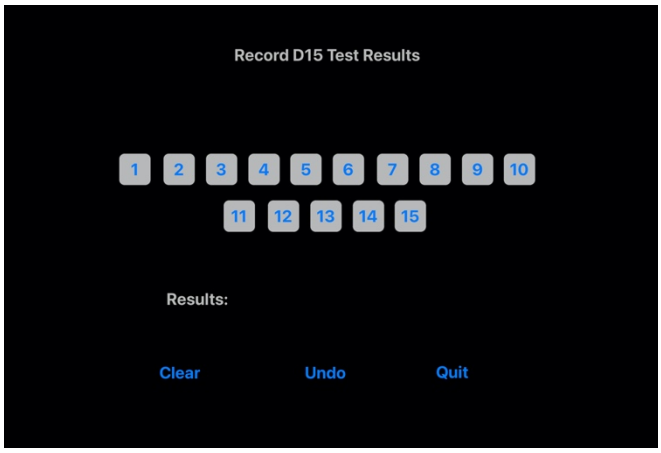
Code	Perceived color
R	Red
G	Green
B	Blue
C	Cyan
M	Magenta
Y	Yellow

The goal for the Test Taker is to use the slider provided below the colored stripes to adjust the gray level of the variable stripes to match the brightness of the stripes with the asterisk. If the user perceives the alternating stripes as the same color, they should press the Match button. Otherwise, they should press the letter-button along the top of the screen matching the perceived color of the stripes with the asterisks. See the table to the left for details. This will save the result, and continue to the next color presentation, or save the test results and return to the Main screen if at the end of the test.

To facilitate perfectly matching the gray levels, the "Fine Tune" button may be used to activate second slider element which provides more fine-grain control of the gray level in the dynamic stripes. This feature is illustrated in the second figure to the right, in which the fine tuning slider has been activated, allowing a perfect match of the dynamic stripes (without an asterisk) to the static stripes (with an asterisk).

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.

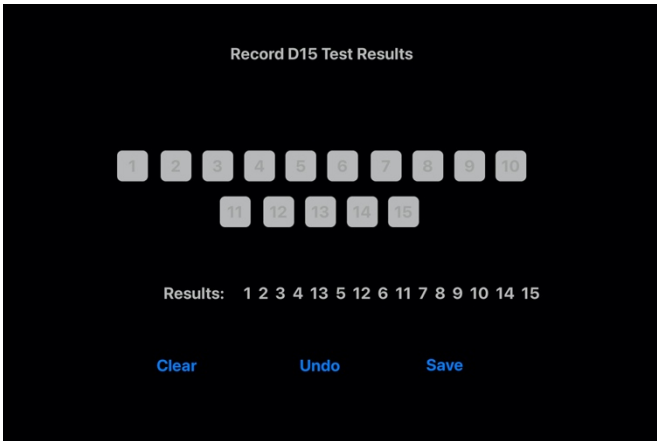
Farnsworth-Munsell D15



The Farnsworth-Munsell D15 consists of a set of 16 colored discs, with one of them in a fixed/known position (the reference cap). The user is instructed to select the color disc which most closely matches the reference cap. They should continue to select the next closest color disc and place them in sequence. Alterations in the sequence are permitted prior to completion.

Instructions for the Test Taker

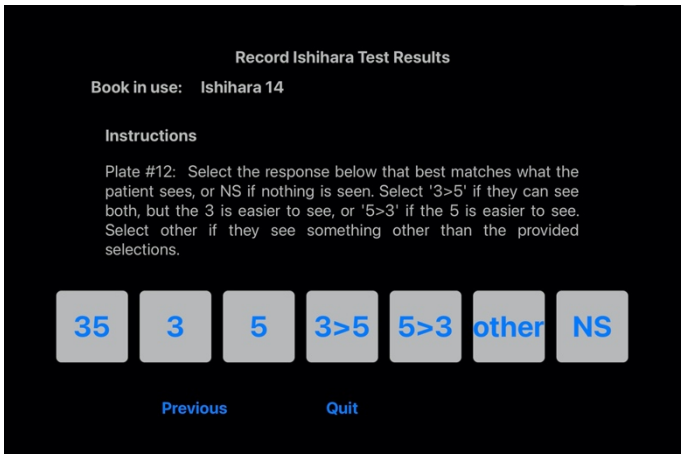
There are 16 colored discs, including a reference disc that is in a fixed position. You are to select the color disc which most closely matches the reference disc and place that next to the reference disc. Then, from the collection of unselected discs, select the disc that most closely matches your first selected disc, and place that next to your first selected disc. Continue this process until all discs have been used. You are allowed to reorder the discs prior to completing the test.



For the Farnsworth-Munsell D15 Test, the Iowa Color Vision app provides an interface to rapidly capture the order of the discs, using the numbers found on the underside of the discs (from 1 through 15). The basic interface for recording this data is shown at the right. To record the sequence of the caps, the button with the corresponding number is pressed. As each button is pressed that number is added to the results, and the button is disabled. A fully specified test is shown at the right.

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.

Pseudo-Isochromatic Plates – Ishihara



The user interface for the Ishihara pseudo-isochromatic plates test is designed to facilitate recording of the responses to the Ishihara 14 plate test in a streamlined and standardized fashion. For each plate, in the order of presentation, the interface provides a set of buttons with options for recording the participants response/observation at each page. These are listed in order from most likely on the left-most button, with "NS" for nothing seen in the right-most button. For this particular plate, Plate #12, it is possible that the participant may see 35, only the number 3, only the number 5, or one of the digits may be easier to see. [use a simpler plate] If the participant perceives some other shapes or numbers, the "other" option is provided to record that response.

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.

Per-plate instructions

Plates #1-10

Select the response that best matches what the Test Taker sees, or NS if nothing is seen. Select other if they see something other than the provided selections.

Plate #11

Select "correctly traced" if they are able to trace the bluish-green line, or "other" if they fail to trace the line correctly. Select NS if nothing is seen.

Plate #12

Select the response that best matches what the patient sees, or NS if nothing is seen. Select "3>5" if they can see both numbers, but the 3 is easier to see, or "5>3" if they can see both numbers but the 5 is easier to see. Select "other" if they see something other than the provided selections.

Plate #13

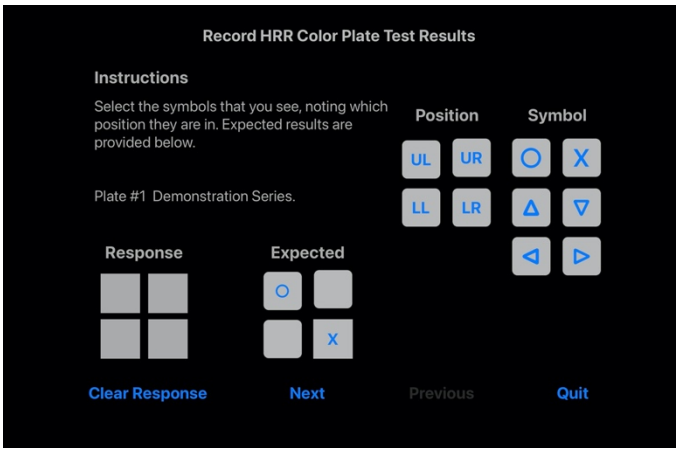
Select the response that best matches what the patient sees, or NS if nothing is seen. Select "9>6" if they can see both numbers but the 9 is easier to see, or "6>9" if they can see both numbers but the 6 is easier to see. Select other if they see something other than the provided selections.

Plate #14

If they are able to trace both the upper and lower paths select "both". If they are only able to trace one path select the appropriate response – upper or lower. Select "upper>lower" if they can trace both but the upper path is easier to see, or "lower>upper" if they can trace both but the lower path is easier to see. Select NS if nothing is seen, or other if they see something other than the provided selections.

Pseudo-Isochromatic Plates – Hardy-Rand-Rittler

The user interface has been designed to rapidly and robustly record the data for each plate. In this interface, the current set of responses recorded for the plate are presented in the "Response" grid in the lower left of the screen. As responses are entered they will appear in the appropriate position in the response grid. The expected responses for each plate are presented in the "Expected" grid immediately to the right of the Response grid. A quick tap on these positions will record the glyph in the pressed button into the response. For non-standard responses, the user may select a position and symbol pair from the applicable grids on the right half of the screen. Pressing the "Clear Response" button will blank all responses for the current plate. When the user is done recording the participant's responses for the current plate, they should press the Next button to proceed to the next plate. On all plates except the first plate, the option of returning to the previous plate is available using the "Previous" button. After responses have been recorded for all applicable plates, the "Save" button is enabled to save all of the recorded responses, and return to the Main Screen.



The HRR consists of five sets of plates. The first set of plates are demonstration plates which all participants are expected to identify. The second and third sets of plates are "screening series" to test for red-green and blue-yellow color vision defects, respectively. The fourth and fifth sets of plates are "diagnostic series" to further distinguish the primary defects into protanomalous and deutanomalous for red-green color vision defects, and tritanomalous and tetartanomalous for blue-yellow color vision defects. As per the suggested screening protocol, the diagnostic series are only presented if the participant had one or more errors in the matching screening series.

Instructions for the Test Proctor

Plates #1 - #4: Let the test taker know that you are going to show them some colored symbols, and that without touching them, they should let you know how many they see and what the symbols are. You may have them trace the symbols with a pointer or brush.

Remind the test taker than the test is made up of only three symbols (circle, square, and triangle) and that each page may have two, one, or none of the symbols. Also let them know that some of the symbols will be more challenging to see as they may be "less strong in color".

All other plates: Ask the test taker: how many colored symbols they can see on the plate, which symbols those are, and where on the page they appear.

Color Matching Test – Brightness Pre-test

Using the slider provided, match the intensity of the blinking light as it alternates between two different colors. As the slider is moved the relative amounts of the two colors are altered. When you have matched the intensity of the red and green LEDs, press the Done button. You will then be taken to the next stage of the test.

Color Matching Test

The standard version of the Color Matching Test procedure uses an adaptive testing strategy. The goal is the determine the matching profile between a mixture of red and green light and monochromatic yellow. For each test point, the participant's task is to judge whether the central LED matches the color of the flanking yellow LEDs, or if the central LED is too green, or too red to match the yellow LEDs.

The test proceeds in a series of two or three rounds of testing, with the extent of the red-green mixture over which the participant is tested is updated in an adaptive fashion between each round. There are two rounds of testing by default, which is increased to three rounds of testing when Research Mode is enabled.

After completing the final presentation, the data for the Color Matching Test is saved and the user is automatically taken back to the Main Screen.

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.

Color Matching Test – Protanomalous

The Protanomalous version of the Color Matching Test testing procedure begins using an adaptive testing strategy in which 6 presentations (red-green mixtures in the central LED) are evaluated in each phase. The goal is the determine the matching profile between a mixture of red and green light and monochromatic yellow, and the relative brightness of each of the red-green mixtures. For each test point, the participant has two tasks. The first is to judge whether the central LED matches the color of the flanking yellow LEDs, or if the central LED is too green, or too red to match the yellow LEDs. The second is to use the provided slider to alter the intensity of flanking yellow LEDs to match the brightness of the central LED.

After completing the final presentation, the data for the Color Matching Test is saved and the user is automatically taken back to the Main Screen.

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.

[add picture of the interface, along with an annotation of the slider]
[perhaps include a figure with a drawing of the digital anomaloscope too]

Ramp Test

In the Ramp Test, the LEDs will begin matched using the matching data from the Color Matching Test. Each test presentation begins with the user pressing the **Start Ramp** button, at which point the central LED will begin changing color adding either red or green. When the Test Taker perceives the central LEDs color to be redder or greener than a match, they should press the **Red** or **Green** buttons respectively. This re-sets the LEDs to matching and re-enables the **Start Ramp** button for the next presentation.

After completing the final presentation, the data for the Ramp Test is saved and the user is automatically taken back to the Main Screen.

The **Previous** button can be used at any time to return to the prior presentation. And the **Stop Testing** button can be used at any time to interrupt the testing and return the user to the Main Screen.

Brightness Test

In the Brightness Test, the central LED alternates presenting a specific intensity of red and one of green. The Test Taker's job is to determine whether they perceive the colors to be the same brightness, or if the red or green color is brighter.

After completing the final presentation, the data for the Ramp Test is saved and the user is automatically taken back to the Main Screen.

The Previous button can be used at any time to return to the prior presentation. And the Stop Testing button can be used at any time to interrupt the testing and return the user to the Main Screen.