

Tutorial for the pssr R package

Angelos-Miltiadis Krypotos & Gaëtan Mertens

Here, we provide a brief tutorial for the pssr R package. The *pssr* package provides a suite of functions for preregistrating and sharing data/materials. Although it was initially designed as an easy-to-use tool for experimental psychopathologists and other researchers across Clinical psychology, it can also be used from any researcher running experimental studies.

Here, we first provide instructions on how to install the package. Then, we explain each tab of the software one by one. Lastly, we go through a hypothetical example. The rationale behind the design of the package can be found in our

paper available here: A Step-By-Step Guide on Preregistration and Effective Data Sharing for Psychopathology Research.

Installation instructions

Before installing the *pssr* package, make sure that you have the most recent versions of the following software installed: R, Rtools, and git, pandoc. You can also choose between installing MikTeX or tinytex – *tinytex* is lighter and seems to be working fine for basic documents.

After that, start a new R session and paste the following commands in the R console.

```
if(!require(devtools)) { install.packages("devtools") }  
# Install devtools (in case you need to)  
devtools::install_github("AngelosPsy/pssr")
```

If everything went as planned, the software is now ready to be used. To test that, check whether the next step works. In case you have any problems during installation, please open an issue here. Instructions about how to open an issue are provided here.

Initiating a pssr session

The main function is the `pssr::shiny_app()` that initiates a new shiny session. As in any other function in R, just paste:

```
pssr::shiny_app()
```

in the R console. After doing that, a browser window will appear. The browser window will look as follows:

The Preregistration and Sharing Software

General instructions

Use the present app for creating a project, creating a preregistration, and for time stamping changes in your project directory. For executing any of these actions you can use the corresponding tabs on the right.

Disclaimer

The present app is distributed for free without any guarantee.

Contact

Angelos Krypotos: amkrypotos@gmail.com
Nicolas Perez: nicolasp89@gmail.com

Reference

Krypotos, A.-M., Klugkist, I., Mertens, G., & Engelhard, I. M. (submitted). A Step-By-Step Guide on Preregistration and Effective Data Sharing for Psychopathology Research.

Create projectPreregistrationAnonymize dataZip and encrypt data

Use this tab for either creating a new project or finding an existing one. For creating a new project, just provide a name and select the folder in which the project will be saved. For finding an existing project, you just need to locate it using the 'Find existing project' button.

Project name

Create new projectFind existing project

We now explain each tab of the software separately.

Create project Tab

For creating a new project, navigate to the ‘Create project’ tab. Then, place a name in the ‘Project name’ box and click on the ‘Create new project’. To reopen an existing project the user can just click on the ‘Find existing project’ box and navigate to an existing project. In case a folder is selected that was not created by the *pssr*, the program will return a warning.

When a project folder is created, the program automatically creates a directory with the project’s name. Inside the directory the following subdirectories are created: “analyses”, “data”, “manuscript”, “material”, and “preregistration”.

The Preregistration and Sharing Software

The screenshot shows the 'Create project' tab of the software. On the left, there is a sidebar with 'General instructions', 'Disclaimer', 'Contact', and 'Reference'. The main area has a header with tabs: 'Create project', 'Preregistration', 'Anonymize data', and 'Zip and encrypt data'. Below the header, there is a text box for 'Project name' with the value 'project'. At the bottom, there are two buttons: 'Create new project' and 'Find existing project'.

Preregistration Tab

For creating a preregistration document, you can enter a name in the “Enter name of the preregistration”. Then, choose the template you want to use so as to form your preregistration. The *pssr* software supports 3 templates. These are the ‘pss’, the ‘aspredicted’ from the aspredicted website, and the ‘osf’ from the osf website. In case the ‘pss’ template is selected, then a new tab is presented, with each tab now having different boxes for every different piece of information that needs to be preregistrated (e.g., methods, statistical analyses). We describe what type of information should be included in each box in our paper. An example of a pre-registration can be found below.

In case the ‘aspredicted’ or the ‘osf’ template are selected, then a new window will appear. The user then can manipulate the text using the (Rmarkdown)[<https://rmarkdown.rstudio.com>] template. For these templates, we use the (prereg)[<https://cran.r-project.org/web/packages/prereg/index.html>] package authored by (Frederik Aust)[<https://github.com/crsh>].

Generate a pdf of the pregristration file

Under ‘Preregistration’ press ‘Choose files’. On the pop up window, go to the ‘preregistration’ folder. Inside that folder, select the ‘Rmd’ file with the name of the preregistration file you want to manipulate and click on ‘Select’. After that, click on the ‘Create PDF’s’. Then the pdf files of the preregistration files are now being saved in the ‘preregistration’ folder.

The Preregistration and Sharing Software

The screenshot shows the 'Preregistration' tab of the software. On the left, there is a sidebar with 'General instructions', 'Disclaimer', 'Contact', and 'Reference'. The main area has a header with tabs: 'Create project', 'Preregistration', 'Anonymize data', 'Zip and encrypt data', 'Record changes', and 'Version control'. Below the header, there is a text box for 'Enter name of the preregistration' with the value 'preregistration'. Below that, there is a dropdown menu for 'Choose a pre-registration template' with the value 'pss'. At the bottom, there are four buttons: 'Search Preregistrations', 'Choose files', 'Continue editing', and 'Create'.

Anonymize data

Our software can also be used to anonymize data. For that, navigate to the ‘Anonymize data’ folder. Then, choose a CSV file that can be used for anonymizing data. The software currently accepts only csv files. After that, select the columns that will be anonymized. After selecting the columns, you can select either to fill in the columns using random numbers or just encryption algorithms by clicking one of the options in the drop down menu named ‘How to anonymize data?’.

The Preregistration and Sharing Software

The screenshot shows the 'Anonymize data' tab of the software. On the left, there is a sidebar with 'General instructions', 'Disclaimer', 'Contact', and 'Reference'. The main area has a navigation bar with tabs: 'Create project', 'Preregistration', 'Anonymize data' (active), 'Zip and encrypt data', 'Record changes', and 'Version control'. Below the navigation bar, there is a section 'Upload data' with a 'Choose CSV File' button and a 'Browse...' button. Below that, there is a 'Header' section with a 'Separator' dropdown menu (options: Comma, Semicolon, Tab). Below that, there is a table titled 'Original data' with columns 'x' and 'y'. The table shows two rows of data. Below the table, there is a 'Showing 1 to 2 of 100 entries' message and a 'Previous' button. Below that, there is a 'Select Columns' dropdown menu (options: x, y) and a 'How to anonymize data?' dropdown menu (options: random, encrypt).

Zip and encrypt data

The full project can be zipped and encrypted so that it can be easily shared with the rest of the community. For that, navigate to the ‘Zip and encrypt data’ tab. Then, enter the password you want, select the columns that you want to zip and encrypt, and then click on the ‘Encrypt Project files’. Please check with the your local ethic committee under which conditions you are allowed to share the data.

The Preregistration and Sharing Software

The screenshot shows the 'Zip and encrypt data' tab of the software. On the left, there is a sidebar with 'General instructions', 'Disclaimer', 'Contact', and 'Reference'. The main area has a navigation bar with tabs: 'Create project', 'Preregistration', 'Anonymize data', 'Zip and encrypt data' (active), 'Record changes', and 'Version control'. Below the navigation bar, there is a section 'Enter password' with a text input field. Below that, there is a section 'Select the subfolders to encrypt' with checkboxes for 'Analyses', 'Data', 'Manuscript', 'Material', and 'Preregistrations'. Below that, there is a green button labeled 'Encrypt Project files'. Below that, there is a section 'The following links constitute sources that are often used to backup personal data in cloud storage. Click on one of them if you want to manually upload your ZIP project files.' with links to 'Upload to The Open Science Foundation' and 'Upload to The GitHub'.

Example of using the *pssr* software

For this example, we are going to be based on the preregistration of the study “Modality-specific dual-task interference on aversive memories”, written by Gaëtan Mertens, Vera Bouwman, Jonas Asmervik, & Iris M. Engelhard. Please note that we describe below more steps than the ones used in the preregistration. Also, we deviate from the preregistration material in order to provide a more detailed example.

STEP ONE: Initialise a project

First, we start by initializing a project by using the command `{r eval = FALSE} pssr::shiny_app()`. If everything worked as planned, a new project is initialized.

STEP TWO: Fill in the details in the ‘Create Project’ tab

Here, we first need to fill in the name of our project (i.e., Modality-specific dual-task interference on aversive memories). Then, we should click on the *Create new project* tab. On the window that appears, you can select the directory (i.e., computer folder) where you want your project folders to be stored. If anything goes as planned, the directory that the project is stored will be printed on screen (e.g., C/Desktop/ProjectName). Please note that everytime you want to open the projet, you can just click on the “Find existting project”, locate the folder that contains your project (for the example that would be the folder named “Modality-specific dual-task interference on aversive memories”) and open it. Please note that if a folder is selected that was not created by *pssr*, a warning will be returned. This will mean that also some functions of the *pssr* will not work (e.g., the zip function).

STEP THREE: Preregistration

Now that the project has been created (see (Step two)[#step2]), we are ready to create our preregistration document. For that, first click on the *preregistration* tab. We first need to name our preregistration document. This could be something as simple as “preregistration”. Then, we need to choose one of the available preregistration templates. The *pssr* provides 3 different preregistration templates: the *pss*, *aspredicted*, and *cos* templates. The last two templates were provided by the prereg R package of Frederik Aust. The first template was written by us and it is the template we describe in our relevant paper. Here, we descibe only the *pss* template as for the other two, there other relevant resources (e.g., <https://osf.io/zab38/wiki/home/>).

In order to select the *pssr* template, the user can just select the template from the drop down menu named *choose a pre-registration template*. Then, click on the *+ Create* button. After doing that, a new tab will be created, with separate boxes for each one of the fields that need to be filled in. Here, we provide within boxes the inforation we have provided.

Title

Modality-specific dual-task interference on aversive memories

Author list

Gaëtan Mertens, Vera Bouwman, Jonas Asmervik, & Iris M. Engelhard

Affiliation list

Department of Clinical Psychology, Utrecht University

Background of the study

Study questions

This study will investigate whether the reduction of self-reported vividness and emotionality of aversive memories in dual-task paradigms can be enhanced by using modality-specific interference.

Study hypotheses

A greater reduction in vividness and emotionality in visual memories is expected after a visuospatial taxation task compared to an auditory taxation task. In addition, a greater reduction in vividness and emotionality in auditory memories is expected after an auditory taxation task compared to a visuospatial taxation task.

Methods

Stimuli

Three visual stimuli (IAPS pictures 9181, 3400, and 6350) and three auditory stimuli (IADS sounds 286, 275, and 279) are randomly assigned to the three tasks.

Questionnaires

No questionnaires are included in this study.

Equipment

This study will be run on a standard laboratory PC. The experiment was programmed in Inquisit v4.0.

Procedure

All participants will complete three tasks: (1) Control task: watching a white screen, (2) Visual task: detecting a target letter (e.g., p) between distractors (e.g., q) appearing alternately on the sides of the computer screen (Homer, Deeprose, & Andrade, 2016), (3) Auditory task: detecting a target letter (e.g., d) between distractors (e.g., e) presented by male and female voices on alternating sides of the headphone. During each of the tasks participants will have to recall their memory for either an emotional picture or sound (also on a within-subject basis).

Protocol

Protocol - Experiment Modality specific interference

Version: June 2018

Materials:

- Computer with Inquisit experiment
- Chair
- Headphones
- 2 pencils
- Protocol experimenter
- Counterbalance scheme
- Information letter
- Informed consent (2x)
- Questionnaire prior knowledge modality specificity
- Debriefing
- Money
- Money/course credits received checklist

Preparation:

- Turn on the computer and log on -> right icon, password = fswlab
- Make sure that the sound on the computer is set correctly -> full?
- Open the experiment in Inquisit -> Labshare(L-schijf) -> Gaetan Mertens -> Experiment Modality specific interference (Jonas Asmervik) FINAL -> Experiment.iqx
- Insert the correct participant and group number based on the counterbalance scheme. Put on the red light in the cubicle when you enter the lab with the participant.

Introduction:

“Welcome to the eye-movement study with aversive images and sounds. I would like to ask you to switch off / silence your phone.

This study consists of a computer task which will take approximately 40 minutes. I would like you to read

the information letter concerning this experiment. If you then decide to participate, I would like you to ask to fill in the informed consent.” Give participant the information letter.

When participant is done reading:

“Do you have any questions? Would you like to participate?”

If yes, give two informed consents:

“Please fill in these two forms. One is for you, the other is for our administration.”

Instructions on computer task:

“You now will start with the computer task. Please sit close to the desk with your upper body barely touching. During the experiment, sounds are presented to you through these headphones. Please wear the headphones throughout the experiment.

All instructions will appear on the screen. When you are finished, please come out and see me at the front desk.

Do you have any questions?”

Answer any questions

“You can press the spacebar when I have left the cubicle to start the experiment. Good luck.”

Leave the cubicle

End of the experiment:

When the participant is finished with the computer task, assess the prior knowledge of modality specificity questionnaire.

Provide debriefing and sign it after the participant has signed it.

Provide incentive:

“This is the end of the experiment. Thank you for participating. You will receive 8 euro’s / 1 course credit as incentive. Will you fill in this list?”

Statistical analyses

Participant number

The sample size calculation is based on pilot data. As G-power does not allow for a repeated measures ANOVA within-within interaction, we calculated the sample size by using the dependent means t-test option. Therefore, we restructured the pilot data into two variables: congruent modality (M reduction vividness = 21.53, SD = 19.99) and incongruent modality (M reduction vividness = 14.99, SD = 14.02) and determined the effect size ($d_z = 0.31$). Sample size calculation using a dependent t -test with an α of .05 and statistical power of $1 - \beta = .80$ indicated a required sample of 66 participants. Because of the counterbalance procedure (the sample size needs to be multipliable by 12) and feasibility, the final sample size will be 60 participants. Post hoc power calculations indicates that a power of .77 will be obtained with 60 participants, which we considered sufficient.

Stopping rule

Data collection will continue until valid data for 60 participants is obtained.

Confirm hypotheses

The memory vividness and emotionality scores will be analyzed separately in two repeated measures ANOVAs with task (visual, auditory, control) and stimuli (visual, auditory) as a within-subject factors and the difference scores (pre- and post-measurements) as dependent variable. To further explore the results, paired sample t-test will be performed to compare the different tasks per stimuli. The analyses will be conducted within the traditional null hypothesis testing framework (NHST) using an α of .05.

Our primary hypothesis is that there will be an interaction between task and stimuli, with greater memory vividness and emotionality difference scores in the visual task using a visual stimuli and greater memory vividness and emotionality difference scores in the auditory task using auditory stimuli. In comparison, incongruent modality interferences are expected to show less reduction in memory vividness and emotionality. Furthermore, we expect overall greater reductions in memory vividness and emotionality in the experimental conditions compared to the control condition.

Disconfirm hypotheses

Any evidence opposite to the previous predictions would be provide first evidence of disconfirmation of our hypotheses.

Other

Not applicable.

References

Baddeley, A. D. (1983). Working Memory. Philosophical Transactions of the Royal Society of London. *Series B, Biological Sciences*, 302, 311-324. <https://doi.org/10.1098/rstb.1983.0057>

Homer, S. R., Deeprase, C., & Andrade, J. (2016). Negative mental imagery in public speaking anxiety: Forming cognitive resistance by taxing visuospatial working memory. *Journal of Behavior Therapy and Experimental Psychiatry*, 50, 77-82. <https://doi.org/10.1016/j.jbtep.2015.05.004>,

STEP FOUR: Anonymize data

The anonymize data tab can be used for anonymizing the data easily. Please note, though, that all functions are provided as an easy step ensuring anonymization of the data. However, all users should check whether indeed the data are fully anonymized before releasing them in public. For the sake of the example, we will open the “exampleDataSet.csv” file. These data are already anonymized but we have added an extra column with random numbers. The data set looks as follows:

##	ID	Auditory	Control	Vis1	Vis2	Vis3	Grand.Total	Age
## 1	1	500.9775	348.7957	570.1647	614.3012	527.0000	508.7945	18
## 2	2	421.9895	418.1443	558.1918	557.9552	566.3333	491.1594	18
## 3	3	444.0851	419.3152	485.2432	482.8611	521.7200	466.2955	22
## 4	5	393.4330	346.9500	531.5208	566.7143	478.6795	437.0137	20
## 5	7	365.0928	315.7864	578.3571	455.0115	492.4725	434.8983	19
## 6	8	564.9041	382.7957	508.5493	522.3538	499.0896	488.7182	23
## 7	9	495.4568	358.5684	634.8194	634.6207	636.6000	539.1867	19
## 8	10	368.1020	374.3113	528.4412	522.1220	541.2000	433.7961	19
## 9	12	596.4444	510.3267	649.7143	578.2292	630.8333	579.9603	19
## 10	14	485.5238	349.2404	536.4127	502.9747	483.8485	461.0303	19
## 11	15	529.7447	377.1613	465.9091	655.6667	477.0294	483.7621	21
## 12	16	490.8571	492.7681	604.1765	643.5926	604.9032	557.2000	20
## 13	17	494.3810	392.1343	554.0488	473.1739	570.5588	484.2851	21
## 14	18	453.4533	363.6795	579.2381	535.0938	511.8980	480.8419	18
## 15	19	579.5455	361.6324	571.3750	600.2000	532.0462	512.3594	22
## 16	21	407.8861	354.6117	393.1316	425.8378	568.2000	419.6275	21
## 17	23	446.6429	349.3966	413.4426	354.0588	462.8462	406.1927	20
## 18	24	483.8219	400.9070	519.3611	407.5541	520.2899	471.3323	20

For our example, we would want to remove the age column as, for an unknown reason, we are afraid could trace some of our participants back based on their age – a bit unrealistic argument in the present case. In order to fill in this column with random numbers, we will follow the steps mentioned in *Anonymize data* section. Specifically, by using the *Anonymize data* tab, we will click on the *browse* button, and select the CSV file with our data (here *exampleDataSet.csv*). If everything went fine, then we should be able to see the first 2 columns of the data in our browser. Then, in the *Select Columns* box, we can select the columns that we want to be filled in with random numbers (here the *age* column). In the *How to anonymize data?* box, there are different options for anonymizing the data. Here, we stick to the random option (the default). After we do that, the “Anonymized data” section should now show the first 5 lines of our data. Importantly, the columns that we have selected to be anonymized have changed both in name (i.e., the original column name + the suffix “_anonym”), Lastly, in case we want the anonymized data to be saved in our working directory, we need to go under the *Do you want the data to be saved* radio button and click on ‘Yes’ (in the example it was set to ‘No’).

[Create project](#) [Preregistration](#) [Anonymize data](#) [Zip and encrypt data](#)

Here you can anonymize the data of your project. For that you need to select the data file -- at this moment only .csv files are supported. Then, select the columns to be anonymized. The software will fill in the columns with random numbers or any of the encryption choices. By clicking on 'Yes' at save data, the anonymized data are will be saved in the data directory of the project.

Upload data

Choose CSV File

Browse... exampleDataSet.csv

Upload complete

☒ Header

Separator

☐ Comma

☒ Semicolon

☐ Tab

Original data

Show 10 entries

Search:

ID	Auditory	Control	Vis1	Vis2	Vis3	Grand.Total	Age
1	500,9775281	348,7956989	570,1647059	614,3012048	527	508,7945205	18
2	421,9894737	418,1443299	558,1917808	557,9552239	566,3333333	491,159383	18

Showing 1 to 2 of 18 entries

Previous 1 2 3 4 5 ... 9 Next

Select Columns

Age

How to anonymize data?

random

Do you want the data to be saved?

☐ Yes

☒ No

Anonymized data

Show 10 entries

Search:

ID	Auditory	Control	Vis1	Vis2	Vis3	Grand.Total	Age_anonym
1	500,9775281	348,7956989	570,1647059	614,3012048	527	508,7945205	-1.5264856
2	421,9894737	418,1443299	558,1917808	557,9552239	566,3333333	491,159383	0.2119678
3	444,0851064	419,3152174	485,2432432	482,8611111	521,72	466,2955224	-0.1135050
5	393,4329897	346,95	531,5208333	566,7142857	478,6794872	437,0136986	-0.6456117
7	365,0927835	315,7864078	578,3571429	455,0114943	492,4725275	434,8982684	1.1912963

Showing 1 to 5 of 18 entries

Previous 1 2 3 4 Next

STEP FIVE: Zip and encrypt data

Here, we just type in a password in the *Enter password* field (here the word 'password'). Then, we select the subfolders that we want to be encrypted (here the 'Analyses' and 'Material' subfolders). Lastly, we click on the *Encrypt Project files* button. If anything went as predicted, the directory where the zip file was located

should be shown on screen (here hidden for privacy issues).

You can use this tab for zipping and encrypting the folders in the project. To do that, just tick on the folders you want to encrypt, select a password, and then click on 'Encrypt Project files' button.

Enter password

Select the subfolders to encrypt

- ☒ Analyses ☐ Data ☐ Manuscript
☒ Material ☐ Preregistrations

 **Encrypt Project files**

The following links constitute sources that are often used to backup personal data in cloud storage. Click on one of them if you want to manually upload your ZIP project file.

[Upload to The Open Science Foundation](#)

[Upload to The GitHub](#)

STEP SIX: Record changes

Although this is described as the sixth step, the “*Record changes*” tab should be visited often during the whole project and not just in the end. Specifically, it is best to record as many changes as possible as this will provide a better view of the changes made throughout the whole project. In our example, we have just filled in a username and an email. Then, and every time we want to timestamp the changes made in the project, we just provide a brief description of the changes we have made (e.g., anonymized data) and then click on the ‘timestamp changes’. Whenever we want to see if any changes have been made in the files, we can click on the ‘track changes’ button.

As explained in our main paper, no new copies of the files are made. However, sometimes maybe the user wants to revert to an older version of the files. The *version control* tab was designed for exactly this. For that, just click on the folders you want to revert to and then go to the commit you want to revert to using the *Go to Commit* button. Please note that there should be at least one commit in order for this feature of the software to work. In case of no commits, the tab will return an error.