**Investigating structural connectivity in congenital prosopagnosia with**

**diffusion tensor imaging**

**Abstract**

Congenital prosopagnosia is subtle deficit of the vision perception that is only widely recognised in the last ten-fifteen years. It characterised by dodgy recognition of familiar faces and thought to be genetic and also perhaps developmental of origin. A recent study used diffusion tensor imaging for significant reductions in structural connectivity in some of long assocaition tracts of middle-aged congenital prosopagnosic subjects. New developments in the analyses of diffusion-weighted data, particularly in the field of tractographs, now offer opportunity to refine/extend these findings. The proposed experiment would want to prove that the old study’s findings apply in all of the adult lifespan of prosopagnosics and are therefore not some effect of the lifelong perceptual habits. It would localise differences with microstructure to particular subregions of the tracts of interest, providing novel ideas of their potential role in such a disorder. Finally, through employing the more robust measures, it would tackle an unexplicable result of the former study and provide a significantly accurate quantifying of white matter abnormalities.

**Introduction**

Diffusion tensor imaging (DTI) is an MRI type that allows to non-invasively examine white matter structures in the human brain (Basser and Pierpaoli, 1996). In the fifteen years past it has widely been used for exploring correlations between the white matter integrity measures and differences of cognitive ability (van Eimeran et al., 2008; Yeatman et al., 2012), psychiatric profile (Kubicki et al., 2002; Steele et al., 2005), genetic (Sprooten et al. 2009; Dietsche et al., 2014) and task-specific training (Bengtsson et al., 2005; Scholtz et al., 2009). Over the same times, there have been substantial developments in analysis of diffusion-weighted data. The tractography algorithms have been modified to take account into uncertainties in the diffusion tensor model (Behrens et al., 2003; 2007; Tournier et al., 2004; 2007) and prior knowledges about tract location (Catani et al., 2002; Clayden et al., 2007). Rigorous frames for voxelwise comparisons of multi-subject data were established (Smith et al., 2006; 2007). More recently, protocols for detailed within-tract analysis have been suggested (Colby et al., 2012). The fast speed of these developments means that many relatively recent studies of white matter and cognitions do not take use of the full range of analytical tools available now. Going back over their findings using more sophisticated approach to data analyses is an efficient and reliability way for generating the new insights.