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Visual Illusions and Inattention: Their Association with Adiposity Among Adolescent Girls

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Abstract

The Delboeuf concentric circle illusion is frequently invoked as an explanation for the hypothesized association between dinner plate size and overeating. We examined its association with adiposity among 162 girls, aged 14–18 years. We also examined the association of adiposity with neural and behavioral responses during a separate visual discrimination task. The analysis showed that girls with a body mass index percentile ≥ 85 , or with greater triceps skinfold thickness, exhibited less sensitivity to the Delboeuf illusion than girls with normal adiposity. The excess adiposity group also exhibited significantly smaller electroencephalographic responses and more errors during the separate visual discrimination task. In combination, the findings from the two tasks suggest that girls with an elevated body mass are less sensitive to visual cues in their environment. The implications of these findings for weight loss education should be considered.

Keywords

Overweight; obesity; evoked potentials; Delboeuf illusion; plate size

INTRODUCTION

The obesity prevention and treatment literature includes many simple solutions and gimmicks that have been proposed for a complex and serious health problem. An example of a simple solution is the proposal from the U.S. Department of Agriculture's Center for Nutrition Policy and Promotion (USDA ChooseMyPlate.gov) that weight-conscious consumers use smaller plates for serving food. Two mechanisms have been used to justify this proposal.

The first mechanism is the most obvious: a small plate cannot accommodate the same amount of food as a large plate. In addition, if the goal is to overeat, then a small plate challenges the consumer to exert effort and reload the plate by returning to the buffet table, kitchen, or serving bowl. Although these impediments are viewed by many health professionals as

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important for limiting energy intake, it is noteworthy that the research examining the association between plate size and energy intake is sparse and mostly unsupportive (Benton, 2015; Rolls et al., 2007; Shah et al., 2011; Yip et al., 2013).

The other mechanism justifying the proposal of a smaller plate involves a visual illusion, i.e., the DelBoeuf illusion (Nicolas et al., 1997), which can bias a consumer's judgment of the quantity of food served on a large plate. The illusion emerges when one views two concentric circles with different diameters. When the diameter of the outer circle is increased and the ratio of the outer/inner circle diameters exceeds 4:1, a negative illusion occurs and the observer will underestimate the true size of the inner circle (Figure 1). Various researchers (McClain et al., 2014) have extended this simple illusion involving concentric circles to dinner plates (the outer circle) of various sizes containing a meal (the inner circle) of a smaller size. They have shown that the effect generalizes to these different stimuli.

Although the DelBoeuf concentric circle illusion is reliable (Howard et al., 1973), and its connection to overeating is logical, it is not known if it contributes to the development of an overweight or obese body mass. It is also not known if it is a factor during the critical developmental period of adolescence: the illusion is greater in older than younger adults (Lorden et al., 1979) and might not be present during adolescence if it is sensitive to learning and life experience. One goal of the present study was to detect it in adolescent girls, aged 14–18 years, and demonstrate variability in illusion sensitivity associated with body mass.

A second goal was to examine the association between the Delboeuf illusion and another measure of visual information processing. The purpose here was to determine if sensitivity to the illusion represents a specific deficit among adolescents with an elevated body mass or is a component of a general problem. Indeed, there is already a wealth of literature demonstrating decrements in brain structure and function in this population. For example, as a group, adolescents with an elevated body mass show reduced gray matter volumes in frontal (Alosco et al., 2014; Maayan et al., 2011) and limbic brain regions (Alosco et al., 2014). On functional tests, they differ from their normal-weight peers (Liang et al., 2013; Reinert et al., 2013) in the domains of inhibitory control, attention span, working memory, and motor skills. The findings of these studies are consistent with the robust associations shown in clinical and epidemiological studies (Anderson et al., 2006; Schwartz et al., 2014) between an elevated body mass and impulsive behavior disorders (Attention Deficit and Conduct Disorders) in which executive cognitive functions are severely affected.

The findings of the neuroimaging and cognitive studies also point to an interesting and under-appreciated contradiction: how can theorists simultaneously argue that children with an elevated body mass are more attentive than normal to the context (i.e., the illusion-inducing ring) of the Delboeuf stimulus but subnormal in their performance of most other cognitive tests? It is, of course, possible that the Delboeuf illusion is an entirely different entity. In contrast to many tasks, the Delboeuf task is simple, requires minimal attention and motor skill, and does not engage a large neural network. A better control for evaluating the specificity of the Delboeuf effect might involve a simple visual discrimination task, of the

type that has been used to examine event related electroencephalographic (Bauer et al., 2010a; Bauer, 2014; Tascilar et al., 2011) potentials, such as the P300. The P300 is a positive voltage deflection in the average electroencephalographic (EEG) response to a stimulus that is novel or relevant to the task at hand. It is a neural reflection of the attentional resources engaged by the stimulus (Polich, 2007) and has often been used in studies of patients with Attention Deficit Hyperactivity Disorder and other highly impulsive or inattentive populations (Iacono et al., 2003). The present study employed this simpler task and P300 EEG responses to determine the specificity of the association of the Delboeuf illusion with body mass among adolescent girls.

The final goal of the present study was to examine the association between illusion sensitivity, visual discrimination skills, and an impulsive personality. This goal is founded in previous research that has associated a personal (Anderson et al., 2006; Bauer et al., 2012; Fuemmeler et al., 2011; Goldstein et al., 2008; Thamotharan et al., 2013; van Egmond-Frohlich et al., 2012; Waring and Lapane, 2008) or family history (Gearhardt and Corbin, 2009; Grucza et al., 2010) of impulsivity, or disorders characterized by high levels of impulsivity, with weight gain and obesity.

METHODS

Participants and Procedures

Adolescent volunteers were recruited with posters, direct mail solicitations, and newspaper advertisements. These advertisements mentioned weight management problems, risk-taking tendencies, conduct problems, or a family history of risk-taking or drug/alcohol abuse as potential qualifiers. Each interested volunteer and one of her biological parents were asked to call a research assistant for additional information and eligibility screening. Volunteers who reported no past or current pregnancy, psychosis, or major medical disorders that would complicate body weight (e.g., HIV, thyroid disease) or evoked electroencephalographic responses (i.e., seizure disorder, heart disease, hearing loss, uncorrected visual impairment) during the telephone and in-person interviews were deemed eligible and became participants in the protocol. They were paid for their time and effort.

Informed consent and medical release documents approved by the university's Institutional Review Board were reviewed and signed by the participant and parent on the day of data collection. On the same day, the parent completed a questionnaire reviewing the child's health history as well as a separate questionnaire that inquired about obesity, alcohol/drug dependence, and hypertension among first and second degree relatives. The parent was then dismissed and asked to return at the conclusion of the session to retrieve his/her daughter.

The participant was escorted to a private office where she completed several questionnaires assessing constructs with documented relevance to overeating or obesity. These measures of impulsivity or inattention were the Barratt Impulsiveness Scale (Stanford et al., 2009), Toronto Alexithymia Scale (Bagby et al., 1986; Elfhag and Lundh, 2007), Borderline Symptom List (Bohus et al., 2009), and the Inventory of Callous/Unemotional Traits (Kimonis et al., 2008). Other questionnaires and interviews were administered for the purpose of describing the general background characteristics of the sample. These included a

modified Drug Abuse Screening Test (McCabe et al., 2006), the computerized Diagnostic Interview Scale for DSMIV (Robins, 2002), and the 90-day Timeline Follow-back Interview for alcohol and drugs (Dennis et al., 2004).

Height and weight were measured by the research technician with a Health-o-meter™ (McCook, IL) stadiometer. The technician also measured skinfold thickness over the right and left triceps with calipers (Lange calipers, QuickMedical, Issaquah, WA) to provide a second measure of adiposity. The two technicians involved in this measurement were trained in the use of the calipers prior to study initiation. During the training period, their goal was to achieve an inter-rater reliability (intraclass correlation coefficient) greater than 0.85 within a block of 50 measurements. The maintenance of measurement reliability was checked at 3-month intervals. If needed, additional training was undertaken to return to the criterion level of reliability.

The absence of recent cigarette use by the participant was checked with a breath carbon monoxide monitor. In addition, two saliva samples were collected. The first sample was used for same-day drug toxicology screening. The second sample was preserved for DNA extraction and genetic analyses to be performed at a later time.

Neurophysiological and Cognitive Task Procedures—Prior to the administration of the DelBoeuf and visual discrimination tasks, Ag/AgCl EEG electrodes were applied to 64 scalp sites positioned by an electrode cap. A reference electrode was taped to each earlobe. A ground electrode was applied to the middle of the forehead. Interelectrode impedances were maintained below 5 Kilohms.

After the electrodes were applied, the participant was escorted into a sound-shielded chamber and seated in a comfortable chair facing a 14-inch computer monitor. The monitor was used for the presentation of visual stimuli. A panel with two response keys was also placed in front of the participant.

The Delboeuf task was formed by 317 images presented at a distance of 99 cm for 700 msec each. Images appeared at rate of 1 per 2500 msec. Each image consisted of single circular black dot (a reference) presented in the left visual field. In the right visual field, a dot was drawn inside a black ring (Figure 1). The participant was asked to press one response button if the two dots were the same size (50% of trials) and another button if they differed in size (50% of trials). Across trials, dot size (6–14 mm) and the ring/dot diameter ratio (2.0–9.1) were varied. For analysis, trials were collapsed to form two categories including trials with either small (2.0–3.0) or large (>4) diameter ratios. EEG activity was not recorded during the DelBoeuf task because the stimuli elicited large scanning eye movements and uncorrectable artifacts.

The other task (Bauer, 1997) was simpler in design and required attention to, and discrimination of, rarely occurring events that did or did not require a motor response. The task involved the presentation of a Bernoulli series of three visual stimuli--the letters "X" ($p=0.1$), "C" ($p=0.1$), and "T" ($p=0.8$)--presented for 50 msec each at a rate of one stimulus every 1.2–1.8 sec. Three hundred stimuli were presented in total. The participant was

instructed to press a key whenever the “X” was presented. She was instructed to ignore all other stimuli.

During this visual discrimination task, the electroencephalogram was recorded from 64 electrodes placed across the scalp. Eyeblinks and eye movements were also recorded, using a pair of electrodes placed diagonally above and below the left eye. The EEG and eye movement channels were appropriately amplified (gain=10K). Along with markers indicating stimulus and response onsets, the channels were routed to an A/D converter, digitized at a rate of 500 Hz, and processed through a Butterworth zero-phase shift filter (high pass=0.5 Hz, 12 db/octave roll-off; low pass=15 Hz, 48 db/octave roll-off). Epochs of EEG were then extracted. The epochs spanned 100 msec preceding to 900 msec following the onset of the target (“X”) and novel non-target (“C”) stimuli.

During other off-line computations, a linear regression algorithm (Semlitsch et al., 1986) implemented in Scan version 4.3 software (Compumedics/Neuroscan, Inc) mathematically removed eye movement and eye blink artifacts from each epoch. Corrected epochs were screened to eliminate those with a voltage deviation <-50 or $>+50$ microvolts or with an incorrect button press response. Time-point averaged responses were then formed from the same number (minimum=15) of target and novel non-target epochs for each participant. The amplitudes of P300 peaks within these responses were measured between 225–660 ms post-stimulus onset at frontal (Fz), central (Cz), and parietal (Pz) midline electrode sites.

Analysis Plan

A limited number of analyses were performed to assess specific hypotheses. The first analysis focused on background and personality differences. It contrasted groups defined by the absence ($n=84$, 29.8% Black or Hispanic) versus presence ($n=78$, 47.4% Black or Hispanic) of an overweight or obese body mass index percentile ($BMIP<85$ vs. $BMIP\geq 85$). It employed a multivariate test to screen for the presence of differences across multiple measures and protect against the multiple comparison problem. The next two analyses used repeated measures ANOVAs to examine separately hit rate and reaction time performance during the Delboeuf task as a function of the diameter ratio (small/large) and response type (same/different), as well as group ($BMIP<85/BMIP\geq 85$).

The analysis of group differences during the separate visual discrimination task employed a multivariate ANOVA with followup, univariate ANOVAs if, and only if, the multivariate test for the BMIP effect was significant. The variables in the analysis were P300 amplitudes measured for each electrode site (Fz/Cz/Pz) and stimulus type (target/novel non-target) as well as three measures of task performance: hit rate, false alarm rate, and reaction time.

The final set of analyses used regression methods to address remaining questions about the association between the Delboeuf effect and P300 during the visual discrimination task, as well as the association between a different measure of adiposity and measures selected from the background and DelBoeuf and visual discrimination tasks. In all of these analyses, age and race/ethnicity were specified as covariates. The criterion for significance was $p<0.01$.

RESULTS

Background Characteristics

The multivariate test for group differences in background and personality characteristics was statistically significant [Wilks' Lambda=0.44, $F(12,147)=14.0$, $p<0.001$]. Univariate ANOVAs of the measures listed in Table 1 demonstrated group differences on two measures. Triceps skinfold thickness, another measure of adiposity, was significantly greater [$F(1,158)=175.9$, $p<0.001$] in the $BMIP \geq 85$ group than in the other group. Also, the former group exhibited a higher score on the non-planning impulsiveness factor of the Barratt Impulsiveness Scale [$F(1,158)=3.5$, $p<0.05$].

A separate χ^2 analysis was performed to examine one additional background variable. That analysis revealed an association between an elevated body mass percentile and a family history of alcohol and drug abuse. The one degree-of-freedom test yielded a χ^2 of 5.5 ($p<0.01$). Eight of 84 or 9.5% of the $BMIP<85$ group were family history positive. In contrast, eighteen of 78 or 23.1% of the $BMIP \geq 85$ group were family history positive.

Delboeuf Task Performance and Visual Discrimination Task P300 Amplitudes and Task Performance

The repeated measures analysis of percent correct from the Delboeuf task revealed significant main effects of diameter ratio [$F(1,158)=189.7$, $p<0.001$] and response type [$F(1,158)=31.9$, $p<0.001$]. The main effect of diameter ratio is an indicator that the illusion was induced—that is, participants were generally more accurate under the condition of a small diameter ratio versus a large ratio. The effect of response type indicates greater accuracy when indicating that the dots were the same size versus a response indicating a different size.

More pertinent to the goal of the present study was the demonstration of a main effect of BMI Percentile group [$F(1,158)=13.3$, $p<0.001$] as well as a BMI Percentile group by Diameter Ratio [$F(1,158)=7.2$, $p<0.009$] interaction. The findings shown in Figure 2 suggest, and Scheffe' post hoc tests confirm, that the effect of a smaller versus larger diameter ratio (i.e., the Delboeuf illusion) on response accuracy is not significantly greater in the $BMIP \geq 85$ group. Instead, it was greater in the $BMIP<85$ group than in this overweight/obese group. Also, the $BMIP<85$ group was generally more accurate across all trial types. No other tests were significant in this analysis.

Similar analyses of reaction time across Delboeuf task conditions and groups revealed only one finding of note. It was a trend across groups [$F(1,153)=4.1$, $p<0.05$] in which the $BMIP \geq 85$ group demonstrated a faster reaction time, $M(SE)=608(12)$ msec, than the $BMIP<85$ group, $M(SE)=644(12)$ msec, across all conditions. No other effects approached significance.

The multivariate ANOVA of data from the separate visual discrimination task revealed a statistically significant omnibus test for the group effect [Wilks' Lambda=0.86, $F(9,152)=2.5$, $p<0.05$]. Follow-up, univariate ANOVAs demonstrated smaller P300 amplitudes in the $BMIP \geq 85$ group in the target response across all electrode sites: target

P300 at Fz [$F(1,160)=7.1$, $p<0.01$]; target P300 at Cz [$F(1,160)=9.2$, $p<0.01$]; target P300 at Pz [$F(1,160)=17.0$, $p<0.01$]. The group difference in P300 amplitude within the novel stimulus response was less robust: novel P300 at Fz [$F(1,160)=3.1$, $p=0.07$]; novel P300 at Cz [$F(1,160)=5.5$, $p<0.03$]; novel P300 at Pz [$F(1,160)=4.3$, $p<0.04$]. The BMIP groups likewise differed on hit rate [$F(1,160)=3.9$, $p<0.05$]; but not on the false alarm rate or reaction time. Group means and standard errors are presented in Table 2. Group-averaged P300 waveforms are shown in Figures 3 and 4.

Regression Analyses

In the regression analyses, the first goal was to confirm that the associations of Delboeuf task performance and P300 with BMI percentile generalized to another measure of adiposity, average triceps skinfold thickness, entered as a continuous variable. This goal was met. In a hierarchical model which began with age and race/ethnicity as covariates, target P300 amplitude at Pz ($\beta=-0.17$, $t=-2.1$, $p<0.05$) and Delboeuf illusion ($\beta=-0.16$, $t=-1.97$, $p<0.05$) magnitude, i.e., the difference in percent accuracy between small and large ratio diameter condition, were individually and jointly (Multiple $R=0.29$, $F=3.7$, $p<0.01$) associated with triceps skinfold thickness.

The second goal was to test overlap of the primary outcomes. Here, a partial overlap was evident. Target P300 amplitude ($r=0.33$, $p<0.001$) and hit rate ($r=0.22$, $p<0.01$) during the visual discrimination task were significantly and positively correlated with the magnitude of the Delboeuf illusion.

DISCUSSION

The present study was founded on the premise that overweight or obese adolescent girls are more sensitive to at least one aspect of the environment than their normal weight peers. This aspect is the Delboeuf illusion wherein a larger container, such a circle or a dinner plate, induces a misperception of the size of an object within that container. The Delboeuf illusion has frequently been invoked as a justification for recommending that overweight/obese patients change their dinnerware and use smaller plates.

The findings of the present study do not support this premise and justification. In contrast to the original hypothesis, adolescent girls with a body mass percentile ≥ 85 were not more sensitive than normal to the DelBoeuf illusion. In fact, they generally responded faster and with more errors during the task, and also demonstrated a smaller decrement in performance in the presence of a larger versus smaller illusion-inducing ring (Figure 2). In addition, during a separate visual discrimination task that did not induce a perceptual illusion, they exhibited smaller neural responses to novel stimuli (Figures 3 and 4) and made more performance errors. Similar findings were discovered in analyses that substituted triceps skinfold thickness for BMI percentile. In sum, girls with greater adiposity were less sensitive than their normal-weight peers to events in their visual environment.

The findings of this study therefore confront and question a popular theory about the role of the illusion in the meal and portion size estimation skills of the overweight/obese. To the degree that performance of a simplified Delboeuf task generalizes to meal/portion size

estimation on a dinner plate, one must ask if recommending the use of smaller plates has a foundation in this group. Clearly, the illusion is not the only justification for encouraging use of a smaller plate: as the default, a smaller plate limits the portion size and challenges the overweight/obese consumer to invest extra effort for more food. But, in the face of a recent literature review (Robinson et al., 2014) showing no reliable effect of plate size on food intake, one must question if there is any compelling justification for the recommendation.

It is also possible that the individual differences shown presently are important and smaller plates may be a recommendation more appropriate for normal weight adolescents than their overweight/obese peers. In the present study, we found that participants with a BMIP<85 were effectively deceived by the Delboeuf illusion and exhibited large P300 responses, less impulsivity on the Barratt scale, and a lower familial rate of alcohol/drug dependence. For these normal-weight adolescents who are perceptually aware, not impulsive, and probably highly motivated, a smaller dinner plate may be one of many effective tools for maintaining their weight status and future health.

Although the present findings challenge hypotheses about sensitivity to the Delboeuf illusion and obesity risk, these findings do not challenge, and are consistent with, a large literature demonstrating neuroanatomical (Alosco et al., 2014; Maayan et al., 2011), neurophysiological (Babiloni et al., 2009; Bauer et al., 2010a; Bauer et al., 2010b; Tascilar et al., 2011), cognitive (Liang et al., 2013; Reinert et al., 2013), personality (Nederkoorn et al., 2006), and genetic (Bauer et al., 2010a; Bauer et al., 2012) differences in overweight/obese participants. Increasingly, it appears that these factors may overshadow differences in the food environment and impede the effectiveness of lifestyle interventions (Nederkoorn et al., 2007). The present findings suggest that an inherent problem of inattention and diminished reactivity exists among adolescents with a BMIP>=85. Interventions that specifically address this problem may be needed.

Limitations

The present findings and their implications are obviously limited by several issues. First among these is a question about the generalization of these findings to males and other racial/ethnic groups. Although the literature does not describe robust racial/ethnic or sex differences in visual illusion magnitude or P300 event related potentials, the potential for these factors to serve as moderators should be ruled out in a larger and more diverse sample of participants.

A second and more interesting question is the degree to which containers other than a simple circle are also capable of inducing the Delboeuf illusion to a greater degree in normal weight versus overweight adolescents. For example, if the present study had examined large 3-dimensional containers, such as pizza or fast food cartons, as inducing stimuli, would the size of the contents be similarly misjudged by each group? An examination of the perceptual bias from other containers may be important as more meals are consumed outside of the home (Larson et al., 2014) and the dinner plate becomes *passé*.

Finally, we should be mindful of the complex assemblage of factors that may contribute to the etiology of obesity. Although the groups examined here differed on measures of attention and perception, family history, and impulsiveness, many other factors may differentiate them. Also, we cannot assume from the present cross-sectional design that these factors are causal; a prospective design could better address this limitation.

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Highlights

- Overweight/obese girls were less sensitive to the Delboeuf illusion than normal weight peers.
- They also exhibited more errors during a separate task that did not induce an illusion.
- Overweight/obese girls are less sensitive to visual cues.
- Reduced visual sensitivity may be detrimental for diet education and weight loss.

Figure 1.

Example of one trial of the DelBoeuf illusion task. The instruction to the participant was to press one response key if the black dots are the same size and a separate key if they differ in size. Across trials, the ring/dot diameter ratio of the stimulus on the right and dot size were varied. Note that the dot on the right erroneously appears smaller in diameter--this is the DelBoeuf illusion.

Figure 2.

Performance accuracy (proportion correct) during the Delboeuf task as a function of BMI Percentile and ring/dot diameter. Note that the strength of the illusion is demonstrated by the reduction in performance accuracy when the ring/dot diameter ratio is large.

Figure 3.

Group averaged electroencephalographic potentials evoked by the target stimulus during the oddball visual discrimination task. The x-axis range is -100 to +900 msec relative to stimulus onset. Note the reduction in P300 amplitude in the BMIP>=85 group most prominent at the parietal midline electrode.

Figure 4.

Group averaged electroencephalographic potentials evoked by the novel non-target stimulus during the oddball visual discrimination task. The x-axis range is -100 to +900 msec relative to stimulus onset. Note the reduction in P300 amplitude in the BMIP ≥ 85 group most prominent at the central midline electrode.

Table 1

Background characteristics sorted by group.

	BMIP<85 Mean or % N=84	Std Error/n	BMIP>=85 Mean or % N=78	Std Error/n
Age in yrs	15.60	0.14	15.62	0.14
% Black or Hispanic *	29.8%	25	47.4%	37
% Family history of alcohol or illicit drug abuse *	9.5%	8	23.1%	18
BIS Non-planning *	24.06	0.56	25.49	0.59
BIS Attention	16.10	0.44	16.02	0.47
BIS Motor	20.73	0.36	20.17	0.38
Borderline Symptom List Score	0.45	0.06	0.54	0.07
ICU Callous	5.91	0.38	6.54	0.41
ICU Uncaring	6.89	0.28	6.93	0.30
ICU Unemotional	6.32	0.36	6.66	0.38
TAS Difficulty describing feelings	13.41	0.27	13.46	0.29
TAS Externally oriented thinking	23.52	0.30	23.97	0.32
TAS Difficulty identifying emotions	18.25	0.44	17.10	0.46
DAST-10	0.36	0.12	0.61	0.13
Average triceps skinfold thickness in mm *	24.08	0.83	40.26	0.88

*
p<0.05.

Abbreviations: BIS, Barratt Impulsiveness Scale; ICU, Inventory of Callous-Unemotional Traits; TAS, Toronto Alexithymia Scale; DAST-10, Drug Abuse Screening Test.

Table 2

Visual Discrimination Task P300 and Performance Data by group.

	BMIP<85 Mean N=84	Std Error	BMIP>=85 Mean N=78	Std Error
Target P300 amplitude @ Fz in microvolts. *	12.55	0.55	10.43	0.57
Target P300 amplitude @ Cz. *	16.73	0.53	14.14	0.61
Target P300 amplitude @ Pz. *	17.45	0.53	14.24	0.56
Novel P300 amplitude @ Fz.	6.12	0.35	5.22	0.37
Novel P300 amplitude @ Cz. *	8.12	0.36	6.85	0.39
Novel P300 amplitude @ Pz. *	8.98	0.38	7.83	0.39
Hit Rate (proportion correct) *	0.988	0.01	0.970	0.01
False Alarm Rate (proportion of non-target trials with response)	0.011	0.01	0.013	0.01
Reaction Time in msec.	375	5.74	390	5.96

*
p<0.05