What is actually the warning label on the package of cigarettes?

Branislav R. Tanasic

People University, Sabac, Serbia

Received 2017-11-25; Accepted 2018-01-23

Abstract:

The year 1965 was very significant in the history of the tobacco industry. It was passed Cigarette Labeling and Advertising Act, which obliged the tobacco corporations to set up the labels on the health warning on every packet of cigarettes intended for sale in the USA. To remind you, this was passed Cigarette Labeling and Advertising Act, which obliged the tobacco corporations to set up the labels on the health warning on every packet of cigarettes intended for sale in the USA. This work examines the real effect of health warning label on the package of cigarettes. Why such a clear and unambiguous warning text has no influence on reducing the number of smokers. What is the secret of the controversial nature of this label? These are the main questions that this research is trying to resolve. The study involved 50 participants, aged 20 to 40 years, active cigarette smokers with dominant right hand. EEG recorded respecting the prescribed standard of electroencephalographic scanning.

Research has shown to what extent the warning label does not affect the smokers to reduce the number of cigarettes but actually incentive the desire to smokers to light up a new cigarette. Conducted EEG monitoring just proved that the warning label is actually hidden message which smokers cannot resist, and this is a feature of the first-class subliminal message.

Key words: Tobacco, marketing, neuromarketing, EEG–electroencephalography, propaganda.

1. Materials and methods:

The experiment was performed in the stable environment with controlled temperature and illumination, respectively all experimental condition was in accordance with Guidelines for the recording and quantitative analysis electroencephalographic activity research contexts. (Pivik & all, 1993: 547-558) EEG signals were recording using an MITSAR 201 system, through active Dry electrodes, TDE-200, Florida Research Instruments. The electrode placement system we used was a 10/20 system. The frontal electrode is placed 10% of the total length above the nasion, and the rest of the electrodes are spaced 20% between them. We used a referential montage, Fp1, Fp2, F7, F3, Fz, F4, F8, T3, C3, Cz, C4, T4, T5, P3, Pz, P4, T6, O1, O2, with a common reference on the ear (A1 & A2). Impendance is lower than 5 kOhm. Processing and visualization of signals made by using computer software WinEEG.
Branislav R. Tanasic / What is actually the warning label on the package of cigarettes?

All subjects were given instructions and were asked to abstain from tobacco smoke, at least, four hours before EEG monitoring. All participants were warned that must no have neurological disorders and must no be taking mind altering medications or some illegal substances. The ending, all of them were required to sign the consent form. Participants in the experiment were exposed to a stimulus, a series of photographs that have provoked a certain mental and emotional states. After displaying each photo a 5 sec long baseline recorded. When is presented a picture, marked times of this activity? Computer broadcasting photo stimuli synchronized with a computer EEG device, so that any change in the stimulus automatically records. Upon completion of the EEG, monitoring subjects were asked to complete a questionnaire. The questionnaire consisted of closed answers, (Likert scale 1 to 5), about average daily cigarette smoking, then fear of the consequences of smoking, reducing the number of cigarettes due to the effects of health warning labels, etc.

2. Foreward:

The first page of Allan Brandt book, The Cigarette Century, begins with professor Ronald Numbers dramatic declaration: “For decades tobacco companies have killed more Americans than all the armies, terrorists, and criminals combined.“ The same author continues with very pessimistic prognosis: “100 million people died of smoking-related diseases in the twentieth century; in the next 100 years, we expect 1 billion deaths worldwide.“ (Brandt, 2007)

Tobacco is grown and used for a long time. Native Americans utilized it for more than two thousand years for chewing and smoking in religious ceremonies. The first European who used tobacco for smoking was Christopher Columbus. At the beginning of the eighteenth century, smoking and tobacco growing are widespread. However, many doctors soon realize and establish a connection between tobacco consumption with the emergence of severe respiratory illness. Even in 1602, an anonymous English author published an essay Work of Chimney Sweepers, which compares diseases of the respiratory build up of soot in the j.chimney. Despite all the resistance and alert doctors and their associations, sale and cultivation of tobacco were growing steadily. It’s become so exceptional volume and profit business. Growing understanding of the connection between the consumption of tobacco products and the respiratory illnesses. In the years that followed, all the most frequent and more severe warning of the danger to health from tobacco smoke. Back in 1965, was passed in the US Cigarette Labeling and Advertising Act /Law on compulsory setting up a health warning labels on/. This law obliged the tobacco industry to put labels on each package of cigarettes intended for sale in the US. On the label is printed clearly visible text: “CAUTION: SMOKING MAY BE HAZARDOUS TO YOUR HEALTH:“ Just two years later, the Federal Trade Commission, after conducting extensive research, submit a report to US Congress, which says that there is no evidence on the impact of health warnings on reducing the number of smokers. (Federal Trade Commission, 1967) Why such a clear and unambiguous warning text has no effect on reducing the number of smokers? Number of drug nicotine smoke, particularly at developed countries, consistently increasing at an annual rate of 3.4%. Subsequent studies have confirmed all the Federal Commission results, (Lindstrom, 2008) but only neuromarketing analysis of bioelectric potentials involved brain regions as the impact of warning labels, could exposed its true effects. What is actually neuromarketing, bioelectric potentials, and how it all begin?

3. The brief history of research bioelectric potentials:

Englishman Richard Caton first observed the ability of neurons to achieve the bioelectric potential intercellular - bioelectricity, which can be detected by a galvanometer. Caton was able to record the electrical activity of the exposed brain of rabbits and monkeys using a galvanometer with mirror. In general, early explorers were extremely modest possibilities, given the area that is trying to explain. They have mainly used electrometer called "electroscope" that revealed weak electrical potential, and the experimenter these changes could follow on the instrument, through subtle mechanical changes, such diversion needles or thin gold foil. (Pearce, 2001: 620) Galvanometer which is used Caton was already considerably more advanced devices. In order to improve the visualization of the results, when measuring weak signals, intensified the wave form such as oxygen torch lighted mirror, and thus reflect the two-meter-scale display on the wall of his laboratory. (Hass, 2003: 9)

International Journal of Contemporary Research and Review, Vol. 9, Issue. 02, Page no: SS 20383-20392
doi: http://dx.doi.org/10.15520/ijerr/2018/9/02/415
Branislav R. Tanasic / What is actually the warning label on the package of cigarettes?

About his experiment in 1875. Caton said: "The emergence of electric current in the gray matter associated with its function." (Collura, 1993) Short and concise statements, set the cornerstone for further research electro-brain activity, actually represents the discovery of electroencephalography. A survey conducted two years later, confirms and extends previous results. Caton reports that studied more than 40 cats, rabbits, and monkeys, watched the variation of brain activity. The first successful electroencephalographic (EEG) recording was performed on a human being, done by Hans Berger (1873-1941), German neurologist, at 1929. Results of early neurophysiological shooting at people were unsuccessful for various reasons. For example, a respondent was sitting with a bunch of silver electrodes affixed to the head, which was not very comfortable, the less moving head could break down the results. From failures and successful efforts formed the experience, and among other things, expressly requested that during the EEG recording, in order to eliminate ignorant exclude other devices - ray machines for example, even though located in another building! (Millet, 2001: 529)

Already in 1946, founded the American EEG Society (American Electroencephalographic Society – AEEGS), and in the same year the first International Congress of EEG experts. Ross Adey, head of the group for quantitative studies of the brain at UCLA Brain Research Institute, was a pioneer in the use of QEEG (Quantitative EEG), with the use of digital computers for data processing. During 1961, they did an excellent job of mapping the human brain for the first time. Thus, these researchers laid the foundation for further studies of the human brain.

Modern EEG is a neurophysiological method that identifies the electrical activity of the brain, or changes made through the membranes of ganglion cells of the CNS (central nervous system). EEG device detects these changes by using silver or gold electrodes arranged on the head of the respondents. There are international standards that regulate the number and arrangement of electrodes, the most commonly used 10/20 or 10/10 as the expanded version. Actually, the technique is based on measuring the potential differences between these electrodes. This is the oldest neurophysiological measurement method, developed from the galvanometer used by the pioneers in this field of research. Otherwise, the method is widely accepted not only for medical purposes but also as a tool in research neuromarketing.

4. Neuromarketing:

Neuromarketing is not a new type of marketing, it's a new way to approach the study of marketing. It is based on the use of modern research techniques and instruments intended for measuring the level of brain activity, to understand and measure the impact of marketing and advertising to consumers. Neuromarketing techniques explain how people really think and make decisions, including the brain processes which actually are not aware of or insight into the decisions and behavior invisible to traditional research methodology. Neuromarketing originates from the field of neuroscience, and the goal is to better understand the functioning of the human brain. This is a relatively new field of consumer research and marketing using the latest technology to study the neurophysiological processes that occur during the making individual decisions. Unlike traditional, behavioral psychological interpretations of subjects, introducing neuromarketing methods and instruments, the researchers were able to directly observe the changes in bioelectric potentials in the brain, without a doubt, unmistakably identify and measure the activities of certain regions of the brain to stimuli from the environment. Neuromarketing is a combination of marketing and neuroscience, brain scans may identify the activity of certain brain regions, but also to gauge the level of influence of stimuli from the environment, for example - the advertising content. Ability neuromarketing techniques to peek directly into the consumer's head removes any possibility of confusion and concerns about reactions of the respondents. Tools and methods used in neuromarketing analysis of rapidly developing the ability to better visualization of the consumer subconscious response to stimuli from the environment, or the use of modern software enable the visual display of brain regions involved in 2D and 3D format.

Neuromarketing view can give a stunning and surprising result. An example of small label warnings on the harmful effects of tobacco illustrates the surprising turn, even a hidden message that the label is transferred to smokers. It was one in a series of attempts to limit or reduce the number of drug tobacco. In addition to the obligations of the company to put a label with information about the harmful effects of tobacco on the health of consumers, Congress Act severely restricted the ability of tobacco advertising in mass media.

International Journal of Contemporary Research and Review, Vol. 9, Issue. 02, Page no: SS 20383-20392
doi: http://dx.doi.org/10.15520/ijcrr/2018/9/02/415
Results of numerous studies coincide in evidence that the health warning label does not affect the reduction in the number of smokers. On the contrary, neuromarketing is unequivocally proving that label, not only distracts from smoking, but awakens in smokers desire for tobacco, and provokes the urge to light another cigarette! Therefore, Martin Lindstrom perfectly right when commenting on various legal prohibitions, including label warnings, says for tobacco corporation: “They have succeeded in bypassing governments’ regulations by creating stimuli powerful enough to replace traditional advertising. And in fact, they’ve even managed to enlist the help of governments all over the world; by banning tobacco advertising, governments are unwittingly helping to promote the deadly behavior they seek to eliminate.” (Lindstrom, 2008: 114) Lindstrom’s statement is further evidence of the findings of the Federal Trade Commission inspired us to examine very interesting question - what is actually the warning label?

5. Neuromarketing research – Results and discussion:

We examine 30 male participants, aged from 20 to 40, and 20 female aged from 20 to 40 years, all right-handed, different occupations and level of education. All participants selected as right-handed because of differences that occur in brain lateralization. Through neurophysiological research conducted using EEG, research raw data need to be processed prior to the analysis- correction of EEG artifacts. The signals usually acquired during EEG is generally contaminated with different noise sources, power line interference 50Hz, and severe biological signals. WinEEG offers a methods of digital EEG filtering, the list a set of parameters we used: speed 30mm/sec, gain /absolute peak-to-peak threshold/ 200 milliV, low cut 0.1 sec (1.6Hz), high cut 30Hz, and notch filter to suppress AC line, 45-55Hz, (European AC frequency standard is 50Hz). Eye blink artifacts separation performed using an Independent Component Analysis (ICA) methods. Throughout basic statistical analyzes, EEG findings, and discussion will present data and evidence to suggest the true nature of the warning labels and its actual effect on smokers. The first analysis we did was review the relationship of the average amount of cigarettes smoked and gender. (Table 1) then respondents were sorted by age categories, with the monitoring of a number of cigarettes smoked. (Table 2)

Table 1.

| Count | Sex | Average smoke more than one pack of cigarettes | Total |
|-------|-----|-----------------------------------------------|-------|
|       |     | Average smoke more than one pack of cigarettes |       |
|       |     | not at all | rarely | I am not sure | often | always |
| Sex   | female | 6 | 6 | 4 | 3 | 1 | 20 |
|       | male  | 8 | 9 | 4 | 3 | 6 | 30 |
| Total |       | 14 | 15 | 8 | 6 | 7 | 50 |

Table 2.

| Count | Age | Average smoke more than one pack of cigarettes | Total |
|-------|-----|-----------------------------------------------|-------|
|       |     | Average smoke more than one pack of cigarettes |       |
|       |     | not at all | rarely | I am not sure | often | always |
| Age   | to 20 years | 2 | 0 | 3 | 0 | 2 | 7 |
|       | to 30 years | 7 | 10 | 4 | 2 | 3 | 26 |
|       | to 40 years | 5 | 5 | 1 | 4 | 2 | 17 |
| Total |       | 14 | 15 | 8 | 6 | 7 | 50 |

The next step is to compute the correlation between several important issues of this research. Pearson correlations between questions: Are you afraid of the consequences of smoking and cigarette packing warning label influence, (Table 3), shows a significant degree of impact warning labels on cigarette
smokers, \( \text{Sig (2-tailed)} = 0.000 \). The size of correlation of 0.732 means a strong positive linear relationship. (Cohen, 1988: 79-81)

**Table 3:**

| Correlations | Are you afraid of the consequences of smoking | Warning cigarette packing label influence |
|--------------|---------------------------------------------|------------------------------------------|
|              | Pearson Correlation Sig. (2-tailed)          |                                          |
| Are you afraid of the consequences of smoking | 1                                          | .732                                     |
| Warning cigarette packing label influence     | .000                                        | 1                                        |
| N                                                     | 50                                         | 50                                       |

When Pearson's correlation coefficient to recalculate in the coefficient of determination could see how much of the variance of two variables together 53,5%. What are actually means; that more than 53% responders have a fear of the consequences of smoking, which is caused by label warnings. By designing this study, in accordance with the text of the warning labels, we started from the set hypotheses: The label of health warnings on packets of cigarettes really have the effect on smokers by reducing the desire to smoke, so smokers reduce the number of cigarettes smoked. Preliminary results showed that the respondents gave oral answers in the expected framework, adapted to social norms and socially acceptable standards, which is actually the main problem of the classic survey. This is particularly important because of the results of the survey based on which we can conclude a direct impact warning labels to reduce the number of cigarettes smoked. It is clear that the behavior of subjects is not in accordance with the given answers, and it is necessary to review the reasons for this discrepancy. As you can see at first glance, the results obtained in the poll, show illogical answers and a lack of consistency between them. First of all, a relation between health warning cigarette label, whose influence is expressed through the fear of smoking, and reducing the number of cigarettes due to warnings. Table 4, shows these relationships.

**Table 4.**

**Warning cigarette packing label influence * Did you reduce the number of cigarettes due to warnings**

| Did you reduce the number of cigarettes due to health warnings | Total |
|--------------------------------------------------------------|-------|
| not at all | slightly | I am not sure | smoke less | considerably |
| little bit | 2 | 0 | 0 | 1 | 0 | 3 |
| I am not sure | 8 | 2 | 8 | 2 | 1 | 21 |
| partially | 6 | 2 | 4 | 3 | 1 | 16 |
| completely | 3 | 1 | 0 | 2 | 4 | 10 |
| Total | 19 | 5 | 12 | 8 | 6 | 50 |

Since the Serbian’s is world leader in the number of cigarettes smoked per year, 2861 cigarettes per capita, (Market Watch, 2014), we will display some interesting additional indicators.

*International Journal of Contemporary Research and Review, Vol. 9, Issue. 02, Page no: SS 20383-20392 doi: [http://dx.doi.org/10.15520/ijcerr/2018/9/02/415](http://dx.doi.org/10.15520/ijcerr/2018/9/02/415)*
We compared the impact of health warning labels on several different indicators. For example the first pair (table 5); The impact of warning labels on reducing the number of cigarettes smoked, can see the huge direct impact of warning text alerts to reduce the number of cigarettes respondents. The column Eta squared, the value of 0.36 indicate that there is a significant influence on the examined results. (Cohen, 1988: 284-287) Similarly with the second analyzed case, but should pay attention to the third pair: Warning cigarette packing label influence – Average smoke more than one pack of cigarettes. Average difference results (Mean) with value T as well as negligible Eta squared, indicates that almost no fear of the consequences of smoking regardless of the 53.5% of respondents expressed fear of the consequences of smoking, but the majority of respondents smoked one, or more than one pack of cigarettes a day!

At the and the question: Do you think it’s time to quit smoking? Somewhat provocative question that the respondents in the survey answers to the range: “Not yet“ had been categorically 11 persistent smokers, through the responses “Sometimes“ identified themselves 14 resp., “Not sure“ declare 13, while “Think about it“ 9 smokers, and finally “Interruptning smoke“ said 3 respondents.

EEG recording contains very much information so that during an examination and comparison of the data is necessary to establish specific criteria by which we compare the data and draw conclusions. We attention to the beta waves, an alpha activity of the frontal and occipital cortex, and theta waves which are closely linked to emotions and the limbic region, represented in the orbitofrontal cortex. Also, the amygdala is involved in emotional processes, since it is located in the deep brain, it is activities do not directly affect EEG scans, but through the cortio-stratio-thalamo-cortical loop which is reflected in the prefrontal cortex, precisely DLPFC, it is possible to detect emotional changes of subjects. There is a difference in frontal cortex activity among the left and right hemispheres of the brain. Davidson’s model describes the left side alpha activity of PFC as an expression of positive emotions while the activity of the right side shows negative emotions. (Davidson, 1992; Jones & Fox, 1992: 280-299) Instead of comparing the results with average of all the electrodes for certain wave rhythms, we decided to compare the results on the basis of the measured values of key electrodes for each harmonic rhythm, respectively theta, alpha and beta. We tried to localize precisely what changes to the measuring points- electrodes. For example, theta activity in the right prefrontal cortex represents fear, anxiety. (Coan & Allen, 2004: 7-49) This claim may initiate a heated debate about the lateralization PFC activation during emotional regulation, and that the effect of EEG asymmetry represents regulate negative emotions, actually reducing the negative emotions. Realistically, it is one of the possibilities, but discussions in this direction would far exceeded the scope of this paper. Therefore, we reduction theta activity in the left ventrolateral prefrontal cortex (VLPC), or alpha majority in occipital regions, interpreted as a reaction to negative experienced stimulant.

Software WinEEG allowed us to criete frequency spectrum brain mapping, so we can see sequences, reaction to the photos that are supposed to stimulate smokers. (Figure 1 and 2)
We have already noted that EEG monitoring can give a huge amount of data, so we have focused on an analysis of the results of a couple of basic questions. After each photo finished, the participant asked to perform a self-assessment of their levels of health fear, daily amount of cigarette, or desire for the light-up new cigarette, etc.

One of our questionnaires was: Are you afraid of the consequences of smoking? At the answer of a question, but under EEG monitoring, we had the following results.

Figure 3 shows the average respondent's answer. Lack of fear in response to stimuli as a warning on the package despite the fact that this horrific photos of deadly diseases. This controversial attitude towards health warning is further proof that there is often a significant difference between the responses to the questionnaire, and what is really happening in the brain of respondents, judging by the fact that the majority of respondents stated that they fear the health warnings, and they therefore significantly reduce the number of cigarettes smoked.

Question from the questionnaire concerning the fear of consequences of smoking, but now formulated as: “Read the warning on the packaging of cigarettes, you see photos of various diseases, do you think that some of this illness can affect you?” Table 6 shows the statistical relationship between the response "I don’t think so" or disagreement and response "I agree". Regardless of the high percentage of fear of consequences of smoking, which respondents expressed during the interview, EEG research shows a high level of disagreement with the possibilities that smokers get sick.
By completing the EEG monitoring, we regularly perform the following experiment: On the table there is always a packet of Marlboro cigarettes, but covered with some paper. When we inform the respondent that the experiment is completed, of course still have all of the electrodes on the scalp, discreetly slip away paper so that the respondent could clearly see the health warning label on the pack. The most common reaction was instantaneous; a significant jump alpha and theta rhythm in the prefrontal cortex, that clearly shows a great desire to light a new cigarette immediately. (Figure 6)

After finishing the research has opened some additional questions and as always new ideas about organizing research. First of all, carry out research to non-smokers, scan their reactions to the warning label, and then compare the results with smokers. Another idea that crystallized during this research, which also needs to improve the study and contribute to its implicit; scan smokers’ reactions to the old cigarette packs without warning label and compare the reactions to the package with health warning label. All of these ideas is necessary to check through the research procedure, and further researches in this area could be developed in this direction.
Conclusion:
What exactly is this label warning? By its form, the text of the health warning notices on the harmful effects of tobacco and it is clear to anyone who can read it. Launched as a goodwill gesture tobacco corporations intended to reduce the number of smokers actually is the biggest marketing scam. Through the development of electroencephalography, we show that the top management of the tobacco corporations could have a look at the reverse effect on health warning labels, far earlier than the statutory obligation that is placed on cigarette packaging. They had mean technical capabilities that directly and without any possibility of confusion, know the real effects on smokers. Neuromarketing is flawless proved that the label does not discourage smokers from tobacco but strongly stimulates the desire to light up a new cigarette. All the above leads us to the conclusion that the etiquette is actually hidden message where smokers can not resist, and this is a feature of a first-class subliminal message. Small warning label ended a great job!
At the end just to remind, in the US about half of all consistent smokers will die prematurely as a result of their nicotine addiction. (U.S. Department of Health and Human Services-HHS, 2004). Thus, if only one smoker read this article and decide to reduce the number of cigarettes or even make a decision to cease smoking, this manuscript has justified its existence.

Literature:
1. Brandt A., (2007). The Cigarette Century: The Rise, Fall and Deadly Persistenc of the Product that Defined America, Basic Books, New York
2. Coan J.A. & Allen J.J. (2004). Frontal EEG asymmetry as a moderator and mediator of emotion,
3. Bihavioral Psyhology, 2004 Oct; 67(1-2): 7-49
4. Cohen J. W. (1988). Statistical power analysis for the behavioral sciences, 2nd edn, Hilsdale, NY: Lawrence Erlbaum Associates
5. Collura T., (1993). History and Evolution of Electroencephalographic Instruments and Techniquesm Journal of Clinical Neurophysiology, Raven Press Ltd. New York, 10 (4)
6. Davidson, R. J. (1992). Emotion and affective style: Hemispheric substrates, Psychological Science, 3(1), 39-43
7. Federal Trade Commision, (1967). Report to Congress, Persuant to the Federal Cigarette Labeleing and Advertising Act, Federal Trade Commision Hass L.,(2003). Hans Berge /1873-1941/ Richard Caton /1842-1926/ Neurology,Neurosurgery & Psychiatry.
8. Jones, N., & Fox, N. (1992). Electroencephalogram asymmetry during emotionall evocative films and its relation to positive and negative affectivity, Brain and Cognition, 20, 280-299
9. Lindstrom M., (2008). New York, Broadway Books
10. Market Watch, (2014). 10-Countries where people smoke the most, [online] Available, http://www.marketwatch.com/story/10-countries-where-people-smoke-the-most-2014-07-22 [Novem. 19, 2015]
11. Millet D., (2001). Hans Berger: From Psychic to the EEG, Perspectives in Biology and Medicine, Volume 44, Number 4
12. Pearce J., (2001). Emil Henrich Du - Bois Reymond /1818 – 86/, Journal of Neurology Neurosurgery & Psychiatry, 71, 620
13. Pivik R. T., R. J. Broughton, R. Coppola, R. J. Davidson, N. Fox & M. R. Nuwer, (1993) Guidelines for the recording and quantitative analysis electroencephalographic activity research contexts, USA, Psychophysiology, 30 (1993), Cambridge University Press
14. U.S. Department of Health and Human Services (HHS),(2004), The Health Consequences of Smoking A Report of the Surgeon General, HHS, CDC, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, [onli Available: http://www.cdc.gov/tobacco/data_statistics/sgr/2001/index.htm [Feb. 02, 2016]