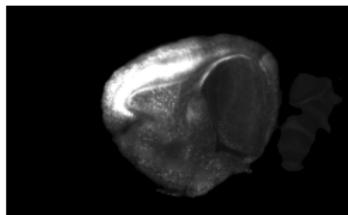
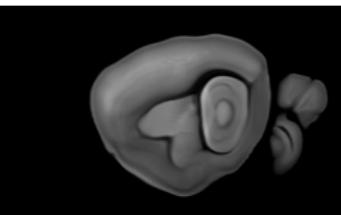


Explanation

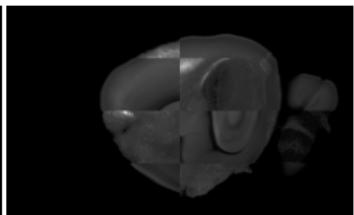
- ▶ *Checkerbording* is a technique used to evaluate the image registration quality. It is analogous to placing the deformed registered (moving) image on the red squares and the target (fixed) image on the black squares of a checkerboard. If the registration quality is high structures will be aligned across squares. The ITK documentation has a good example of it's usage:
<https://itk.org/ITKExamples/src/Registration/Common/PerformMultiModalityRegistrationWithMutualInformation/Documentation.html>
- ▶ The first, second and third columns of the following slides are CLARITY-ARA checkerboard images of selected coronal, axial and sagittal slices.



(a) CLARITY

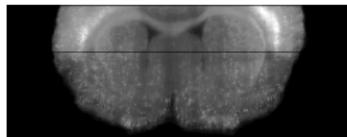


(b) Atlas

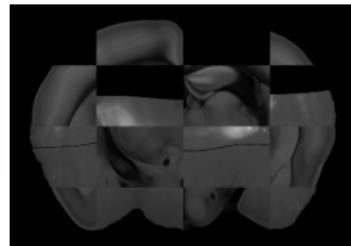


(c) Checkerboard

- ▶ Many CLARITY images are missing data thus the corresponding checkerboard images have empty squares



(a) CLARITY image missing
superior portion of brain



(b) Checkerboard

- ▶ For example registration of **Control182** worked despite missing data while **Control189** did not.

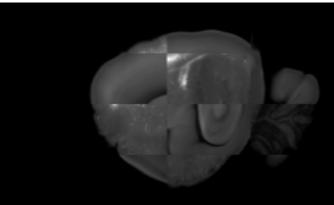
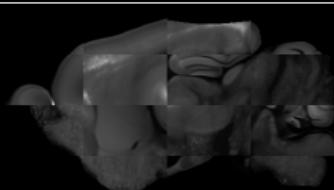
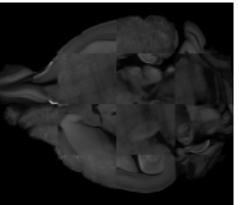
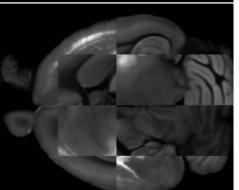
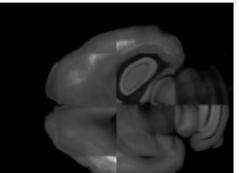
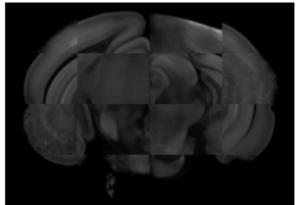
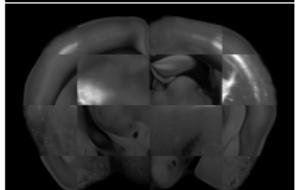
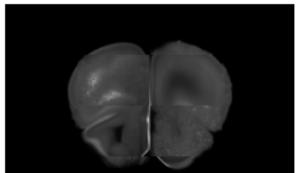
For cost function M

- ▶ “Value” column contains $M(I_0 \circ \varphi_{01}, I_1)$
- ▶ “Value (%)" column contains the normalized value. Lower “Value (%)" indicates a better match.

$$\frac{M(I_0 \circ \varphi_{10}, I_1) - M(I_1, I_1)}{M(I_0, I_1) - M(I_1, I_1)} * 100\%$$

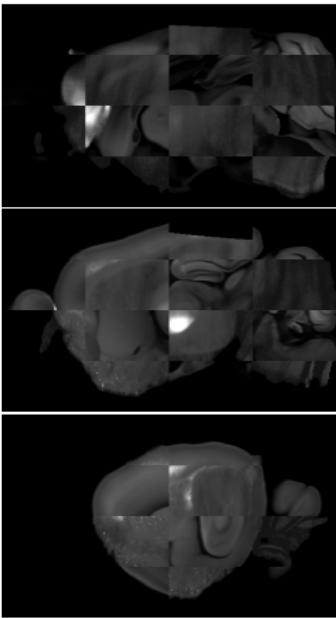
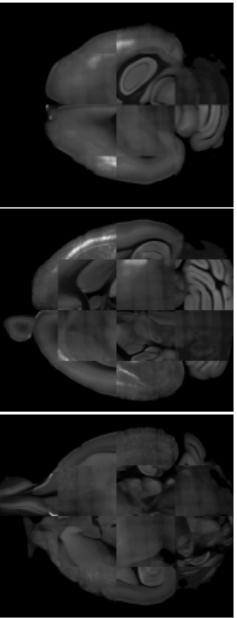
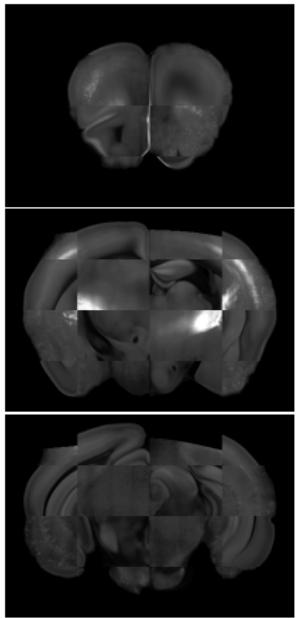
Cocaine174

	Value	Value (%)
MSE	16431.3697	55.31
MI	0.6601	52.52



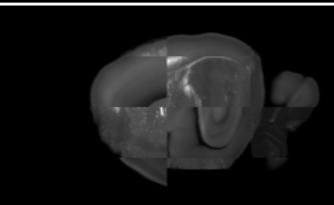
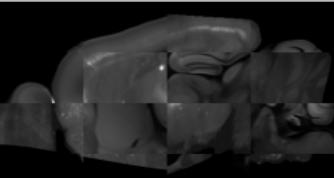
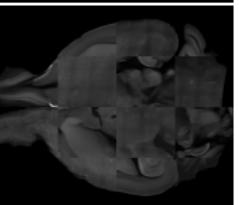
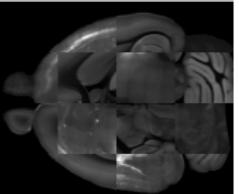
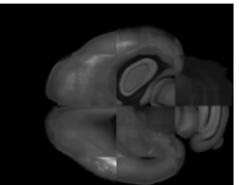
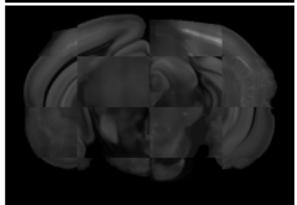
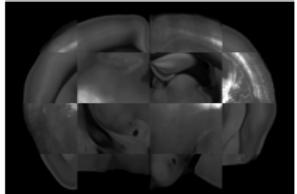
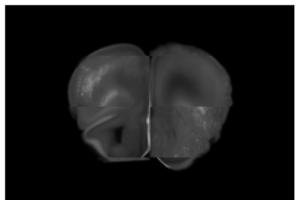
Cocaine175

	Value	Value (%)
MSE	24128.1103	63.02
MI	0.6260	49.61



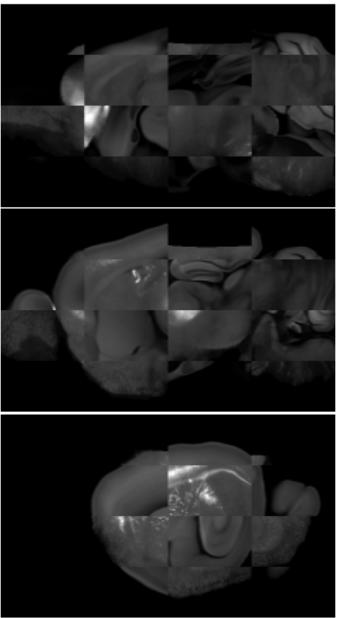
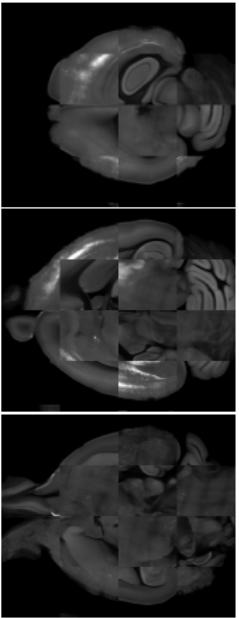
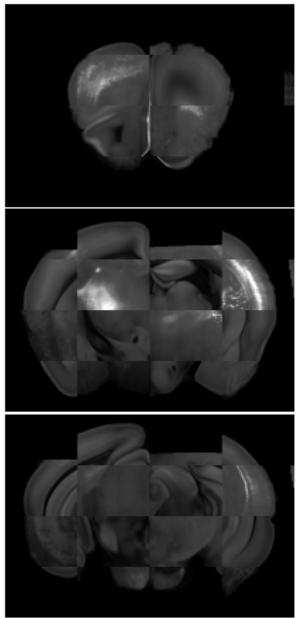
Cocaine178

	Value	Value (%)
MSE	20292.0638	66.42
MI	0.6395	57.23



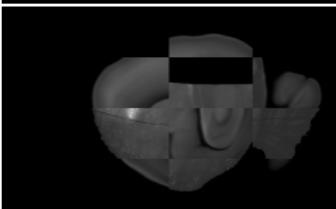
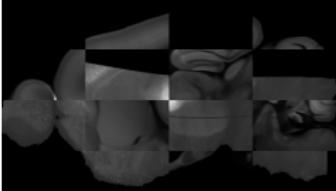
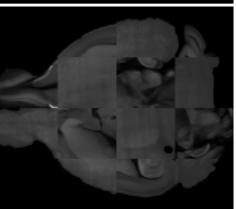
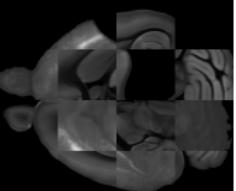
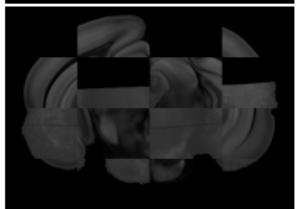
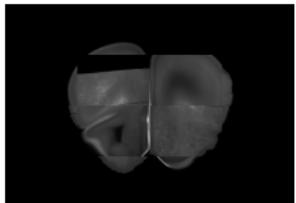
Control181

	Value	Value (%)
MSE	20497.4425	40.26
MI	0.5881	52.95



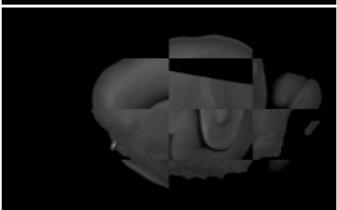
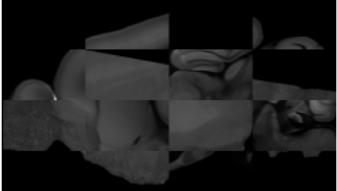
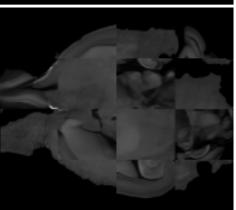
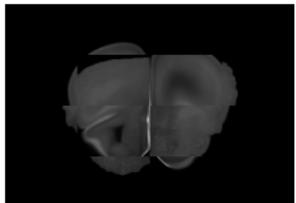
Control182

	Value	Value (%)
MSE	19053.7418	43.34
MI	0.4151	66.24



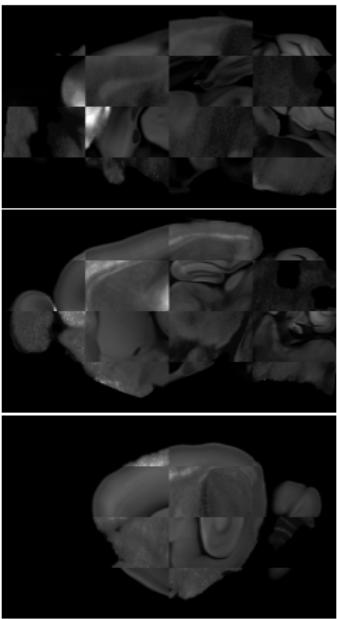
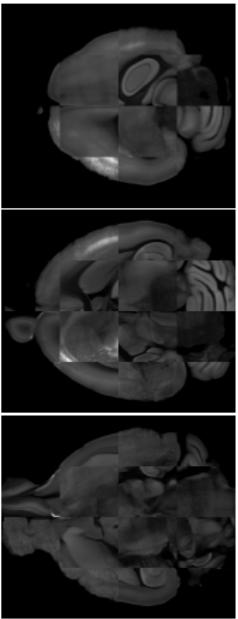
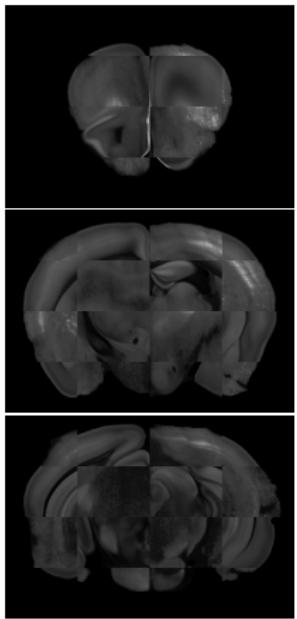
Control189

	Value	Value (%)
MSE	18755.3208	43.05
MI	0.0127	99.12



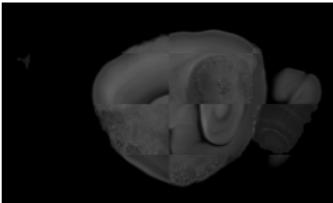
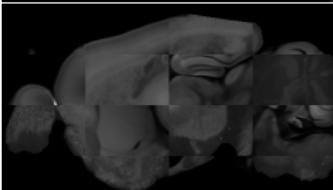
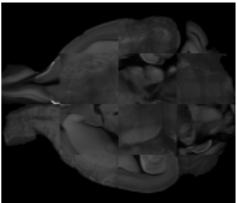
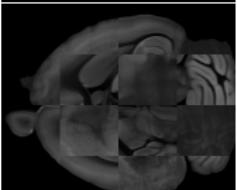
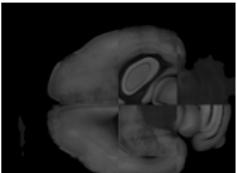
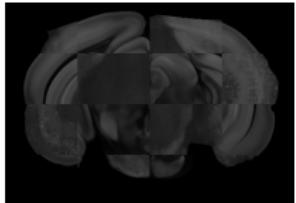
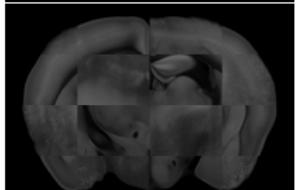
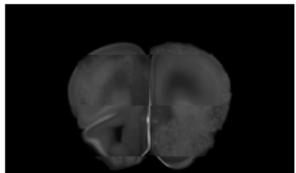
Control239

	Value	Value (%)
MSE	19615.2652	55.46
MI	0.6232	55.03



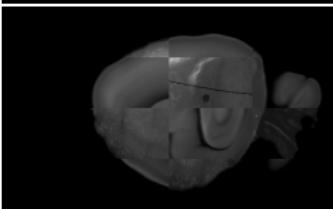
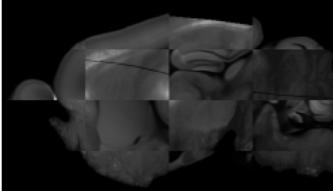
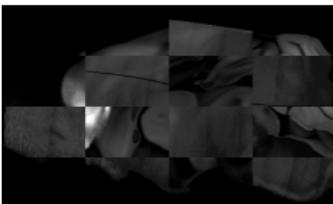
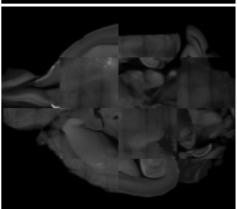
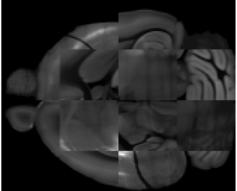
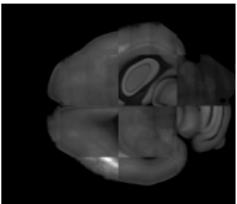
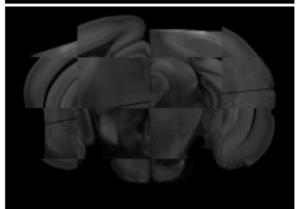
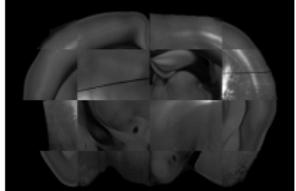
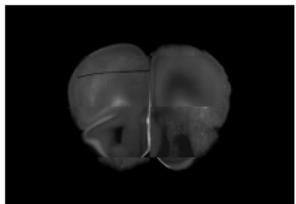
Control258

	Value	Value (%)
MSE	16703.5797	47.22
MI	0.0807	94.21



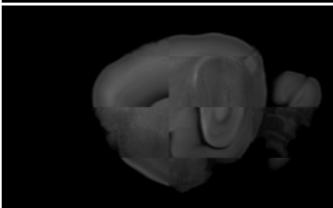
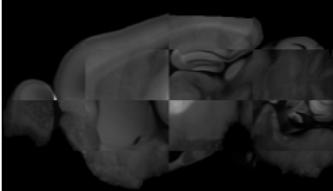
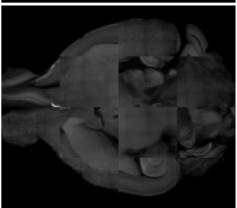
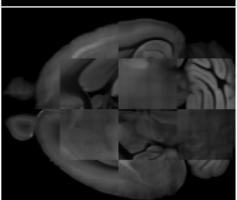
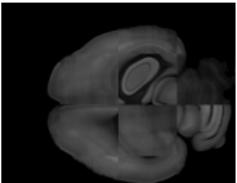
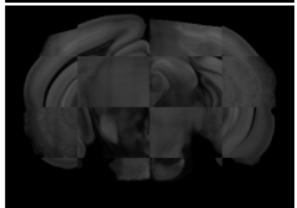
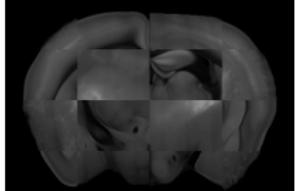
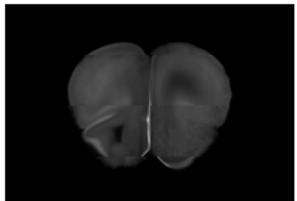
Fear187

	Value	Value (%)
MSE	21212.3496	60.26
MI	0.6252	52.57



Fear197

	Value	Value (%)
MSE	19022.8142	57.75
MI	0.2510	82.12



Fear199

	Value	Value (%)
MSE	23006.3332	55.58
MI	0.6342	53.92

