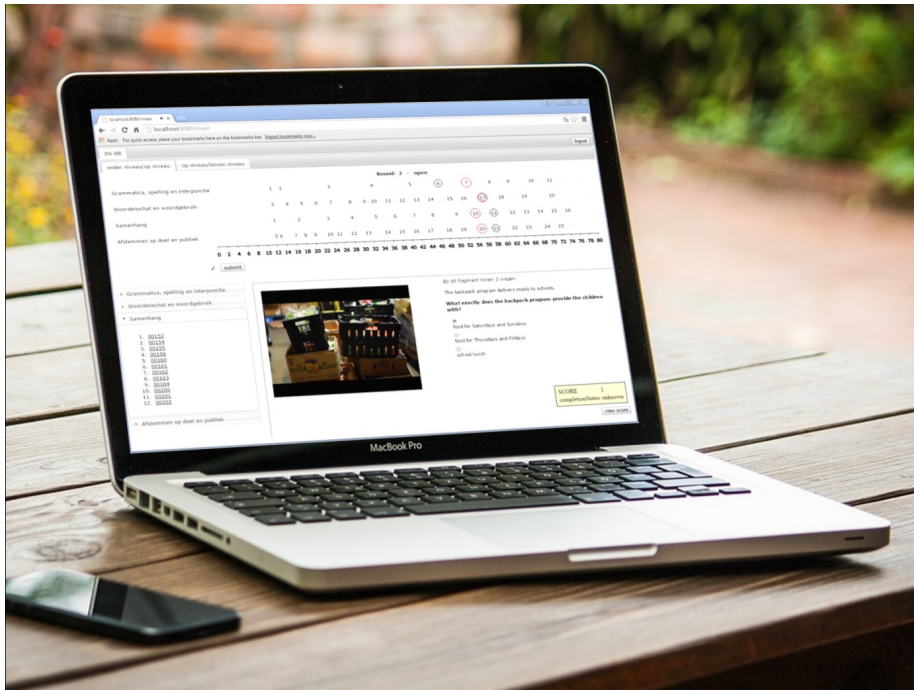


# 3DC Standard Setting Application



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## **Introduction**

In this short manual we explain how to use the 3DC standard setting application to perform a standard setting procedure according to the Data Driven Direct Consensus method of standard setting. The 3DC application is quite user friendly. To use the standard setting method and the application, you need people with the following three skill sets, who may but will probably not be the same person.

### **Leading a standard setting session**

No technical know-how is required, but you do need:

- a good understanding of the 3DC method of standard setting
- preferably a good understanding of the subject matter of the test
- to have read the “rater interface” and “group leader interface” parts of this manual

### **Installing and starting the standard setting application**

A person with some technical knowledge of the following subjects:

- how to set up a wired or wireless LAN
- some knowledge about firewalls and IP addresses
- some familiarity with command line programs

### **Preparation of a standard setting session**

A person with basic skills in psychometric analysis, specifically:

- familiarity with the R programming language
- a solid understanding of the 3DC method of standard setting
- either familiar with the R-package Dexter or able to estimate your own score scale and work with relational databases

## 3DC Method for standard setting

The Data Driven Direct Consensus (3DC) method for standard setting is fully described in Keuning et al. (2017).

### Preparing a standard setting session

The preferred way to prepare a standard setting session is to use the R-package Dexter, see Maris et al. (2017). The function `create3DC` creates a file (a sqlite database) that the standard setting program uses to build the 3DC forms and to save the standards from the panellists. See the help for this function in the Dexter package for more details.

### Setting up the standard setting application

The 3DC application is a micro server that serves two html pages: one for the group leader and a different one for the standard setters. It also saves the ratings in the standard setting database and it provides a basic login mechanism.

### Requirements

Using the application requires setting up a Local Area Network or a Server. The application has to be installed on the network Master or the Server. If you use a pre-compiled distributable, it will work under the specified operating system(s). If you use a Local Area Network, the application works best with the following minimal system requirements:

- Gigabit Ethernet Switch
- Network master (the computer on which you run the application) should have a:
  - Gigabit Ethernet port
  - Ssd hard drive is advisable in case you plan to use items with lots of media files.

The master computer needs to have windows 7+. The client computers will need Google Chrome version 45 or later (the mobile version has not been tested) with JavaScript enabled. The application will not work in Internet Explorer (tested in version 9) or Mozilla Firefox (tested in version 38).

### Installation

Installation of the application is quite easy, copying it to your master computer or server is all the installation that is required. The application can be set up

on an (intranet) Server or a local area network (LAN). In the present version the login mechanism and other security is extremely basic so it is not advisable to run the application on a public server.

## Starting the tool

It is assumed that you have already created a database for the standard setting.

If you have set the application up on a LAN, be sure to check that there are no firewalls blocking the connections between the computers. In rare cases you might also need to assign static IP addresses to all computers on the LAN. This depends on your system and router settings.

The 3DC application is a command line program. You need to specify the path to the standard setting database and you can specify some options on the command line as well. These options are explained in the help which can be viewed by typing: `sts_server --help`. The group leader and the content experts can log in to the standard setting application by navigating to `[SERVER_ADDRESS]:[PORT]/login` using Google Chrome

Some examples:

`sts_server demo.sqlite -v qti -i example_package.zip` will start the server using the standard setting database “demo.sqlite”. Items will be displayed using the “qti” item viewer and selected from the package “example\_package.zip”

`sts_server demo2.sqlite -v html -i my_items/demo2 -s 192.168.1.9` will start the server using the standard setting database “demo2.sqlite”. Items will be displayed using the “html” item viewer and selected from the directory “my\_items/demo2”. Your users will have to navigate to `192.168.1.9:8080/login` to use the standard setting application since you specified your server address to be `192.168.1.9` and the default port is `8080`. To get the ip-address of your computer you can type “ipconfig” in the dos dos-box on Microsoft Windows.

`sts_server -h` displays help about the possible options you can use

## Item viewer

A big advantage of the 3DC tool is that it enables both the group leader and the participants to easily browse through the items in the different clusters. In this way, there is no misunderstanding which items belong to which clusters and the content materials on which the standards should be based are just a click away. The 3DC tool can display items in html, QTI or picture format.

### **Items in QTI format**

The QTI item viewer supports a reasonable subset of the QTI 2.1 standard. Unfortunately, the QTI standard is not implemented in a consistent way across different applications that claim to support it. Please check that all your items are rendered correctly and according to your expectations before performing a standard setting. To view items in QTI format, you start the application in the following way: `sts_server DBNAME -v qti -q PATH_TO_QTI_PACKAGE` where `PATH_TO_QTI_PACKAGE` is the path to a zipped qti package which contains all the items that are used in the standard setting. The item identifiers should correspond to the item id's you used to prepare the standard setting database.

### **Items in HTML format**

The html item viewer supports all of the html syntax that your browser supports. To view items in html format, you start the application in the following way: `sts_server DBNAME -v html -i PATH_TO_ITEM_DIR` where `PATH_TO_ITEM_DIR` is the path to a folder with your html files. For security reasons, all resource files (e.g. stylesheets, images) have to be in a subdirectory of this folder. Names of html documents have to correspond to item id's.

### **Items in image format**

Screenshots or pictures are also supported. Start the application in the following way: `sts_server DBNAME -v screenshot -i PATH_TO_ITEM_DIR` where `PATH_TO_ITEM_DIR` is the path to a folder with your screenshots. Names of the image files have to correspond to item id's.

## **A standard setting session**

The 3DC application consists of two easy to use interactive webpages, one for the group leader and a different one for the panellists. After specifying their credentials (username and password), the group leader and panellists are redirected to their respective pages automatically. These two webpages are described in the following two sections.

## Rater Interface

After login, panellists are redirected to a rater page where they can use the standard setting forms and navigate through the items in the tests. The interface is described below.

The screenshot displays the Rater Interface with the following components and annotations:

- Top Bar:** Shows the user ID "EN-BB" and a "logout" button. An annotation points to the "logout" button with the text: "The rater should logout if he/she leaves the computer. Ratings are always saved immediately, so logging out or accidentally closing the browser does not present a problem."
- Standard Setting Form:** Located below the top bar, it includes tabs for "under/on level" and "on/above level". An annotation points to this area with the text: "Choice of tests assigned to this rater (in this example there is only one test)".
- Test Score Scale:** A horizontal scale from 0 to 80 in increments of 2. It is divided into four clusters:
  - Cluster 1 (0-15): Grammar, spelling and interpunction
  - Cluster 2 (16-20): Register
  - Cluster 3 (21-25): Cohesion
  - Cluster 4 (26-30): Focus on target and audience
 An annotation points to the scale with the text: "Standards set by this rater for each cluster. Standards set in round 1 are given a black color, standards set in round 2 are red."
- Cluster Navigation:** On the left, there are buttons for "Grammar, spelling and interpunction", "Register", "Cohesion", and "Focus on target and audience". An annotation points to these buttons with the text: "Clusters that have been defined on this test".
- Item List:** Under the "Cohesion" cluster, a list of 12 items is shown, each with a number and a QTI ID (e.g., "1. 00152"). Item 3, "00155", is highlighted in red. An annotation points to this list with the text: "Browse through the items in the different clusters".
- Item Preview:** The main area shows a preview of item 3. It includes a video player with a play button and a progress bar (0:35 / 1:25). Below the video, the text reads: "Bij dit fragment horen 2 vragen. A family with two children aged 5 and 18 will be arriving in Canada. Which of these statements is true for every part of the country?". Three radio button options are listed:
  - Both children may have to go to school.
  - The oldest must definitely go to school.
  - The youngest is required to go to school.
 An annotation points to this preview with the text: "Preview of the item. The previewer supports items in picture, html or QTI format."
- Submit and View Score:** A "submit" button is located below the score scale. A "view score" button is located at the bottom right of the preview area. An annotation points to the "submit" button with the text: "Test score scale".

## Group leader interface

After login, group leaders are redirected to an overview page, where they can see the standards set by all the raters and manage the standard setting session by collecting and distributing the forms. Only forms and rounds that are distributed can be edited by the raters. Once a form is collected, it can be re-distributed so that the raters can edit it again. There is one restriction though, once a form for round 2 is distributed, it becomes impossible to re-distribute the form for round

1 of that same standard. The standards can be exported to an excel file from the page or read from the underlying sqlite database from R.

Choice of tests assigned to this rater (in this example there is only one test)

The raters and the standards they have set

Some general statistics on rater agreement

The group leader has the same options for browsing through the test items as the raters

The screenshot shows the 3DC group leader interface. At the top, there is a navigation bar with buttons for 'View Form', 'View Histogram', 'Download Excel', 'Add Rater', 'Change password', and 'logout'. Below this is a table showing the standards set by raters. The table is organized by 'Standard' (under/on level and on/above level) and 'Round' (1 - closed and 2 - open). The 'Cluster' column lists various tests: Focus on target and audience, Cohesion, Register, Grammar, spelling and inter-punctuation, and Focus on target and audience. The table lists raters and their scores for each test and round. A 'collect' button is visible for round 2. Below the table, there are statistics for mean, mode, and frequency of mode. On the left, a sidebar shows a list of test items with a 'Register' button. The main content area displays a text passage about contactless payment cards and a question: 'What can be said about the contactless payment card according to paragraph 1?'. The question has three radio button options. A 'view score' button is at the bottom right.

Standard	under/on level				on/above level			
	1 - closed		2 - open		1 - closed		2 - open	
Round			collect				collect	
Cluster	Focus on target and audience	Cohesion	Register	Grammar, spelling and inter-punctuation	Focus on target and audience	Cohesion	Register	Grammar, spelling and inter-punctuation
Florence Nightingale	21	11	17	6	19	9	15	7
John Tukey	17	12	17	7				
Janet Norwood	9	12	17	7	14	5	10	4
Thomas Bayes	9	12	9	7	9			
Edward Tufte	17	12	17	7	17	12	18	6
Gertrude Mary Cox	21	12	17	7	19			
Karl Pearson	21	12	17	7	17	6	11	4
Ronald Aylmer Fisher	9	12	17	7				
Norman Verhelst								
mean	15.5	11.9	16	6.9	15.8	8	13.5	5.3
mode	9&21	12	17	7	17&19			4
frequency of mode	3	7	7	7	2			2

Grammar, spelling and inter-punctuation

- 00233
- 00234
- 00240
- 00241
- 00242
- 00243


Register

Cohesion

Focus on target and audience

**What is a contactless payment card?**

**1**  
Contactless payment cards are debit, credit, charge or pre-paid cards which can be used to make quick, easy and secure payments for everyday purchases under £20. There's no need for a PIN or a signature, just touch your card on a contactless card reader.  
If you've got a contactless payment card but haven't used it yet, you might need to make a chip and PIN payment elsewhere before using it for contactless payments (including for travel).



**Is my card contactless?**

**2**  
If your bank card's been issued in the UK and displays the contactless payment symbol (as shown), you can already use it to travel on London bus services. Later this year, contactless payment cards will be accepted on Tube, tram, DLR, London

**What can be said about the contactless payment card according to paragraph 1?**

- The card can be used for all purchases without the use of a PIN.
- The card can be used in the same way as a regular bank card but is much safer.
- The card can be used to pay small amounts of money in a quicker way.

view score

Options for the group leader. The 3DC program offers some helpful graphics. The ratings table can also be downloaded in excel format.

With these buttons the group leader can control which standard setting forms are open to the raters. When the group leader first logs in, all forms are closed. Just like with paper forms, these computer forms can be distributed, collected and re-distributed if necessary. Once a form for round 2 is distributed, it is no longer possible to re-distribute the form for round 1. As a group leader you should therefore carefully check if everyone has filled in all scores in round 1 before you distribute the form for round 2.



## References

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- Maris, G., Bechger, T., Koops, J., and Partchev, I. (2017). *Dexter: Data Management and Analysis of Tests*. R package version 1.0.