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Horn Sounds in Transportation Systems and a Cognitive Perspective on the Instant Mood-Condition Disorder

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Abstract

This study was performed on sidewalks that there can secure movement of pedestrians. The basic theme of the research is how pedestrians are influenced by the sudden hearings of horns in the walking moments. In this study on different horns chord samples were randomly presented during simultaneous Electroencephalogram (EEG) recordings to a total of 48 healthy participants aged between 25–65 years; the elicited brain responses were examined. EEG recording with visual stimuli is performed on 48 subjects at delta, theta, alpha, beta and gamma frequency bands by using 5 different horn sounds which are selected from the real traffic environments. Especially trucks with a high-end horn sound, show very significant differences in the brainwaves of the pedestrians. Therefore, it is very important for pedestrians to make legal arrangements related to the voice of the high horn, especially in the developed countries.

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Keywords: pedestrian safety, cognition, EEG, horns

1. Introduction

The main objective of "Assessment and Management of Environmental Noise (2002/49/EC)" Directive [1] is to define a common approach intended to avoid, prevent or reduce the harmful effects, including annoyance, due to

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exposure to environmental noise. Noise annoyance dose-effect relations are to be established for these given indicators and It is stated in the directive that each action plan should contain estimates in terms of reduction in number of people annoyed and sleep disturbed [2]. In this moment, noise control is very important factor for traffic and pedestrian safety.

People have the ability to distinguish the voices of nature. In environmental sounds; Because of the non-structural nature of these voices, usually noise-like and straight spectrum characteristics, the recognition process is more complex [3]. In other words it is difficult to distinguish the voices in some cases. In particular, pedestrians are difficult to distinguish some voices in traffic. This is normal condition when think about different urban noises, traffic sounds, and nature sounds. Pedestrians to walk safely and in those cases where a specific scheme is very important in terms of comfort moments. Especially, in developing countries, loud horn noise is a serious problem in terms of pedestrian comfort. Because there is no law to prevent the horn or the law is not applied in there. Perspective from Turkey, according to law: "The horns can be used in a way that will not disturb the comfort and peace of public" On the other hand all sophisticated voices that are unintentional and disturbing are called noise. Classification for different sound levels is shown in Table 1.

Table 1. Sound levels.

An example of a column heading	Noise Levels
30–65 dBA	Uncomfortable
	Discomfort
	Anger
	Sleeping Disorder
	Impaired Concentration
65–90 dBA	Heartbeat Irregularity
	Respiratory Acceleration
	Decreased Blood Pressure
90–120 dBA	Headache
120–140 dBA	Inner-ear disorder
140>dBA	Burst of Eardrum

It is inevitable to place our horn in our everyday life if it is thought to be so important in terms of human health.

In this study, the effects of the horn were tried to be investigated cognitively. Experiments have been made on different types of horns. It has been tried to determine how pedestrians' cognitive processes are affected.

2. Material and Method

The methodology of our study is shown in Fig. 1.

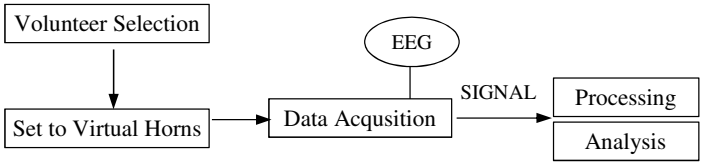

Fig. 1. Methodology of our study.

The general configuration of the study is as follows: Firstly volunteers were chosen who could be used for the experiment. It has been noted that volunteers are healthy individuals. Naturally, the horn sounds used intensively in the traffic were detected. It has been noted that the frequencies of these horn sounds are different from each other. After this difference, 5 different horns were played to the individuals. How the volunteers reacted to the 5 different