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Research Report

Extraversion degrades performance on the antisaccade task

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ABSTRACT

Previous studies have suggested that baseline and task-related activity within the prefrontal cortex varies with the degree of extraversion; we examined whether this trait influenced performance on the antisaccade task, a measure commonly used in psychiatric and neurological disorders. Extraversion was assessed in young normal subjects using the Eysenck Personality Questionnaire-Revised Short-scale. Highly extraverted and highly introverted subjects' antisaccade errors and latencies were evaluated. Extraversion was associated with significantly more errors but did not influence the latency of either correct or erroneous responses. This effect on error rate but not latency is similar to that seen in schizotypal personality disorder, whereas normal ageing, as well as schizophrenia and attention deficit–hyperactivity disorder, increase errors and also delay saccade onset. This is the first study in a young, non-clinical population to show an influence of a normal personality dimension on an ocular motor measure.

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1. Introduction

The antisaccade task has been widely used in a range of neurological and psychiatric illnesses, including Huntington's disease (Lasker et al., 1987), Alzheimer's disease (Abel et al., 2002; Fletcher and Sharpe, 1986), traumatic brain injury (Williams et al., 1997), attention deficit–hyperactivity disorder (Munoz et al., 2003), affective disorders (Gooding and Tallent, 2001; Katsanis et al., 1997), schizophrenia (Fukushima et al., 1988; Hutton and Ettinger, 2006; Levy et al., 2004) and schizotypal personality disorder (SPD) (Cadenhead et al., 2002; Ettinger et al., 2005; Holahan and O'Driscoll, 2005; Larrison et al., 2000). Antisaccade performance has also been studied in normal ageing (Abel and Douglas, 2007; Eenshuistra et al., 2004; Sweeney et al., 2001). When a peripheral visual target appears, the subject is required to suppress the normal saccade to it and instead look the other way. Subjects may perform the antisaccade correctly, or make a corrected or uncorrected error (Abel et al., 2002; Guitton et al., 1985). Errors have been ascribed to failure of frontally controlled inhibitory pathways (Butler et al., 1999; Guitton et al., 1985; Sweeney et al., 2001).

One striking feature of the antisaccade task is the variability of normal performance, with error rates ranging between 5 and 25% (Hutton and Ettinger, 2006), even within homogeneous age groups (Abel and Douglas, 2007). In this study we examined the influence of personality, specifically extraversion, as a potential contributor to this variability. Extraversion-related differences in brain activity using fMRI have been reported in areas implicated in antisaccade control (Kumari et al., 2004). Extraversion is characterised by sociability, a preference for physical activity (Eysenck, 1967) and, sometimes, impulsivity (Depue and Collins, 1999). In addition to its utility in characterising normal populations, extraversion has also been related to aspects of psychopathology (see Dinzeo and Docherty (2007) for a recent review). These include

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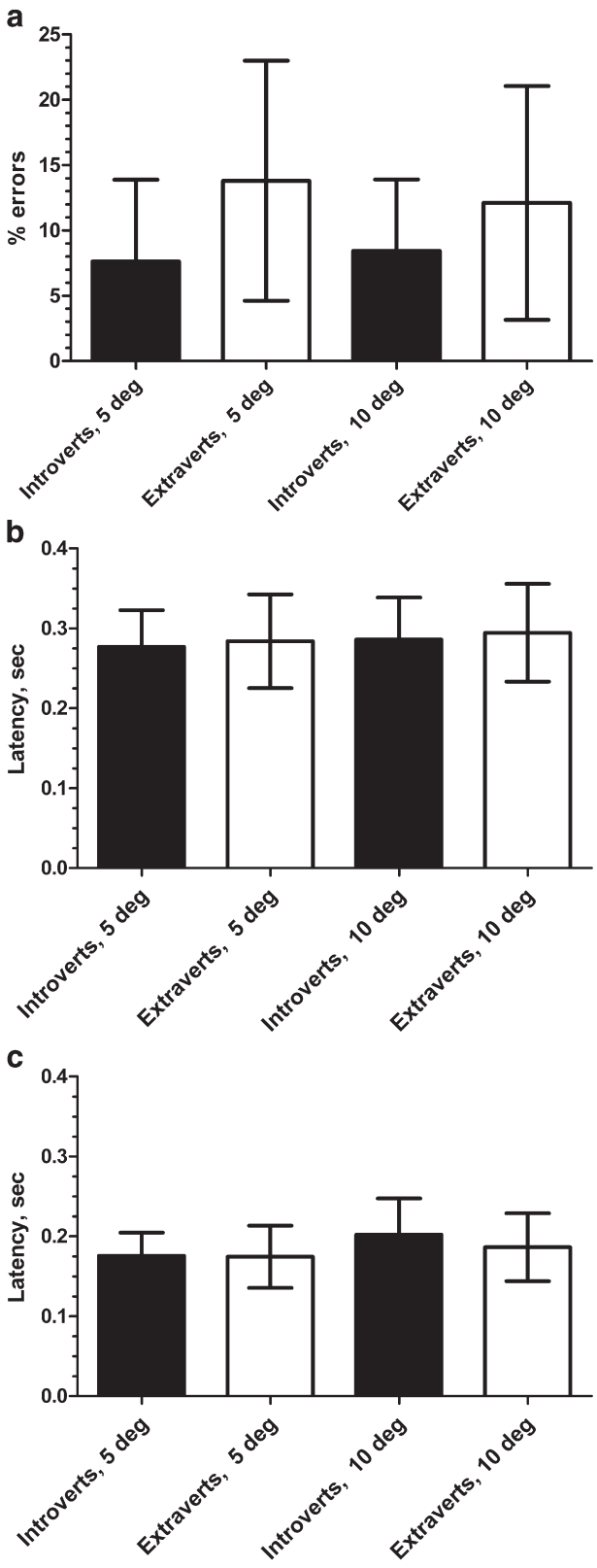

Fig. 1 – (a) Comparison of introverts' and extraverts' antisaccade error proportions at both target amplitudes. Difference between groups was significant only at 5° ($p=0.016$). Error bars indicate ±1 S.D. in this and subsequent figures. (b) Latencies of correct antisaccades and (c) antisaccade errors at both target amplitudes. Latencies did not differ between groups at either target amplitude for either type of saccade.

high extraversion being associated with reduced risk of psychosis and, within populations with schizophrenia, being associated with better quality of life but poorer work functioning.

Eysenck (1967) proposed that introverts' basal cortical arousal was higher than extraverts', and that cognitive performance and arousal showed an inverted U-shaped relationship. Thus introverts outperform extraverts on tasks which are less arousing, as they start higher on the curve. As external arousal increases, extraverts improve and eventually surpass the introverts, for whom the combination of internal and external arousal pushes them past peak performance.

If reflexive saccade suppression and volitional saccade initiation are demanding enough, we might expect extraverts to make fewer errors or be faster. If, however, the repetitive nature of the task renders it monotonous and thus favours individuals with a higher initial level of prefrontal arousal, then introverts would have the advantage. The present study was carried out as an initial step, evaluating which of the preceding predictions was more accurate; future functional imaging studies could then determine whether the aforementioned inferences about arousal were correct.

2. Results

Extraverts made significantly more errors on the antisaccade task than introverts ($t=2.235$, $p=0.03$). When separated into errors made to targets at ±5 or ±10°, extraverts made more errors at both amplitudes but the difference was only statistically significant at 5° ($t=2.51$, $p=0.016$ but not at 10° target displacements ($t=1.58$, $p=0.122$). However, neither the latency of correct antisaccades ($t=0.42$, $p=0.68$) nor the latency of reflexive errors ($t=0.743$, $p=0.46$) differed between groups. When separated into responses made to targets at ±5 or ±10°, comparisons across groups remained nonsignificant for the latencies of both correctly made antisaccades (Fig. 1b) and antisaccade errors (Fig. 1c).

3. Discussion

This is the first instance where extraversion, a fundamental personality trait, has been shown to influence an ocular motor function. Neuroticism has previously been shown to be unrelated to antisaccade performance in a study which found antisaccade errors to be influenced by schizotypy (Ettinger et al., 2005). Extraverts made more errors than introverts for both 5 and 10° targets, though the difference only reached significance at 5°. In contrast to the common finding that introverts have longer reaction times, consistent with cautiousness (Eysenck, 1982; Lieberman and Rosenthal, 2001; Wacker et al., 2006), their superior performance was not the result of a speed-accuracy trade-off. Introverts showed shorter latencies in early components of the auditory brainstem evoked response (Wacker et al., 2006) and lateralised readiness potentials in a visual choice reaction time task (Rammsayer and Stahl, 2004). In the latter study, reaction times between the groups did not differ at either target amplitude.

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