A study on the communicative effectiveness of graphic warning labels on tobacco packages in Taiwan.

Introduction

The World Health Organization adopted the first global public health treaty, the Framework Convention on Tobacco Control (FCTC), on May 21, 2003, during its 56th conference. The main purpose of the framework is to protect people from tobacco hazards by undertaking effective legislative and administrative measures and through international collaboration. Article 11 of the FCTC specifies that health warnings and messages on tobacco product packaging and labeling should be large, clear, obvious and concise; they should make up no less than 30% of the major visible area and be approved by a responsible governmental administrative authority (Strahan et al., 2002).

From statistics on the smoking rate of adults (18 and above) for the 1980s, the smoking rate of males and females was 60.4% and 3.4%, respectively. In 2002, the male smoking rate declined to 48.2%, while the female smoking rate increased to 5.3% (Taiwan Tobacco Control Annual Report, 2008). In 2008, the adult (18 and above) smoking rate for males and females was 38.6% and 4.8%, respectively (Bureau of Health Promotion Annual Report, 2009). From the statistics above, we can see that the male smoking rate has been declining, although the rate has slowed in recent years. The female smoking rate should be carefully observed. The smoking rate for junior high school students was 6.6% in 2004 (8.5% for males; 4.2% for females) and 7.5% in 2006 (9.7% for males; 4.7% for females). The smoking rate for senior high school students was 15.2% in 2005 (21.1% for males; 8.5% for females) and 14.8% in 2007 (19.3% for males; 9.1% for females) (Bureau of Health Promotion Annual Report, 2009). Thus, the smoking rate among juveniles has been growing as they age, especially for female juveniles. Based on the population over 18 years of age for 2007, there were a total of 3,500,834 adult male smokers and 455,894 adult female smokers. The 2007 data shows that among adult male smokers, the age group of 36-40 with a 53.3% smoking rate was the highest; for adult female smokers, the age group of 21-25 with an 8.3% smoking rate was the highest (Taiwan Tobacco Control Annual Report, 2008).

This research focuses on the following three target groups for further study on the effectiveness of warning labels on tobacco products for different groups.

1. Male smokers age 18 and above (the major smoker group)

2. Female smokers between age 18 to 30 (the major female smoker group)

3. Juvenile smokers between age 12 to 18 (continuously increasing)

The research purposes are threefold: First, to provide an analysis of the foreign and national researches on warning messages and labels on tobacco products for further execution in Taiwan; second, through a scientific eye-tracking assessment, this research aims to understand smokers' visual navigation patterns towards warning labels; third, to summarize the overall evaluation results for future label design references.

Literature Review Smoking Population and Related Policies

According to the WHO, there are 1.3 billion smokers in the world, and half of them will die early due to tobacco use. Tobacco hazards cause 4.9 million deaths every year. Moreover, other than being detrimental to health and lives, smoking incurs incalculable national medical, economic, and social expenses.

Modifying the packaging and labeling of tobacco products is a very important measure to decrease the use of tobacco products, since the tobacco package is a direct medium to smokers. If clear warning messages and labels can be added onto it, and misleading wordings can be corrected, the tobacco package can be a positive communication channel to achieve the effectiveness of reverse marketing. According to a Canadian research report, modifying the packaging and labeling of tobacco products can draw the attention of smokers' and lead to discussion on damages caused by smoking, thereby increasing their willingness to quit smoking. The assessment on warning messages and labels on tobacco packages carried out by the Australian government in 2008 indicated that 90% of smokers think the labels are believable or effective. Among this group, 56% want to quit; 55% say the warning labels can help them continue not to smoke, and 22% think it can prevent them from smoking. Therefore, it is indeed necessary to execute warning labels on tobacco packages.

According to the Canadian Cancer Society, 28 countries use graphic warning messages, among which, Canada was the first country to adopt graphic warning labels in 2001, followed by Brazil in 2002. Taiwan is among the first 20 countries to use warning messages

and labels on tobacco packaging. Currently, neighboring countries, including Thailand, Hong Kong, Malaysia, and India are adopting graphic warning messages (Fong, Hammond, & Hitchman, 2009).

Evidence shows that health warnings and messages that contain both pictures and text are far more effective than those only with text. The most well-known studies are those by Hammond, Fong, McNeill, Borland, and Cummings (2006), and the survey by ITC of twenty countries (Fong, Hammond, & Hitchman, 2009). These results reveal that graphic warning messages are more likely to be noticed. Moreover, for the purpose of educating smokers, graphic messages can catch smokers' attention regarding the health threats and risks induced by smoking, thus stimulating smokers' intention to quit.

From the perspectives of educational level and residence, the smoking rates of individuals with less than senior high school education and living in eastern, central and southern Taiwan are higher; the smoking rate of individuals with less than a high school education and living in eastern Taiwan in particular is the highest (National Health Index Interactive Website, 2005). Foreign studies found that although people with more education know the damage caused by smoking, this finding is not directly related to the factor of attention to graphic labels or the intention to quit. On the contrary, young people tend to react to graphic labels whether for health messages or cessation actions. Therefore, the studies concluded that targeting youths is relatively effective. The studies showed that those who are more dependent on nicotine pay less attention to graphic labels. The studies further indicated that since graphic labels may not be effective for this group, nicotine replacement therapy may be more effective (Thrasher, Hammond, Fong, & Arillo-Santillan, 2007). As for communicative effectiveness, Thrasher, Hammond, Fong, and Arillo-Santillan (2007) also deem those who have the intention to quit are more likely to pay attention to warning labels, so the effectiveness would be more obvious than the intention evoked by graphic labels.

Warning Messages and Labels in Other Countries

Before the enforcement of FCTC, the Canadian government had been implementing health warning messages and graphs on tobacco products from 2001. Canada was the first country to use warning labels with both graphs and texts instead of the customary text-only warning labels. Brazil's government, in 2002, produced a series of "mild" warning labels without substantial effect. Consequently, it produced another series of warning labels with a fear-inspiring approach in 2004 and 2009, respectively; this successfully attracted the attention of smokers' attention and the concern of tobacco companies concern. It reduced the sales of tobacco products and stopped the continuous increase of the smoking

population. By April 2007, 42 countries adopted laws regarding this issue, and nearly 200 warning labels for tobacco packages have been adopted by countries around the world (Devlin, Anderson, Hastings, & MacFadyen, 2005). The study collected warning labels for tobacco packages from different countries, and analyzed these labels with respect to the message content. The content features three major types of approaches or appeals:

1. Fear-inducing approach: diseases induced by smoking and the regression of physical condition.

2. Social appeal: the effects of smoking on one's state of health, personal relationships, and personal values.

3. Cessation-support appeals: benefits of quitting smoking.

In terms of the production of warning labels, most countries adopt the fear-inducing approach. Based on a review of the literature since 1950, a number of studies supported that fear can trigger changes in unhealthy behavior, such as the promotion of the cessation of smoking, especially supportive information is also provided (Hammond, 2009). The six warning labels currently in use adopt a strategy similar to that used by Canada, the fear-inducing approach and social appeal. Different approaches can be used in the future. For instance, Fong, Hammond, and Hitchman (2009) suggested neuropsychology (previously adopted by Brazil) rather than the fear-inducing approach or social appeal, endorsement (previously adopted by Chile), or cessation assisting channel (adopted by Taiwan and New Zealand) or a combination of character or graphs with public media.

1. Canada: Over half of the messages adopted a fear-inducing approach, emphasizing the types of damage to one's health caused by smoking (e.g., oral cavity, sexual function, cardiopulmonary function, life expectancy). Social appeals are also adopted to point out the damage inflicted on others (e.g., on fetuses, babies).

2. Brazil: Primarily used a fear-inducing approach, together with strong visual impact and rational appeals.

3. Singapore: Communicative messages are primarily fear-inducing approaches (e.g., diseases affecting the oral cavity, fetuses, circulating system, cancer). Measures are similar to those of Brazil, using strong visual impact with rational textual messages.

4. Thailand: Primarily fear-inducing approaches Concluding from the content analysis of warning labels used in different countries, most cover oral cavity diseases, cardiovascular diseases, lung and respiratory tract diseases, sexual dysfunction, the health condition of pregnant women and their fetuses, life expectancy, etc. There is no significant difference between the six current warning labels used in Taiwan. The major difference is the means of presentation. In general, the point of our warning label is closer to the fear-inducing approach, with relatively fewer social appeals and cessation supportive appeals. Liu (2002) took messages for the prevention of tobacco hazards as an example to evaluate the effectiveness of the fear-inducing approach in health promotion messages. The research based on (e.g., stroke, emphysema, aging, oral cavity damage, cancer), with only a few psychological and moral approaches.

5. Australia: Primarily fear-inducing approaches (e.g., cancer, eye diseases, life expectancy, cardiovascular diseases, emphysema), social appeal (second-hand smoking) and cessation support appeals (health condition improvement).

6. Uruguay: Distinct from the countries described above, messages are primarily related to the physical damage caused by smoking (e.g., toxic materials, sexual dysfunction, oral cavity diseases, and cancer), but more messages adopting social appeals are used. In addition to textual messages appealing to reason, emotionally-charged messages and questions are used to catch the attention of target audiences' and elicit an emotional projection to attain the desired effects.

The following six warning labels are currently used in Taiwan:

EPPM, health promotion messages adopting a fear-inducing approach should be able to evoke a perceived fear, perceived threat and perceived efficacy in individuals to attain effectiveness. Results revealed that the messages adopting a fear-inducing approach should be related to the audiences; meanwhile, a portion of the examinees may have reactance for not being able to react.

[FIGURE 1 OMITTED]

However, given that there are different cultures and different people in different countries, the percentage of fear-inducing approaches should be re-evaluated. Moreover, some researches suggested adding warning labels using social appeals and cessation supportive appeals. Also, emotional factors should be put into textual messages, such as those used in Uruguay, to communicate with a target audience and enhance the power of the warning

label for resonance.

Strahan et al. (2002) analyzed the warning labels from a social psychological perspective, making the following suggestions on content to enhance the warning effect:

1. Promote attitudes and beliefs towards alternative behavior: If the message can promote the desired passive behavior and attitude while suppressing negative behavior, the message will be more persuasive (for example, promoting the benefits of quitting smoking).

2. Utilize gain-framed messages: Gain-framed messages may be more effective than loss-framed messages.

3. Emphasize subjective norms: According to the Theory of Reasoned Action, subjective norms are defined as the individual's perception of social approvals or social pressure to engage in or not to engage in a given behavior (Fishbein & Ajzen, 1975). Specifically, if a smoker perceives pressure from the social environment like family, peers, and friends, the more likely he or she will have higher motivation to quit smoking. If the warning messages and labels can gain support from the reference group, the validity of the message can be enhanced.

4. Focus on relevant attitudes of the target group: Not only identify the attitudes and beliefs of the target groups, but probe into the meaning behind their attitudes and beliefs.

5. Increase perceived self-efficacy: If people believe they can succeed, that is, if they have a high perceived self efficacy, they are more likely to change their behavior.

People may encounter warning messages and labels under different circumstances. To enhance the effectiveness of such messages, the features of the labels should emphasize an increase of involvement, such as orange-red warning messages. Orange-red is related to warning signs and notices. While there is low involvement, even if the message does not work, the color can still deliver a sense of warning.

Eye-tracking Measurements and Applications

In the 1970s, an eye-tracking system was developed and applied to learning and recognition areas. For example, Just and Carpenter (1980) and Rayner (1978) indicated that the time fixation points stay on a word or a sentence can be regarded as the time needed to learn or recognize it. In other words, while comprehending message meaning,

the eyeballs fix on the specific message. Rayner (1978) further proved that eye-movement position reflects a reading and information recognition mode. Consequently, the eye-movement and reading-comprehension mode are correlated. Theories based on establishing a reading and comprehension process through fixation and eye movement were developed gradually after the 1980s, and were widely adapted to other related fields. Tang and Jhuang (2004) pointed out that many studies only use images as stimuli (Mackworth & Morandi, 1967; Yarbus, 1967; Baker & Loeb, 1973; Antes, 1974; Henderson & Hollingworth, 1999) or only use texts as stimuli (Just & Carpenter, 1976; Rayner, 1998). Most research institutes equipped with eye-tracking systems in Taiwan focus on human engineering, but not on layout arrangements. Therefore, up to the present, few empirical studies apply both images and texts so that it has thus far been inconclusive whether images influence text reading or vice versa.

Among applications on advertising, marketing, and design, researchers began to use an eye-tracking system to study consumers' fixation time on advertising messages and to study consumer behavior from the comprehension of messages to purchasing-related decision making. For instance, Frazier (2006) used an eye--tracking system to study how consumers look at products on shelves after entering retail stores or wholesale markets. The study found that 70% of consumers decide what they are going to buy after entering the store, and among the wide variety of products on the shelves, only half of them are seen by the consumers. An eye-tracking system can further help researchers understand how consumers pay attention to products on shelves, what kinds of packaging attract consumers' attention, how consumers read the package designs and the textual messages, and the time span of the fixations. All these factors may influence the final purchasing decision. Marketing researchers use an eye-tracking system to study the fixation and product selection behavior after consumers enter a store. The same concept can also be applied to study how consumers browse online advertisements and print advertisements (Frazier, 2006).

Fox, Krugman, Fletcher, and Fischer (1998) used an eye-tracking system to study teenagers' attention concentration level on warning labels in print ads of beer and tobacco. They believed using a large number of images as such warning labels are more likely to result in projective learning behavior, especially when more and more teenagers regard advertisements as a major information resource (Assael, 1992). Consequently, the government intends to make regulations and add eye-catching warning labels. On the other hand, tobacco and alcohol companies do not want these warning labels to affect advertising messages. Fox et al. then applied an eye-tracking system to analyze print ads of five kinds of tobacco and alcohol. Examinees looked at each ad for sixty seconds. By analyzing the

length percentage of fixation time, researchers determined which warning labels were more suitable for teenagers.

Besides print ads, eye tracking can also be applied to designs. For example, CNET news.com used an eye-tracking system to test audiences' internet ads browsing mode on different web pages with variables including ad size, position, and movements. CNET news redesigned their web pages and ad placement to achieve better visual effects (Paluch, Drapeau, & Marshall, 2001). Besides, Boyland, Janes, and Barber (2004) also proposed that an eye-tracking system should be applied during the web-page design process to understand users' eye movements. This approach enhances the visual effect of the website and browsers' ability to catch users' attention.

Researchers in Taiwan are engaged in eye-tracking research. For example, Tang and Jhuang (2004) conducted a study on relationships between eye movement and the layout of online news and a study on attention focused on web page color and fixation (2005). Moreover, Lai, Fu, Wen, and Tsai (2006) initiated a study on the message placement and recognition effect of TV shopping channels targeting the No.1 shopping channel in Taiwan, EHS. Beginning in 2007, the author executed a research project of the National Science Council to study the major TV shopping channels including viva TV, the momo shopping channel, and EHS, a large-scale consumer eye-tracking quantitative research. Preliminary research results found that examinees mostly shifted their points of regard as successive messages appeared on the screen. When more messages were provided, fixation points shifted back and forth along the screen, with the examinees tending to move their points of regard in accord with the voice of the shopping expert. Recalling the literature reviewed, TV audiences' visual lines follow voice guidance to a specific frame. Moreover, as compared to zoom out, close-ups are more likely to generate fixations.

Lai et al.'s research found that when consumers watch TV shopping channels, messages placed on the screen have to be directly related to the product introduced by the shopping expert. As indicated by eye-tracking records, many messages on the screen are ignored. For example, the lower scrolling message, the TV channel logo, and even promotional messages unrelated to the current product are likely to be ignored. The result proved that the current shopping channel places too many unrelated messages so that producers have to tackle the correlations between messages on the screen, the shopping experts' words, and the product introduction, and place everything with due consideration (Lai, 2007).

The statements above revealed the wide applications of eye-tracking researches. Recent studies on the effect of advertising started to notice that eye tracking can be a supplement for

traditional advertising research. The early advertising-effect studies focused on OTS (opportunity to see), but whether the audiences indeed see the major advertising messages is the CTS (certainty to see) concept. The effect test to understand if the audiences indeed see the placed message is still a grey area. An increasing number of research units are using the eye-tracking system with an OTS survey to assess advertising effect more accurately. (Hulsebos, Bos, & Appel, 2004) Since an eye-tracking system can collect results instantly, its acceptance in the research field is relatively enhanced. An eye-tracking system is often used to test audiences' scan paths so as to observe whether the target is read, and it even helps understand the visual mode and reading content of audiences. Devlin, Anderson, Hastings, and MacFadyen (2005) emphasized several points for designing warning labels to improve effectiveness: enhance the visibility of the label via color contrast; differentiate the design and content; develop creative input and carry out market research for different target audiences.

Research Method

Eye -Tracking Experiment

Fox et al. (1998) used an eye-tracking method to study teenagers' attention toward warning labels on beer and cigarette advertisements. They argued that beer and cigarette advertisements rely heavily on visual images and sensational pictures to attract teenagers' attention, which may lead to a positive attitude towards smoking (Assael, 1992). An eye-tracking technique applied to cigarette advertising has been limited to smoking-prevention research. This research is a pioneer study of eye-tracking and pictorial warning labels on cigarette packages. The purposes of this research are to investigate how smokers notice pictorial warning labels and process label messages.

Subjects

Fifty-eight smokers (34 males and 24 females) were recruited for the experiment. An advertisement for subject recruitment was posted on the PTT (the largest Bulletin Board System in Taiwan).To ensure eligibility, all subjects were screened for smoking history and age. Each selected subject received a reward of NT$300 for participation. Among the subjects were 13 teenagers. The subjects then were divided into three different age groups: teenagers aged 12 to 17 with smoking experience, males aged 18 years and older with smoking experience, and female smokers between the ages of 18 and 30 years old.

Stimuli

There were six different types of stimulus materials based on message contents: lung cancer, heart disease, impotence, oral diseases, premature birth, and family health. Some of the messages, such as lung cancer, heart disease, impotence, oral diseases, and premature birth, were classified as fear inducing. Family health was classified as social appeal. There were a total of six warnings, which was characteristic of the current set of graphic images used in Taiwan. The picture format is JPEG with a size of 350x568 pixels, placed in the center of picture with a grey background of 1024x768 pixels (see Figure 2). The experiment tested only the four areas of cigarette packaging (messages on the upper part of the package, messages on the lower part of the package, graphic image, and the remaining area of the cigarette package). After each stimulus presentation, the subjects' eye-tracking modes were categorized as fixation distributions, fixation durations, and scan paths.

Experimental Procedure

After entering the lab, each subject was given instructions on how to perform the task. The eye tracker was then calibrated and validated for each subject. To ensure that the actual experiment runs smoothly, subjects were asked to look at the image and find a product label within 5 seconds before the actual test took place. During the actual experiment, each stimulus was presented for 5 seconds. After completing the experiment, the subject filled out a questionnaire to understand changes in attitudes. A given session contained 6 stimulus presentations and lasted 10 minutes.

[FIGURE 2 OMITTED]

Results

Eye-Tracking Experiment

1. Differing Subjects' Fixation Patterns for Cigarette Warning Labels

The following results show the subjects' fixation patterns, including mean fixation counts and mean fixation time, for graphic warning labels. When a warning label was presented, the subject's fixation sequences between the first and second points were calculated as he or she would eye-trace over the image.

Overall, teenagers are the last group to notice warning labels, probably because they tend

to think that the message is not targeting them. Female smokers were aware of the message Smoking during Pregnancy can Cause Premature Death and Underweight Birth. On average, it only took 0.4 seconds for subjects to notice warning labels.

2. Comparison between Fixation Points and Fixation Time

The warning label was divided into four areas (Figure 3). In general, male smokers took most notice of the cigarette package, and most female smokers paid attention to the graphic images. However, the messages on the warning labels had the weakest impact on teenagers.

[FIGURE 3 OMITTED]

3. Distribution of Fixation Points

In order to determine which area in the scene the subject focused on, we mapped the fixation points to the area using different colors. The distribution of fixation points over each stimulus for each subject is shown in Figure 4 to 9. We used yellow, green, blue, purple, and red to characterize the spatial density of fixation points from low to high (e.g., red represents high density).

[FIGURE 4 OMITTED]

Overall, for the warning label, Smoking Causes Bad Breath and Mouth Diseases, subjects' fixation points were mostly distributed over the graphic image, and on the messages appearing in the upper part of the package.

For the warning label, Second-hand Smoke Harms Your Family, subjects' fixation points were mostly distributed over the graphic image, especially on the child's face. Most likely, the child's facial expression of fear attracts the subjects' attention.

[FIGURE 5 OMITTED]

For the warning label, Smoking Causes Heart Diseases, subjects' fixations were mostly focused on the center of the image. However, teenagers' fixations were diffusely distributed, probably because the image did not attract their attention.

[FIGURE 6 OMITTED]

For the warning label, Smoking May Cause Impotence, subjects' fixation points were mostly focused on the visual image, with teenagers paying the most attention to the bent cigarette. This image attracted the most attention among the teenagers.

[FIGURE 7 OMITTED]

For the warning label, Smoking Can Cause Lung Cancer and Emphysema, subjects' fixation points were mainly focused on the image and the message that appeared in the upper part of the package; however, female adults also noticed the message displayed on the lower part of the package. In addition, male adults purposely avoided the picture of a diseased lung on the left. This may be attributed to the fact that smokers are more inclined to evade the warning labels which induce fear.

[FIGURE 8 OMITTED]

On average, for the warning label, Smoking during Pregnancy Can Cause Premature Death and Premature Birth, subjects' fixation points were focused on the image. However, each subject group responded differently to the label. Male adults paid less attention to the image, while female adults were very focused on the image and all the messages on the package. Females were evidently more aware than males and teens that smoking may have negative effects on unborn babies.

[FIGURE 9 OMITTED]

Conclusions

Graphic health warnings (GHWs) on cigarette packages have been a prevalent means of conveying the health risks of smoking and promoting smoking cessation. Past research showed that health warnings and messages that contain both pictures and texts are far more effective than text-only ones. The present research sheds light on several issues. First, the communication objectives of Tobacco Control Programs should be specific and aligned with specific strategies. The results show that current cigarette warning labels mainly use a fear-inducing approach in an attempt to reduce smoking rates. However, from the perspective of consumer behavior, the consumer's perception of a product must be changed before changing his/her behavior about a product. In other words, rather than focusing efforts on changing smoking behavior, the communication campaign should be aimed at changing the smoker's perception of cigarettes. The study also found that

smokers who intended to quit are more likely to notice the warning labels. Therefore, the warning labels should provide a toll-free number to further assist these smokers to make a successful attempt at quitting.

Second, it is suggested that the design of warning messages should be sub-divided into different types that target heterogeneous groups of smokers. Current warning labels target smokers in general; however, different types of smokers react to the warning labels in different ways based on their personalities, motives, and information-processing abilities. Therefore, using various types of message strategies in the warning labels can enhance the persuasiveness of the message (Strahan et al., 2002).

Third, the effects of the fear-inducing approach on changes in attitudes and behavior of smokers are limited. Although prior research (e.g., Fong, Hammond, & Hitchman, 2009; Hammond et al., 2007) has indicated that inducing fear can be effective in health-related campaigns, nevertheless, our research results showed that excessive use of fear-inducing images may lead to the occurrence of a defensive mechanism of smokers (selective attentions). In other words, the fear-inducing approach had no significant influence on the intention or behavior of smokers after smokers were repeatedly exposed to threatening or fear-inducing images, especially for female smokers. As a result, to be effective, the use of such images should be accompanied with scientific data or statistics.

Fourth, Tobacco Control Programs strategies should mainly focus on light smokers and smokers with a short smoking history. The results showed that occasional smokers, and those who smoke less than 10 cigarettes per day tend to be influenced by warning images and messages more easily than moderate and heavy smokers do. Probably it is because occasional smokers and light smokers are less susceptible to psychological and behavioral dependence. Therefore, they are more likely to be persuaded to quit smoking.

Finally, warning labels should use positive communication strategies to achieve persuasive effects. Smokers are less likely to be influenced or to change their attitudes once they become accustomed to high fear appeals. Therefore, in addition to fear-inducing images, the use of affective appeals, humorous appeals, social appeals, and slice-of-life appeals, may achieve great effectiveness with respect to effecting changes in smokers' intentions and behavior.

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Table 1. Mean of Fixation Counts and Mean of Fixation Time for Graphic Warning Labels

	Smoking causes bad breath and mouth diseases		Second-hand smoke harms your family	
	Mean of fixation counts	Mean of fixation time (ms)	Mean of fixation counts	Mean of fixation time (ms)
Male adults	1.93	452.57	1.21	255.29
Female adults	1.46	357.23	1.31	300.15
Teenagers	1.25	366.5	1.5	375.75

All subjects	1.6	397.49	1.31	299.49

	Smoking may cause impotence		Smoking can cause lung cancer and emphysema	
	Smoking causes heart diseases			
	Mean of fixation counts	Mean of fixation time (ms)		
Male adults	1.21	271		
Female adults	1.23	292.46		
Teenagers	1.88	549.75		
All subjects	1.37	342.69		

	Smoking during pregnancy can cause premature death and underweight birth			
	Mean of fixation counts	Mean of fixation time (ms)	Mean of fixation counts	Mean of fixation time (ms)
Male adults	1.5	370.43	1.36	319.14
Female adults	1.31	335.38	1.31	330.77
Teenagers	1.63	394.75	1.38	564.5
All subjects	1.46	362.97	1.34	379.54

	Mean of fixation counts	Mean of fixation time (ms)
Male adults	1.78	431.57
Female adults	1.23	346
Teenagers	2.75	451.75
All subjects	1.57	404.4

	Overall Mean Values	
	Mean of fixation counts	Mean of fixation time (ms)
Male adults	1.5	350
Female adults	1.31	327
Teenagers	1.56	450.5
All subjects	1.45	366.77

Table 2. Overall Means of Graphic Warning Labels

Overall Mean	Groups	Average number of fixation points	Average fixation time (ms)
Messages on the upper part of the package	Male adults	1.37	483.05
	Female adults	1.9	597.72
	Teenagers	1.25	589.96
	All subjects	1.54	550.08
Graphic images	Male adults	7.96	2565.83
	Female adults	8.5	2710.62
	Teenagers	7.36	2430.13
	All subjects	8.02	2588.59
Messages on the lower part of the package	Male adults	1.71	442.29
	Female adults	1.68	453.03
	Teenagers	0.71	198.21
	All subjects	1.47	390.49
Cigarette package	Male adults	7.76	1998.98
	Female adults	5.96	1576.8
	Teenagers	5.9	1726.54
	All subjects	6.67	1779.9
Grey background	Male adults	1.7	494.4
	Female adults	1.75	523.34
	Teenagers	3.17	939.42

	All subjects	2.05	606.87
Overall Mean	Percentage of of fixation points	Percentage of fixation time (ms)	
Messages on the upper part of the package	6.72%	8.07%	
	9.60%	10.21%	
	6.82%	10.03%	
	7.82%	9.30%	
Graphic images	38.97%	42.87%	
	43.04%	46.23%	
	40.13%	41.25%	
	40.69%	43.75%	
Messages on the lower part of the package	8.38%	7.40%	
	8.53%	7.71%	
	3.88%	3.36%	
	7.48%	6.60%	
Cigarette package	37.60%	33.40%	
	30.05%	26.92%	
	31.67%	29.39%	
	31.67%	30.09%	
Grey background	8.34%	8.27%	
	8.79%	8.94%	
	17.48%	15.97%	
	10.44%	10.26%	