

## Psychophysiological impact of european tobacco-warning images

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### Abstract:

The World Health Organization insures that tobacco epidemic kills nearly six million people a year. In 2003, the European Commission proposed a series of pictorial warnings to be use on tobacco packages for to prompt negative attitudes towards smoking and predispose smokers to quit smoking. This study evaluated the physiological impact of tobacco-warning European Commission. Fifty healthy volunteers (aged 19 – 23 years) participated in the study. They saw a set of thirty six IAPS pictures and twenty four European tobacco-warning images. Electromyographic activity of zygomatic major and corrugator were recorded when subjects were viewing the pictures. The results showed higher EMG activity level of corrugator to unpleasent IAPS pictures compared to tobacco-warning images. These results indicated that images proposed by the European Commission for tobacco packages could gain of more activating images, in order to promote the activation of defensive/avoidance motivational system.

**Keywords:** Tobacco-warning, Efficacy, Motivation.

Received: 30/06/2013 Accepted: 07/11/2013

### INTRODUCTION

According to the World Health Organisation, tobacco is the cause of six billion deaths across the world each year, and approximately one-third of these are women (WHO, 2004). In 2003, the European Commission proposed using pictorial images on cigarette packages to warn users of their harmful effects. Recently, the ability of these images to promote negative attitudes towards smoking and predispose smokers to quit smoking has been researched (Muñoz et al. 2011). Self-reports indicate that the images proposed by the commission may not be negative enough to serve as activators i.e. to predispose smokers to quit. However, these results have not been tested with objectives scales like the electromyographic activity of the zygomatic major and corrugator muscles. The activities of these muscles is related to the emotional response to positive or negative stimuli; the activity of the corrugator is greater when unpleasent images are shown, while the zygomatic major activity is increased in response to pleasent images.

The goal of this study was to evaluate the emotional image of the tobacco prevention images in women by measuring electromyographic activity of the zygomatic major and corrugator muscles in response to a set of affective images selected from the International Affective Picture System (Lang, Bradley and Cuthbert, 1999).

### METHOD

**Participants.** Fifty university students ages 19-23 (mean=22.02; SD=3.08) participated in this study. All were students at the Universidad de Granada and none were taking medication or suffering from any health problems. The study was approved by the research ethics commission at the Universidad de Granada.

**Procedure.** Participants viewed 36 images with different emotional contents from the International Affective Picture System (IAPS) (Lang, et al., 1999) (12 pleasent, 12 neutral, 12 unpleasent) and 12 preventive unpleasent images and 12 preventive neutral, in following with the study by Muñoz et al. (2011). The task consisted in viewing 5 sets (blocks) of 12 images presented twice; each image was shown for 3 seconds. The blocks were separated by a black screen that was shown for 20 seconds. The order in which the blocks were presented was counterbalanced using a Latin Square design. While viewing the images, participants remained standing before a screen measuring 97 x 103 cm and located 150 cm from with subject with a viewing angle of 38° x 34°. The reaction of the subjects was measured using an integrated electromyogram (EMG) of the zygomatic major and corrugator *supercilii* muscles on the right side of the face.

At the end of the experimental task, participants reported the valence and arousal in response to each image using the Self-Assessment Manikin (Bradley and Lang, 1994).

### RESULTS

When the five affective categories were compared, the analysis of variance in valence and arousal showed significant differences between the two ( $F(4.59)=165.86, p<.001$ ),

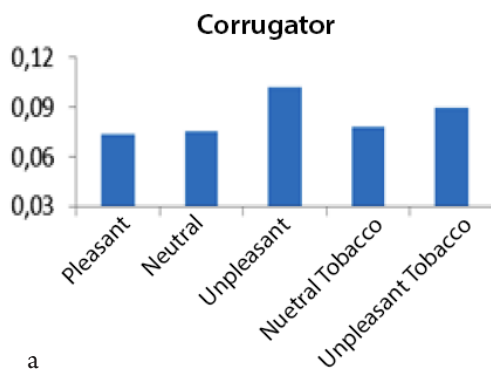
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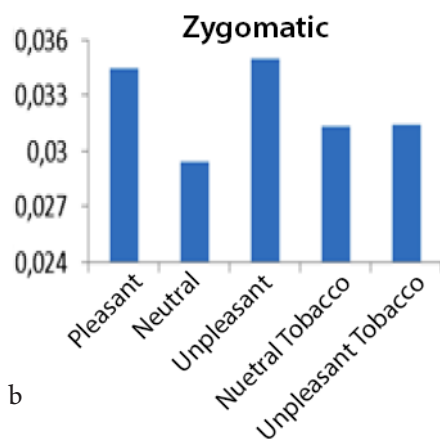
( $F(4.59)=164.96, p<.001$  respectively). The preventive neutral and unpleasant images were viewed as less negative and less activating than the unpleasant images of the IAPS ( $p<.001$ ). At the same time, the preventive neutral and unpleasant images were viewed as more unpleasant and activating than the pleasant images of the IAPS ( $ps<.001$ ; Table 1).

	Valence	Arousal
	Mean (SD)	Mean (SD)
Pleasant	7.11 (0.51)	6.29 (0.38)
Neutral	5.2 (0.28)	2.37 (0.12)
Unpleasant	1.4 (0.18)	7.06 (0.30)
Neutral Tobacco	4.9 (1.07)	3.79 (0.61)
Unpleasant Tobacco	2.5 (0.55)	5.21 (0.84)

Table 1. Mean and standard deviation (SD) on the SAM scales for each category of images.



a



b

$\mu v$

Figures 1a and 1b: Average activity of the corrugator and zygomatic muscles in the image blocks. (\* =  $p < .05$ ; \*\* =  $p < .001$ ).

The result of the ANOVA 5 (Categories) x 5 (Order) of the electromyographic activity of the corrugator showed significant differences in the Categories factor ( $F(4.45)=19.23, p < .001$ ; Figure 1a). The unpleasant images of the IAPS produced greater activation of the corrugator than the unpleasant tobacco prevention images ( $p < .01$ ) or the neutral tobacco images ( $p < .001$ ). At the same time, the activity of the corrugator provoked by the preventive neutral images was lower than that brought on by the preventive unpleasant images ( $p < .05$ ).

The result of the ANOVA 5 (Categories) x 5 (Order) of the electromyographic activity of the zygomatic showed significant difference in the Categories factor ( $F(4.45)=3,904, p < .01$ ). The post-hoc analysis revealed marginally significant differences between the images from the neutral category and those of the pleasant ( $p < .08$ ) and unpleasant ( $p < .05$ ) categories (Figure 1b).

#### DISCUSSION AND CONCLUSIONS

In spite of the efficacy of the use of images in tobacco prevention campaigns, our results indicate that the use of images with a higher emotional impact could increase the effectiveness of the anti-tobacco campaign. The images proposed by the European Commission induce average levels of aversion and activation. This translates into averages levels of activation of the defensive system, which could limit the scope of the preventive campaign. The combination of scales measuring both subjective and physiological aspects lends support to this conclusion. Based on Peter J. Lang's bio-informational theory (Lang, 1995), visual stimuli with a high emotional impact can promote intense emotional states that are reflected in a central activation of the motivational systems for action. In light of the data obtained through these scales, the preventive campaign proposed by the European Commission could benefit from the use of more unpleasant and activating images capable of eliciting a defensive aversive response.

Future studies should include men to corroborate whether the effect is replicated regardless of gender. The incorporation of other physiological and behavioral scales in future studies—like skin conductance or body movements—could increase the scope of these conclusions.

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