Reviewer's report

**Title:** Pattern of neural responses to verbal fluency shows diagnostic specificity for schizophrenia and bipolar disorder

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**Reviewer:** Bert G Park

**Reviewer's report:**

This is an interesting paper which shows the use of support vector machines to classify functional imaging data obtained during a verbal fluency task from patients with schizophrenia and bipolar disorder, both from each other and from healthy controls with reasonable sensitivity and specificity.

**Major compulsory revisions**

1. The paper would benefit from further consideration of the other neuroimaging modalities and methods which have been applied in trying to find a diagnostic tool for schizophrenia and bipolar disorder. Nenadic et al (2009 Neuroimage) found a very similar classification performance in the subsyndromes of schizophrenia against controls using structural MRI images alone. A question which then needs to be asked is what is the additional advantage gained by using fMRI given it's additional costs? Some discussion is also warranted as to what levels of sensitivity and specificity would be required for such a test to be of clinical use.

2. More detail in the methods section needs to be given to the authors' use of classification method. Applying machine learning methods to fMRI data is a developing field (Schmah et al 2010 Neural Computation 22:2729) and from the range of available machine learning algorithms and indeed variants of support vector machine it would be interesting to know why the authors chose the particular approach they did. Similarly it would also be good to know which R libraries/functions were actually used. It was good to see that the authors included the initial feature extraction (the second level ANOVA) within the leave one out cross validation, but a discussion of why the authors chose to use an initial feature extraction of verbal fluency data rather than say a full dataset of five minutes of resting state data would again be informative.

**Minor Essential Revisions**

1. For a paper which is looking to assess the performance of a diagnostic test it is a little unusual that consensus methods were used rather than the gold standard of structured diagnostic interview. This should be acknowledged.

2. The authors rightly acknowledge the potentially important confound of medication status. Given recent concern about the extent to which this confound has been overlooked in neuroimaging studies (Moncrieff & Leo 2010 Psych Med) this is all the more important given we are likely to be wanting to use diagnostic
imaging prior to starting any such treatment.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests