During data acquisition Version 3

Lukas Snoek,Tinka Beemsterboer

Abstract

Protocol to make sure the data acquisition process will yield data that can be processed by the centre's quality control and preprocessing pipelines.

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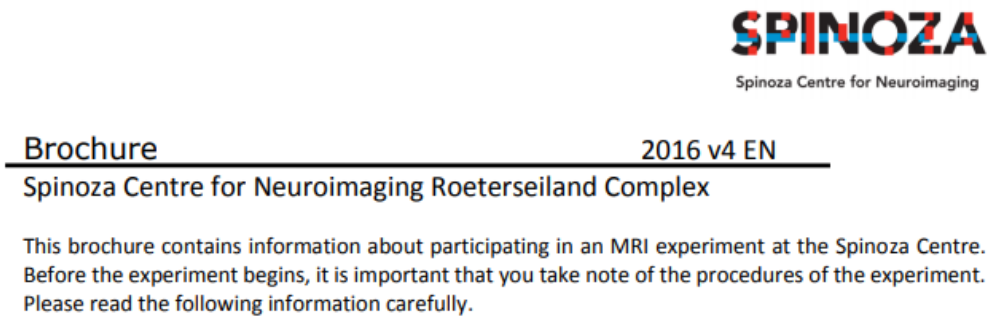
Protocol

Inform your participant about the procedure/experiment

Step 1.

Make sure your participant is well and thoroughly informed about the MRI procedure in general and your experiment specifically.

Always give the participant the upportunity and time to read the information folder about MRI research at our centre, even when the particpant is late for the appointment.


SPINOZA
Spinoza Centre for Neuroimaging

Brochure 2016 v4 EN
Spinoza Centre for Neuroimaging Roeterseiland Complex

This brochure contains information about participating in an MRI experiment at the Spinoza Centre. Before the experiment begins, it is important that you take note of the procedures of the experiment. Please read the following information carefully.

Check forms

Step 2.

MRI screening form

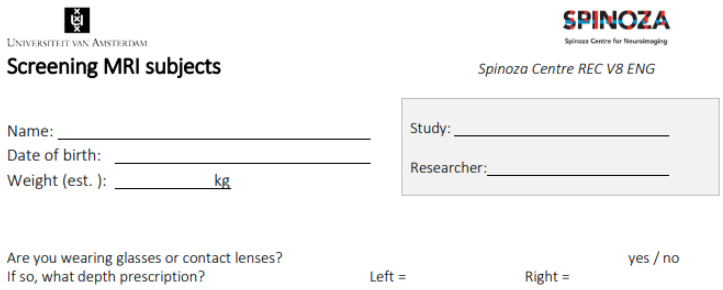
Before you let the participant into the operating room, make sure your participant is actually allowed to go into the operating room (i.e., if she/he is 'MRI-safe'). **As such, you should have the participant fill in the screening form *before* the participant has entered the operating room**. While there is virtually no magnetic field present in the operating room, we do not want to take *any* safety risks.

After checking the screening form (pay attention to whether the participant actually signed the form), discuss any potential safety issues (tattoos, surgeries, etc.) with the participant again ***outside*** the operating room. If you're uncertain whether it's safe for the participant to participate in the experiment, you may consult Tinka or Lukas (whose phone numbers should be known by this stage of your experiment). Almost always, however, the recommendation is to send the participant home in case of uncertainty.

Also, there are two important things to think with regard to the screening form to ensure participant anonymity:

- ***Never*** put the subject-identifier (e.g., *sub-01*) on the screening form (or any other document, for that matter). This is to ensure that there is never a connection between the actual participant's personal information and his/her subject-identifier;
- The above also holds for any 'logbook' or personal schedule of your experiment: ***never*** have the participant's personal info (name, D.O.B., address, etc.) and subject-identifier in the same document;

Technically, this connection between a participant's personal information and subject-identifier may exist for 48 hours (coinciding with the participant's right to withdraw his/her data from the experiment), but afterwards it should be definitively 'disconnected'. As such, we recommend to err on the safe side and *never* connect these two source of information.


UNIVERSITEIT VAN AMSTERDAM

Screening MRI subjects

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Name: _____
Date of birth: _____
Weight (est.): _____kg

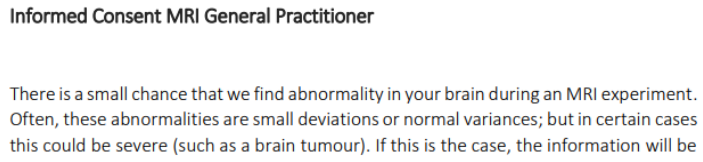
Study: _____
Researcher: _____

Are you wearing glasses or contact lenses? yes / no
If so, what depth prescription? Left = Right =

Step 3.

General Practitioner Informed Consent

In addition to the screening form, the participant should fill in the 'General Practitional Informed Consent', in which the participant writes down the name and contact details of his/her general practitioner (GP). This information is needed in the unlikely case that the researcher notices a potential structural abnormality in one of the anatomical scans. *Note:* if the participant does not have a GP or does not want to share the name/contact details of his/her GP, he/she is *not* allowed to participate in the experiment.


Informed Consent MRI General Practitioner

There is a small chance that we find abnormality in your brain during an MRI experiment. Often, these abnormalities are small deviations or normal variances; but in certain cases this could be severe (such as a brain tumour). If this is the case, the information will be

Step 4.

Informed consent of the study

Apart from the GP informed consent, you should have the participant read and sign an informed consent specific to your experiment, which should have been approved by the university's ethical committee (EC) of Medical Ethical Committee (METC). Note that if you haven't included an explicit section about data sharing (i.e., that the participant agrees that his/her data may be publicly shared) *you are not allowed to legally share raw participant data*.

Prepare examination

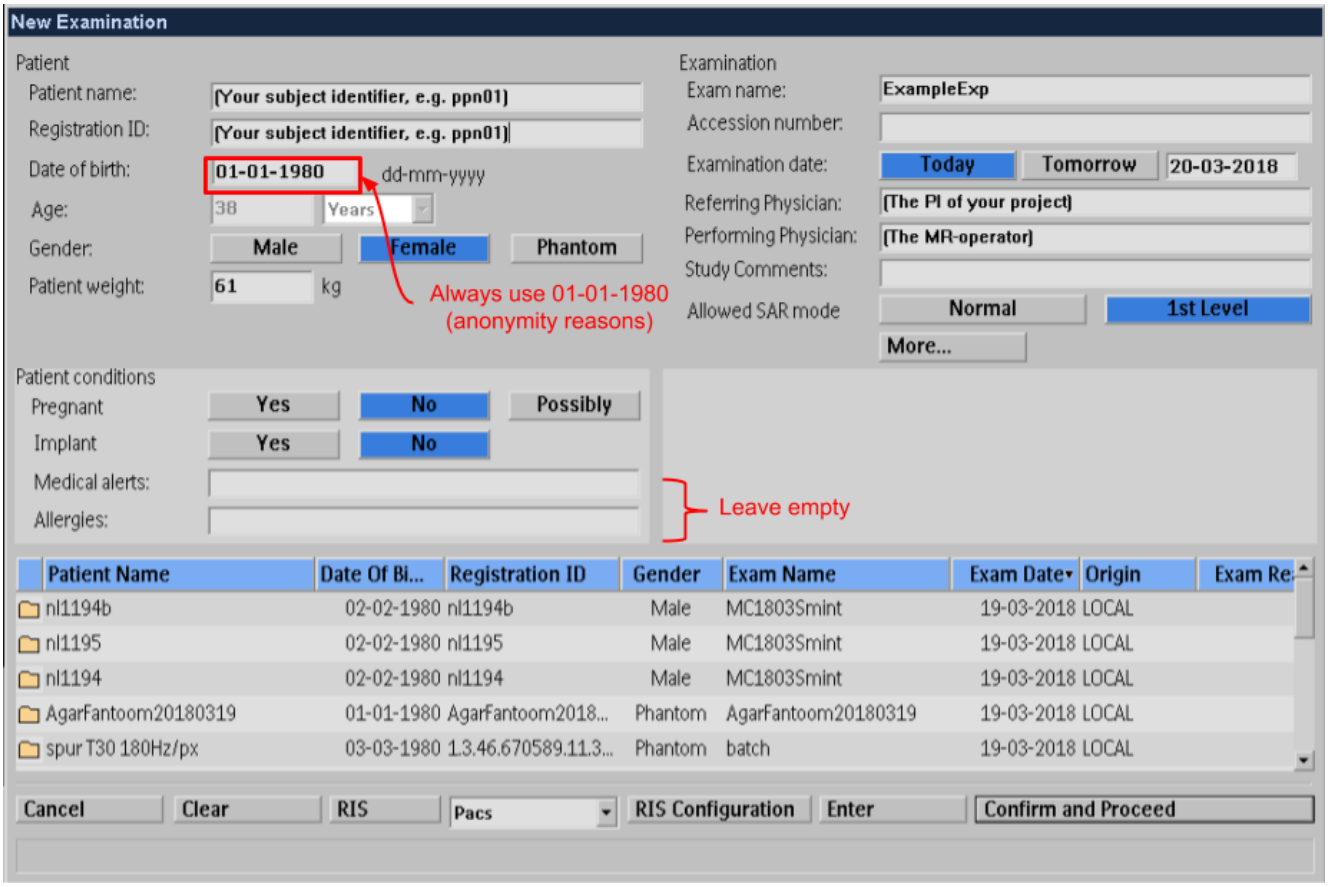
Step 5.

From here onwards, the exact steps of the protocol will depend on whether you will use our centre's QC/preprocessing services. If so, select the case 'Yes' below (if not, select 'No'), which will adjust the steps in the protocol accordingly.

Create a new examination

Step 6 - No (Are you using the centre's QC/preprocessing services?).

You can create a new examination on the scan-computer by clicking on 'Patients' in the menu bar and subsequently on 'New administration'. Here, you have to fill in some information about the participant. An example can be found in the image below:



Fill in the information as follows:

- Patient name: your subject identifier (*never use the participant's real name*!);
- Registration ID: same as patient name (i.e., the subject-identifier);
- Date of birth: *always use 01-01-1980* (do ***not*** use the participant's real D.o.B. for anonymity reaons);
- Gender: fill in participant's gender;
- Patient weight: fill in participant's weight (is listed on screening form; this info is used to calculate the SAR);
- Patient conditions: the pregnant/implant fields should always be "No", because these are strict **exclusion** criteria for participation at our centre. Leave the medical alerts/allergies fields empty (these are only relevant when using contrast agents);
- Examination, exam name: fill in whatever identifier you're using for your project (e.g., ExampleExp; preferably without spaces in the identifier);
- Acession number: leave empty;
- Examination date: Today;
- Referring Physician: the PI of your project;
- Performing Physician: the MR-operator;
- Study Comments: leave empty;
- Allowed SAR mode: 1st Level;

Safety check

Step 7 - No (Are you using the centre's QC/preprocessing services?).

Before entering the scanner room, make sure to do a safety check together with the participant. Make sure he/she ...

- Took his/her shoes off;
- checks all of his/her pockets (of trousers, shirt, etc.);
- checks his/her hair for pins, clips, etc.;
- checks whether all of his/her jewelry (bracelets, necklaces, etc.) and watch are off (if the material is completely non-metallic, the participant doesn't have to remove it);

Also, check yourself whether the participant's clothes have any ferromagnetic pieces that may come off. In that case, we provide sweatpants and/or sweatshirts for the participant to wear instead.

After this check, make sure that you are yourself safe to enter the scanner room (i.e., check your pockets!). Afterwards, you can enter the scanner room with the participant; make sure to close the door after entering.

Check exam cards

Step 6.

Make sure your exam cards are BIDS-formatted.

As discussed earlier, if you will use the centre's QC/preprocessing pipeline(s), it is of utmost importance to make sure our tool is able to convert the raw data to the BIDS-format. As such, check the names of your exam cards once more; use the points outlined below to do a final check of the names of your exam cards:

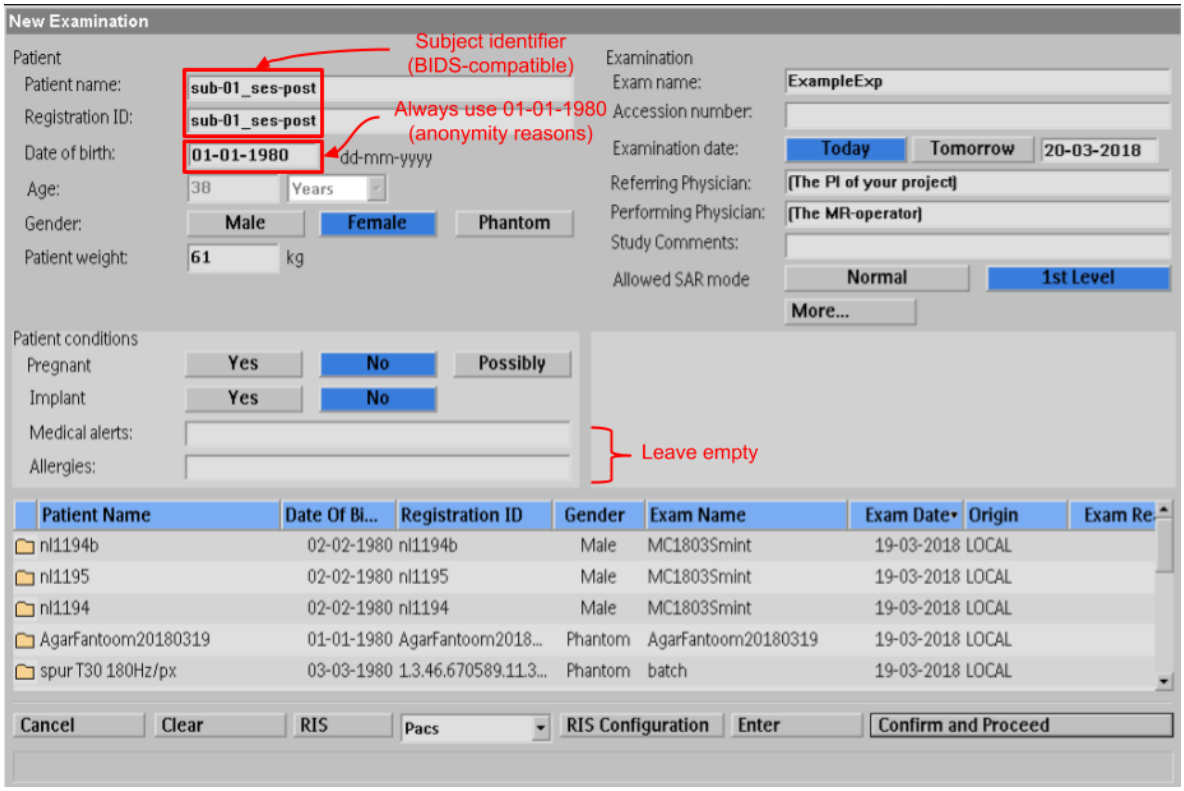
- Are all the placeholders, i.e. (*this_is_a_placeholder)*, replaced with the relevant information? For example, *task-(taskname)_run-(nr)_bold* should be named (for example) *task-workingmemory_run-1_bold*
- Do all the exam cards have *unique* names? It's easy to have multiple runs of particular scan, but forgetting to update the *run-(nr)* field!

If you've double-checked the names of your exam cards, you can proceed to the next step!

Create new examination

Step 7.

After you've made sure your exam cards are BIDS-compatible, you can create a new examination by clicking on 'Patients' in the menu bar and subsequently on 'New administration'. Here, you have to fill in some information about the participant. An example can be found in the image below:



Fill in the information as follows:

- Patient name: your BIDS-compatible subject identifier (more information below);
- Registration ID: same as patient name (i.e., your BIDS-compatible subject identifier);
- Date of birth: *always use 01-01-1980* (do ***not*** use the participant's real D.o.B. for anonymity reaons);
- Gender: fill in participant's gender;
- Patient weight: fill in participant's weight (is listed on screening form; this info is used to calculate the SAR);
- Patient conditions: the pregnant/implant fields should always be 'No', because these are strict **exclusion** criteria for participation at our centre. Leave the medical alerts/allergies fields empty (these are only relevant when using contrast agents);
- Examination, exam name: fill in whatever identifier you're using for your project (e.g., ExampleExp; preferably without spaces in the identifier);
- Acession number: leave empty;
- Examination date: Today;
- Referring Physician: the PI of your project;

- Performing Physician: the MR-operator;
- Study Comments: leave empty;
- Allowed SAR mode: 1st Level;

If you have a simple experiment and you don't have any (between-subject) factor in your experiment, and only have a single session you may skip the information about the subject identifiers in this step. As such, the following subject-identifier is completely valid (and probably the format most researchers will use):

- *sub-01*

If you have any (between-subject) factor in your experiment, and/or multiple sessions make sure you use the BIDS format for subject identifiers in a correct manner.

According to the BIDS-specification, subject identifiers (filled in at Patient name/Registration ID) should be formatted as:

- *sub-[condition](number)[_ses-(identifier)]*

Here, *[condition]* refers to an *optional* condition-identifier, helpful in between-subject designs (e.g., *control* vs. *treatment*). The *(number)* field is a *mandatory* number (e.g., '01' or '25'). the *[_ses-(identifier)]* part is an *optional* field to specify the specific session, in case of experiments with multiple sessions (e.g., *_ses-01*, or *_ses-post*).

For example, suppose you are testing 20 subjects, each two sessions, of which the first 10 subjects are in the 'control' condition and the last 10 subjects are in the 'treatment' condition. In that case, you could use the following identifiers:

- *sub-CON01_ses-01*
- *sub-CON01_ses-02*
- *sub-CON02_ses-01*
- *sub-CON02_ses-02*
- *...*
- *sub-TRE20_ses-01*
- *sub-TRE20_ses-02*

Safety check

Step 8.

Before entering the scanner room, **the MROperator makes** sure to do a safety check together with the participant. Make sure he/she ...

- Took his/her shoes off;
- Took of her bra;
- doesn't wear wet clothes (if so, provide sweatpants and/or sweatshirt);
- wears enough clothes, otherwise skin-skin contact can cause loops (if necessary, provide sweatpants and/or sweatshirt);
- checks all of his/her pockets (of trousers, shirt, etc.);
- checks his/her hair for pins, clips, etc.;
- checks whether all of his/her jewelry (bracelets, necklaces, etc.) and watch are off (if the material is completely non-metallic, the participant doesn't have to remove it);

Also, the MROperator checks whether the participant's clothes have any ferromagnetic pieces that may come off. In that case, we provide sweatpants and/or sweatshirts for the participant to wear instead.

After this check, the MROperator and the researcher check whether they are safe to enter the scanner room (i.e., check your pockets!). Do this each time you enter the scanner room.

Afterwards, you can enter the scanner room with the participant; make sure to close the door after entering.

Note that it is the responsibility of the MROperator to check wheter the participant may enter the scanner room. Also the MROperator has the final say in who may or may not entre the scanner room.

Communication with participants before/during scanning

Step 9.

MRI research can be quite 'intimidating' for participants, especially when they don't have any experience with MRI research.

As such, the MR-operator is responsible to explain what happens before (e.g., when putting the participant in the scanner) and during scanning.

The information given to the participant should at least include the following:

- There is a magnetic field active in de scanner room and therefore we have to make sure you are safe to go into the scanner room. We use this screening form and also we will check whether you have nothing of metal on your body before you enter the room;
- The scanner makes a lot of noise during scanning. For your comfort and for ear protection you'll get earplugs and headphones;
- You can't talk to us during the scans because of the noise, therefore you get an alarm button. Squeeze this button in case of an emergency or when you are don't want to continue with the scan.

We advise you to communicate with the participant (through the intercom) both *before* the start of the first scan and in between scans.

It is very important to make sure the participant is relaxed during scanning, both for ethical reasons (as participation is completely voluntary) and for reasons of data quality:

relaxed participants tend to move less which yields better-quality data! For this reason, it is advisable to remind the participant in between scans to move as little as possible (also in between scans, as to minimize the inhomogeneity of the magnetic field).

Rename files

Step 10.

Rename your physiology files.

If you measure physiology (heart rate and respiration, or 'PPU/RESP' in Philips lingo), you'll have to rename the file to make sure it complies with the BIDS-format. By default, the physiology-files are named 'SCANPHYSLOG*.txt'. To make it BIDS-compatible, rename it using the following format:

- *sub-(identifier)[_ses-(identifier)]_task-(taskname)[_acq-(identifier)][_run-(nr)]_physio.txt*

in which the parts in square brackets, [...], are optional. So, basically this is simply the concatenation of the subject identifier and the scan-name; importantly, the scan-identifier (most likely *_bold*) is replaced by *_physio*.

Step 11.

Rename your event files (optional).

Our service does not include conversion of custom logfiles. However, if (on the off-chance) you've

programmed your experiment such that it already outputs BIDS-compatible event-files (i.e., tabular *.tsv files), make sure you rename it using the following format:

- *sub-(identifier)[_ses-(identifier)]_task-(taskname)[_acq-(identifier)][_run-(nr)]_events.tsv*

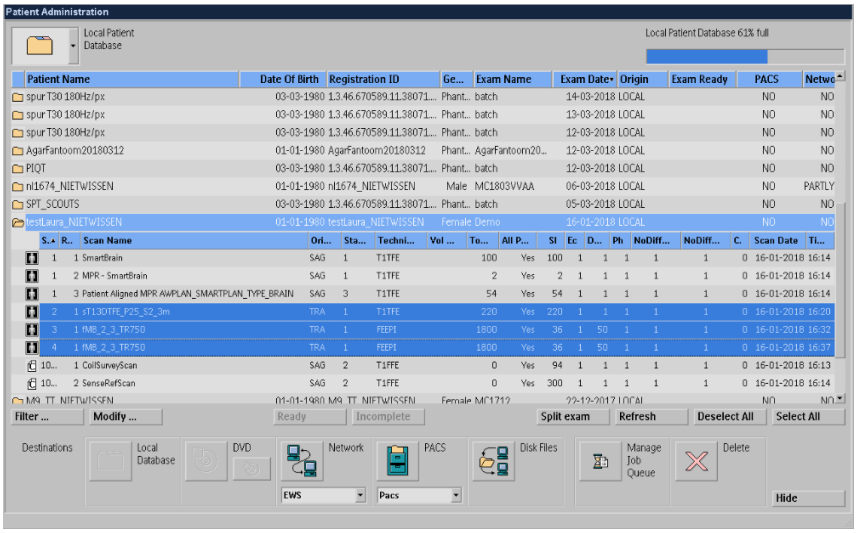
in which the parts in square brackets, [...], are optional. Just like the physiology files, the name of event files is the concatenation of the subject identifier and the scan name, and the scan identifier (e.g., *_bold*) replaced by *_events.*

Export data

Step 12.

After data acquistion, export your data to your 'fMRI Projects' folder (UvA researchers) or 'Dropbox' folder (external researchers).

- To export your data, click on 'Patients' in the menu bar and subsequently click 'Administration'
- Find the examination (participant) that you want to export. Double-click the relevant examination and select all relevant scans (you *won't need the following scans:* SmartBrain, MPR - SmartBrain, CoilSurveyScan, SenseRefScan, and B0_PreScan)

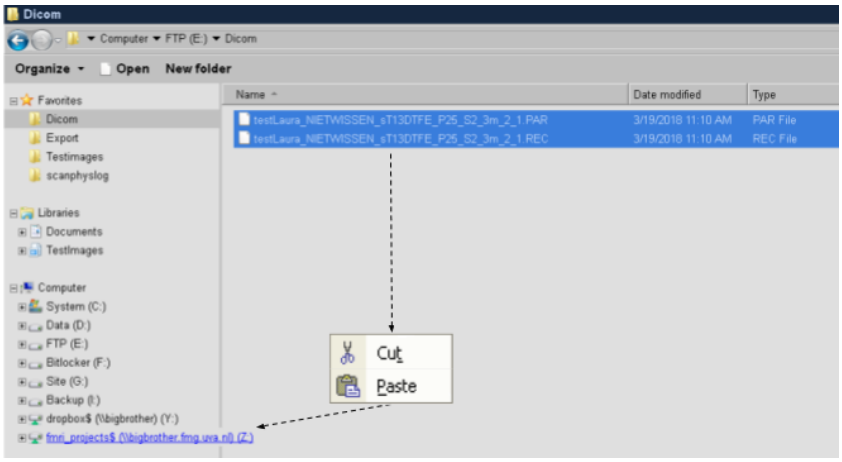


- Click on 'Disk Files'. This will prompt a new window with export options. You can choose either 'Dicom Export' or 'Non Dicom Export' (we recommend 'Non Dicom Export'). In case of Non Dicom Export, *make sure to check the boxes next to the 'Use Scan Name' and 'Sort' options!*
- Also, for Non Dicom Export, you need to choose the format of your data (XML-REC, PAR-REC, NIfTI, FSL-NIfTI); we recommend PAR-REC (this is the native Philips format which contains most meta-data). For both types of export, you need to *first* export the data locally (you may use the

default location *e:\dicom*). You can specify the path under the 'Destination:' box.

- Note: if you're using the centre's QC/preprocessing services, you *have to* select the Non Dicom Export option with PAR-REC filetype!

- Click 'Proceed' to start the export to the local drive
- After the local export has finished, go to the specified local path (e.g., *e:\dicom*) and simply cut & paste your files to your *own* export folder (e.g., cut from *e:\dicom\sub-01_T1w.PAR* and paste to *Z:/fMRI Project ExampleExp*)



Step 13.

Make sure your export folder is compatible with the BIDS-format.

Every day at 11pm, we will check the export folders (fMRI Projects or Dropbox) corresponding to the currently active experiments at our centre. If we find 'new' data, we will copy it to our server and start BIDS-conversion and QC (and, if desired, preprocessing). In order for our tools to 'find' your data, we expect it to be organized in a particular way. In all cases, we expect that you export the data to a subfolder in your export folder called 'raw'. Then, we expect each subject to get its own subdirectory in the 'raw' directory, with the subject name as folder-name (e.g., *sub-01CON*). Optionally, if you have multiple sessions, each session will get its own subdirectory in the subject-directory, with the session name as folder-name (e.g., *ses-01*). For example, suppose you plan to scan 20 subjects, each two sessions, and your export folder is called 'fMRI Project ExampleExp'. You should export the data from subject *sub-01_ses_01* to the following location:

fMRI Project ExampleExp

```
└── raw/
    └── sub-01
        └── ses-01
            ├── sub-01_ses-01_T1w.PAR
            ├── sub-01_ses-01_T1w.REC
            ├── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.PAR
            └── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.REC
```

If you don't have multiple sessions, you may export all files directly to the subject-directory, e.g.:

fMRI Project ExampleExp

```
└── raw/
    └── sub-01
        ├── sub-01_ses-01_T1w.PAR
        ├── sub-01_ses-01_T1w.REC
        ├── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.PAR
        └── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.REC
```

Note that you cannot create directories within your export folder from the scan-computer; you can use the 'scan-assistant' computer (right of the scan-computer) for that. Then, after 24 hours or so (depending on the desired parameters used in the preprocessing pipeline), we will copy the BIDS-converted data, quality control results, and preprocessing results to your export folder, using the following structure:

fMRI Project ExampleExp

└── raw

└── bids

└── qc

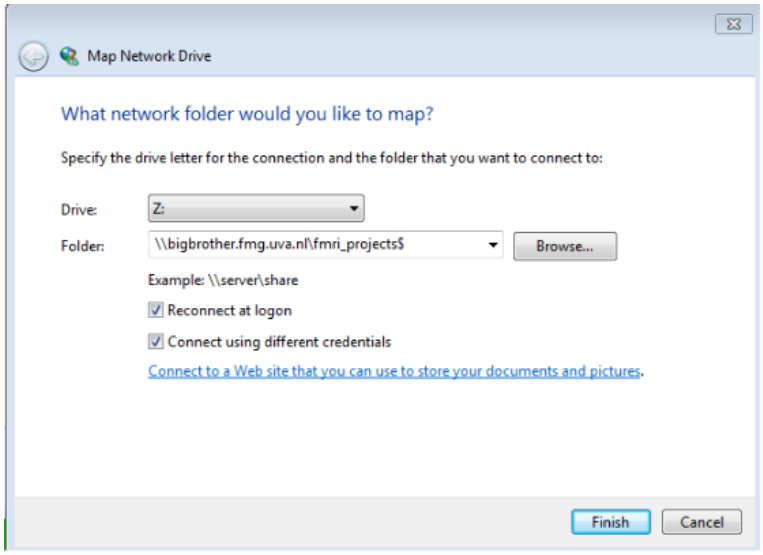
└── preproc

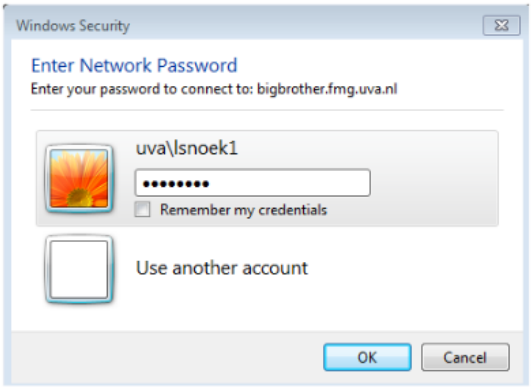
Step 14.

Export your event-files (logfiles from experiment) to your export folder.

To transfer files from the stimulus-computer to your export folder (fMRI Projects or Dropbox), you first need to exit the computer's 'testing mode' (red desktop background = testing mode). To do so, double click the green start button on the desktop. This will enable internet access. Then, you need to map the BigBrother drive:

- Go to 'This Computer' and click on 'Map Network Drive' in the menu bar;
- Select a drive (e.g., *Z:*) and fill in the appropriate folder (*\\bigbrother.fmg.uva.nl\fmri_projects$* or *\\bigbrother.fmg.uva.nl\Dropbox$*
- Select both 'Reconnect at logon' and 'Connect using different credential' (see left image below);
- Click 'Finish' and fill in your credentials (for UvA employees: prepend your UvANetID with 'uva\'; see right image below);
- Now, you can transfer (copy-paste) your files (e.g., from C:*\data\<user>/some_logfile.txt* to *Z:\fMRI Project ExampleExp*)





Make scanner/operator room ready for next researcher

Step 15.

If you're done scanning for the day, make sure to check/do the following:

- On the scan computer, close your current examination;
- Put down new paper on the scanner table and two earplugs;
- Tidy up scanner room (e..g., leftover tape, old earplugs, etc) and operating room;
- Lock the door to the scanner room and hang the key in the cabinet;
- Make sure you've archived/put away all the documents used during your experiment (e.g., informed consets, screening forms, etc.);
- Log out from any website/service on the 'scan-assistant computer', such as Facebook, email, etc.;

Close off (only if you're the last researcher that day)

Step 16.

If you were the last researcher scanning for the day (check Calpendo), make sure to check/do the following:

- Make sure the table in the scanner room is elevated;
- Unplug the headcoil;
- Tidy up the scanner room (throw away leftover tape, earplugs, etc.)
- Lock the door to the scanner room and hang the key in the cabinet;
- Turn of the monitor in the scanner room (button is next to the stimulus computer);
- Turn off the stimulus computer and the 'scan-assistant computer' (to the right of the scan computer);
- Restart the scan computer (Start → Restart) and turn off the monitor;
- Turn off the cubicle computers (if used);
- Close the door to the operating room after you leave;
- Turn off all the lights and put on the alarm;