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PSYCHOACOUSTIC ASPECTS OF THE NOISE PERCEPTION IN ENGINEERING PRODUCTS

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ABSTRACT

Often, the perception of noise is in human conditional on other effects. It can be classified among them for example size of the object. age, color alternatively experiences with that source of noise. Traffic noise is the most frequently occurring type of noise that is encountered by all. Its effects on humans, we can find mainly in annoyance and other nonspecific effects. These effects depend on gender, age, momentary disposition and other factors. The article deals with psychoacoustic noise analysis of the specific vehicles and its subjective evaluation. Similar analyzes are the basis for further development of the cars in their acoustic parameters.

Keywords

traffic noise, psychoacoustics, psychoacoustic analysis.

INTRODUCTION

The sound quality has become a very important activity in the design and development of all products that emit noise such as cars. This article aims to assess the suitability of vehicles sound, in this case, three cars of different brands (Renault Thalia, Skoda Fabia, Ford Escort) from different perspectives such as the passage of cars from the pedestrians point of view in terms of assessment in terms of passenger. Passing and driving were assessed with and without sensory sensory stimuli. It has been the subject of research assessing differences in perceptions, with passages of cars, which were between transit, videos, sounds altered. Based on these facts has set a target:

- Determine prejudice the visual impact of noise on the respondents (the same sound with different visual perceptions).
- Find basic psychoacoustic perceptions of target groups of respondents.

THE RESEARCH

The subject of the recording were three cars of different brands and the Renault Thalia 1.4, year of manufacture 2009, Skoda Fabia Combi 1.2, year of manufacture 2000, Ford Escort 1.4, year of manufacture 1992 in all cases the gasoline engine. In all cases, the recordings made under identical conditions, namely at a speed of 50 km / h at 2,500 rpm. Recordings has been made using a digital camera were taken from a pedestrian perspective view of the passenger. These recordings were presented to respondents through questionnaires. The categories in the survey respondent had the opportunity to indicate their feelings on using predefined scales, four options "*non-distruptive*", "*less distruptive*", "*distruptive*" and "*very distruptive*". Questionnaires were filled out while watching movies and sounds.

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Evaluation

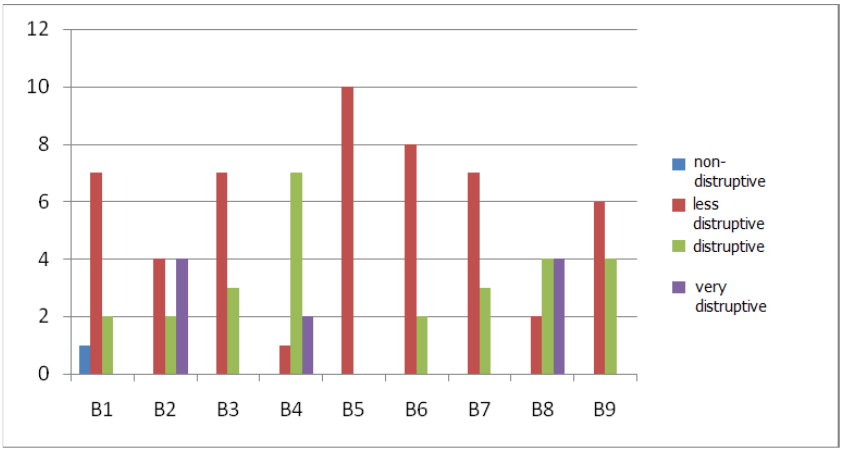

Fig. 1 Graphical representation, women from 21 to 30 years old

In Fig. 1 is an example of how comparisons were affected by the sound of the respondents to the original recording video and sound and video in modified cars and passing the assessment from the perspective of a pedestrian. B1-B9 are detailed in Table. 1

Tab. 1 Description of category

	Simultaneously presented		
	Category	**Video**	**Audio**
Assessment from the perspective of pedestrian	**B1**	Skoda Fabia	Skoda Fabia
	B2	Ford Escort	Ford Escort
	B3	Renault Thalia	Renault Thalia
	B4	Skoda Fabia	Ford Escort
	B5	Renault Thalia	Skoda Fabia
	B6	Ford Escort	Skoda Fabia
	B7	Skoda Fabia	Renault Thalia
	B8	Renault Thalia	Ford Escort
	B9	Ford Escort	Renault Thalia

EVALUATION OF AVERAGE VALUES ACCORDING THE REFERRAL SCALES

The assessment scale, we chose to design the questionnaire were assigned values (see Table 2) for better implementation of the evaluation process.

Tab. 2 Assigned values of assessment scales

The referral scale sound			
non-distruptive	less distruptive	distruptive	very distruptive
1	2	3	4

In assessing the perceptions of the relationship was used:

$$V = \frac{\sum(PŠ \times n)}{m} \quad (1)$$

Where: V – final perception
PŠ – Assessment scale
n – number of judgments
m – number of respondents

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EVALUATION OF AVERAGE PERCEPTIONS FROM THE PEDESTRIANS POINT OF VIEW

The conducted survey were statistically evaluated the results. A summary of the individual perception scales of all respondents to the passage of cars, so from the perspective of pedestrian, are listed in Table. 3.

Tab. 3 The average assessment of perceptions in the passages that is, from the perspective of pedestrian

The combination of sounds and visual prejudices	Renault Thalia	Skoda Fabia	Ford Escort
Identical recordings of passages (B3, B1, B2)	2,3	1,9	3
audio Renault Thalia - video Skoda Fabia (B7)	2,4	-	-
audio Renault Thalia - video Ford Escort (B9)	2,6	-	-
audio Skoda Fabia - video Renault Thalia (B5)	-	1,95	-
audio Skoda Fabia - video Ford Escort (B6)	-	2,1	-
audio Ford Escort - video Renault Thalia (B8)	-	-	2,95
audio Ford Escort - video Skoda Fabia (B4)	-	-	2,65

The table shows that the resulting feelings of acoustic perception in combination with visual perceptions differ on average by 0.1 -0.4 points. According to the least intrusive sound was the sound of the engine Skoda Fabia, regardless of visual perception.

Renault Thalia is in the range of scales less intrusive and disturbing. It is interesting that the same sound but changing the image values rising New to Old car. We can conclude that in this case, the respondents inclined to sensory perception assessment.

In the case of Ford, the most inclined to assess disruptive, but, in changing its image and maintaining sound, we can see moderate fall, in favor of less annoyance. So I can assume that to some extent as well as the appearance.

EVALUATION OF AVERAGE VALUES FROM THE PASSENGER POINT OF VIEW

The survey was conducted for different age groups and for men and women separately. As an example results of the survey are shown in the figure for the category of women from 21 to 30 years of age (Fig. 2).

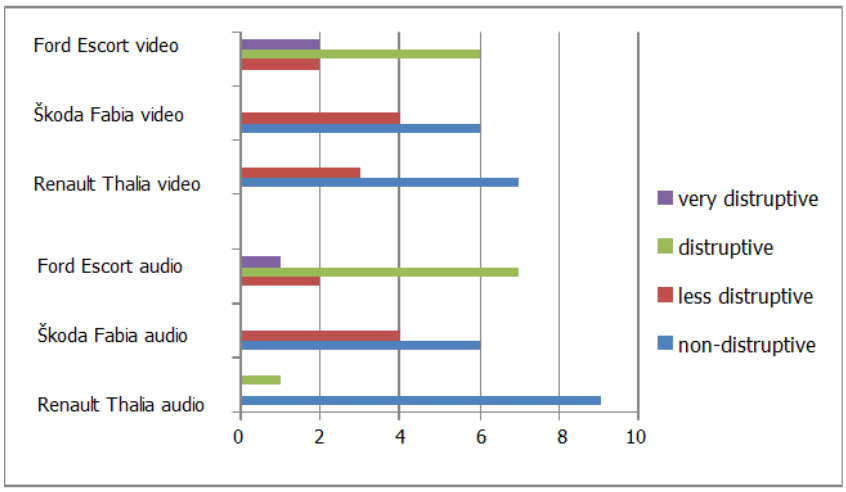

Fig. 1 Graphical representation, women from 21 to 30 years old

Visual prejudiies have shown more significantly, it is clear that they significantly influenced subjective feelings, especially in a case of Renault Thalia. Results of mens' reactions in age group from 31 to 40 years are shown in figure 3.

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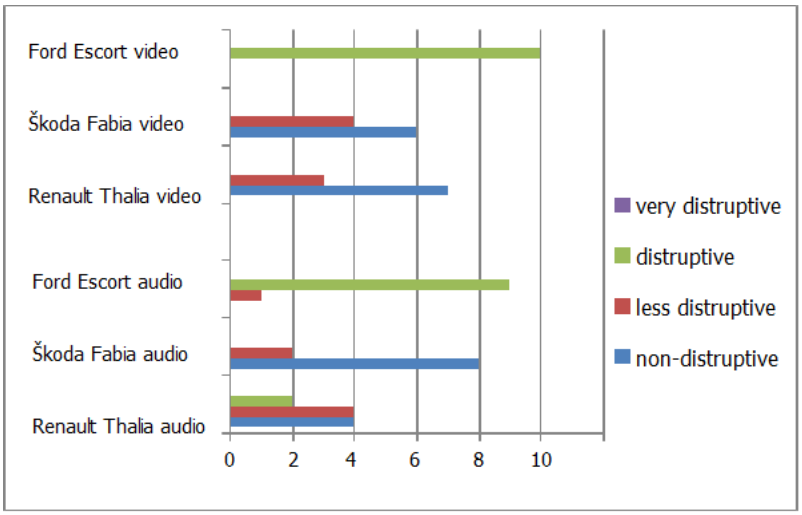

Fig. 3 Graphical representation, men from 31 to 40 years old

The chart shows that the respondents found the noise without the visual information less disruptive.

CONCLUSION

From these values, we can assess that in all cases these are similar results in terms of a mathematical difference between the judgments. In the case of Skoda Fabia and Ford Escort, the respondents seemed noise, without video, less disturbing than with video, while in the case Renault Thalia is the opposite. The Renault respondents considered more intrusive than the perception and Skoda Fabia is more intrusive audio without video. As for Ford, respondents are more inclined to judgment intrusive, although as in Škoda also had seemed audio perception without disturbing of video. In these cases, could be said that audio of Renault is more intrusive than the Fabia but due to the video of the Renault stable with fewer shocks and this might influence the attitude of the respondents. In case of Ford is the first obvious phenomenon for the same reason as this is already the older type of vehicle.

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