Reviewer's report

Title: Smooth Pursuit Eye Movement Dysfunction and General Schizotypy as Measured by the SSQ: A Variance-Analytic and Correlational Study

Version: 1 Date: 4 March 2009

Reviewer: Nikolaos Smyrnis

Reviewer's report:

Review: “SPEM dysfunction and general schizotypy as measured by the SSQ: a variance-analytic and correlational study”.

This manuscript describes the results of a comparison between a group of 18 individuals with high scores on a schizotypy questionnaire (SSQ) and 19 individuals with average scores on the same questionnaire on a global measure of smooth eye pursuit (RMSE) and pupil size. The authors report that individuals with high schizotypy have worse pursuit (higher RMSE) than individuals with average schizotypy while there is no difference in pupil size between the two groups.

I have major problems with this manuscript:

The observation of worse pursuit performance in high schizotypy compared to average schizotypy in normal volunteers has already been documented by three independent studies (O’Driscoll et al 1998, Gooding et al 2000 and Smyrnis et al 2007). Actually all these studies have used larger sample sizes and the two later ones more than one instruments for the measurement of schizotypy and its factors (positive, negative, disorganization). This study then is a confirmation of the same finding but the authors do not mention at all these previous studies. Actually their literature on smooth eye pursuit is old and does not include recent studies (after 2000). Thus the authors have to explain what is novel in this study compared to previous ones.

My most serious reservation for this study though concerns the methodology of eye movement measurement. The video camera at 50Hz used in this study for eye movement measurement is adequate for measuring pupil size but not so for measuring eye movements. Actually at such a low temporal resolution most eye movements that occur within the pursuit record remain undetected (a usual saccade has a speed of 400-600deg/s and in order to be detected the measurement system needs to have a temporal resolution of at least 200Hz, see Smyrnis 2008). Also most studies today use both global and specific measures of smooth eye pursuit such as the RMSE and the gain (Smyrnis 2008). Actually in a recent meta-analysis of SPEM dysfunction in schizophrenia by O’Driscoll and Callahan (2008) the best measure for dissociating patients from controls was the gain that had the narrowest confidence intervals. The sampling frequency though of the measurement system used in this study would preclude any accurate
measurement of pursuit gain and saccades during pursuit.

Minor comments:

1. Page 3: the bibliography on eye tracking in schizotypy is completely out of date (see my first major comment). Also the single gene hypothesis for the SPEM deficit in schizophrenia is also out of date (see the recent review of Calkins et al 2008 on the heredity of SPEM).

2. Page 4 second paragraph: the notion that the most sensitive measure of SPEM in schizophrenia is the RMSE is not valid today (see the meta-analysis of O’Driscoll and Callahan 2008 and see also Smyrnis 2008 for a discussion of the pros and cons of the different measures in pursuit performance).

3. Page 4 third paragraph: what do the authors mean by accidental scales? There is a large body of literature for the Chapman scales measuring schizotypy and their validity. The same is true for the schizotypal personality questionnaire (Raine 1991). Why these scales are considered accidental by the authors?

4. Page 5 first paragraph: I do not understand the argument of the authors about the different principal components of their scale. Of course the components are inter-correlated. Why the authors did not use the components if they wanted to see the specific effects of the positive or negative factor on SPEM? The best way would be to use both the general score and the component scores. The argument presented that the general score reflects mostly the negative factor and less so the positive is an indication that the instrument is problematic and there is no balance between the items for negative schizotypy and the items for positive schizotypy. In any case this discussion seems irrelevant for the main point of this manuscript.

5. Page 6: the authors describe a process by which they started with 495 subjects and concluded with 37 subjects included in the study which is a very small sample size. Also I can not understand why the subjects with schizotypy scores < 1SD are 13 while the subjects with schizotypy scores > 1SD are 33 (3 times as many). This indicates that the distribution of the scores of schizotypy is not normal thus raising a problem for the use of SD. Also most studies using schizotypy questionnaires define the high group as scoring > 2SD and the average group as scoring +/- 0.5 SD (see Gooding et al 2000). Thus the two groups are clearly separated.

6. Page 8 last paragraph: the system for measuring eye movements is inadequate (see my major comment).

7. Page 9 end of first paragraph, start of second paragraph: the description of the pursuit procedure is not clear. Was the target moving at constant speed (triangular stimulus?). How many cycles were performed at each target speed? Was the RMSE computed after excluding blinks or did it include blinks (not proper). In any case with such a low system resolution the definition of the start and end of a blink would be highly problematic.
8. Page 10 second paragraph: why is it interesting that the two groups differed in schizotypy scores? This is the way they were defined.

9. Page 9: the figures are not needed since all the information is provided in the tables.

10. Page 9 last paragraph: I do not see what is added by the correlational analysis. The ANOVA demonstrates all the significant effects. The correlation analysis is superfluous.

11. Page 12 end of page: the whole discussion on why the authors did not use the low schizotypy score group is not convincing and could be removed.

12. Page 13 second paragraph: I do no see the point for discussing the choice of the general score in the schizotypy questionnaire and how this relates better to schizophrenia. If the authors wanted to test specific hypotheses on the effect of schizotypy dimensions on SPEM they should use a factor analysis and test factor effects on SPEM.

13. Page 13 second paragraph last sentence: this is one hypothesis for the pursuit dysfunction in schizophrenia but there are other hypotheses too and the authors should cover the existing literature on them more thoroughly.

14. Page 14 last paragraph: The pursuit function is not simply related to frontal cortex as the authors suggest. A large network of areas is involved in normal pursuit function and key areas are to be found also in the parietal cortex and subcortical structures (see Lencere and Trillenberg 2008 for a thorough review of the anatomical substrate of pursuit in humans).

The manuscript has very long paragraphs and is difficult to read. Editing is required.

**Level of interest:** An article of limited interest

**Quality of written English:** Not suitable for publication unless extensively edited

**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