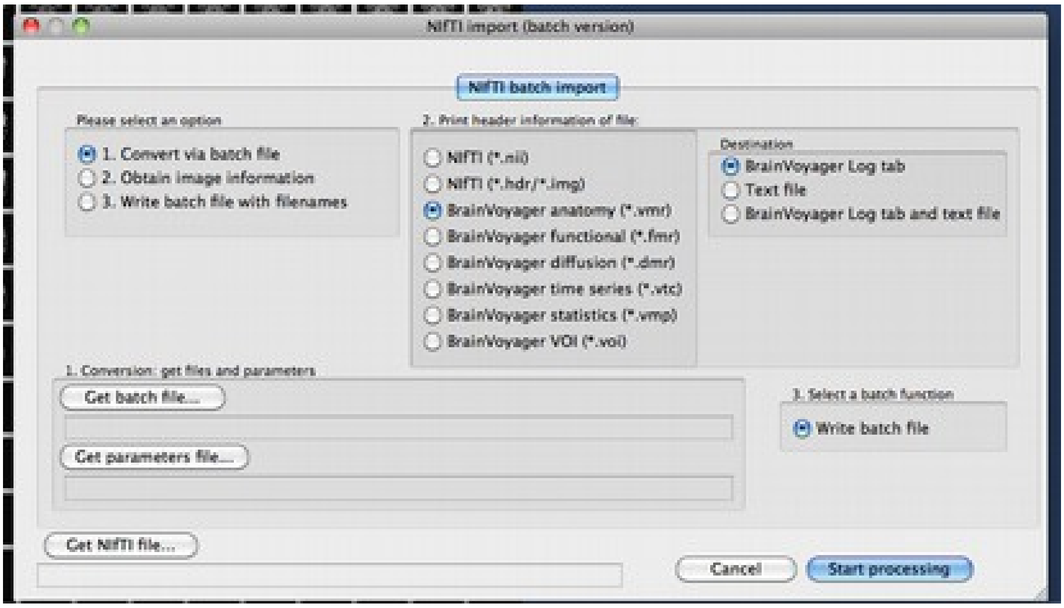
Manual for batch-nifticonverter v1.1.0 beta

The batchversion of the nifticonverter reads all settings and filenames from text files.
Latest update: 27-11-2015

Usage

The dialog of the nifticonverter v1.1.0 is shown in the figure below. There is one dialog without tabs, with a choice of 3 options:

1. Convert via batch file
2. Obtain image information
3. Write batch file with file names



The options work in the following way:

1. Convert via batch file

a. Select option 1: Convert via batch file.

b. Select the batch file (via clicking the "Get batch file" button), this is the file with file names of the files to be converted.

c. Select the parameters file (via the "Get parameters file" button), this is the file with parameters.

d. Click the "Start processing" button.

2. Obtain image information

a. Select option 2: Obtain image information

b. Select the file type (if it is a BrainVoyager file type, the file should be open in BrainVoyager; if it is a NIfTI file type, click the button "Get NIfTI file..." to select the file.)

c. Select whether the header information should be written to the Log tab, to disk or both.

d. Click the "Start processing" button.

3. Write batch file with file names

a. Select option 3: Write batch file with filenames

b. Click the "Start processing" button. Now a file dialog will appear until the "Cancel" button is pressed.

Release notes v1.1.0 beta

Issue	Old situation (1.09.xx)	New situation
Transformation matrix	Since v1.05, the matrix for import/export was decided upon differently in different subversions for each dataformat	Matrix has to be specified externally (temporary solution); select matrix on basis of orientation
Left- and righthandedness	It was unclear whether an imported image was actually in neurological or radiological convention.	A matrix can be specified in order to make the image radiological (right-is-left). In the logtab will be shown whether the resulting voxel-to-world matrix has actually become `radiological' (at least, determinant > 0). In an imported VTC, VMR and FMR/DMR, the feature will be saved. For VMPs, however, only a notice will be printed to the Log tab, since it cannot be saved in the header. Select 'trftype 3' when applying the flip.
Number of images to convert	One at a time	Many (a `batch') of the same format at the same time. There is one parameter file, so the parameters should apply to all images in the filelist.
Subvolume bounding box (export)	subvolumes (VMP-NR, VTC, VOI): if VMR has positioning information: position of anatomy + x/y/z-start value; otherwise exactly in middle of VMR. (for VMP best option is to zeropad to VMR size and copy position information from exported VMR using 'NIfTI Header Manipulation' function in nifticonverter 1.09)	subvolumes (VMP-NR, but should also apply to VTC): if VMR has positioning information, the position of the anatomy is taken, multiplied with the resolution of the subvolume and the x/y/z-start divided by the resolution. This will be added or subtracted, dependent on the orientation of the image w.r.t. the axes, from the translation values in voxel-to-world matrix of the anatomical image. Any isovoxel-, zeropadding- or reorientation transformation can be applied subsequently.
User interface	There were five tabs with different options for image manipulation	Because the parameters are specified externally, the dialog could be greatly simplified (see topic below).

Other remarks

When a VMP is created, it will always be an NR-VMP.

Please note that this is still an experimental version. Also, the import of VMPs and VTCs should be solved in the next version.

If applying transformations in non-cubic volumes sequentially gives problems, one very nice BrainVoyager user provided the suggestion to perform the transformation as part of the zeropadding; here is an example transformation:

```
apply zeropadding: 1
```

```
trftype: 3
multiplication order: left
save trf as inverse: 0
specify new dimensions: 0
specify matrix: 1
0 -1  0  40
0  0 -1  0
1  0  0  0
0  0  0  1
use bounding box: 0
```

Document history

27-09-13: Added a few multiplied matrices

21-06-13: Started overview with orientations and required transformations (last section of document)

13-06-13: Corrected 'apply' and 'do not apply' in the table that were interchanged

03-05-13: Replaced screenshot of erroneous batch import file.

26-11-15: Added export TAL-VOI procedure

Format of the filename text file

The format of the text file with filename(s) is as follows:

<n> - *number of files to convert*

<name 1>

<target format 1>

<name of underlying anatomy (vmr) for name 1> - *only if name 1 is subvolume (vtc/vmp/voi)*

<name 2>

<target format 2>

<name of underlying anatomy (vmr) for name 2> - *only if name 2 is subvolume (vtc/vmp/voi)*

...

<name n>

<target format n>

<name of underlying anatomy (vmr) for name n> - *only if name n is subvolume (vtc/vmp/voi)*

nifti_batch_import_anatomy.txt

```
6
/Volumes/COMPATIBLE/Data_Antoine/AL/structural/bsMT01629-0015-00001-000176-01.hdr
vmr
/Volumes/COMPATIBLE/Data_Antoine/CL/structural/bsMT01628-0014-00001-000176-01.hdr
vmr
/Volumes/COMPATIBLE/Data_Antoine/DT/structural/bsMT01630-0014-00001-000176-01.hdr
vmr
/Volumes/COMPATIBLE/Data_Antoine/FD/structural/bsMT01681-0014-00001-000176-01.hdr
vmr
/Volumes/COMPATIBLE/Data_Antoine/MS/structural/bsMT01655-0015-00001-000176-01.hdr
vmr
/Volumes/COMPATIBLE/Data_Antoine/SS/structural/bsss230311-0015-00001-000176-01.hdr
vmr
```

Because only one parameter text file can be used for a batch of files, it makes sense to only convert to one kind of format in a batch (see example below).

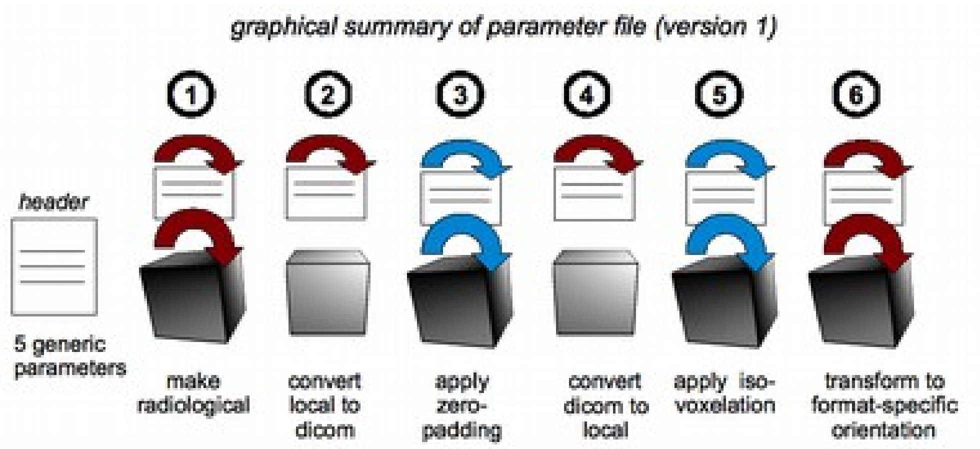
Example for a subvolume:

example_nifti_batch_export_set2_VTC.txt

```
1
/Volumes/COMPATIBLE/Data_test_plugins/nifticonverter/nifticonverter_110/export/set2_vtc_native/set4_fmr_30vols_NATIVE.vtc
nii
/Volumes/COMPATIBLE/Data_test_plugins/nifticonverter/nifticonverter_110/export/set2_vtc_native/AurRou.vmr
```

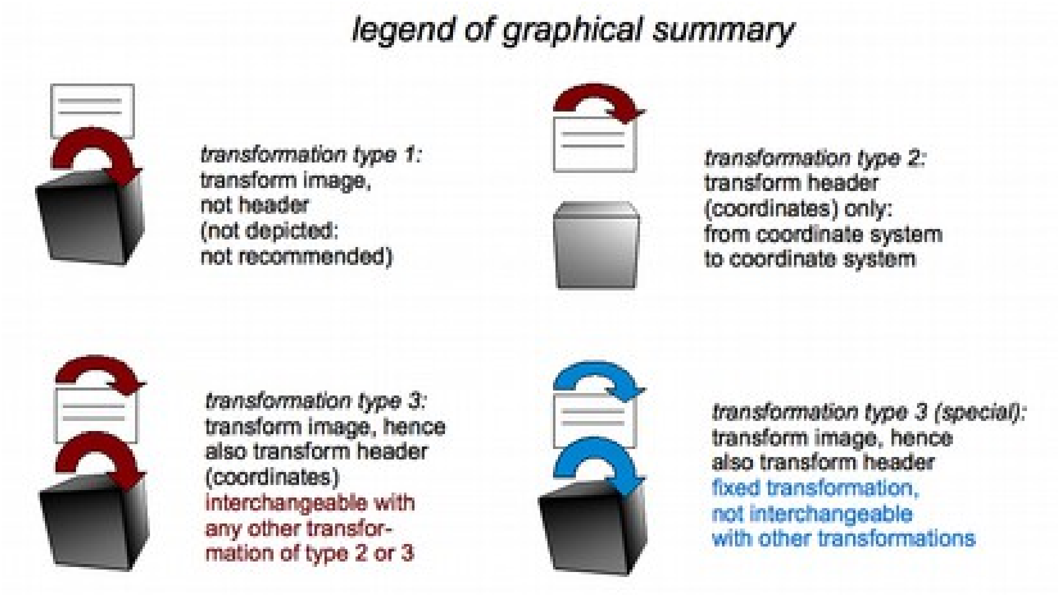
Format of the parameter text file

In the textfile, made of plain text, the following parameters can appear in the order specified in the table. This can be graphically depicted in the following way:

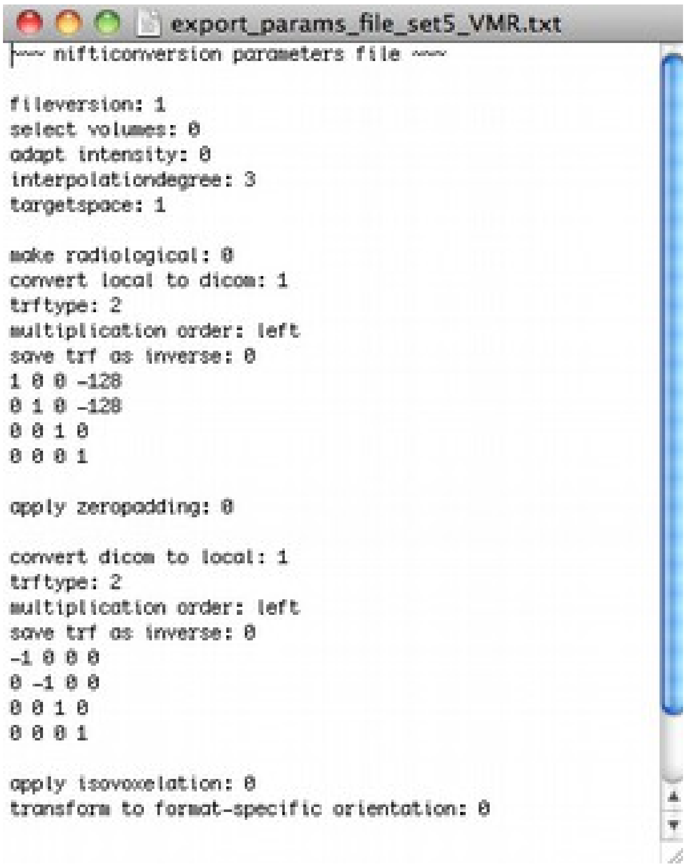


In the header the type of file and 5 generic parameters are specified. Also, in version 1 of the format, the `adapt intensity' parameter is specified in the header, while in fact this is a kind of transformation. In later versions, this will be moved to the body of the text file.

Then, in the body, there are 6 possible transformations, which can be switched on or off. If they are switched on, additional parameters need to be specified. Besides the specific parameter names for `make radiological', `convert local to dicom', `convert dicom to local' and `transform to format-specific orientation', which need to be literally mentioned, the transformation that can be specified can be any of transformation type 2 or 3 (although we have some suggested in table `Suggested transformations').



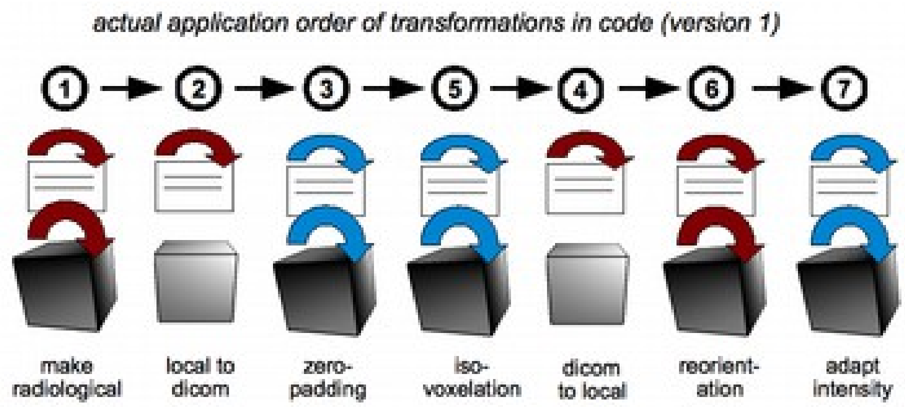
It is possible to leave an empty line between the transformation blocks, as shown in the example text file below. However, the parameter names should be mentioned exactly like specified in this document.



```
export_params_file_set5_VMR.txt
~~~ nifticonversion parameters file ~~~

fileversion: 1
select volumes: 0
adapt intensity: 0
interpolationdegree: 3
targetspace: 1

make radiological: 0
convert local to dicom: 1
trftype: 2
multiplication order: left
save trf as inverse: 0
1 0 0 -128
0 1 0 -128
0 0 1 0
0 0 0 1

apply zeropadding: 0

convert dicom to local: 1
trftype: 2
multiplication order: left
save trf as inverse: 0
-1 0 0 0
0 -1 0 0
0 0 1 0
0 0 0 1

apply isovoxelation: 0
transform to format-specific orientation: 0
```

Application order of the transformations

The actual order of application of the transformations in version 1 is depicted in the figure below.



Note: Since the reorientation is the (almost) last transformation, this gives for exporting to Analyze/NIfTI a different result than when using the same reorientation matrix in BrainVoyager (first Load .TRF and Apply .TRF in 3D volume Tools, then 'Export to Analyze' from the File menu).
To get the same result with the NIfTI batch converter, one could try to exchange the transformations in the text file by using 2 for reorientation (while still calling this `local to dicom'), 4 for local to dicom and 5 for dicom to local.

~~~~~~~ toAnalyze.trf (can be saved in text file without markup) ~~~~

```
FileVersion:        5

DataFormat:         Matrix

0.0000000000000000      -1.0000000000000000     0.0000000000000000      0.0000000000000000
0.0000000000000000      0.0000000000000000      -1.0000000000000000     0.0000000000000000
-1.0000000000000000     0.0000000000000000      0.0000000000000000      0.0000000000000000
0.0000000000000000      0.0000000000000000      0.0000000000000000      1.0000000000000000

TransformationType:     2
CoordinateSystem: 0

SourceFile:         "/myproject.vmr"
TargetFile:         "/myproject_TRF.vmr"
```

~~~~~~~~~~~~~~~~~

Parameters in the text file (table)

The following parameters can be present in the file. The parameters need to be mentioned literally as shown in the first column of the table and should be present in the order that they are presented in the table. It is possible to use single empty lines between the parameters (see example file above).

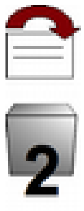
Table: Explanation of the parameters

	parameter	**compulsory or optional**	**possible settings/allowed values**	**Explanation**
	fileversion	compulsory	1	This indicates the file version of the nifti-batchconverter parameters file.
	select volumes	compulsory	0: do not apply 1: apply	This option can be used for 4-dimensional files, to select a subset of the volumes, for example to skip the first few volumes.
	from	Should not be present when 'select volumes' is 0; to be specified when 'select volumes' is 1	value range: 1-N	
	to	Should not be present when 'select volumes' is 0; to be specified when 'select volumes' is 1	value range: 1-N	
	adapt intensity	compulsory	0: do not apply 1: apply	This option is mainly used when converting to classical anatomical files (*.vmr), which uses only values that can be contained in 1 byte, specifically, the gray values in a *.vmr range between 0-225.
	minimum	Should not be present when 'adapt intensity' is 0; to be specified when 'adapt intensity' is 1	Any (will be constrained by the data type of the file, f.e. no negative values for *.vmrs, etc).	This specifies the minimum value for the data. The data will be scaled via a linear transformation between the minimum and maximum.
	maximum	Should not be present when 'adapt intensity' is 0; to be specified when 'adapt intensity' is 1	Any (will be constrained by the data type of the file, f.e. no negative values for *.vmrs, etc).	This specifies the maximum value for the data. The data will be scaled via a linear transformation between the minimum and maximum.
	interpolationdegree	compulsory	0 (nearest neighbor) 1 (linear) 2 (quadratic) 3 (cubic) 4 (quartic) 5 (quintic) 6 (sextic) 7 (septimic)	This specifies how precisely the data will be interpolated during a transformation. A low degree indicates a rougher, quicker interpolation than a higher degree. When working with VOIs, nearest neighbor interpolation is recommended.

	targetspace	compulsory		>>> not yet significant 0: unknown 1: native 2: acpc 3: Tal >> add 4: MNI? 5: coregistered to template?
	**make radiological**	compulsory	0: do not apply 1: apply	The 'make radiological' action can be used when the `qfactor' in a nifti file is -1. The -1 indicates a `left-handedness' (in particular, a change in orientation of the voxel-to-world or world-to-voxel matrix).
	trftype	Parameter should be present if 'make radiological' is 1	2: calculate coordinates in new basis 3. apply image transformation and calculate new coordinates	Recommended: type 3
	multiplication order	Parameter should be present if 'make radiological' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B
	save trf as inverse	Parameter should be present if 'make radiological' is 1	0: save original trf in header 1: multiply position with inverse of transformation matrix	Not needed for this feature, selecting `0' should be fine.
		If 'make radiological' is 1, under trftype, a 4x4 matrix should be specified	A 4x4 matrix	If the NIfTI image is in usual orientation (L-R axis is x-axis [1]), then the matrix could be: 1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1 If the image is oriented in sagittal orientation (A-P axis is x-axis), the matrix could be: -1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 Otherwise the matrix could be: 1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1

	convert local to dicom	compulsory	0: do not apply 1: apply	To convert images in native space between the NIfTI and BrainVoyager coordinate systems, DICOM is used as an intermediate coordinate system. It is recommended to use this. Example parameters will be supplied.
	trftype	If 'convert local to dicom' is 1	2: calculate coordinates in new basis 3. apply image transformation and calculate new coordinates	Recommended: type 2
	multiplication order	If 'convert local to dicom' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B
	save trf as inverse	If 'convert local to dicom' is 1	0: save original trf in header 1: multiply position with inverse of transformation matrix	Not needed for this feature, selecting \`0' should be fine.
		If 'convert local to dicom' is 1, a 4x4 matrix should be specified	A 4x4 matrix	bvqxfile: [dx 0 0 -(dx * nx / 2); 0 dy 0 -(dy * ny / 2); 0 0 dz -dz*((nz-1)/2); 0 0 0 1] niftifile: [-1 0 0 dim(2)-1; 0 -1 0 dim(3)-1; 0 0 1 0; 0 0 0 1]
	apply zeropadding	compulsory		Add zeros (black) to the edges of the image so that it enlarges (f.e. to the size of the underlying image (*.vmr))
	trftype	If 'apply zeropadding' is 1	2: calculate coordinates in new basis 3. apply image transformation and calculate new coordinates	Recommended: type 2 (but in the current plugin this parameter is not taken into account)
	multiplication order	If 'apply zeropadding' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B
	save trf as	If 'apply zeropadding' is 1	0: save original trf	Not needed for this feature,

	inverse		in header 1: multiply position with inverse of transformation matrix	selecting `0' should be fine.
	specify new dimensions	Should not be present when 'apply zeropadding' is 0; to be specified when 'apply zeropadding' is 1	0: image will get dims of underlying VMR (for VMP, VTC, VOI) or size 256x256x256 1: new size specified by user	This parameter is used to indicate where the information of the new size of the image should be obtained from.
	newx	Should not be present when 'specify new dimensions' is absent or 0; to be specified when 'specify new dimensions' is present and 1		Matrix size in x-dimension
	newy	Should not be present when 'specify new dimensions' is absent or 0; to be specified when 'specify new dimensions' is present and 1		Matrix size in y-dimension
	newz	Should not be present when 'specify new dimensions' is absent or 0; to be specified when 'specify new dimensions' is present and 1		Matrix size in z-dimension
	specify matrix	Should not be present when 'apply zeropadding' is 0; to be specified when 'apply zeropadding' is 1		The matrix that the plugin calculates will be printed to the Log tab. May there be a wish to specify a different matrix, then this parameter gives the option.
		Should not be present when 'specify matrix' is 0; to be specified on following lines when 'specify matrix' is 1	A 4x4 matrix	This will typically be a diagonal matrix with translation values in the fourth column (see top illustration on last page).
	use bounding box	Should not be present when 'apply zeropadding' is 0; to be specified when 'apply zeropadding' is 1		If this parameter takes the value '1', the translation that will be applied afterwards using a matrix, will be specified using the 'startx, 'starty' and 'startz' parameters in the following way: 1 0 0 startx 0 1 0 starty 0 0 1 startz 0 0 0 1
	startx	Should not be present when 'use bounding box' is 0; to be specified when 'use bounding box' is 1		distance to translate on x-axis

	starty	Should not be present when 'use bounding box' is 0; to be specified when 'use bounding box' is 1		distance to translate on y-axis
	startz	Should not be present when 'use bounding box' is 0; to be specified when 'use bounding box' is 1		distance to translate on z-axis
	**convert dicom to local**	compulsory	0: do not use this transformation 1: use this transformation	To convert images in native space between the NIfTI and BrainVoyager coordinate systems, DICOM is used as an intermediate coordinate system. It is recommended to use this (for native space, not required for Talairach).
	trftype	If 'convert dicom to local' is 1	2: calculate coordinates in new basis 3. apply image transformation and calculate new coordinates	Recommended: type 2, because this is a change between coordinate systems and does not change the position of the image within the coordinate system.
	multiplication order	If 'convert dicom to local' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B
	save trf as inverse	If 'convert dicom to local' is 1	0: save original trf in header 1: multiply position with inverse of transformation matrix	Not needed for this feature, selecting `0' should be fine.
		Should not be present when 'convert dicom to local' is 0; to be specified when 'convert dicom to local' is 1	A 4x4 matrix	to NIfTI: [dx 0 0 -(dx * nx)/2 0 dy 0 -(dy*ny)/2 0 0 dz 0 0 0 0 1] to BrainVoyager: [1/voxx 0 0 dimx/2 0 1/voxy 0 dimy/2 0 0 1/voxz dimz-1/2 0 0 0 1]
	**apply isovoxelation**	compulsory	0: do not apply 1: do apply	Make voxels isotropic (same size in all dimensions). This should be applied for the import of VTC and VMP files, if the voxels are not yet isotropic.
	trftype	If 'apply isovoxelation' is 1	2: calculate coordinates in new basis 3. apply image	Recommended: type 3

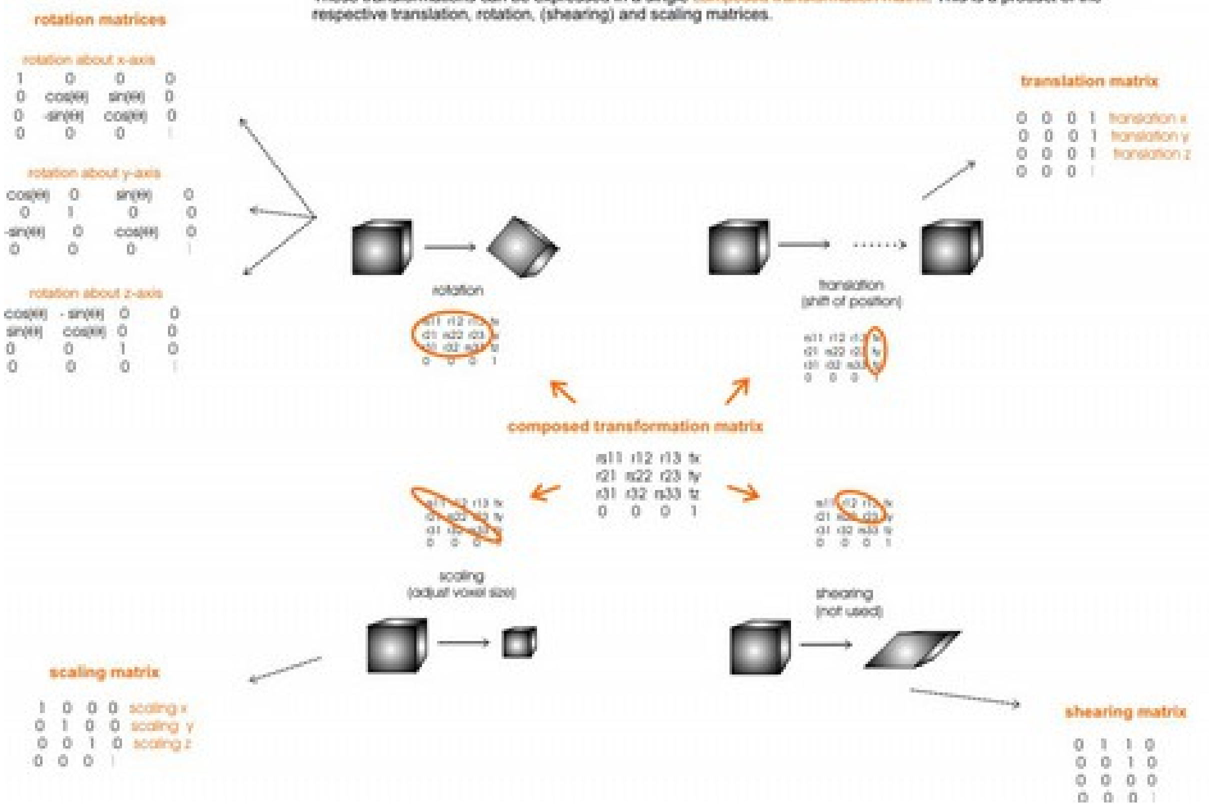
			transformation and calculate new coordinates	
	multiplication order	If 'apply isovoxelation' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B For the isovoxel transformation, the left multiplication was indeed used, in combination with `save trf as inverse'.
	save trf as inverse	Should be specified if 'apply isovoxelation' is 1	0: save original trf in header 1: multiply position with inverse of transformation matrix	For the isovoxel transformation, the left multiplication was indeed used, in combination with `save trf as inverse'.
	new resolution in mm3	Should not be present when 'apply isovoxelation' is 0; to be specified when 'apply isovoxelation' is 1	integer or float (preferrably between 1 and 3)	
	specify matrix	Should be specified if `apply isovoxelation' is 1	0: do not specify matrix 1: specify matrix	
		If `specify matrix' is 1	A 4x4 matrix	Matrix specification is not necessary.
	**transform to format-specific orientation**	compulsory	0: do not apply format-specific transformation 1: do apply	This format-specific transformation could be used for example to bring an anatomical image in sagittal position w.r.t. the BrainVoyager coordinate system, or in 'axial' orientation w.r.t. the NIfTI coordinate system. One could also include here the MNI-to-TAL transformation [2].
	trftype	If 'transform to format-specific orientation' is 1	2: calculate coordinates in new basis 3. apply image transformation and calculate new coordinates	Recommended: type 3
	multiplication order	If 'transform to format-specific orientation' is 1	'left' or 'right'	if A is the position (voxel-to-world) of the image and B is a transformation: left: B * A (this is the usual way) right: A * B
	save trf as inverse	If 'transform to format-specific orientation' is 1	0: save original trf in header 1: multiply	Not needed for this feature, selecting `0' should be fine.

			position with inverse of transformation matrix	
		If 'transform to format-specific orientation' is 1, on the following 4 lines a 4x4 matrix should be specified	A 4x4 matrix	Most likely to be required for anatomical (sub)volumes. For sagittal orientation the most likely candidate is: [0 -1 0 0 0 0 1 0 -1 0 0 0 0 0 0 1] in some form (signs dependent on previously applied reflections), or its inverse.

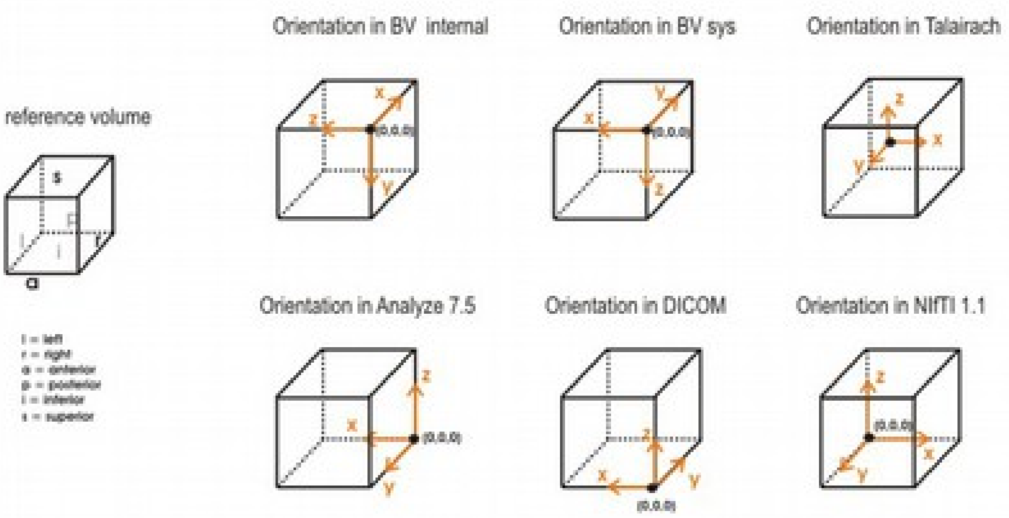
[1] Check via Converter's `Option 2: Obtain image information'
[2] For MNI to Talairach transformations, see for example the transformations of
Brett: http://imaging.mrc-cbu.cam.ac.uk/imaging/MniTalairach#Approach_2:_a_non-linear_transform_of_MNI_to_Talairach
Meyer-Lindenberg: http://imaging.mrc-cbu.cam.ac.uk/imaging/MniTalairach#Approach_1:_redo_the_affine_transform
or the BrainMap transformations:
http://www.brainmap.org/icbm2tal/icbm_spm2tal.m
http://www.brainmap.org/icbm2tal/icbm_fsl2tal.m
One can use these in the reorient-to-format field by multiplying one of these transformation matrices with the existing matrix (if you use one in this field).

AFFINE TRANSFORMATION MATRICES

The mapping, transforming points in one dataset to points in another dataset, involve translations, rotations and scaling. These transformations can be expressed in a single composed transformation matrix. This is a product of the respective translation, rotation, (shearing) and scaling matrices.



ORIENTATION IN DIVERSE COORDINATE SPACES W.R.T. REFERENCE VOLUME



Descriptions of procedures for specific file formats

Export of VOIs in Talairach space

One option is to export VOIs in Talairach space to NIfTI format is to first transform the VMR in Talairach space via the transformation file on page 8 of this document (save as plain text with extension *.trf, load the transformation file (*.trf) via the "Load .TRF" button, then use the "Transform .VMR" button on 3D Volume Tools), and then to export this transformed anatomy in BrainVoyager via File > Export to Analyze… so that the position of the anatomy is set to -127.5 in the fourth column and 1's over the diagonal.

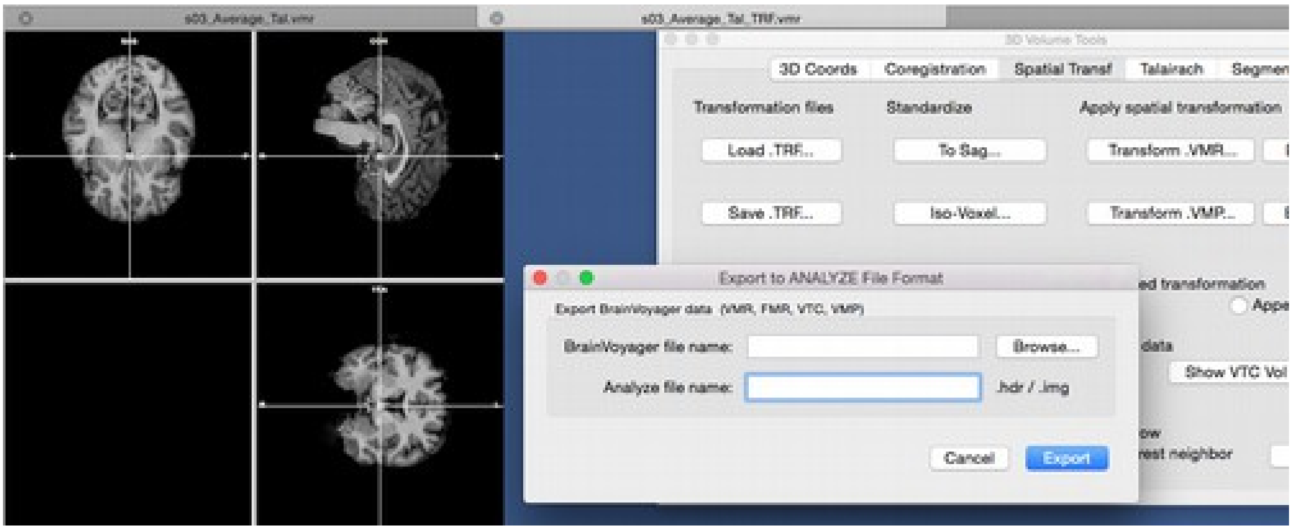


Figure: A screenshot of how to transform the VMR (via the Load .TRF and Transform .VMR buttons on the 3D Volume Tools) and the export to Analyze (predecessor of NIfTI format)

Then any number of VOIs can be exported using the batch option in nifticonverter 1.1.0. This can be downloaded from the support site at:

> http://support.brainvoyager.com/available-tools/49-available-plugins/166-nifti-conversion-volumetric-files.html#nifti_option1

Place the unzipped file in /Documents/BVExtensions/Plugins/. Start via Plugins > nifticonverter 1.1.0...

To use the nifticonverter 1.1.0, one needs

1) a batch file in plain text format (*.txt)
2) a parameter file in plain text format (*.txt)

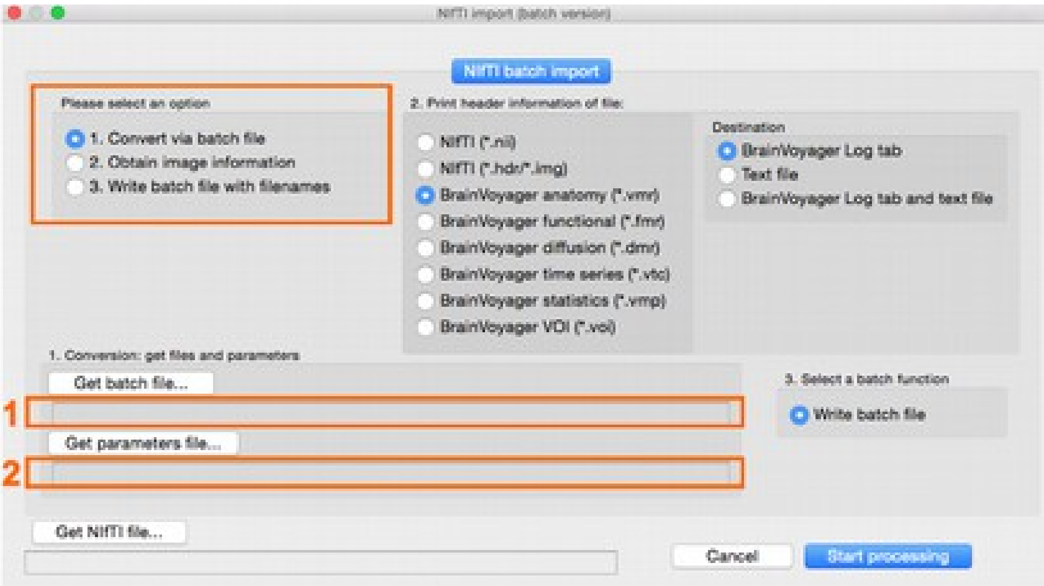


Figure: interface of nifticonverter 1.1.0

Example batch files for Windows and Mac can be downloaded from the support site:

http://support.brainvoyager.com/available-tools/49-available-plugins/166-nifti-conversion-volumetric-files.html#nifti_option1

Please note that for subvolume files like VMP, VOI, etc, an anatomical file (*.vmr) needs to be listed below the 'target format' line (in the example below, this is 'nii'), because during the conversion, the VOI file will be loaded onto the *.vmr in BrainVoyager.

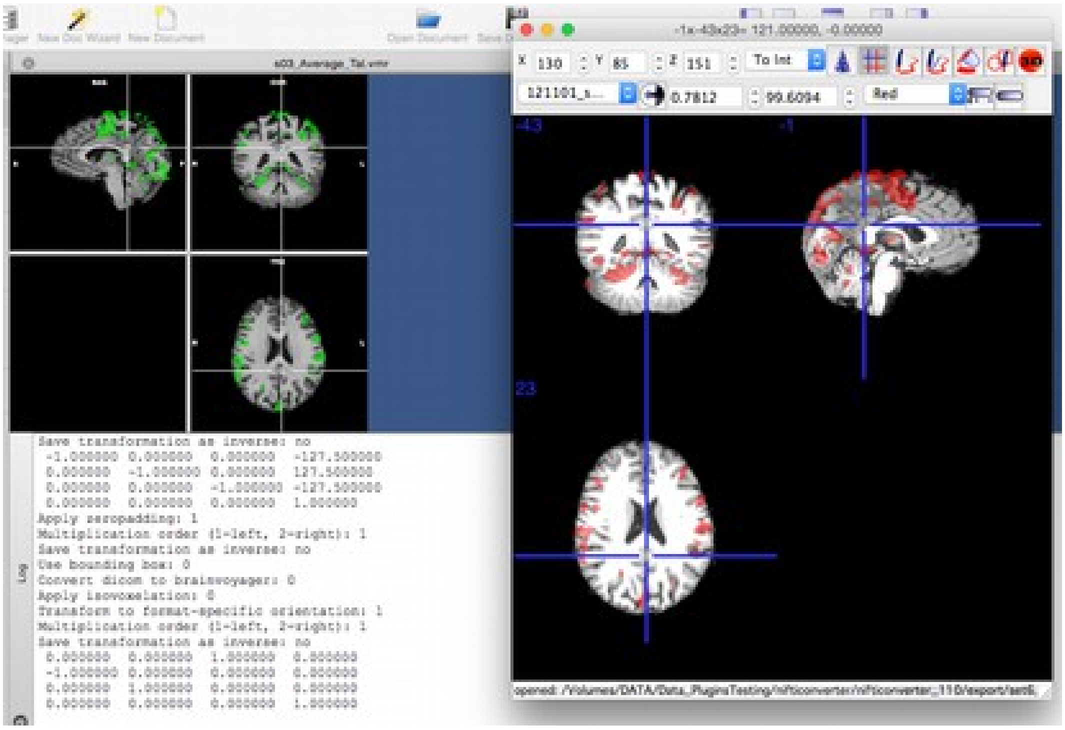
1) example batch text for Mac:

```
3
/Volumes/DATA/Data_PluginsTesting/test1.voi
nii
/Volumes/DATA/Data_PluginsTesting/s03_Average_Tal.vmr
/Volumes/DATA/Data_PluginsTesting/test2.voi
nii
/Volumes/DATA/Data_PluginsTesting/s03_Average_Tal.vmr
/Volumes/DATA/Data_PluginsTesting/test3.voi
nii
/Volumes/DATA/Data_PluginsTesting/s03_Average_Tal.vmr
```

~~~ end of file ~~
~~~

2) A parameter file for exporting VOIs in Talairach space could be the following:

```
~~~ nifticonversion parameters file ~~~

fileversion: 1
select volumes: 0
adapt intensity: 0
interpolationdegree: 0
targetspace: 1

make radiological: 0
convert local to dicom: 1
trftype: 2
multiplication order: left
save trf as inverse: 0
-1      0       0       -127.5
0       -1      0       127.5
0       0       -1      -127.5
0       0       0       1

apply zeropadding: 1
trftype: 3
multiplication order: left
save trf as inverse: 0
specify new dimensions: 0
specify matrix: 0
use bounding box: 0

convert dicom to local: 0

apply isovoxelation: 0

transform to format-specific orientation: 1
trftype: 3
multiplication order: left
save trf as inverse: 0
  0      0      1      0
  -1      0      0      0
  0      1      0      0
  0      0      0      1
```

~~~ end of file ~~



Please make sure that the interpolation value in the parameter file is set to 0 (nearest neighbor interpolation) when working with VOIs and always check for left-right flipping afterwards.
~~~

Appendix

I. Most frequent occuring orientations and required transformation matrices

A list of all matrix rotations can be found at
http://www.euclideanspace.com/maths/algebra/matrix/transforms/examples/index.htm

Import	NIfTI voxel-to-world matrix	Transformation matrix to sagittal (including transformation from NIfTI to BV)
<VMR image set 3: coronal orientation> [insert snapshot]	(Variation of) diagonal 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0.000000 -1.000000 0.000000 0.000000 0.000000 0.000000 1.000000 0.000000 -1.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 1.000000 + radiological matrix

Import	NIfTI voxel-to-world matrix	Transformation matrix (transformation from NIfTI to BV)
<FMR image set 1: coronal orientation> [insert snapshot]	(Variation of) diagonal 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1 + radiological matrix

[rest will follow].

II. A few multiplied matrices

Table: composed rotation matrices (multiplication AB where B are the columns and A the rows)
The colored matrices can be used for reorienting a VMR to sagittal or from sagittal to/from NIfTI

A o B	identity	rot x pi/2	rot x pi	rot x 3pi/2	rot y pi/2	rot y pi	rot y 3pi/2	rot z pi/2	rot z pi	rot z 3pi/2
identity trans-formation	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	1 0 0 0 0 0 -1 0 0 1 0 0 0 0 0 1	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	1 0 0 0 0 0 1 0 0 -1 0 0 0 0 0 1	0 0 -1 0 0 1 0 0 1 0 0 0 0 0 0 1	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	0 0 1 0 0 1 0 0 -1 0 0 0 0 0 0 1	0 1 0 0 -1 0 0 0 0 0 1 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1	0 -1 0 0 1 0 0 0 0 0 1 0 0 0 0 1
rot x pi/2	1 0 0 0 0 0 -1 0 0 1 0 0 0 0 0 1	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	1 0 0 0 0 0 1 0 0 -1 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 0 -1 0 -1 0 0 0 0 1 0 0 0 0 0 1	-1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1	0 0 1 0 1 0 0 0 0 1 0 0 0 0 0 1	0 1 0 0 0 0 -1 0 -1 0 0 0 0 0 0 1	-1 0 0 0 0 0 -1 0 0 -1 0 0 0 0 0 1	0 -1 0 0 0 0 -1 0 1 0 0 0 0 0 0 1
rot x pi	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	1 0 0 0 0 0 1 0 0 -1 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	1 0 0 0 0 0 -1 0 0 1 0 0 0 0 0 1	0 0 -1 0 0 -1 0 0 -1 0 0 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1	0 0 1 0 0 -1 0 0 1 0 0 0 0 0 0 1	0 1 0 0 1 0 0 0 0 0 -1 0 0 0 0 1	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	0 -1 0 0 -1 0 0 0 0 0 -1 0 0 0 0 1
rot x 3pi/2	1 0 0 0 0 0 1 0 0 -1 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	1 0 0 0 0 0 -1 0 0 1 0 0 0 0 0 1	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	0 0 -1 0 1 0 0 0 0 -1 0 0 0 0 0 1	-1 0 0 0 0 0 -1 0 0 -1 0 0 0 0 0 1	0 0 1 0 -1 0 0 0 0 -1 0 0 0 0 0 1	0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 1	-1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1	0 -1 0 0 0 0 1 0 -1 0 0 0 0 0 0 1
rot y pi/2	0 0 -1 0 0 1 0 0 1 0 0 0 0 0 0 1	0 -1 0 0 0 0 -1 0 1 0 0 0 0 0 0 1	0 0 1 0 0 -1 0 0 1 0 0 0 0 0 0 1	0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 1	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	0 0 1 0 0 1 0 0 -1 0 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 0 -1 0 -1 0 0 0 0 1 0 0 0 0 0 1	0 0 -1 0 0 -1 0 0 -1 0 0 0 0 0 0 1	0 0 -1 0 1 0 0 0 0 -1 0 0 0 0 0 1
rot y pi	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	-1 0 0 0 0 0 -1 0 0 -1 0 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1	-1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1	0 0 1 0 0 1 0 0 -1 0 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 0 -1 0 0 1 0 0 1 0 0 0 0 0 0 1	0 -1 0 0 -1 0 0 0 0 0 -1 0 0 0 0 1	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	0 1 0 0 1 0 0 0 0 0 -1 0 0 0 0 1
rot y 3pi/2	0 0 1 0 0 1 0 0 -1 0 0 0 0 0 0 1	0 1 0 0 0 0 -1 0 -1 0 0 0 0 0 0 1	0 0 -1 0 0 -1 0 0 -1 0 0 0 0 0 0 1	0 -1 0 0 0 0 1 0 -1 0 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 0 -1 0 0 1 0 0 1 0 0 0 0 0 0 1	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	0 0 1 0 -1 0 0 0 0 -1 0 0 0 0 0 1	0 0 1 0 0 -1 0 0 1 0 0 0 0 0 0 1	0 0 1 0 1 0 0 0 0 1 0 0 0 0 0 1
rot z pi/2	0 1 0 0 -1 0 0 0 0 0 1 0 0 0 0 1	0 0 -1 0 -1 0 0 0 0 1 0 0 0 0 0 1	0 -1 0 0 -1 0 0 0 0 0 -1 0 0 0 0 1	0 0 1 0 -1 0 0 0 0 -1 0 0 0 0 0 1	0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 1	0 1 0 0 1 0 0 0 0 0 -1 0 0 0 0 1	0 1 0 0 0 0 -1 0 -1 0 0 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1	0 -1 0 0 1 0 0 0 0 0 1 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1
rot z pi	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1	-1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1	-1 0 0 0 0 1 0 0 0 0 -1 0 0 0 0 1	-1 0 0 0 0 0 -1 0 0 -1 0 0 0 0 0 1	0 0 1 0 0 -1 0 0 1 0 0 0 0 0 0 1	1 0 0 0 0 -1 0 0 0 0 -1 0 0 0 0 1	0 0 -1 0 0 -1 0 0 -1 0 0 0 0 0 0 1	0 -1 0 0 1 0 0 0 0 0 1 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 1 0 0 -1 0 0 0 0 0 1 0 0 0 0 1
rot z 3pi/2	0 -1 0 0 1 0 0 0 0 0 1 0 0 0 0 1	0 0 1 0 1 0 0 0 0 1 0 0 0 0 0 1	0 1 0 0 1 0 0 0 0 0 -1 0 0 0 0 1	0 0 -1 0 1 0 0 0 0 -1 0 0 0 0 0 1	0 -1 0 0 0 0 -1 0 1 0 0 0 0 0 0 1	0 -1 0 0 -1 0 0 0 0 0 -1 0 0 0 0 1	0 -1 0 0 0 0 1 0 -1 0 0 0 0 0 0 1	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	0 1 0 0 -1 0 0 0 0 0 1 0 0 0 0 1	-1 0 0 0 0 -1 0 0 0 0 1 0 0 0 0 1