

UK Biobank

Visual Acuity Testing

Version 1.0

<http://www.ukbiobank.ac.uk/>

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This manual details the procedure for Visual Acuity testing at an Assessment Centre of the UK Biobank.

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1. Introduction

1.1: This manual details the procedure for Visual Acuity testing at an Assessment Centre of the UK Biobank. This takes place at the 4th 'station' of the Assessment Centre visit, as listed in Table 1.

Table 1: sequence of assessment visit

| | Visit station | Assessments undertaken |
|---|------------------------------|--|
| 1 | Reception | <ul style="list-style-type: none"> • Welcome & registration • Generating a USB key for Participants |
| 2 | Touch screen Section | <ul style="list-style-type: none"> • Consent • Touch screen questionnaire • Hearing Test • Cognitive function tests (Shape, Pairs, Fluid Intelligence, Snap) |
| 3 | Interview & blood pressure | <ul style="list-style-type: none"> • Interviewer questionnaire • Blood pressure measurement • Measurement of arterial stiffness (Pulse Wave Velocity) |
| 4 | Eye measurements | <ul style="list-style-type: none"> • Visual acuity • Auto-refraction • Intraocular pressure • Retinal image (OCT Scan) |
| 5 | Physical measurements | <ul style="list-style-type: none"> • Height (Standing and Sitting) • Hip & waist measurement • Weight and Bio-impedance (Body Composition) measurement • Hand-grip strength • Heel-bone ultrasound • Spirometry (Lung function Test) |
| 6 | Cardio (Physical fitness) | <ul style="list-style-type: none"> • Exercise ECG (Cycling) |
| 7 | Sample collection & exit | <ul style="list-style-type: none"> • Blood samples collected • Urine sample sought • Saliva sample sought • Consent & result summary printed • Travel expense claim provided |
| 8 | Web-based diet questionnaire | <ul style="list-style-type: none"> • Dietary assessment |

1.2: Throughout this document, the term 'Participant' signifies a study participant who is taking part in the Assessment Centre process, regardless of whether they eventually give or withhold consent to take part in the UK Biobank study.

1.3: The collection of data from assessment visits uses the direct data entry system of the Assessment Centre Environment (ACE). This has five components (**Assessment Centre Environment**), of which Vox operates the Ocular station of the assessment visit.

1.4: At the start of their visit, each participant is issued with a USB Key at the Reception station. This USB Key acts as a participant identifier (it contains Participant ID, name, date of birth and gender) and as a temporary storage device for the recorded data. As the participant progresses between stations, the USB key acts as an identifying token and also as a data transfer mechanism. At the Reception & Exit module, all data on the USB key is removed, after it has been backed up to the Assessment Centre head PC.

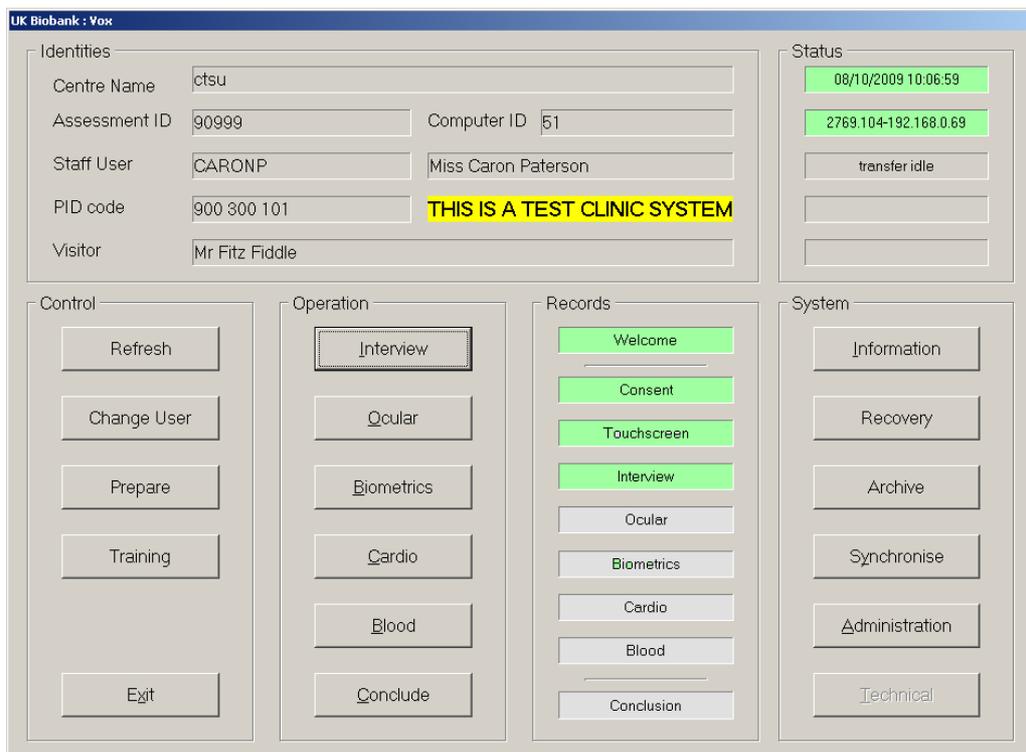
2. Staff

Assessment centre technicians trained in this procedure are responsible for carrying it out. The Duty Manager oversees that all assessment centre staff work in accordance with the standard operating procedure.

3. Participant testing procedure

3.1: The participant is collected from the specified waiting area for this station and seated in an enclosed dark room, free from sources of glare and conditioned to maintain the correct humidity and temperature for the efficient running of the eye measurement equipment.

3.2: The participant's USB key is inserted into a computer. The staff member logs on securely to Vox and checks that the previous stations have been completed, otherwise the participant is directed to the correct station. The 'Ocular' button is selected and the identities of both participant and staff member are confirmed.



3.3: On the Eye Check page, the participant is asked if they have ever had eye surgery and the response and whether surgery was within the last 4 weeks is recorded on Vox. A list of 5 surgery types is displayed and the details are recorded of the type of eye surgery and on which eye, if known.

Note: If the participant has had any eye surgery within the last 4 weeks they cannot continue with Ocular measurements

3.4: On the 'Both eyes Present' section, it is recorded if the participant has a prosthetic eye(s). Eye measurements are attempted on both eyes where eyes are physically present.

Note: Participants with possible eye infections do not undergo refraction, intra-ocular pressure or optical coherence tomography (OCT) measurements but may complete the visual acuity measurement.

3.5: suspected or confirmed eye infections are recorded by selecting the 'Possible' option.

4. Measurement of visual acuity

4.1: Visual acuity is the most common clinical measurement of visual function and measures the smallest size letters that can be reliably identified at a specified distance. The UK Biobank system is based on a traditional LogMar chart (figure 1) with data captured by Direct Entry to Vox.

Figure 1: LogMar chart

4.2: The participant sits on a chair that has been placed exactly over the 4-metre mark. It is checked that the position of the eyes (and not the chair) is exactly at the 4-metre mark. The participant is prevented from leaning forward or backwards in the chair during the visual acuity test (thus altering the distance between eyes and screen). If the booth space is limited, and if the participant is in a wheelchair, the wheelchair is placed so that the participant's eyes are in line with a 3.5 metre mark.

4.3 The right eye is measured first. On the Vox screen 'Measurable' is selected if Visual Acuity of the right eye is measurable. If Visual Acuity cannot be measured the reason why this was not performed is selected (Equipment Failure or Other Reason; Other Reason can be either a reason from the drop down menu or free text entered in the blank window space).

4.4: At start of the session the screen settings are set by using the 'Configure' button. The display screen size is pre-loaded and reads '21.5 inches'. The distance from seated participant to screen is entered (this should routinely be 4m). In assessment centres where booth space is limited, the participant may be sat at the 3.5m mark.

Note: If Visual Acuity is measured using the mirror function then the sum of distance from the participant to mirror and from the mirror to screen is entered, with 'View Type' Selected as 'Mirror'.

4.5: The light is turned out so that lighting conditions in the room are as low as possible while still compatible with safe movement around other equipment. If the participant wears glasses for distance they are put on for this test. It is checked that glasses are clean (offering tissue/wipes if required). If the participant wears contact lenses it is checked they are wearing them. If the participant normally wears distance glasses (or lenses) but has forgotten to bring them, this fact is recorded, and they go ahead and attempt the Visual Acuity test.

4.6: The left eye is occluded using a black plastic occluder, with the concave surface of the occluder placed over the eye. The participant is asked to keep the occluded eye open, if possible, during the Visual Acuity measurement.

4.7 On the Vox page, 'Measure' then 'Begin' is selected

4.8 The participant is asked to look at the display screen and read out the smallest letter that they can identify. If they are unsure, they are encouraged to guess. The technician selects the smallest correctly identified letter on the Vox screen. If they choose a letter not on the screen, the participant is asked for the letter before that one until a correct letter is identified. If the participant cannot see even the largest letter the 'None' option is recorded.

4.9: Next, 5 letters are shown on the display screen. The participant reads out each letter starting from the left side of the screen. On the Vox screen the technician marks each correctly identified letter by selecting the top button (the letter will turn Green to indicate a correct response); incorrectly identified letters are marked by clicking the bottom button (the letter will turn Red to indicate an incorrect response). If all 5 letters are identified correctly, the 'All Correct' button is selected.

4.10: After all 5 correct letter responses, 'Continue' is selected. The test terminates when 2 incorrect values are given with the results displayed on the Vox screen.

4.11: The Visual Acuity of the left eye is measured as outlined above. The Right eye is occluded using the black plastic eye occluder. Upon completion of Visual Acuity, the room light is turned back on. If the participant is able to continue with the eye measurements, they proceed to the **Refraction** test.

5. End of Session Procedures

5.1: After each participant has left the room, all the surfaces and instruments participants came into contact with are cleaned with Azowipes

5.2: After the last participant has left the eye station, the data are archived onto USB keys and securely transported to the UK Biobank Coordinating Centre.