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Preliminary results from the project "Slow On the Bottle – Enjoy the Road (SOBER)": Instruments to measure implicit associations towards drunk-driving and to change implicit drunk-driving associations

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Abstract

Attitude-based interventions are often a key element in attempts to change behavior, but do not always have the expected effect. A reason for the lack of success may be that people have two types of attitudes, explicit (introspectively accessible, what people say they mean) and implicit attitudes (not accessible to conscious introspection, cannot be measured by questionnaires, but by other experiments methods). Implicit attitudes are assessed by measuring participants implicit associations between a target category (here drunk-driving and sober-driving) and valence categories (here good and bad words). International research shows that a person's implicit associations' sensitivity can be changed by relatively simple behavioral methods. This study aims to adjust existing methods of implicit associations' measurement and of implicit associations change, to measure and change implicit associations towards drunk-driving. As a first step, implicit associations towards drunk-driving and sober-driving were measured with the Go/No-Go Associations Task (GNAT), and the implicit associations change was performed with behavioral training method, the Avoid/Approach Task (AAT). The preliminary results show that the GNAT successfully measures implicit associations towards drunk-driving and sober-driving. Also, the preliminary results show that the implicit associations towards drunk-driving and sober-driving were changed with the AAT. The results are promising as it looks like both instruments are applicable. The study has both national and international value, as the first study that measures implicit attitudes towards drunk-driving and also the first to try to change drunk-driving implicit attitudes. Pending a complete sample and further analysis, the results will reveal drunk-driving attitudes and if these attitudes can be changed in a socially beneficial ways.

Summary and relevance

One fifth of all traffic accidents are due to drunk-driving, even though it has been showed that drunk-driving is a socially stigmatized behavior in Denmark (Rådet for Sikker Trafik, 2013; TrygFonden, 2011). How can it be that a relatively frequent behavior is inconsistent with the general attitude towards drunk-driving? Attitude-based interventions are often a key element in attempts to change behavior, but do not always have the expected effect. A reason for the lack of success may be that people have two types of attitudes, explicit (introspectively accessible, what people say they mean) and implicit attitudes (not accessible to

conscious introspection, cannot be measured by questionnaires, but by reaction time based association measures).

Implicit and explicit attitudes direct behavior differently and in different contexts and are often inconsistent. In Denmark, both in real life and in research settings, interventions almost exclusively target explicit attitudes, but leave implicit ones untouched, despite the fact that these attitudes also affect behavior. International research shows that implicit attitudes can be changed by relatively simple methods. For example, studies have changed implicit attitudes towards math, race prejudice and also alcohol consumption efficiently (Kawakami et al., 2000, 2007a, b; 2008; Wiers et al., 2010, 2011). Due to expected social desirability biases in the explicit reporting of behaviors like drunk driving, an increased understanding of how the two kinds of attitudes relate to each other and influence behavior may thus be crucial to alter problem behavior such as drunk-driving more successfully. In order to find out more about the mechanisms behind drunk-driving, new methods for measuring and changing implicit associations have to be developed and tested.

Based on the above, the current project aims are to: 1) to modify an existing method for implicit attitude measuring – the GNAT – to measure implicit attitudes to drunk-driving; 2) altering implicit attitudes in a new research area namely drunk-driving. The hypothesis for the GNAT measure is that the respondents sensitivity will be higher for drunk-driving/dangerous stimuli paired with bad valence stimuli as well as neutral sober-driving stimuli paired with good stimuli, compared to the less 'congruent' pairs of drunk-driving/dangerous stimuli paired with good and neutral sober-driving stimuli paired with bad.

If functional this measure may help clarify the inconsistency between attitudes and behavior in relation to drunk-driving that is found in Denmark. The expected outcome of the project is knowledge that can be used to make interventions that does not only target explicit attitudes, but also implicit attitudes.

Method

Set-up

The experimental set-up was: first the participants completed the pre-test which consisted of the GNAT. One week later the participants came back and completed first the AAT behavioral training, and after they completed the GNAT once more.

Participants

The sample consists of 72 young male drivers (age 18-27) recruited at DTU campus and via a DTU Facebook site. Attrition rendered complete pre-test and post-test data for 45 respondents. The participants received a gift card of for brunch for two persons for participating.

Measures

Implicit association measures

The GNAT (Nosek & Banaji, 2001) is a computer-administered categorization-task method, which presents stimuli for a short time on the computer screen, one stimulus at a time. The participants were asked to press a response button (the ''go'' response) if the stimulus on the screen belongs to either a given target category (e.g. picture of a drunk-driving dangerous situation, or sober-driving not dangerous situation) or a given attribute dimension (e.g. bad or good word, vomit or love). If the stimulus does not belong to either of the categories, the participants are asked to do nothing (the "no-go" response). The effect measure is computed from the pooled differences in task performance between target category/attribute pairings (e.g., drunk-driving/dangerous + good vs. drunk-driving/dangerous + bad/ "sober driving"/not dangerous + good vs. "sober driving"/not dangerous + bad) that reflects the association between that kind of situation and its implicit evaluation. Since not all the data are collected, so far we will only look at the sensitivity scores, and not the pooled difference. Because this is preliminary analysis and not all data have been collected, this effect measure is not analyzed yet.

Changing implicit associations

The AAT (Kawakami et al., 2000, 2007a, b, 2008; Wiers et al., 2010, 2011) were applied to change the implicit associations. Participants were randomly assigned to either the "avoid drunk-driving" condition, the

"approach drunk-driving" condition or the control condition. In the "avoid drunk-driving" condition participants pushed a joystick away from themselves when presented with drunk-driving related pictures. In the "approach drunk-driving" condition the participants' approaches drunk-driving by pulling a joystick toward themselves when presented with drunk-driving related pictures. In the control condition, the participants move the joystick sideways. After the "avoid drunk-driving", "approach drunk-driving" or control condition, the participants completed the GNAT again, to measure any changes in implicit drunk-driving associations again.

Data collection

Both the pre-test and the post-test comprised of the GNAT. We ran the pre-test scripts via the online java applet based platform running delivered by Millisecond LLC (http://www.millisecond.com/). The AAT learning programs and the post-test were combined in the Inquisit desktop setup and the specific contents for the experimental groups were controlled through a PowerShell script. As the AAT involves the use of a joystick the post-test were conducted in a lab.

Statistical analysis

We calculated one sensitivity index (d prime) for each of the four association pairs:

a) Drunk-driving pictures + bad words
b) Drunk-driving pictures + good words
c) Sober-driving pictures + bad words
d) Sober-driving pictures + good words

The size of the d prime indicates the bias adjusted ratios of hits (respond when they should) and correct rejections (not-respond when they should not) versus misses (not-respond when they should have responded) and 'false alarms' (respond when they should not have responded). Bias in this context could for example be a higher propensity for 'go' compared to 'no-go', which would produce artificially high hits and false alarm rate, and the other way around.

In a reliable GNAT it is expected that the d primes would be higher for the 'easy' associations, herein the drunk-driving pictures + words from the bad list as well as sober-driving related pictures + good words. The two other pairs should produce lower d primes. We examined this within the framework of a repeated measure ANOVA with the two factors category and valence words.
Finally, we preliminarily tested for within subjects pre-test to post-test changes from split into the three AAT learning groups with two paired t-tests. We performed all computations and analyses in SPSS 22.

Results

The participants had a significantly higher sensitivity towards the hypothesized pairs, $F(1,71) = 23.4$, $p < .001$, suggesting that this GNAT is a reliable measure of implicit associations between drunk-driving stimuli and the valence label 'bad' (see Figure 1 for illustration).

Further, the preliminary analyses of pre- to post change in sensitivity indicates that the AAT group that pushed away ('avoided') drunk-driving related pictures got significantly more sensitive to drunk-driving pictures paired with good words. The avoid group also got more sensitive also to drunk-driving pictures paired with bad words. The joystick sideways group, the control group, got more sensitive to drunk-driving with bad words, and the pull (approach) drunk-driving pictures group did not change in sensitivity to any of the pairs (see Table 1 and 2).

Table 1 – Pretest GNAT DD is not dangerous versus posttest DD is not dangerous

Groups	N	Mean	SD	t	Df	Sig. (2-tailed)
AAT: DD is not dangerous	17	-.129	.547	-.971	16	.346
AAT: DD is dangerous	20	-.186	.285	-2.92	19	-009**
AAT: Does not learn anything /Control	9	-.128	.321	-1.98	8	.265
Note. DD = Drunk driving. AAT = Approach/Avoidance test						

Table 2 – Pretest GNAT DD is dangerous versus posttest DD is dangerous

Groups	N	Mean	SD	t	Df	Sig. (2-tailed)
AAT: DD is not dangerous	17	-.196	.456	-1.77	16	.096
AAT: DD is dangerous	20	-.224	.395	-2.54	19	.020**
AAT: Does not learn anything /Control	9	-.370	.311	-3.56	8	.007**
Note. DD = Drunk driving. AAT = Approach/Avoidance Test						

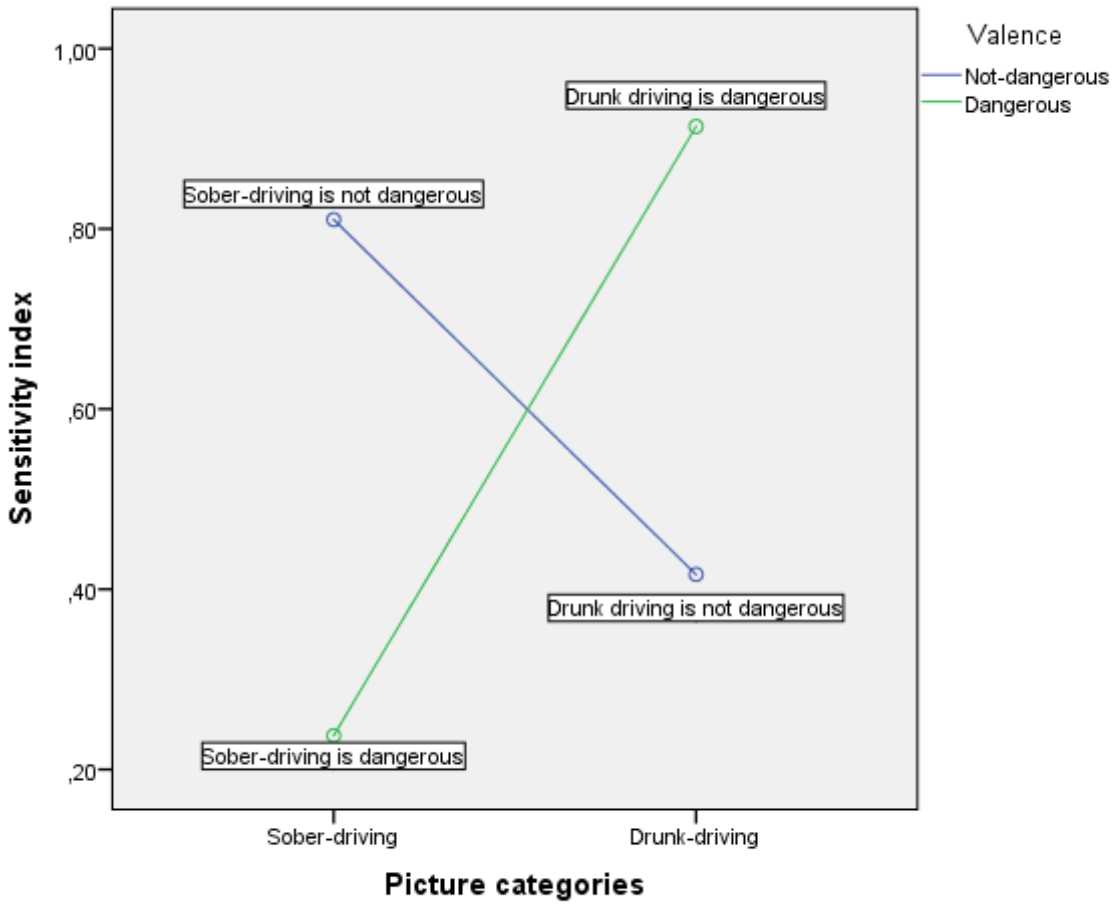

Figure 1. GNAT sensitivity measure output.

Discussion and outline

The results are twofold: 1) confirm that the newly adjusted GNAT successfully works to measure implicit associations towards drunk-driving, 2) the AAT successfully alter implicit associations towards drunk-driving, however only within some conditions.

Importantly, the results so far are preliminary and thus does not say anything about the implicit attitudes towards drunk-driving, just that the participants have the expected implicit associations towards drunk-driving, i.e., drunk driving is bad, and sober-driving is good. The AAT results is also preliminary, nevertheless results show that the method alter the implicit associations, i.e., the participants get more correct hits in the GNAT after the behavioral AAT, thus the participants associations get more sensitive towards drunk-driving stimuli and the valence categories. This is true for the avoid-group, however not for the approach-group. One explanation for why the results are not significant for the approach-group is that

drunk-driving was implicitly associated as bad for the participants in general. In such, one might expect that drunk-driving does not relate to the participants, so the pull drunk-driving behavioral training is not strong enough to alter the strong associations they already have, namely drunk-driving is bad. Contrary, the results were significant for the Avoid-group. This group significantly improved their sensitivity when associating drunk-driving with bad and drunk-driving with good. The Avoid-group thus got better at discriminating between both drunk-driving is bad and drunk-driving is good. As seen in the GNAT results, the participants found it easier to associate drunk-driving with something bad and sober-driving with good. This is expected directions and results. It makes sense that if you are against drunk-driving and you get behavioral training, you get even stronger associations between drunk-driving and bad. However, one unexpected result is that this group also gets better at associating drunk-driving and good. It could be that the participants' get more sensitive towards drunk-driving pictures in general. The descriptive increase in the D sensitivity score is however higher in drunk-driving is bad than in drunk-driving is good (0.225 versus 0.184), thus they learn that drunk-driving is bad to a higher degree in the avoid drunk-driving group. Another unexpected result is that the control group significantly associate better between drunk-driving is bad, however not to the drunk-driving is good. One feasible explanation to this is that the sideway push might also work as an avoid-condition. Getting more into these unexpected results at the present time will just be guessing. Hopefully the AAT training effect will be more easily interpret when we have all the data. At the present time, we can conclude that we have adjusted the GNAT in a satisfactory way, and that the AAT does alter the participants' implicit association sensitivity, however not completely in the expected way, pending a complete dataset and further analysis on the data.

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