THE EFFECTS OF ALCOHOL ON AUTOMATIC AND CONTROLLED PROCESSING IN MISPERCEIVING A WEAPON

J. Scott Saults, Bruce D. Bartholow, & Sarah A. Lust

University of Missouri

Introduction:

Previous work from this laboratory (Bartholow, Dickter, & Sestir, 2006) showed that an acute dose of alcohol (.80 g/kg) increased expression of racial bias in a go-stop priming task by impairing control of inhibition. The current study followed up that research, using L. L. Jacoby's (1991) process dissociation procedure (PDP) to investigate the effects of alcohol on automatic and controlled processing in a priming task designed to test for race bias.

Process Dissociation Procedure (PDP)

To separately test controlled and automatic influences within a single task, Jacoby (1991) developed the process-dissociation procedure (PDP). PDP allows researchers to independently estimate the magnitude of controlled and automatic influences on task performance. To do this, automatic and controlled processes are placed in opposition. To estimate the contribution of controlled and automatic processes, a task must include congruent conditions, in which controlled and automatic processes act in concert, and incongruent conditions in which they act in opposition. Intentional control is measured as the difference between performance when a person intends to respond a certain way, and performance when the person intends not to respond in that way. Control can be estimated from performance in congruent and incongruent conditions by using some simple equations (Jacoby, 1991), as illustrated below.

PDP and Misperceiving a Weapon

Payne (2001) applied PDP to investigate the influence of racial stereotypes on perceptual identification of weapons, using the same task we used in our experiment. Participants misidentified tools as guns more often when primed with a Black face than with a White face. Payne applied PDP to accuracy scores and found that racial primes affected the controlled but not the automatic estimate.

The probability of responding "gun" on a congruent trial is the probability of control, *C*, plus the probability of an automatic association between a Black prime and guns, when control fails:

1. $Congruent = C + A\,(1–C)$

The probability of responding "gun" on an incongruent trial is the probability that the automatic association favors the "gun" response, *A*, when control fails, 1-*C*:

2. $Incongruent = A\ \ (1\text{-}C)$

Equations 1 and 2 can be combined to yield:

3. $C = Congruent - Incongruent$

Once *C* has been determined, *A* can be estimated from equation 2:

4. $A = Incongruent\ /\ (1\text{-}C)$

Methods:

Participants

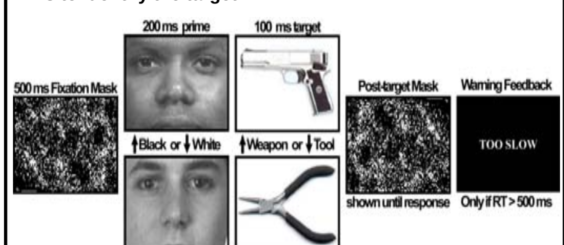
Participants were 62 moderate social drinkers (31 female), 21-35 years old, who qualified according to a telephone screening interview. Individuals reporting any psychological, legal, or health problems related to alcohol or other substance abuse or who had any health conditions contraindicating alcohol consumption were excluded.

Beverage administration

Participants were randomly assigned to consume an Alcohol beverage (100-proof vodka and tonic; Mean BAC = .10%), a Placebo beverage (10-proof vodka and tonic; Mean BAC = .0%) or a Control beverage (plain tonic). Placebo and Alcohol participants were told that their beverage contained alcohol; control participants knew that their beverage contained no alcohol. Breathalyzer tests confirmed that alcohol group participants achieved a maximum BAC during or just after the priming task.

Weapon Identification Task

The weapon identification task was adapted from Payne (2001). On each trial, a 500 ms fixation mask was followed by a 200 ms prime (a black or white, male face), immediately followed by a target picture of a tool or gun, displayed for 100 ms, and then a post-target mask which remained on the screen until the participant responded. Participants' task was to categorize the target as a gun or tool as quickly as possible by pressing one of two buttons. Fast responses were encouraged by a "Too Slow" prompt that appeared whenever a participant took longer than 500 ms to identify the target.



Automatic and Controlled Estimates

Automatic and controlled estimates for White and Black prime conditions were calculated following Payne (2001), based on equations 1 through 4 (left column). Because (1-*C*) serves as the denominator when calculating the *A* estimate, an individual would receive an undefined value for *A* if *C* = 1. However, none of our participants exhibited perfect control for either prime condition.

Results:

Accuracy

As in previous research (Payne, 2001), participants were more likely to misidentify tools as guns when primed with Black faces compared with White faces, $F(1,59)=14.6$, $p<.01$. Also, there was a marginal interaction of race and group, $F(2,59)=3.0$, $p<.10$, suggesting the Alcohol group was relatively more impaired by Black primes than were the other groups.

Controlled and Automatic Processes

As expected, racial primes influenced automatic but not controlled processing, $F(1,59)=18.7$, $p<.01$. However, alcohol influenced controlled processing but not automatic processing, $F(2, 59) = 3.90$, $p < .05$ (see Figure 1). In the Alcohol group, controlled processing ($M = .58$) was significantly worse than in the Placebo group ($M = .80$) or the Control group ($M = .76$); automatic processing was equivalent across all groups (*M*s = .57).

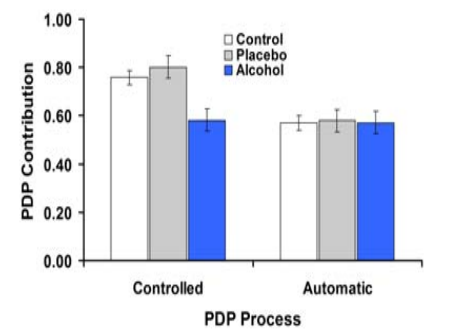


Figure 1. Automatic and Controlled Processing by Group. Error bars = SEM.

Conclusions:

Our findings add to evidence based on PDP with different tasks (Fillmore, Vogel-Sprott, & Gavrilescu, 1999) and to evidence using different methods for identifying control processes (Bartholow et al., 2006) that alcohol especially impairs executive control processes. Also, it tends to reduce identification accuracy when control is most needed.

References:

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