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**EFFECTS OF EVERYDAY NOISES ON A SHORT TERM MEMORY OF CATEGORIZED LISTS**

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INTRODUCTION.

In the specialized literature one can find experimental work leading to conclusions such as: moderate intensity noise exerts an influence on memory organization in subjects in relation to tasks implicating short-term memory of categorized lists. However, it has not been observed that noise has a significant influence on the number of correct words recalled by subjects.

Reduction of grouping found under noise conditions is probably due to changes in recall patterns. These patterns are directly related to the level at which the subject processes the information presented.

Some authors claim that the effects of moderate intensity noise can be understood as a change in the recall strategy used by a person or it can be attributed to an effort directed to one aspect of the task in detriment to others. (Smith, Jones and Broadbent, 1981; Smith and Broadbent, 1982).

In most research that analyzes this problem of short-term memory, the experimental noises were "artificially" generated out of the context of what we assume to be "everyday noise".

Santisteban (1987; 1988) presents a different approach in her publications studying human behavior patterns in relation to everyday sounds.

From this point of view, and considering previous results, the present study was designed to determine how everyday sounds affect performance of a task which implies verbal processes in short-term memorization of categorized lists.

EXPERIMENT.

This experiment was carried out using three categorized lists with a total of 60 words from five prespecified different categories under three different sound conditions.

The experimental lists were made up from results obtained in a pilot study, so that they had the same level of difficulty.

The sounds used to generate the noise conditions were selected by the investigator among the everyday sound groups from which Santisteban (1987; 1988) obtained early individual

behavior curves.

The noise conditions were: 1) SILENCE: Defined as that situation in which no experimental sound was presented and the intensity level of background noise was less than or equal to 60 dBC. 2) CLASSICAL MUSIC: Defined, in our context, as pleasant background sound situation, according to a previous evaluation by subjects. The intensity of the noise in the cabin was between 70 and 80 dBC. 3) ELECTRIC DRILL: Defined as an unpleasant background sound, according to the subjects' opinion in their evaluations. The intensity level in the cabin was between 80 and 86 dBC.

The sound to be present under the different conditions were not chosen arbitrarily. Assignment of silence, classical music and electric drilling to the conditions of silence, pleasant and unpleasant background sound was made according to previous research results. (Santisteban, 1987).

The experiment was carried out on a random sample of 76 subjects selected from the students population of the Fac. of Psychology of the Complutense University.

Each subject attended three experimental sessions in which the task was to recall the maximum possible number of words from those presented in the list.

In each session a list of 20 words was presented. Those words belonging to four different categories were presented under only one sound condition.

The words were presented on a screen. The exposure time was of two seconds with an interval, between words, of 0,5 second.

After the presentation, the subjects had three minutes to recall and were required to write down the words, immediately and in the same order in which they were remembered.

Once the sound corresponding to each session was selected, it was presented as a background sound with the indicated intensities and this condition was maintained during the period of presentation as well as recall.

The time interval between sessions was a week. Each subject carried out his/her session on the same day of the week and at the same time.

The order of presentation of the sound conditions was counterbalanced with the lists.

At the end of each session the subjects answered a questionnaire in which they were required to evaluate whether or not the experimental conditions under which they carried out the task affected performance positively or negatively and if the experimental condition was pleasant or unpleasant.

## RESULTS.

For each of the sound conditions, the number of correct words recalled, the number of errors committed and the level of grouping carried out by the subjects was estimated. The grouping level was calculated using the ARC index. (Roenker, Thompson and Brown, 1971).

Variance analysis was carried out to determine whether or not differential effects due to each of the noise conditions existed, in which direction and whether a relationship existed between the evaluation by the subjects and their observed performance.

The results of this experiment show that first: when subjects were asked to select the environmental conditions

under which they preferred to carry out particular tasks, they preferred silence for those tasks that required processes such as paying attention, information recall and organizing and processing such information. This is agreement with previous opinion as to the effect of pleasant and unpleasant noise, given that 53.95% of the subjects evaluated considered silence extremely pleasant and 26.32% considered it very pleasant. Thus after carrying out the recall tasks in this situation, it was evaluated as being very pleasant and silence was considered to have positive effects on performance. Second: The subjects preferred classical music for activities such as handwork and conversation, thus 64.47% of the subjects considered this condition to be extremely pleasant. Third: the subjects stated that they did not want to carry out any activity in the presence of sound from the electric drill and thus 81.58% of those evaluated considered this situation to be extremely unpleasant and 17.1% as very unpleasant. In fact after carrying out the task under this sound condition they considered it to be very unpleasant and to affect their performance negatively.

The most significant results obtained in our experiment is that this does not coincide with the general opinion of subjects in reference to tasks of recall. The average number of words and the level of grouping is given in the following table.

	silence.	classical music.	electric drill.
N° words recalled.	10.88	10.30	10.42
ARC.	0.06991	-0.05978	-0.08145

This table shows that no significant differences exist among the average number of words recalled as well as in the grouping index. The values of the ARC index are in the interval (-1,1).

The variace analysis shows that the principals effects of the sound conditions were not significant. The sound conditions have no effect on the average number of words recalled ( $F=1.80$ ), nor on the average number of errors committed ( $F=0.26$ ), nor on the grouping level ( $F=2.19$ ).

This results indicate that despite the fact that subjects considered working under noise conditions (pleasant or unpleasant) negatively affect their performance, the experimental results shows that this negative effect is not present. Additionally, we could not prove that silence produces positive effects on the short-term memory of categorized lists.

The average number of words recalled by the subjects in our experiment produced similar results to those found by Smith, Jones and Broadbent (1981). Nevertheless, the agreement is not related to the grouping level index.

The absence of significant differences between different noise conditions in relation to the average number of words recalled and the grouping index contradicts what we expected and with the subjects' opinions. This absence of differences can be explained on the basis of: A) In our experiment the time exposure of a sound under each condition was three minute and 40 seconds. Perhaps it was too short a time to

demonstrate the effect of noise conditions. B) The noises considered in the present experiment were everyday sounds and so we can suppose that the subjects' level of adaptation to these noises is such that their performance is not affected in a short time. C) Finally, we want to point out that in this study the grouping level of the subjects was not significantly different to that expected by chance.

In conclusion, we can say that a pleasant or unpleasant sound environment does not influence performance either in relation to short-term memory or grouping levels.

Since the subjects considered that the sound conditions affected differently their performance, we conclude that the subject pays a psychological price when adapting to conditions such as these in order to leave their performance unaffected. That is, a cognitive attentional cost.

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