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## PROFESSIONAL EDUCATION & TRAINING | RESEARCH ARTICLE

### An Eye-Tracking Study on the Taboo Censorship in EFL Materials: The Case of Attention and Cognitive Load

Emrah Dolgunsöz

**Abstract:** ELT publishers and material designers recently excluded “pig-related visuals” in language learning materials which were to be released for Muslim and Jewish learners as well as Islamic markets such as the Middle East and Gulf region (Flood, 2015; Harley, 2015). This study aimed to establish a scientific basis for this marketing strategy in a critical perspective by examining how eye movements and cognitive load were affected by taboo content. Eye movements of 40 Muslim language learners were recorded while they processed a reversed subtitled video containing taboo (pork) visuals. The eye-tracking analysis results showed no observable effect of pork content on revisiting counts and total fixation duration on image and subtitle areas. Similarly, pupillary response analysis also indicated no effect of taboo content on cognitive load. The results were discussed in terms of emotion-attention relationship, intercultural understanding, and transformative role of second language education.

**Keywords:** cognitive load, EFL; eye tracking; taboo

Learning a second language is not only a matter of learning grammar and syntax but language learners are also required to acquire a target culture to be proficient. Hence, embedding cultural topics in second language learning materials is not only essential but also critical for language proficiency (Alptekin, 1993). In this respect, the inclusion of target culture motifs in the instructional content is obligatory. However, this inclusion in the second language curriculum is sometimes challenging due to the diverse nature of cultures. A visual or a topic which is normal for one culture may offend another. Thus, most materials are designed with the utmost care, using rigid cultural standards in order not to offend learners from different cultures. Publishers, material designers, and teachers do not take risks; they invest in general topics such as family, travel or health to be sensitive to their audience and leaving controversial cultural themes and taboo topics untouched. Taboo is “the prohibition of an action based on the belief that such behaviour is either too sacred and consecrated or too dangerous and accursed for ordinary individuals to undertake.” (Encyclopedia Britannica, 2012). In language learning, Gray (2002) called these taboos or inappropriate cultural themes as “PARSNIPs”; an acronym which refers to politics, alcohol, religion, sex, narcotics, isms and pork respectively. Keturi and Lehmonen (2011) also included suicide, violence, abortion, cursing and smoking in the list. Muslim societies, especially Gulf Arab region, are extra-sensitive and have a larger blacklist of taboo topics such as pork figures, Christian holidays, the zodiac (Gobert, 2003), dating, bikini wear, dancing, fortune tellers, the Christian church, birth control and holy cross (Zaid, 1999). One of these themes is “pork”; especially for Islamic and Jewish learners; publishers and instructors prefer not to include pig-related figures, visuals, or even words (i.e. pork, boar, sow) in their course materials and instructional content. Indeed, this measure has some merits: a concept, an image, or a visual (e.g. a pig figure) that appears natural to a Western learner may be considered offensive by a Muslim or Jewish learner. This argument was confirmed by several authors (Argungu, 1996; Khuwailah, 2000; Timina & Butler, 2011) arguing that the use of taboo motives such as alcoholism, pre-marital relationship, abortion, or religious themes might pose a negative effect on learners. Apart from this, foreign customers may simply reject to purchase an ELT (English

language teaching) material which is regarded as culturally offensive. This leads publishers to show extreme care to the cultural content and to exclude some culture-specific topics. On the other hand, this censorship has some drawbacks; an opposing argument is that censored ELT content only reflected a romanticized Western culture by focusing on only general themes such as family, festivals or travel (Banegas, 2011) presenting a fake and sanitized culture. Except for their common glossy design, ELT textbooks and materials begin to look very much alike as target culture is stripped of some of their distinctive characteristics and therefore, misrepresented. The content takes an identical form which is mainly consisted of general topics such as family, holidays, tourism, health, travel, and the like.

Most importantly, there is not enough robust empirical evidence on how learners are affected by the taboo content. By examining learner attitudes towards pork, the primary aim of this research is to examine how the attention of Muslim language learners was affected by the pork content while they watch a subtitled video including pork visuals by using the eye-tracking technique. The secondary aim is to investigate any effect of taboo content on cognitive load during subtitle processing.

### 1. Pupillary Response and Cognitive Load

Cognitive load (CL) refers to the theoretical construct that describes mental processes during any task and cannot be observed directly (Kalyuga, 2012). CL is categorized into three segments as intrinsic, extraneous, and germane cognitive load. Intrinsic cognitive load emerges due to the inherent complexity of a task (i.e. solving a complex mathematical equation) that cannot be manipulated. Germane cognitive load refers to the processes during forming schemas that are not present (i.e. attending a wedding for the first time). Being affected by external factors, extraneous cognitive load is generated by the way the information is presented (e.g. video with or without subtitles). This type of CL is common in education and primarily relies on how teachers present new input for the learners. In educational contexts, subtitles are assumed to inflate extraneous CL (Kalyuga, 2011; Mayer et al., 2001). However, in language acquisition, subtitles help learners to comprehend and process the new language input, and therefore, they decrease extraneous cognitive load (Mayer, 2002).

One way to measure cognitive load is via pupillary response. It refers to the physiological response regarding the size pupil which either increases (dilation) or decreases (constriction) during a task. The normal pupil size in adults ranges from 2 to 4 mm in bright light, 4 to 8 mm in the dark (Clark & Kruse, 1990). Apart from luminosity, although pupil dilation is open to external effects such as gender, anxiety, or some psychological disorders, it is one of the most reliable ways to measure cognitive load (Janisse, 1977). CL and pupillary response are directly linked; as the dilation increases, CL also increases (Steinhauer, 2002). The pupillary response can be measured via eye-tracking which can offer data about mean pupil diameter (Buettner, 2013). In this respect, this study hypothesized that mean pupil size during subtitle processing of the video may give valuable clues about learners' cognitive load.

Depending on the mediating role of emotion to drive attention (Eastwood et al., 2001; Oatley & Jenkins, 1996), the hypothesis of the current research is that if pork as a taboo is internalized as an emotionally negative concept by the Muslim EFL learners, their attentional span during target language processing might be affected by pork visuals. In this respect, the current study is significant as it aimed to investigate the effect of taboo visuals on the attention and cognitive load of language learners via eye-tracking technique while they processed a subtitled video with pork content. The research questions were as follows:

1. Was there an effect of taboo content on revisit counts and total time spent on the image area and the subtitle area?

2. Regarding pupillary response, is there an effect of taboo content on the cognitive load while learners processed the subtitled video?

## 2. Methods

### 2.1 Design

The current research had a between-subject design with two conditions including a group of learners who watched pork content (experimental group) and another group who watched lamb content (control group). As a part of the study, both groups watched the same cooking video including pork but the control group was instructed that they would watch a recipe video including lamb meat.

### 2.2 Participants

40 learners of EFL (20 males and 20 females) from a university in a Muslim country in an age range of 19 to 20 voluntarily participated in this study. All participants were either preparatory class students or freshmen students who were at least pre-intermediate level. Regarding demographics, all participants were Muslims with the same L1 background and they reported that they had no international experience. No participant was vegetarian. For the experiments, the participants were randomly attended into two groups with equal male and female numbers as the 'Pork Group' (PG) and the 'Lamb Group' (LG). All participants had normal or corrected to normal eyesight and were naive to the research questions.

### 2.3 Apparatus

The eye movements were recorded via a remote GP3 eye tracker with a 60hz speed. GP3 can register a sample every 16 milliseconds with 0.5–1° of visual angle accuracy and a 25 cm (horizontal) x 11 cm (vertical) head movement flexibility. Eye-tracking data was analyzed with GP3 Professional Software.

### 2.4 Visual Stimulus

A 3.20-minute cooking video with 1280 × 720 resolution was used as the visual stimulus. The video step by step described how to prepare “pork carnitas”—a special dish in Mexican cuisine. The video was downloaded from the YouTube channel ‘Food Wishes’, shortened and edited by the researcher to add subtitles and soundtrack. All sounds of the original video were deleted and it was turned into a reversed video (native language soundtrack with FL subtitles). Reversed subtitling is quite common in language education and was found to have positive effects on learning (D’Ydewalle & van de Poel, 1999; Lambert & Holobow, 1984;). For the soundtrack, text to speech software was used. 12 simple subtitle areas having 3-6 words length were designed consisting of short and simple imperatives such as “put, cut and add.” The final word for each subtitle was substituted with a five-letter non-word generated from the ARC Non-Word Database (Rastle et al., 2002). These non-words were used to attract learner attention on the subtitle area. Each subtitle lasted about 10 seconds. A sample substitution is shown below:

e.g., Add some salt → Add some loast

Some samples from the video are as follows:



*Figure 1. Sample visuals from the video*

## 2.5 Procedure

Participants attended eye-tracking sessions individually in a separate room. Before each experiment, nine-point calibration for eye tracking was applied in front of a 19-inch monitor set up at about 60 cm from the participant's eye. As pupil dilation might be affected by the distance between the participant and the monitor (Holmqvist, et. al, 2011), attention was paid to hold a similar distance for each participant. The room was well-lit and the luminosity of the room was also the same for all participants. Before starting the video, the PG was told that they would watch a cooking video including pork with subtitles. LG was told that the video included lamb meat. Same procedures were followed for this group also.

## 2.6 Data Analysis

Eye movements were analyzed by Gazepoint Professional edition. AOIs were drawn for the image area and the subtitle area. The analyzed metrics were total fixation duration and revisit counts for each AOI. For the pupil size, the mean pupil diameter in pixels can be extracted from the software. The software registers pupil size for each eye and these values were then averaged for mean pupil diameter. Then pupil sizes in pixel values were converted into mm (millimetres). To analyze the effect of pork content on eye movements, T-Tests were used.



Figure 2. Areas of interests

### 3. Results

#### 3.1 Finding 1: Effect of Pork Content on Attention

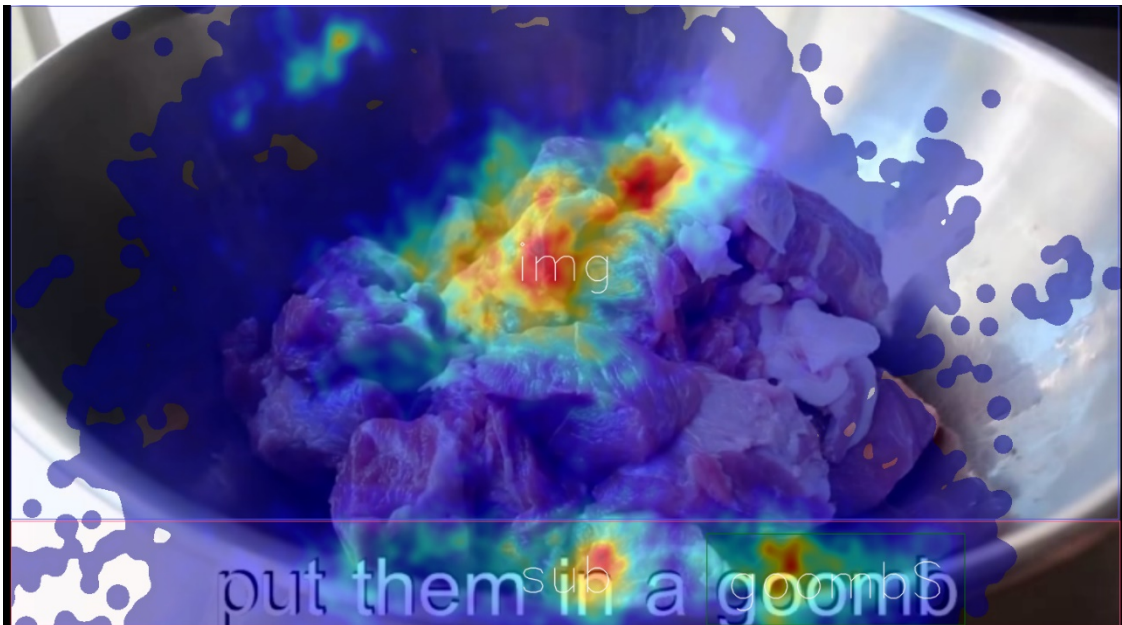
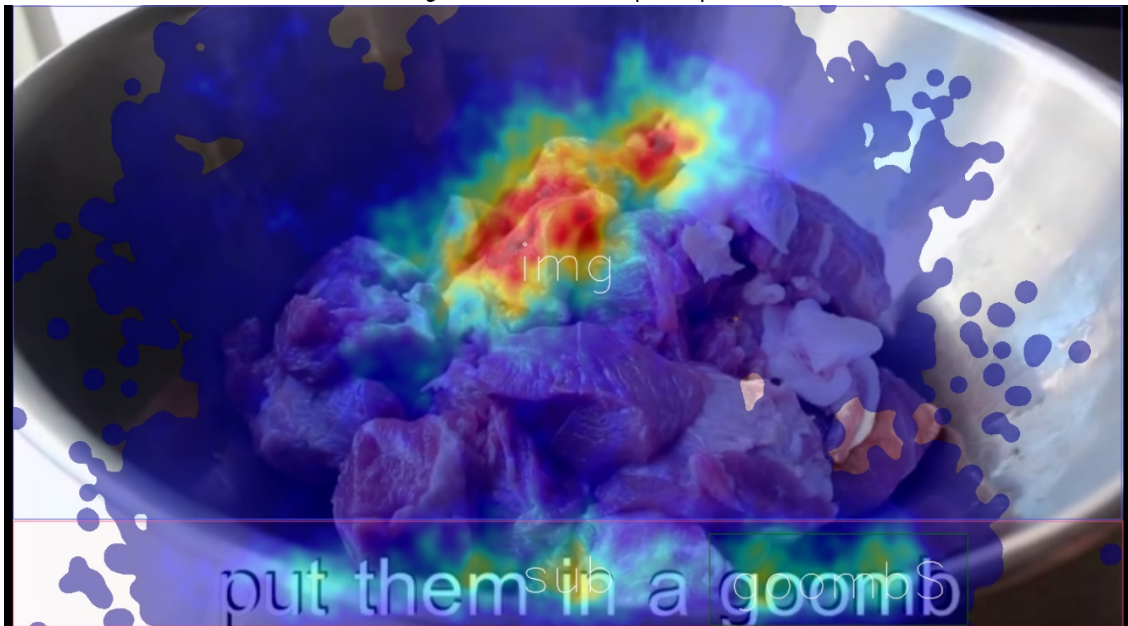
To reveal any effect of pork content on total fixation duration on subtitle and image areas, a T-Test was used as groups as the independent variable and total time on each AOI as the dependent variable. Total time spent on related AOIs are as follows:

Table 1. Mean values for total fixation duration

	Group	N	Mean (sec)	Std. Deviation	Std. Error Mean	Sig.
Image Area	PG	20	108	16.9	3.7	.719
	LG	20	105	20.3	4.5	
Subtitle Area	PG	20	31	13.3	2.9	.508
	LG	20	29	13.9	3.1	

For the image area, PG spent slightly more time ( $M=108$ ,  $SD=16.97$ ) than LG did ( $M=105$ ,  $SD=20.33$ ). PG also attended more on subtitle area ( $M=31$ ,  $SD=13.34$ ) than LG did ( $M=29$ ,  $SD=13.98$ ). No statistically significant difference was observed in all areas regarding total fixation duration. Thus, it can be proposed that pork content did not affect the total time spent on the image area and subtitle area. A sample heat map illustrating attentional homogeneity between groups was given below:



*Figure 3. PG heat map sample**Figure 4. LG heat map sample*

The next hypothesis of the current study was that pork content might confuse learners and cause them to revisit images and reread subtitle areas. To investigate the effect of pork content on revisiting counts on 2 AOIs, a T-Test was utilized as groups as the independent variable and revisit counts on each AOI as the dependent variable. Results were given in Table 2.

Table 2. Mean values for revisit counts

	Group	N	Mean (times)	Std. Deviation	Std. Error Mean	Sig.
Image Area	pork	20	60	19.75	4.41	.653
	lamb	20	57	17.86	3.99	
Subtitle Area	pork	20	62	18.27	4.08	.749
	lamb	20	60	18.87	4.22	

According to Table 2, PG revisited the image area 60 times (SD=19.7) while this value is 57 (SD=17.8) for LG. Revisits on subtitle were also nearly equal; PG revisited it 62 times (SD=18.2) and LG revisited for 60 times (SD=18.8). None of these values was found to be statistically significant.

### 3.2 Finding 2: Taboo Effects on Cognitive Load during Subtitle Processing

To examine the effect of pork content on cognitive load, a T-Test was used with mean pupil diameter as the dependent variable and groups as the independent variable. The mean pupil size for PG was found to be 5.15mm (SD=.67) which is a slightly smaller value when compared to the pupil size of LG which had a value of 5.46mm (SD=.63). This difference was not statistically significant;  $t(38) = 1.497$ ;  $p = .143$ . Depending on these results, it can be proposed that pork content had no observable effect on cognitive load.

It is worth mentioning that pupillary response is quite a sensitive measure including extra factors such as age, sexual arousal, fatigue, drugs, and diabetes which are hard to control. For interpreting cognitive load, the pupillary response is mostly linked with fixation durations and other measures, and consistency is expected between them (Brooking, Wilson & Swain, 1996; Van Orden, et al., 2000). The pupillary response results were consistent with other findings of eye movement measures in this study (total time and revisit counts) for which no statistically significant difference was also found.

## 4. Discussion

### 4.1 Pork Content and Attention in Second Language Learning

Depending on the common assumption proposing that pork content in EFL context caused disgust and negative attitudes among Muslim EFL learners, the primary prediction of the current study was that this emotional negativity would affect learners' attention on the visual material relying on the mediating role of emotion to drive attention (Eastwood et al., 2001; Fox et al., 2001; Oatley & Jenkins, 1996). People detect emotionally loaded stimuli, such as an angry face, a spider, or a gruesome accident, faster than neutral stimuli (Mather & Knight, 2006; Öhman et al., 2001). Such emotionally loaded stimuli cause high-intensity emotional states. Eye-tracking and brain imaging studies have shown that people initially fixate on emotional stimuli and spend more time on them (Mather et al., 2006; Nummenmaa et al., 2006; Rosler et al., 2005) as emotions and attention use some of the same neural components such as the amygdala, portions of the frontal lobes and the anterior cingulate cortex (Vuilleumier et al., 2004; Vuilleumier, 2005). This arousal-enhanced attention was also expected for pork content in this study. However, the findings contradicted the expectations; it was observed that measures of eye movements were nearly identical for each group. In particular, the image and subtitle areas were processed in similar time-spans with similar revisit counts. These findings indicated that although learners disgusted pork content, the emotional arousal was not intense enough to enhance or distract learner attention. In conclusion, learners processed visual and linguistic input regardless of the taboo condition.

### 4.2 Taboo Content and Cognitive Load

The second hypothesis of this study was that pork content might affect cognitive load during processing visual and linguistic input. The results showed no effect of pork content on the cognitive load while learners processed the visuals



and subtitles. Thus, it can be argued that although learners held negative attitudes towards pork, they did not spend extra cognitive effort while processing the visuals and subtitles.

Previous assumptions proposing that taboo topics had a negative effect on learners were vague and the phrase “the negative effect” was unclear. The findings of this study confirmed that Muslim learners personally held negative attitudes towards pork which is a taboo topic (Gray, 2002). However, pork content neither distracted learner attention on visuals and linguistic input nor increased their mental effort. Therefore, ELT publishers must be censoring pork-related themes due to a cultural assumption rather than any scientific basis. It should be noted that this study is not in advocacy of free usage of all taboos (e.g. nudity, suicide, abortion, or birth control) in educational contexts but only examined pork as a taboo topic in a psycholinguistic perspective. The results may differ with taboo extremity.

## 5. Conclusions

This study investigated how EFL learners react to pork content in a subtitled video and explored any effect of pork content on learner attention and cognitive load via eye-tracking. These results alone may not be sufficient to include “pork-related themes” in language learning materials but may contribute to shaping the marketing policies of ELT publishers who recently censored pork for Islamic and Jewish learners. Condemning pork as an alienated figure, this censorship does not meet the requirements of intercultural understanding and competence. ELT publishers might reconsider their cultural policies and reconstruct a more specified strategy, especially at least for Muslim countries which are close to western culture. Such a wide cultural scope can contribute to the transformative role of language education and can promote a correct representation of Western cultures which would increase cultural awareness and mutual respect.

## 6. Limitations of the Study

This study was conducted in a relatively westernized Muslim country close to Europe. The results may differ in countries such as Saudi Arabia, Iran, or Pakistan in which Islamic rules were strictly applied.

## 7. Disclosure of Conflict

The author declares that he has no conflicts of interest.

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