

UK Biobank

Web-based version of Symbol Digit Substitution

---

Version 1.8

<http://www.ukbiobank.ac.uk/>  
1<sup>st</sup> May 2024



## Contents

|   |                                      |   |
|---|--------------------------------------|---|
| 1 | Introduction .....                   | 2 |
| 2 | Symbol digit substitution test ..... | 2 |
| 3 | Data captured.....                   | 3 |

## 1 Introduction

- 1.1 This manual details the procedure for the symbol digit substitution test.
- 1.2 The UK Biobank cognitive function tests have been selected to cover a range of cognitive domains and are believed to be sensitive to cognitive decline and dementia. All tests have been constructed specifically for use in UK Biobank and other epidemiological studies in order to conform to the constraints of conducting large population-based studies. Tests have been constructed using established testing paradigms that have been shown to produce valid scores and to be acceptable to participants.
- 1.3 Respondents were invited to complete the questions using their own devices, via touchscreen interface (tablet or phone) or traditional desktop computer.

## 2 Symbol digit substitution test

- 2.1 Respondents are presented with a table linking symbols to single-digit integers and a second table containing only the symbols. Respondents are then asked to indicate which number is associated with each of the symbols in the second table, using the first table as a key. This test measures the complex processing abilities of respondents. The estimated time to completion is three minutes.
- 2.2 The instructions are:
- “This is a code-breaking game. A code is given in a bar near the top of the page linking a symbol to a number. In this test you will have to match symbols and numbers. In the lower bar, place the correct number in the box under each symbol according to the code. Working from left to right select the correct number using the number pad on the screen. Please work as quickly and accurately as you can. You will have ONE MINUTE to do as many as you can. Click “Next” to practice before taking the test.”*
- 2.3 A practice test screen is then presented to respondents before they attempt the symbol digit test.
- 2.4 Respondents are presented with a series of grids in which symbols are to be matched to numbers according to the key presented on the screen (see Fig. 1). A series of similar screens are shown until the time limit expires. The counter is reset to zero at the beginning of each round.

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| @ | & | " | = | ! | : | % | ¿ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| ! | ¿ | % | & | @ | " | : | = |
|   |   |   |   |   |   |   |   |

To select the number for each symbol, click on the number pad appearing on screen below:

|   |   |   |   |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |

*Fig. 1. Symbol digit substitution test*

### 3 Data captured

The following data are stored for the web-based version of the test:

- Data field 20159: Number of symbol digit matches made correctly
- Data field 20195: Number of symbol digit matches attempted
- Data field 20196: First code array presented
- Data field 20198: Test array presented
- Data field 20200: Values wanted
- Data field 20229: Values entered
- Data field 20230: Duration to entering value
- Data field 20245: Symbol digit completion status
- Data field 20137: When symbol digit substitution test completed