How Cognitive Biases Can Distort Environmental Statistics: Introducing the Rough Estimation Task

Thomas D.W. Wilcockson & Emmanuel M. Pothos

Thomas D.W. Wilcockson, PhD, MSc, BSc (Hons)
Emmanuel M. Pothos, DPhil, BSc

Please address correspondence regarding this manuscript to Thomas D.W. Wilcockson, Department of Psychology, Lancaster University, Bailrigg, Lancaster, LA1 4YW or Emmanuel M. Pothos, Department of Psychology, City University, London, EC1V 0HB.

Electronic mail may be sent to t.wilcockson@lancaster.ac.uk or emmanuel.pothos.1@city.ac.uk

Running text word count: 4403 words. **Running head**: Percentage Estimation Task.

Tables: Three
Figures: Four

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Abstract

The purpose of this paper is to develop a novel behavioural method to explore cognitive biases. The task, called the Rough Estimation Task (REsT), simply involves presenting participants with a list of words, such that words can be in one of three categories: appetitive words (e.g. alcohol, food, etc), a category of neutral related words (e.g., musical instruments), and a category of neutral unrelated words. Participants read the words and are then asked to state estimates for the percentage of words in each category. Individual differences in the propensity to overestimate the proportion of appetitive stimuli (alcohol- or food-related words) in a word list were associated with behavioural measures (i.e. alcohol consumption, hazardous drinking, body mass index, external eating, and restrained eating, respectively) thereby providing evidence for the validity of the task. The task was also found to be associated with an eye-tracking attentional bias measure. The REsT is motivated in relation to intuitions regarding both the behaviour of interest and theory of cognitive biases in substance use.

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Cognitive biases have been the focus of extensive research within both alcohol abuse and eating behaviour (Field & Cox, 2008; Brooks, *et al*., 2011). In an effort to understand the exact role of such biases, researchers have employed different cognitive tasks (e.g., Jones & Schulze, 2000; Cox *et al*., 2006; Wilcockson & Pothos, 2015). Such work has led to several key insights regarding the nature of cognitive biases. For example, in the case of attentional biases, a bias can reflect a number of processes, such as rapid initial attentional orientation and difficulty with disengaging attention. Further, cognitive biases can alter memory processes, so that positive expectancies or outcomes become more readily associated with related stimuli (Field, *et al*., 2008). Such work reveals the multifaceted nature of cognitive biases and the difficulty of explaining these biases comprehensively by reference to a single cognitive process (e.g., attention).

Most existing work on cognitive biases has been developed in the context of tasks representative of particular cognitive processes. For example, to demonstrate a cognitive bias in attention, the emotional Stroop has been employed (Cox *et al.*, 2006) and biases in memory have been studied with typical association tasks (e.g., Stacy, 1997; see also McCusker, 2001). In the present work, we adopt a slightly different approach. Can we specify a task which will help us understand how a cognitive bias (related to the abuse or overconsumption of a substance, e.g., alcohol) can potentially affect the perception of a person's environment?

Assuming that cognitive biases can lead to the orientation of attention toward and difficulty disengaging from such stimuli, then we can hypothesise that cognitive processing will prioritise appetitive stimuli, at the expense of other stimuli in the person's environment. Moreover, research suggests an increased salience of memory representations for the abused substances (cf. McCusker, 2001). This therefore leads to an unaddressed, though key question: whether this enhanced salience (through increased attention, increased memory representation, and cognition) of individual stimuli might translate into a *distorted* perception regarding the availability or frequency of such stimuli in the environment. In other words, is it the case that the perception of appetitive stimuli 'crowds' that of unrelated stimuli, to an extent that it distorts intuitions about relevant environmental statistics? This would mean that, from the perspective of someone with a cognitive bias, the frequency of appetitive stimuli is inflated. A perception of an increase in frequency would plausibly be linked with a sense of greater availability, further fuelling a desire to engage in bias-related behaviour e.g. excessive consumption of alcohol or over-eating.

We developed a simple task to explore this hypothesis, that is, that for individuals having a cognitive bias, there is indeed a perception of increased frequency/availability of corresponding appetitive stimuli in their environment. The task involves having participants read a list of words and subsequently provide an estimate of word frequency in each category. It can be called a Rough Estimation Task (REsT). The objective of this task is twofold. First, of interest is assessing the prediction that, even when the objective frequency of appetitive stimuli is matched to that of neutral stimuli, someone with a cognitive bias will have an inflated sense regarding the former. Second, the REsT can potentially serve as a novel measure of cognitive bias, but which does not require precise reaction time measurement or computer-controlled presentation of stimuli.

For this first illustration of the REsT, excessive drinking was chosen, as corresponding cognitive biases have been robustly demonstrated for even casual heavy drinkers (Cox *et al.*, 2006). Research into alcohol-related cognitive biases has shown that such biases can predict alcohol use. Cox, Fadardi, and Pothos (2006) found that heavy drinker vs. light drinkers were clearly distinguished regarding their attentional bias for alcohol-related information (as measured by a Stroop task). Cox, Hogan, Kristian, and Race (2002) found that alcoholics undergoing treatment for alcoholism who had a greater attentional bias interference for alcohol-related stimuli were more likely to relapse than alcoholics who had decreased their attentional bias. Cox, Pothos, and Hosier (2007) found that attentional bias demonstrated by heavy drinkers could predict the reduction in drinking days six months from baseline. Therefore, there is plenty of evidence to associate alcohol-related attentional biases with alcohol use.

Research into the nature of cognitive biases has revealed several key insights. For example, if alcohol abusers have difficulty disengaging attention from alcohol-related stimuli (as indeed seems to be the case; Cox *et al.*, 2006), then the additional processing of such stimuli plausibly makes it more likely that cognitive processes will likewise reflect a similar bias in preferential processing. If alcohol abusers have a lower attentional threshold for processing alcohol-related information (and, perhaps equivalently, find alcohol-related stimuli more attention-grabbing; Robinson & Berridge, 1993; cf. Field *et al.*, 2008), then in an array of stimuli including an alcohol-related stimulus, alcohol-abusers will tend to focus on the alcohol-related stimulus. Within this first demonstration of the REsT, the empirical question of interest is whether REsT will be associated with self-reported alcohol use and another measure of alcohol-related behaviours.

Another behaviour which robustly leads to cognitive biases is eating behaviour (e.g., Brooks, *et al*., 2011; Tapper *et al.*, 2008). Therefore, as an illustration of how the REsT can be extended to other kinds of behaviour, we include an examination of the REsT which is related to eating behaviour. Cognitive biases for food are thought to operate in a similar manner as cognitive biases for other substances and reflect a preferential processing for food-related stimuli. In the case of eating, the distinction between adaptive and maladaptive behaviour is less straightforward than alcohol and the quantity of food consumed does not necessarily indicate maladaptive behaviour. Note that traditional measures of cognitive/attentional bias have led to inconsistent results in relation to food. For example, Pothos, Tapper, and Calitri (2009) examined several measures for the assessment of food-related cognitive biases, and reported inconsistent results amongst the measures. This provides additional motivation for the exploration of alternative measures of cognitive bias in eating behaviour, such as the REsT.

Partly driven by what is practically interesting, in the present experiment we focussed on the following dependent variables. First, we considered Body Mass Index (BMI), because of its significance from a health perspective (high BMI is associated with health problems; Kopelman, 2000). Note, the association between BMI and cognitive bias using traditional measures (i.e. the emotional Stroop) is not always robustly demonstrated (e.g. Boon, Vogelzang, and Jansen, 2000; Pothos *et al*., 2009; Calitri *et al*., 2010). Second, we considered the Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien *et al.*, 1986) indices, as a characterisation of eating behaviour; the DEBQ involves three indices external eating, emotional eating, and restraint eating. External eating is eating in response to external food cues, such as sight and smell of food. Emotional eating is eating in response to emotional arousal states, such as fear, anger, or anxiety. Restraint eating concerns restricting one's food intake. Individuals high on the external eating measure may be expected to display a cognitive bias for food-related information, as such individuals would be more sensitive to the appetitive qualities of food (e.g. Franken and Muris, 2005). Also, such biases would be expected to be the result of preoccupation with food, as may be the case for individuals trying to decrease their food consumption, i.e. restraint eaters (Tapper et al., 2008). Note, an analogous motivation for an association between emotional eating and cognitive biases for food-related information is less forthcoming (cf. Werthmann et al., 2014). The empirical question of interest is whether REsT task will be associated with BMI and (a subset of) the three forms of eating behaviour measured by the DEBQ.

The first two of our experiments aim to examine the association between the REsT task measure and behaviours which have traditionally been linked with cognitive biases. Experiment 1 considers whether the REsT score is associated with alcohol use. Experiment 2 considers whether the REsT score is associated with indices of eating behaviour that have been previously shown to be associated with related cognitive biases. Such results would certainly suggest that the REsT measure could be one of cognitive bias, but Experiments 1 and 2 do not address this possibility directly. We do so in Experiment 3, using an eye-tracking measure of attentional bias, for alcohol-related stimuli. We attempt to verify the REsT as a cognitive bias task by comparing the results obtained from it with the results from an attentional bias task based on eye-tracking

Methods

Experiment 1: Alcohol Task

Participants

56 (48F, 8M) psychology students at Swansea University or London South Bank University participated for course credit (mean age: 23.19 (SD: 7.28); mean weekly alcohol unit consumption: 6.93 (7.54); mean AUDIT: 7.86 (5.35)). To avoid accidentally priming participants in relation to the hypotheses, recruitment was blind to alcohol use level. In all experiments reported in this paper participants believed they were taking part in a reading task; however, participants were fully debriefed at the end of the task.

Materials and procedure

A list was created of 60 words (from Cox, Yeates, & Regan, 1999), such that 10 words were presented on each page. Three word categories (20 words each) were employed: alcohol (e.g., beer, vodka), neutral related (music; e.g., trombone, bass), and neutral unrelated (e.g., carpet, invitation). The category of music words was included so that there would be a category of control words as matched in semantic relatedness as the category of alcohol words (since semantic relatedness can increase cognitive bias, e.g., Warren, 1972). The category of unrelated control stimuli was included as a filler category. The stimuli comprising the three categories were almost entirely common, concrete nouns. The words were broadly matched in terms of length and syllables. The order of words on each page was randomised. Participants were simply given the list of words and asked to read them aloud, without any instructions about the task to follow. Participants had no time-constraints whilst reading the words. After the word list, participants were given a sheet of paper, with questions regarding the percentage of words which were related to alcohol, music, or were neutral. They were also asked whether they played a musical instrument (this variable was not found to have an effect and will be ignored in the analyses). Participants finally completed the Alcohol Use Disorders Identification Test (AUDIT: Babor, de la Fuente, Saunders, & Grant, 1992) with the standard scoring system of total number of responses being used as a measure of alcohol behaviour. Participants were also asked to estimate their typical weekly alcohol use using self-report – a list of common alcoholic beverages and their unit content was provided to aid the participant in their estimation. Therefore there were two alcohol behaviour measures; AUDIT and self-reported usage.

Experiment 2: Eating behaviour task

Participants

42 (36F, 6M) experimentally naïve participants were recruited from Swansea University or London South Bank University, who took part for course credit (mean age: 22.49 (SD: 6.12); mean BMI: 24.39 (4.64)).

Materials and procedure

A food REsT was created, such that 20 words were food-related, 20 were related to transport, and 20 were neutral-unrelated words. The food and transport-related words were taken from Tapper *et al.* (2008). The neutral words were obtained using an online random word generator (http://www.datavis.ca/online/paivio/). Neutral words were matched in terms of length, syllables, and frequency to the food and transport-related words. Following the reading of the list, participants estimated percentages for the frequency of each word category. Finally, participants were asked to complete the DEBQ questionnaire, which included questions to compute the BMI (Van Strien *et al.*, 1986). Information about the weight and height of the participants was based on self-reports.

Experiment 3: REsT and attentional bias task

Participants

15 (11F, 4M) experimentally naïve participants at London South Bank University took part for course credit (mean age: 25.07 (SD: 4.91); mean alcohol use: 9.26 (9.12); mean AUDIT: 8.27 (6.60)).

Materials and procedure

The objective of this experiment was to create an eye-tracking measure of alcohol attentional bias that we could employ to validate the corresponding measure from the REsT task. We created a simple experimental task, based on the stimuli from Experiment 1 that allowed us to measure these variables.

In each trial, participants were presented with a word indicating a category, 'Alcohol' or 'Music', for 2 seconds. Then, two words were presented on the left and right side of the screen; one alcohol-related and one music-related. Participants had to indicate with a button press which word was congruent with the category initially presented (Figure 1)

There were 20 words in each category and each word was presented four times; twice as the target word (once on the left side of the screen and once on the right), and twice as the foil (again on the left and right side). There were 40 trials in total.

The eye-tracking task led to two variables. First, first fixation dwell time was the duration of the first fixation for alcohol stimuli minus the duration of the first fixation for music stimuli, during congruent trials. For example, suppose following an alcohol prompt an alcohol stimulus was fixated on for 500ms and following a music prompt the music stimulus was fixated on for 250ms, then the participant would have a first fixation dwell time of 250ms, for this pair of alcohol-music stimuli.

Second, stimulus fixation was a logical variable of whether an alcohol stimulus was fixated on or not minus whether a music stimulus was fixated on or not, during congruent trials. For example, for a pair of alcohol-music stimuli, suppose following an alcohol prompt the alcohol stimulus was fixated on and following a music prompt the music stimulus was not fixated on during that trial, then the participant would have a stimulus fixation of 1 for this pair of alcohol, music stimuli. For each pair of stimuli, the stimulus fixation variable could take the values of 1, 0, -1. These eye-tracking variables were used because the task was too quick for the measurement of traditional measures such as dwell time and fixation count.

Results

Experiment 1: Alcohol Task

The correct percentage response for each word category was 33%. An Alcohol Percentage Difference Score (APDS) was computed as the reported percentage for alcohol words minus those for the two other word categories. For example, if a participant reported there were 30% music words, 40% alcohol words, and 30% neutral words, then their APDS would be scored as 40-(30+30)=-20. Therefore, participants able to process the frequency information accurately would have APDS scores of -33; also, the more positive the APDS score, the more the bias to overestimate the frequency of alcohol-related words in the list. Note that APDS is an appropriate dependent variable, as opposed, for example, to just the estimate produced for the alcohol stimuli, because it correctly controls for situations where participants systematically under- or overestimate the % of words in all categories. However, note that, using just the % estimate for the critical category of words allows a replication of all key conclusions below (the same applies to Experiments 2 and 3).

A correlation between the APDS and reported alcohol use was significant (r(54)=.371;p=.005). There was also a significant correlation between the APDS and AUDIT scores (r(54)=.331;p=.013). The results indicate that participants who reported an elevated APDS also reported more weekly alcohol use and had increased AUDIT scores (see Figure 2).

Participants were then divided into heavy and light drinkers, on the basis of the Department of Health guidelines (Shenker, Sorensen, and Davis, 2009). Accordingly, light drinkers (LD) were defined as males drinking on average less than 6 alcohol units/week and females less than 4 alcohol units/week (one alcohol unit = 10 ml. of pure alcohol; N=32). Heavy drinkers (HD) were defined as males consuming more than 21 units of alcohol/week and females more than 14 units/week (N=9). Note, participants who were not deemed a LD or HD were excluded from this particular analysis only. A single sample t-test was performed on each group in order to see if their scores differed from the critical value of -33, which would be indicative of no bias in the estimation of alcohol words. It was observed that LD participants did not significantly differ in their responses from -33 (t(31)=.699;p=.490) whereas HD participants did significantly differ from -33 (t(8)=3.934;p=.004). The results indicate that LD participants demonstrated no bias to over-estimate alcohol words but the HD participants reported an increased number of alcohol-related words (see Figure 3). As for this comparison we are interested in evidence in favour of the null hypothesis, for the LD, we also computed the Bayes Factor in favour of the null hypothesis for the LD, which was 4.162, indicating ‘substantial’ evidence in favour of the null hypothesis (Rouder et al., 2009; we employed the Bayes Factor calculator provided by these authors).

Experiment 2: Eating behaviour task

A Food Percentage Difference Score (FPDS) was computed, in a way analogous to that in the alcohol task. Also, external, restraint, and emotional eating indices were computed following Van Strien *et al.* (1986). The distribution of BMIs was approximately normal. A correlation between the FPDS and BMI was significant ($r(40)=.321; p=.038$). The results indicate that participants who reported an elevated FPDS also reported a higher BMI. Correlations were computed between the FPDS scores and the DEBQ indices. Significant correlations were identified in the case of restraint eating ($r(40)=.309; p=.046$) and external eating ($r(40)=.339; p=.028$), but not emotional eating ($r(40)=.252; p=.108$). Note that in all cases, a positive correlation means that more positive FPDS scores (i.e., a greater overestimation of the frequency of food-related words) were associated with a higher degree of the corresponding eating behaviour (see Figure 4).

As with the alcohol task, we then sought to categorise the participants in Experiment 2 (Eating Behaviour Task) in order to further explore their data. However, in the case of eating, the distinction between adaptive and maladaptive behaviour is less straightforward than for alcohol and the quantity of food consumed does not necessarily indicate maladaptive behaviour. Nevertheless, on the basis of World Health Organisation (2012) participants were divided in terms of their BMI into four groups; underweight (BMI below 18.5), normal (BMI 18.5 to 25), overweight (BMI 25 to 30), and obese (BMI above 30) groups. A single samples t-test was performed on each group in order to see if their scores differed from the critical value of -33, which would be indicative of no bias for the category of food words. It was observed that participants did not significantly differ in their responses from -33 in the underweight ($t(2)=.087; p=.939$; Bayes Factor in favour of the null 2.13), normal ($t(22)=-.619; p=.542$; Bayes Factor in favour of the null 3.84), or overweight ($t(9)=-.268; p=.794$; Bayes Factor in favour of the null 3.14) groups. However, the obese group did significantly differ from -33 ($t(5)=3.806; p=.013$). The results indicate that the obese participants reported an increased number of food-related words whilst the participants in the other groups demonstrated no bias to overestimate food-related words (see Figure 4), although we acknowledge that the small sample sizes in some of these groups precludes any strong conclusion.

Regarding the DEBQ indices, there is a lack of any established criteria for dividing our sample into corresponding high/ low groups. We can look at the distribution of scores and explore whether there is a natural threshold. However, there is no evidence for natural dichotomisation points (the distributions of scores are all approximately normal) and so we did not further pursue this issue. Note, McCallum et al. (2002) showed that dichotomisation of scores makes sense only when the distribution of the scores has natural breaking points, e.g., when the distribution is bimodal.

Experiment 3: REsT and attentional bias task

We first assessed whether the APDS correlated with alcohol use, which was the case ($r(13)=.557; p=.031$), thus providing a useful replication of the sensitivity of the APDS measure to alcohol use.

We subsequently sought to examine whether the measure of attentional bias from the REsT task, the APDS, was associated with the more established attentional bias measures, from the eye-tracking task (Table 3). The critical correlations involve APDS against first fixation dwell time and stimulus fixation. In both cases, the correlations were significant, providing an important demonstration that the assumption of APDS as an attentional bias task is valid.

General Discussion and Conclusions

The purpose in developing the REsT was to provide a measure of cognitive bias based on the intuition that for (e.g.) excessive drinkers alcohol-related stimuli crowd other stimuli. Thus, alcohol-related stimuli are not only attended to more rapidly and are harder to disengage attention from, they also appear more *numerous*, in an excessive drinker’s environment (cf. Tiffany, 1990). The REsT may help us understand how the environment would plausibly appear to, for example a heavy drinker, in terms of a perception of increased frequency/availability of alcohol-related stimuli. Our results show that the REsT is associated with various relevant behaviours (alcohol drinking; restrained eating; external eating; BMI).

The significant positive correlations between the percentage scores and the alcohol use measures suggest that increased alcohol use is associated with increased estimations of alcohol-related words. Thus, it appears that cognitive biases for substance-related stimuli may lead to overestimation biases, at least in the case of alcohol abuse. We assume that this finding implies that heavy drinkers perceive an increased number of alcohol stimuli within their environment, which is an interesting perspective regarding the role of cognitive biases in the cognitive processes of heavy drinkers.

Correlations between the eating variables and the REsT task scores demonstrate an association between cognitive bias and stimuli related to food. In particular, we note that a significant correlation was observed involving BMI, while research employing standard measures of cognitive bias (such as a food version of the emotional Stroop task) do not typically identify a corresponding significant association (Pothos, *et al*., 2009). Perhaps, when it comes to food-related biases, the REsT task could be a more sensitive measure of cognitive bias, compared to tasks which relate more specifically to attentional processes.

The significant correlation between the REsT scores and external eating is consistent with previous related work. For example, Brignell, Griffiths, Bradley, and Mogg (2009) observed a significant correlation between external eating and attentional biases in a food-related task. Likewise, there have been reports of correlations between restrained eating and food-related cognitive biases (with the Stroop task; e.g. Francis, *et al*., 1997). Emotional eating was not found to correlate with the REsT task measure. Previously, Brignell *et al* (2009) failed to observe an association between emotional eating and their measure of attentional bias (a visual probe task); our finding is analogous to Brignell *et al.'*s finding.

Overall, it appears that the food version of the REsT task is sensitive to a number of indices related to eating behaviour, in a way broadly consistent with previous findings for when to expect cognitive biases related to eating behaviour (e.g., associations between indices of the DEBQ questionnaire and food Stroop attentional biases). More interestingly, we obtained a clear correlation between BMI and the REsT score, even though correlations between BMI and the more standard food Stroop can be elusive.

There are potentially a number of processes which are involved with performance on the REsT. Preferential processing of a stimulus caused by orienting of attention may lead to an over-inflation of a stimulus's importance (cf. Field, *et al*., 2008). This would increase the salience of the appetitive words during the task. When recalling the number of words, cognitive biases may lead to distortions in working memory resulting in an overestimation in the number of words (cf. McCusker, 2001). Then a perceived increase in frequency of appetitive stimuli could lead to perceived greater availability (cf. Tiffany, 1990), which may subsequently induce a desire to engage in bias-related behaviour e.g. excessive consumption of alcohol or over-eating. Understanding these links in cognition appears an important direction for future research. However, the focus of the current paper was the examination of a task, the REsT, which, we suggest, is a simple procedure for the measurement of biases in cognition.

From a practical point of view, the REsT is exceptionally easy to administer and analyse. The REsT can easily produce an index of emphasis for a particular word category, relative to another, even if there are baseline differences in the relative salience of the word categories. Also, significant behavioural distinctions were identified even with small sample sizes.

This first presentation of the REsT has several limitations, which we hope to address in future work. Researchers sometimes explore gender in conjunction with alcohol or eating behaviour, but sampling limitations meant that it was not possible to explore gender in the statistical models. Our female participants were more numerous than the male ones. This may be a complication in understanding the sensitivity of the REsT, because females generally show higher cue reactivity than males (e.g. Field & Duka 2004). Clearly, future examinations of the REsT need explore gender directly. Regarding the potential of the REsT to serve as a general, easy to administer measure of cognitive bias, we used an eye-tracking measure and observed an association between the REsT task and attentional bias measures. However, this still raises an issue of how the REsT measure relates to other attentional bias tasks; nevertheless it is known that when multiple attentional bias measures are administered in a within-participants way cross priming problems can occur (see Pothos, *et al*., 2009). Nevertheless, the observation of an association between REsT and these attentional bias measures provides evidence to suggest the REsT has the potential to be a stand-alone cognitive bias task.

Cognitive bias researchers have sought to explore the predictive value of cognitive biases and so imply a causal role of such biases for the behaviours of interest (e.g., Field & Cox, 2008). Can REsT provide a unique perspective to this debate? It is hoped the encouraging results reported here will at least warrant interest in the further investigation of the REsT regarding these important questions. However, given the fairly low sensitivity/specificity of the REsT as a measure of any clinical attribute (alcohol problems, maladaptive eating), its two most impressive attributes right now are (a) its ease of use, and (b) the fact that it works at all, i.e., that the correlations are (reliably) in the expected directions. But further research is clearly needed. It is unclear yet whether the REsT will be useful for either clinicians or investigators. Our aim in this first presentation of the REsT is to indicate that the question is worth pursuing.

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Figures:

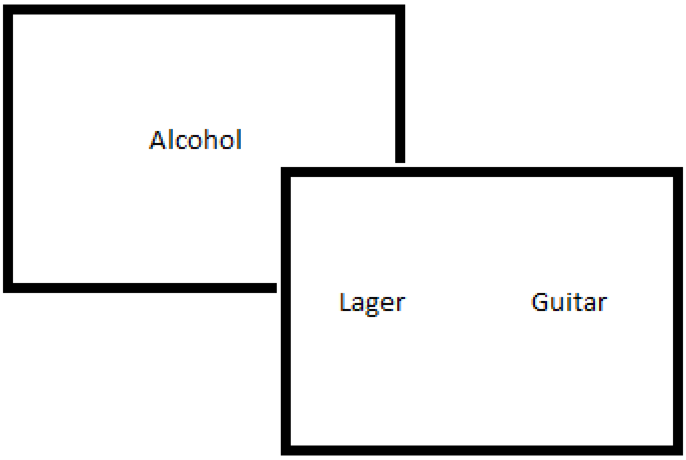

Figure 1. Example of a trial in the eye-tracking task. The participant is prompter with a category on the first screen. On the second screen the participant indicates which word belongs to that category by using a right or left button press. Eye movements were recorded.

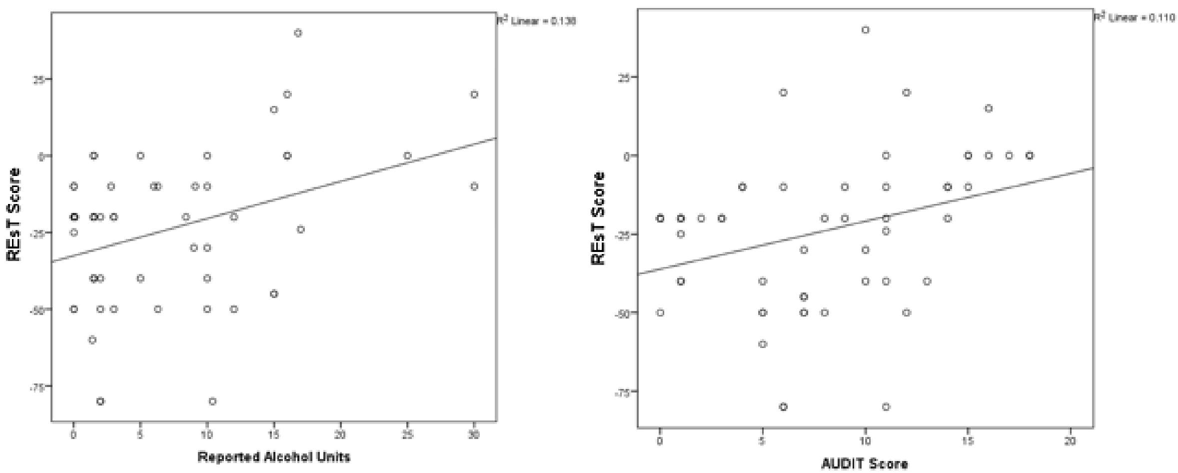

Figure 2. Experiment 1 results: The association between the REsT score & reported alcohol units (left) and the REsT score & the AUDIT score (right).

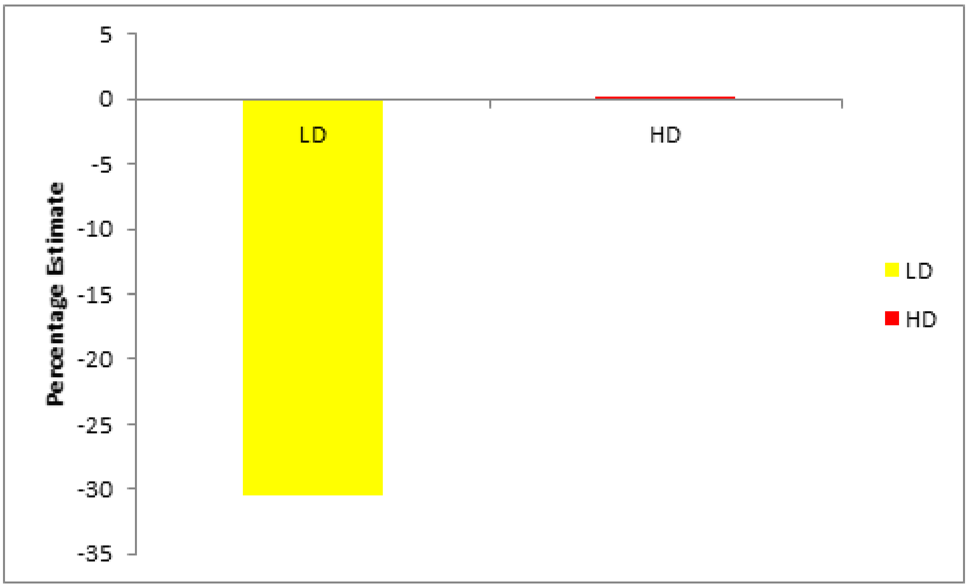

Figure 3. Average APDS scores for light drinkers (LD) and heavy drinkers (HD. An unbiased estimate of the proportion of alcohol words is at -33.

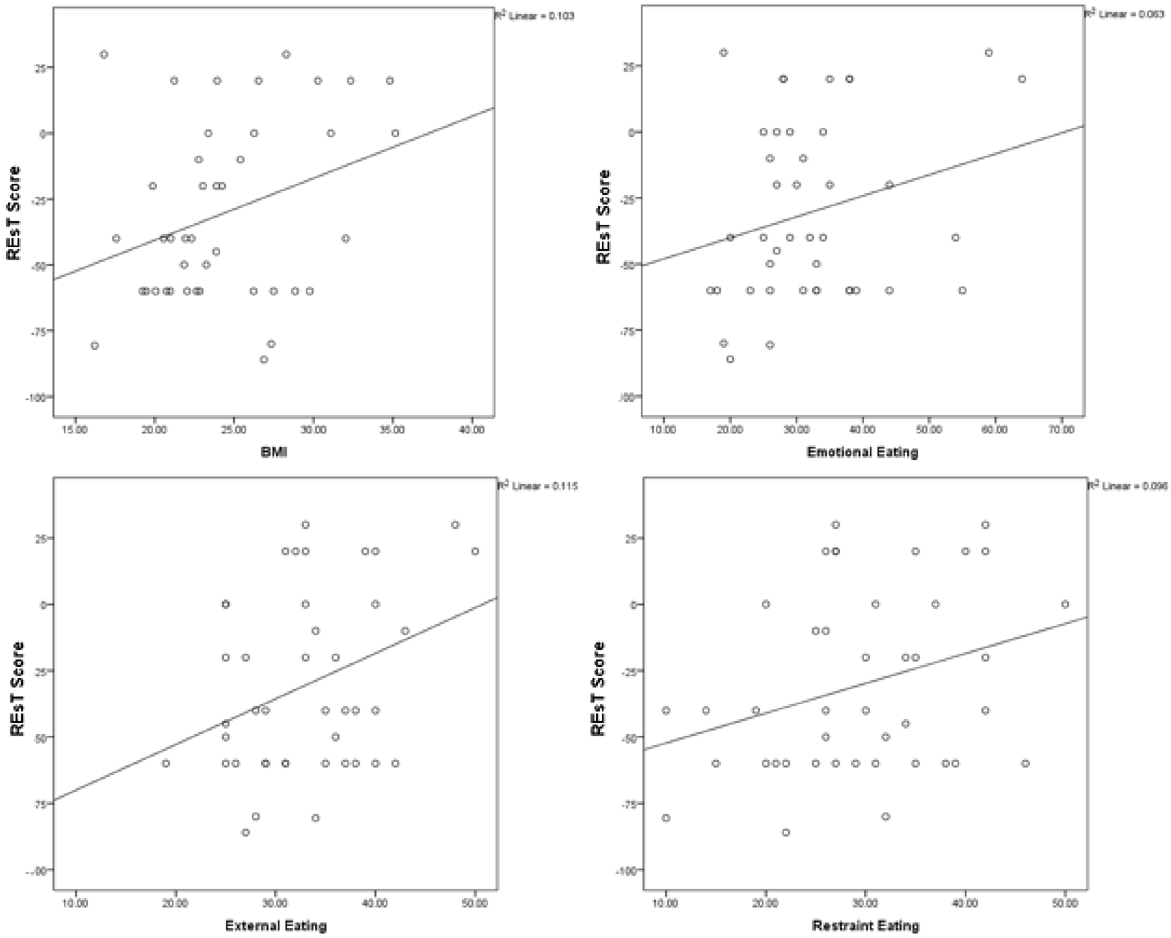

Figure 4. Experiment 2 results: The association between the REsT score & each of BMI (top left), emotional eating (top right), estimated external eating (bottom left), and restraint eating (bottom right).

Tables:

Table 1. Correlations between the alcohol Rough Estimation Task score, reported weekly alcohol consumption, and the Alcohol Use Disorders Identification Test.

	1	2
1. Alcohol REsT (APDS)		
2. Alcohol self-reported usage	.371**	
3. AUDIT	.331**	.509**

Note. ** denotes p<.01

Table 2. Correlations between the food Rough Estimation Task score, BMI, and the DEBQ subscales.

	1	2	3	4
1. Food REsT (FPDS)				
2. BMI	.321*			
3. DEBQ: Emotional	.252	.230		
4. DEBQ: External	.339*	-.110	.457**	
5. DEBQ: Restraint	.309*	.278	.240	-.108

Note. ** denotes p<.01 * denotes p<.05

Table 3. Correlations between the alcohol Rough Estimation Task score, reported weekly alcohol consumption, the Alcohol Use Disorders Identification Test, and the attentional bias measures.

	1.	2.	3.	4.
1. Alcohol REsT (APDS)				
2. Alcohol self-reported usage	.557*			
3. AUDIT	.215	.778**		
6. First fixation dwell time	.719**	.107	.099	
7. Stimulus fixation	.537*	.341	.258	.471

Note. ** denotes p<.01 * denotes p<.05