



# Differences in Alpha-related Inhibitory Control between Smokers and Ex-smokers

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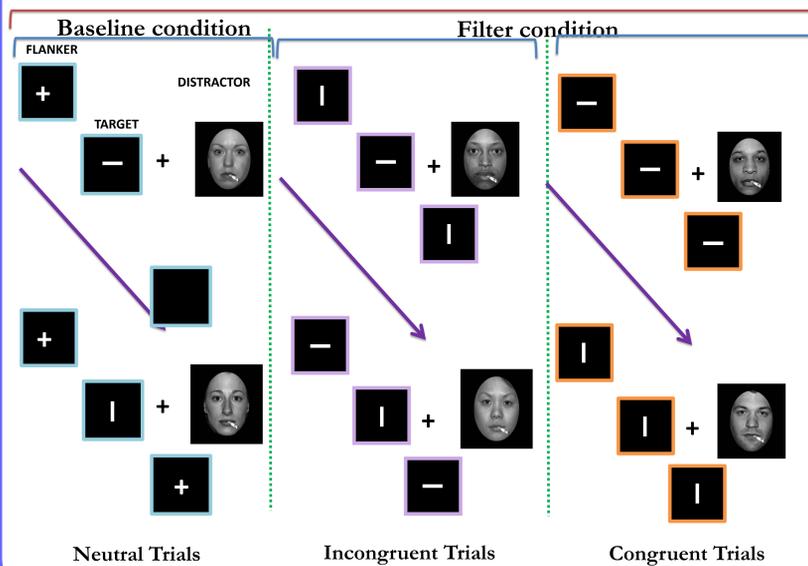
## Introduction

Health complications caused by cigarette smoking are responsible for one in five deaths in the United States every year (Centers for Disease Control and Prevention, 2016). Worldwide, tobacco use leads to the death of approximately seven million people each year due to smoking-related complications (World Health Organization, 2017).

Despite all the efforts to reduce smoking behaviors in the population, most abstaining smokers relapse within the first six months after a quit attempt (Zhou et al., 2009). Researchers have explored the impact of environmental cues on craving behaviors and it is widely believed that these elicit cravings and urges to smoke (Baumann & Sayette, 2006).

This study used a time frequency analysis to examine the role of alpha inhibition in the presence of smoking related cues. Because the alpha frequency is related to inhibitory control, we hypothesized that we will find differences in alpha-related inhibition between smokers and ex-smokers in the presence of smoking related cues.

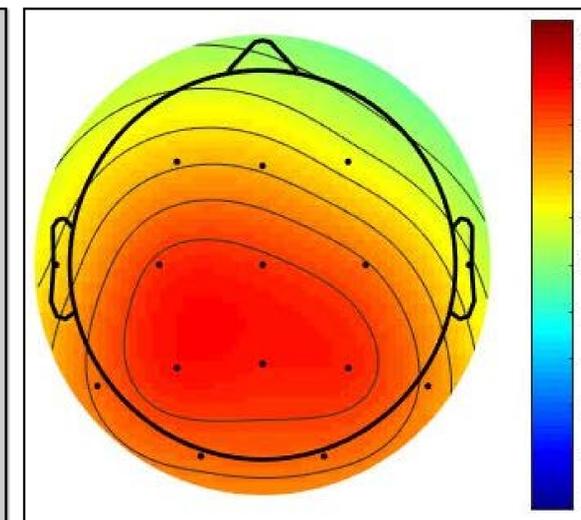
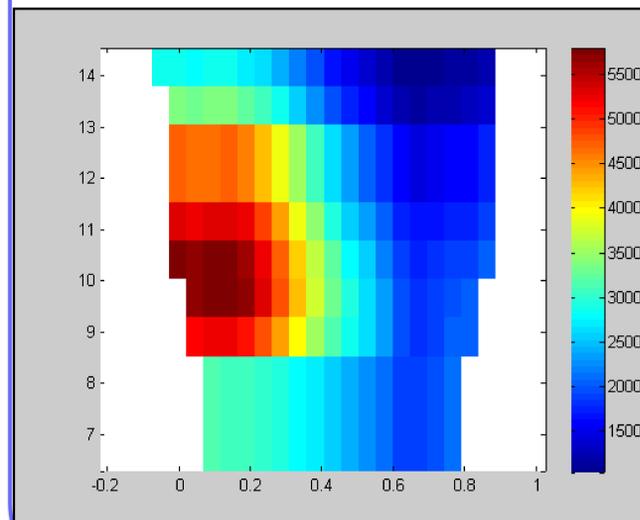
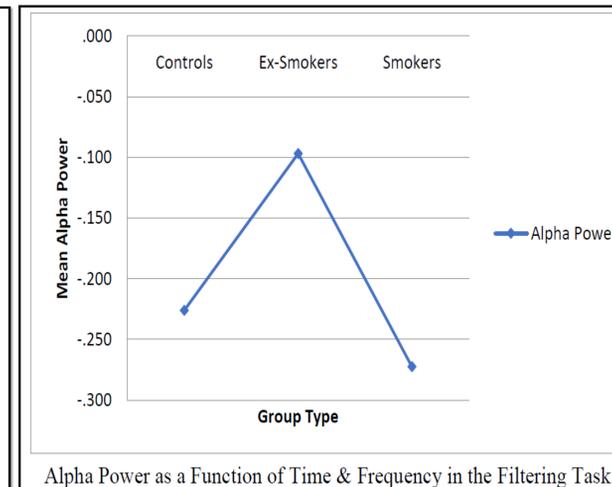
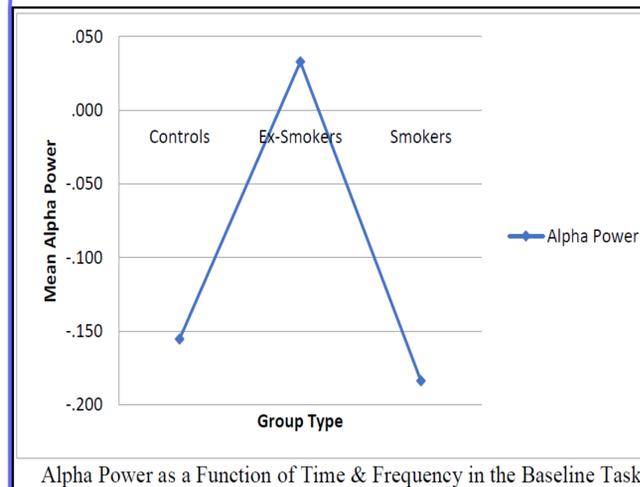
## Modified Flanker Task



## Methods

Participants were recruited in the NYC area and completed a modified version of the Emotional Flanker task while EEG recordings were made. Behavioral data were collected from 21 controls, 24 ex-smokers, and 48 smokers matched in age, education and gender. These participants completed the modified version of the Emotional Flanker task, which measured their ability of attending to and ignoring various types of stimuli such as smoking related, neutral, positive and negative. We calculated differences in alpha related inhibition in parietal regions.

## Results



## Results

A mixed-model ANOVA revealed a main effect for group  $F(2, 57) = 9.756, p < .001, \eta^2 = .26$ , with alpha power greatest for ex-smokers and least for smokers, with controls intermediate and differing significantly only from smokers. In the filtering condition, we found a main effect of group  $F(2, 57) = 4.80, p < 0.05, \eta^2 = .144$ , as alpha power was significantly greater in ex-smokers than in either of the other two groups. No significant main effects was found for condition type.

## Discussion

We hypothesized that ex-smokers would have better inhibition to distracting cues than smokers prior to the onset of distracting cues. In both baseline and filtering trials, ex-smokers displayed higher alpha to distracting cues in relationship to smokers. This relative increase in alpha power found in ex-smokers over smokers is consistent with studies exploring differences in attentional mechanisms between such groups. However, the overall higher alpha power found in ex-smokers might be related to higher distractor encoding. In this account, distractor representations would be strongly activated in ex-smokers' working memory, creating more attentional interference once the target stimulus appears.

## References

Baumann, S. B., & Sayette, M. A. (2006). Smoking cues in a virtual world provoke craving in cigarette smokers. *Psychology of Addictive Behaviors*, 20(4), 484.

Centers for Disease Control and Prevention. (2016). Smoking & Tobacco Use. Retrieved from <http://www.cdc.gov/tobacco/>

World Health Organization, & World Health Organization. (2017). Tobacco fact sheet. Retrieved July 09, 2017, from <http://www.who.int/mediacentre/factsheets/fs339/en/>

Zhou, X., Nonnemaker, J., Sherrill, B., Gilsenan, A.W., Coste, F., West, R. (2009). Attempts to quit smoking and relapse: Factors associated with success or failure from the ATTEMPT cohort study. *Addictive Behavior*, 34, 365-373.