

Introduction

Neurocognitive deficits suggesting disturbances in the prefrontal cortex have been reported in both schizophrenia and major depression. These deficits include difficulty initiating voluntary responses, shifting attention and cognitive set, inhibiting context-inappropriate responses, and maintaining information in working memory. Converging with these neuropsychological findings are results from neuroimaging studies indicating both resting-state and activation deficits of the frontal cortex in major depression. Brain imaging studies of depressed individuals have demonstrated abnormal patterns of activation in prefrontal brain regions thought to contribute to the regulation of affect (Mayberg et al., 1997; Brody et al., 2001; Kennedy et al., 2001; Liotti et al., 2002; Davidson et al., 2003; Phillips et al., 2003; Keedwell et al., 2005), including hypoactivation in ventral and medial regions of PFC. Taken together the present study evaluated the relation of self-reported depression to measures of attentional functioning: alertness, orienting and executive control. It was hypothesized, that depression is specifically associated with executive attention deficit.

Methods

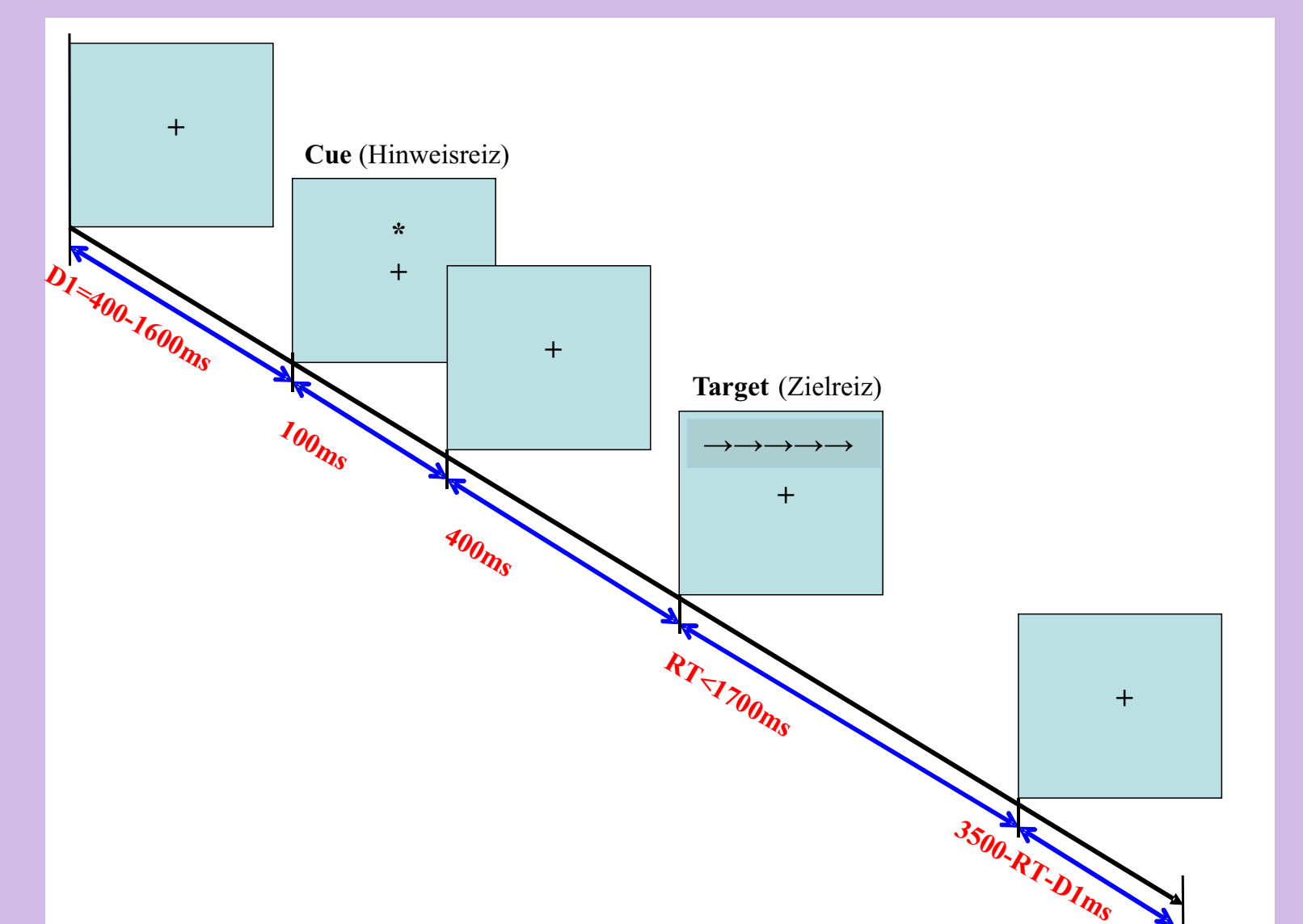
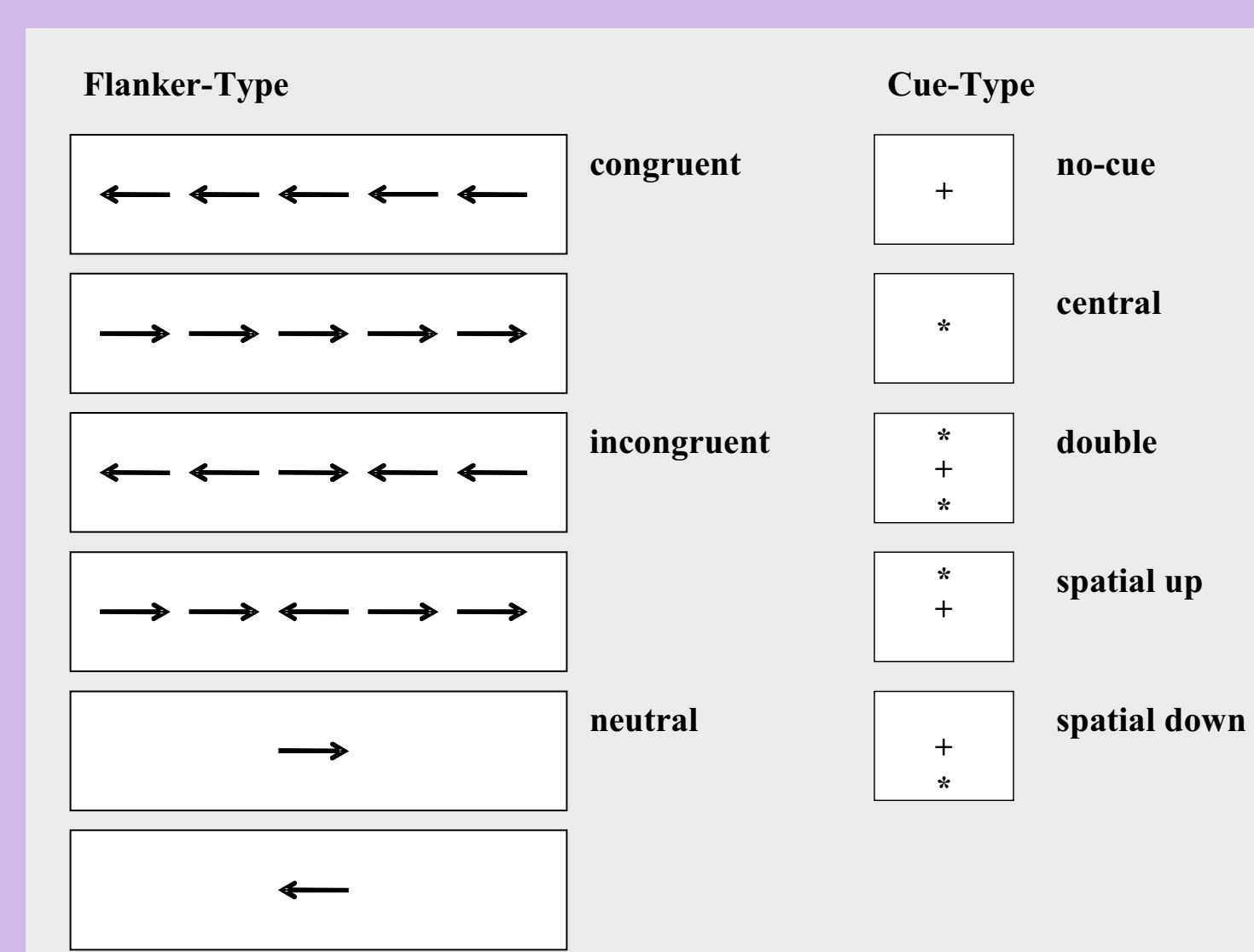
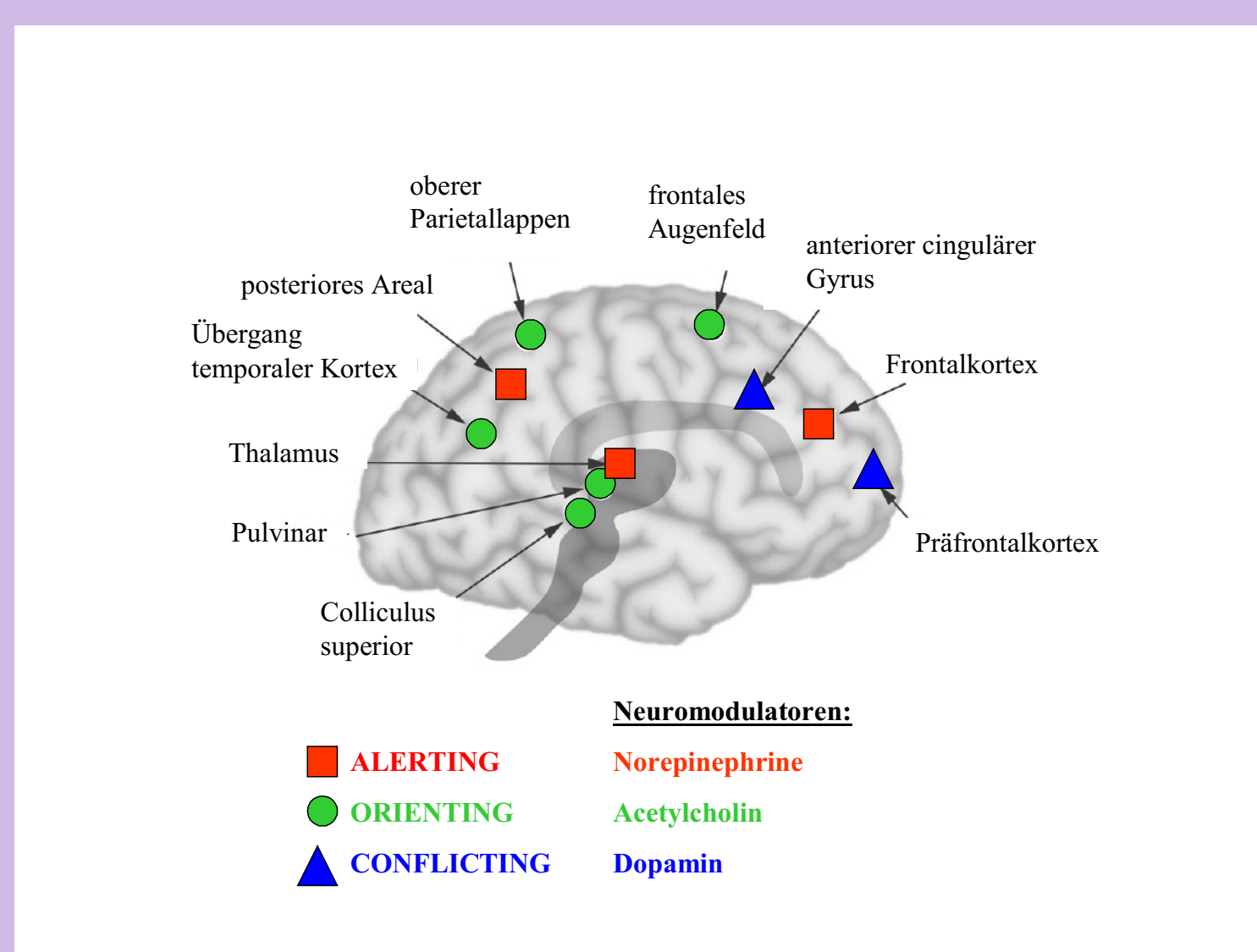
Participants were 60 (45♀, 15♂) individuals between 18 and 55 (mean: 27,5) years old. They were divided in two groups of subjects (high or low scoring in depression) screened with the BDI II (Hautzinger, Kühner & Keller, 2006). The ANT was presented as specified in Fan et al. (2002) to provide an evaluation of the efficiency of three aspects of attention: alerting, orienting and conflict resolution. Participants were seated in a comfortable chair 70 cm away from a 17" monitor. The participants were presented with a fixation cross in the center of the screen for a variable period of 400 to 1600 ms, then one of the four types of warning cue condition were presented: (a) no cue; (b) center cue; (c) double cue and (d) spatial cue. Warning cues were presented for 400 ms prior to the presentation of a target arrow. The task was to press the left key if the central arrow pointed leftwards and the right if it pointed rightwards. The target arrow was surrounded by flanker arrows that either pointed in the same direction (congruent) or the opposite (incongruent). Each subject was given a total of 288 experimental trials, one fourth in each of the four cue conditions.

Conclusions

Our results clearly reveal that contrary to our hypothesis alerting network deficits were obvious among participants scoring high in self-reported depression relative to participants with lower scores. No other differences were observed.

The ANT index of alertness assesses the ability to achieve and maintain an alert state. The alerting system has been associated with the frontal and parietal regions of the right hemisphere because continuous performance and vigilance tasks activate different levels of alertness, and such tasks activate the frontal and parietal regions of the right hemisphere. This is thought to be due to the cortical distribution of the brain's norepinephrine system (NE) (Coull, Frith, Frackowiak, & Grasby, 1996; Marocco, Witte, & Davidson, 1994). Norepinephrine itself is known to have a role in depression. Furthermore depression is often accompanied by fatigue and anergy (Groen & Petermann, 2005). Future research in depression may focus on areas and functions of the brain modulated by monoamine systems rather than the monoamine systems themselves.

Attention Network Test



Results

Alerting

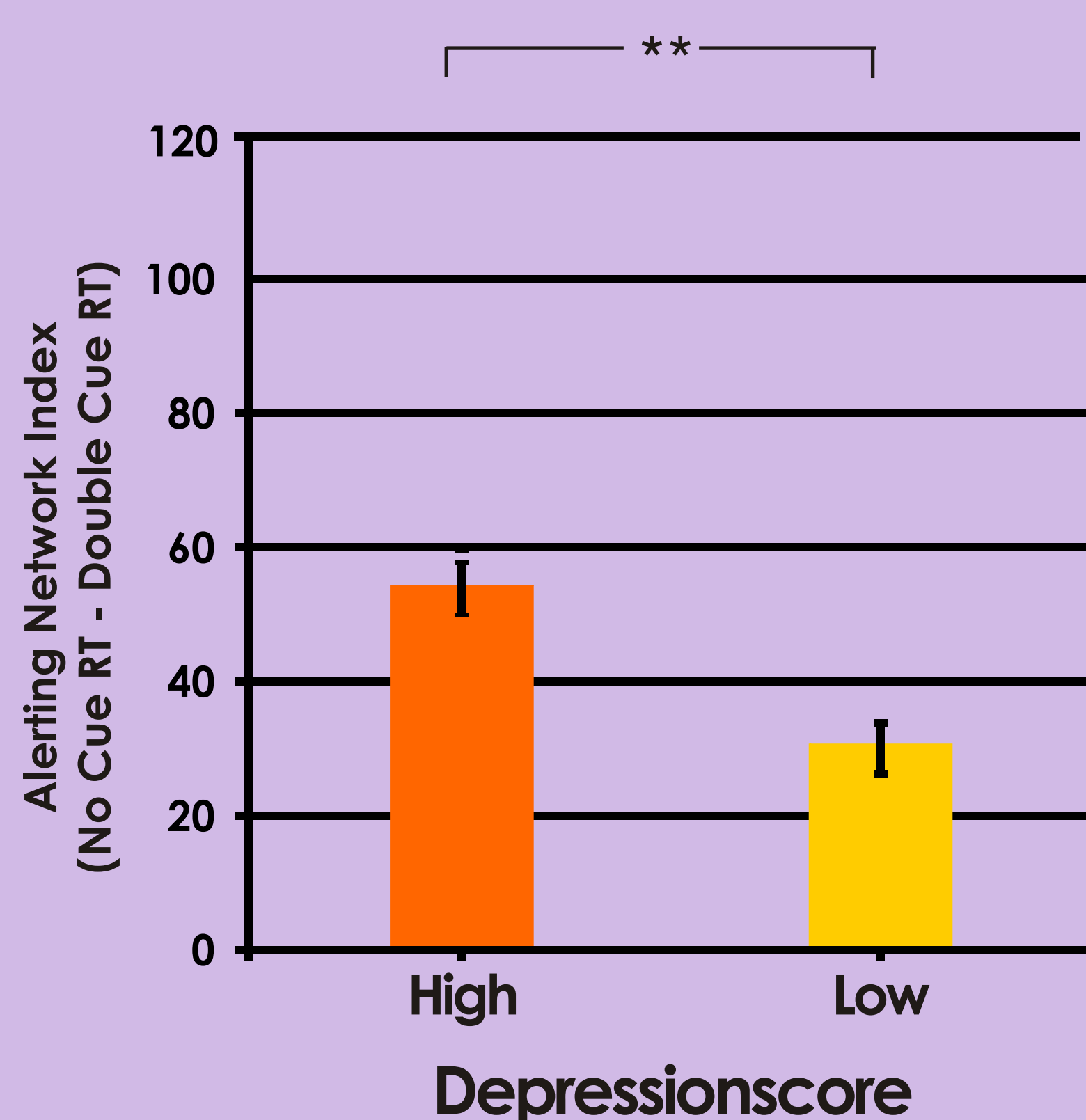


Fig. 1: Alerting Condition

Depressive subjects (BDI II mean: 19,7) showed deficient performance in the alerting condition compared to non-depressive subjects (BDI II mean: 4,9) ($F(1,58) = 7.778; p < .01$).

Orienting

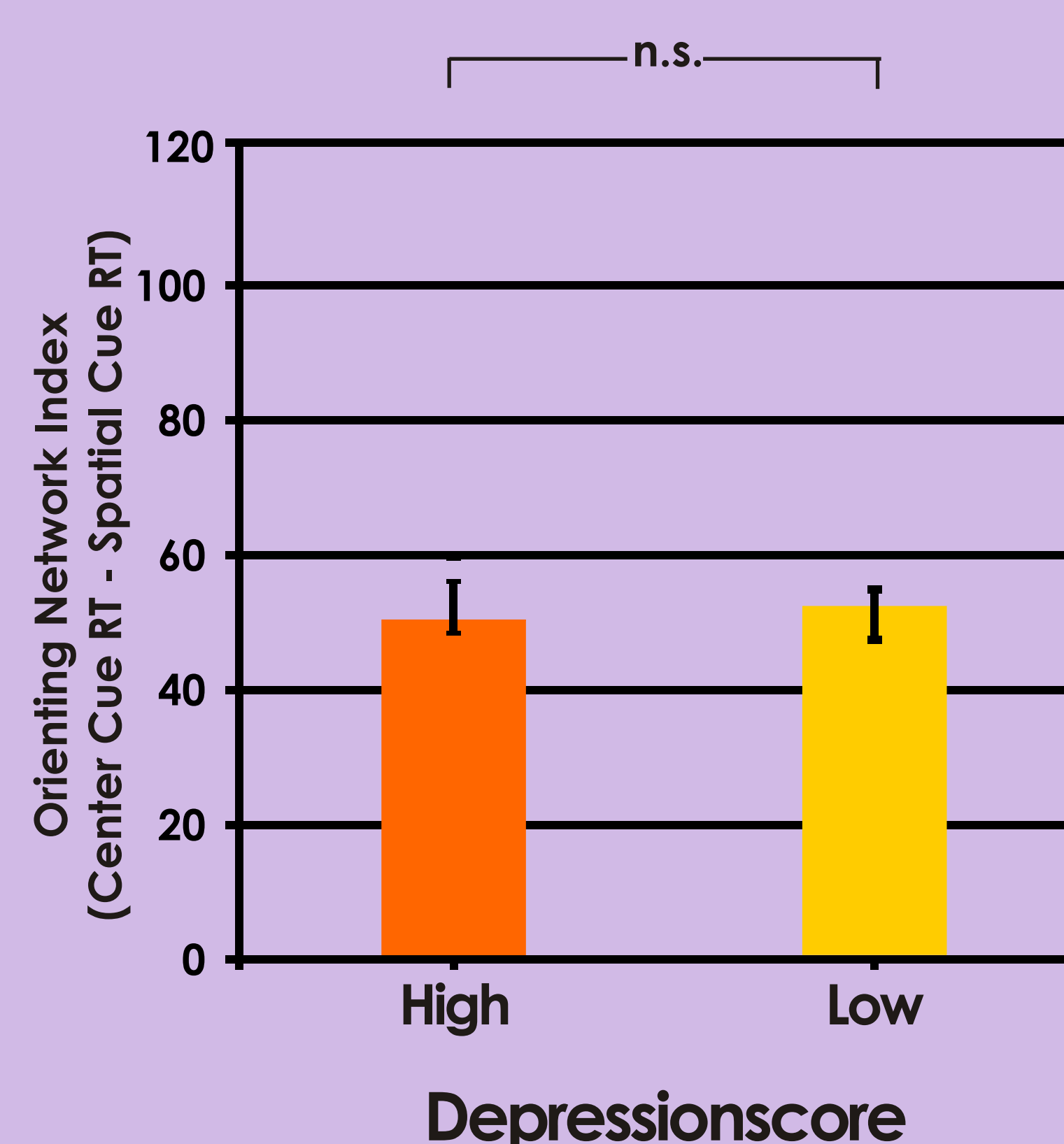


Fig. 2: Orienting Condition

Depressive individuals performed as well as non-depressive subjects in the orienting condition ($F < 1$).

Conflicting

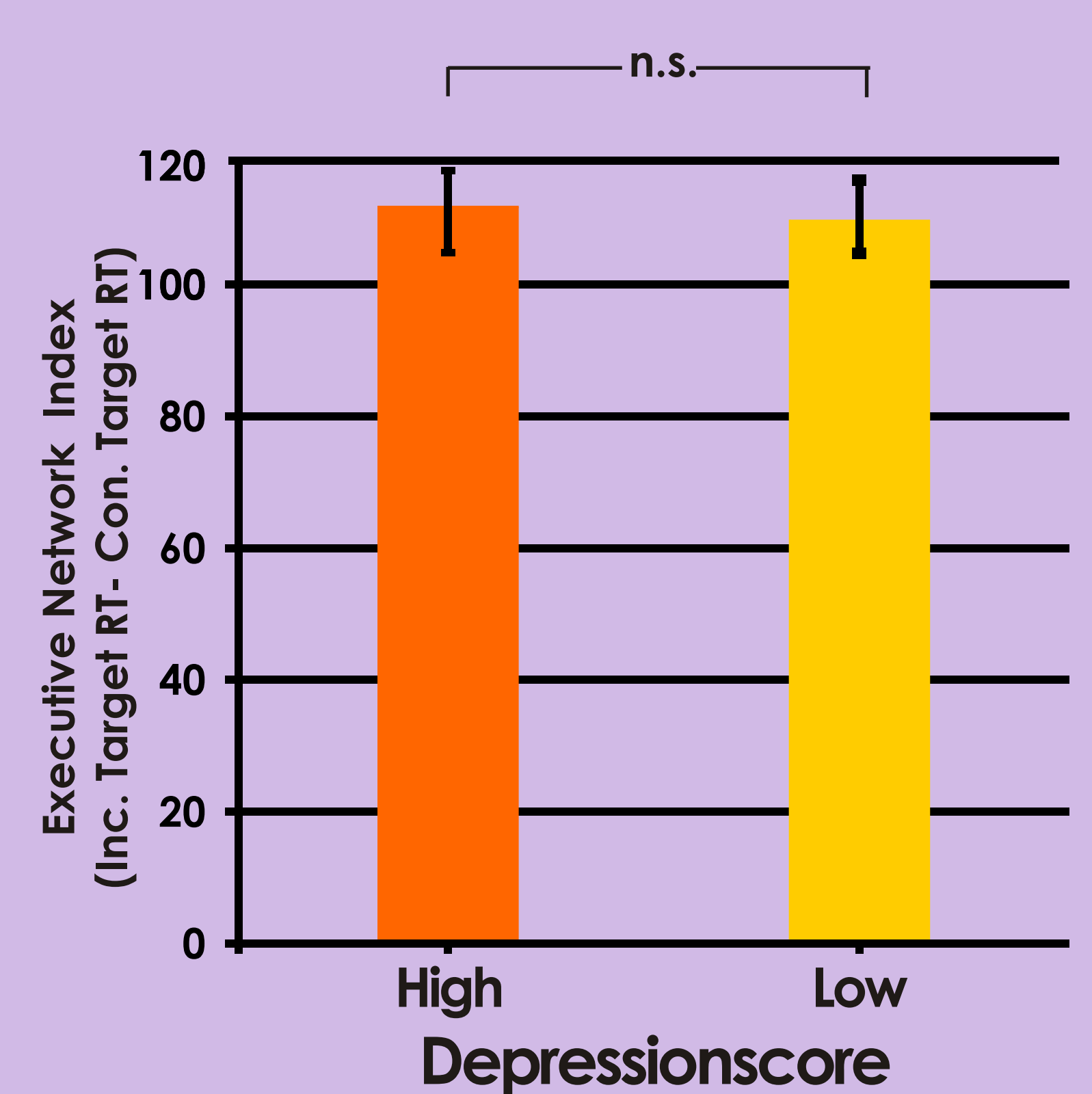


Fig. 3: Executive Condition

Depressive individuals performed as well as non-depressive subjects in the executive condition ($F < 1$).