Before preprocessing :

1) Vérification visuelle des images anatomiques et **fonctionnelles** par défilement

* 1. Vérification du mouvement
  2. Vérification de la présence d’artéfacts (de mouvement, métalliques, spikes, regions de « signal dropout » : **surtout au niveau temporal et frontal**)

1. **(**Lancer Tsdiffana et regarder :  
       -Si les valeurs sont importantes sur le **1er graphe (> 20)** mais quelques fois moins 🡪le sujet a trop bougé 🡪 On rejète les données**)**

**🡪** étape pas appliquée à Genève pour l’instant

- Mais souvent, quand on a un doute, lors du preprocessing (Point 7) on regarde les **Translations : si < 3**  ok  
 **Rotations : si < 1.5** ok

1. Ouvrir manuellement (checkreg) run1, run2, t1, t2 et t2\* et les réaligner. A priori en manipulant l’image Run 1 pour orienter comme les 3 autres. Ensuite, appliquer les modifications à toutes les images fonctionnelles. (Si deux structurelles pas réalignés faire la même chose pour la structurelle qui diffère de la T1)
2. Ouvrir manuellement la T1 et la placer à la commissure antérieure. Ensuite appliquer les déformations à toutes les images
3. Ouvrir la T1 et le template canonical de SPM et aligner la T1 au template. Ensuite appliquer les déformations a toutes les images
4. Lancer le préprocessing

**Preprocessing.**

**1) MÉTHODE CAEN (T2\* CORRECTION ; Villain et al. (2010).)**

**Goal:** Correct the deformation of the magnetic field (drop out of activity in the temporal and orbitofrontal lobe)

**Step 0 - Segmentation** of T1

**Step 1 - Slice timing** of functional images -> ( We will not do this step in Geneva!!)

**Step 2 - Realignement (Estimation & Reslice)** of all functional images -> creation of the meanEPI

**Step 3 - Coregistration (Estimation)** source : T2 -> Ref : T1

**Step 4 - Coregistration (Estimation)** source : T2\* -> Ref : T2

**Step 5 - Coregistration (Estimation)** source: meanEPI -> Ref: T2\*

+ apply also to the rest of the functional images (run1 + run2)

**Step 6 - Old Normalisation (estimate & write)** source: Mean EPI -> Template image : t2\*

+ images to write: all functional images (run1 + run2)

-> here the meanEPI is warped to match the T2\* and the parameters are applied to the rest of the functional images

**Step 7 - Old Normalisation (write)** parameters: “.sn” file -> images to write: mean EPI

🡪 here the spatial normalization parameters extracted before are applied to the mean EPI

**Step 8 - Normalisation (write).** Deformation field (y\_file) apply to all functional images.

-> normalize the functional images into the MNI

**Step 9 – Normalisation (write).** Deformation field (y\_file) apply to the T1 and the MeanEPI.

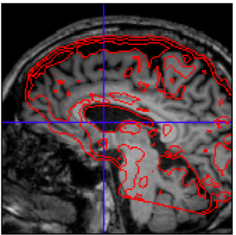
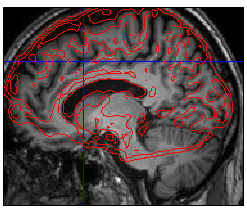
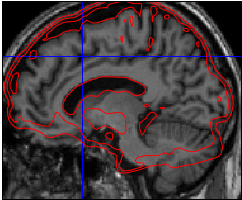
-> normalize the meanEPI and T1 into the MNI

**Step 10 – Smoothing.** 8x8x8 mm to all functional images.

**Step 11 – Normalization (write)** Deformation field (y\_file) applied to the T2\*

**Step 12 – Old Segmentation.** Segmentation of the normalized T2\*

**Ex of participants 1 & 2:**



Raw Image:

Corregistration EPI –T1

T2\*- Corrected Image

Corregistered and normalized

Raw Image

**2) NORMAL PREPROCESSING (WITHOUT CORRECTION) PLANNED IN GENEVA BEFORE DROP OUT PROBLEMS (2017):**

**Step 1** – Realignement & Reslice (registered to the Mean)

**Step 2** – Coregistration. Source: T1 -> Ref: meanEPI

**Step 3** – Segmentation of T1

**Step 4** - normalization (write ) of T1 and all functional images

**Step 5** – Verification with the help of check reg in SPM plotting together structural image along with one functional image

**Step 6** - Smoothing. 6x6x6mm

**3) PREPROCESSING STEPS IN LIEGE (MARINE) (version 2017)**

1. Segmentation

2. Create Dartel Templates

3. Fieldmap presub phase & magnitude (calculate VDM dans dernière version)

4. Realign & unwarp

5. SliceTiming

6. Coregister

7. Segmentation % script Seg-Dartel

8. Create Dartel Templates % script Seg-Dartel

9. Normalise to MNI

10. Smooth (Optionnel : Images nommées s8\* mais Normalise to MNI dépendant de Dartel fait déjà un smooth à 8 par défaut)

Methods :

Quality control of raw fMRI data as well as each step of data processing was performed by experts. The pre-processing procedure for the SoVT-Rest data was conducted using Statistical Parametric Mapping software (Wellcome Trust Centre for Neuroimaging, London, United Kingdom) and follow a methodology designed to reduce geometric distortions effects, described in Villain et al. (2010). This procedure includes the following steps: 1) Coregistration of the mean EPI volume and anatomical T1, T2 and T2\* volumes. 2) Warping of the mean EPI volume to match the anatomical T2\* volume, and application of the deformation parameters to all the EPI volumes. 3) Segmentation of the anatomical T1 volume. 4) Normalization into the MNI space of all the EPIs, T1 and T2\* volumes using the parameters obtained during the T1 segmentation, 5) 8mm FWHM smoothing of the EPI volumes. Analysis of the SoVT-Rest fMRI data were performed using SPM12 (implemented in Matlab 2017). Statistical analyses include group comparisons (anova) and correlations (regression analyses). Whole brain analysis as well as seed region and whole brain functional connectivity were conducted. In order to study the temporal dynamics of brain activity, our analysis cover different time periods during and after emotional exposure (see Eryilmaz et al., 2011)

MR scans were all acquired in Cyceron, Caen (France) using a Philips Achieva (Eindhoven, The Netherlands) 3 T scanner. Subjects were equipped with earplugs and their heads were stabilized with foam pads to minimize head motion.