

least recently explored part of the environment, rather than a tendency to avoid a place where movements are restricted.

In the D-maze experiments, after the rats had settled down to a steady preference, the maze was changed, so that the arm previously leading to the D-maze became a blind alley, and the previous blind alley led to a D-maze. The rats' preferences followed this change, so that they continued to prefer the D-maze. A similar result would be expected in the present experiment if *RS* and *URS* were interchanged. To test this the experiment was continued for a further 12 days, with *RS* and *URS* on the sides of the maze opposite to where they had been for the first 12 days. Contrary to expectation, the preferences did not switch to the new *RS*; the mean number of choices to *RS* was 16.33.

Thus rats prefer an arm leading to a D-maze, and change their preferences when the position of the D-maze is changed; while in the present experiment rats prefer *RS*, part of which is likely to be less recently explored than the rest of the environment, but do not change their preferences when the position of *RS* is changed. The first part of the experiment supports the hypothesis that rats prefer a D-maze because of a tendency, as in alternation, to go to the least recently explored part of the environment. A possible explanation of the failure to change preferences is that when responses are rewarded they become increasingly stereotyped, and rats become insensitive to changes in the environment that do not affect the reward. Thus the preference for *RS* may become fixated and continue even though no longer appropriate to the exploratory tendencies through which it was originally acquired. In the D-maze experiments no primary reward, such as food, was given, so that the preference would not become fixated.

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### An Acoustic Factor in Letter Cancellation

CONRAD<sup>1,2</sup> has shown that intrusive errors in the recall of letters presented either auditorily or visually are acoustically similar to the presented items. Thus confusions in recall occurred mainly between *B*, *C*, *P*, *T* and *V* and between *F*, *M*, *N*, *S* and *X*. Subsequent work (for example, Wickelgren<sup>3</sup>) has confirmed and extended these findings.

The following experiment is reported because the results would appear to extend the already important phenomenon of 'acoustic confusion' to an area hitherto considered unrelated to short-term memory.

Twenty naval ratings were presented with foolscap sheets containing a passage of prose reproduced from an article in *Punch*. They were requested to go through the sheets crossing out all the letters 'e' and were allowed 15 min to complete as much of the material as they could. The emphasis of the instruction lay towards speed rather than accuracy.

The first two paragraphs (329 words) of the completed work were examined to determine which particular e's had remained uncanceled. The results were analysed under three categories: (1) words in which the e was pronounced; (2) words in which the e was silent; (3) 'the's.

The results of this gross analysis are presented in Table 1, from which it is clear that the probability of missing a silent e is greater than that for missing a pronounced e. This difference is statistically significant ( $P < 0.002$ , on a two-tailed binomial test). The e in 'the' had the greatest probability of being omitted; this being significantly greater than silent e's ( $P < 0.024$ ) and the pronounced e's ( $P < 0.002$ ).

Silent e's are commonly found at the end of words and it was therefore necessary to discover whether it was the predominantly late position of the silent e which caused it to be missed rather than the fact that it was silent. Accordingly, a positional analysis was carried out in which the words containing e's were divided into: (i) those in which e occurred at the terminal position; (ii) those with e in the penultimate position; (iii) those in which e occurred in a position other than last or penultimate (the 'early' e). Table 2 presents the probabilities of missing an e which is silent or pronounced under the three positional categories. It is evident that, after controlling for the position of the e in the word, silent e's are still significantly more likely to be omitted than pronounced e's. Position in the word does have an effect, however, in that early e's are less likely to be missed than later ones.

Table 1. PROBABILITIES OF MISSING AN e IN 'THE', WHEN PRONOUNCED AND WHEN SILENT

'The'	Pronounced	Silent
0.32	0.04	0.15

Table 2. PROBABILITIES OF MISSING A PRONOUNCED OR SILENT e RELATED TO POSITION IN WORD

Position category	Pronunciation category		Significant level (P) (pronunciation)
	Pronounced	Silent	
Early in word	0.03	0.06	N.S.
Penultimate	0.07	0.14	0.024
Terminal	0.12	0.18	0.042
	$P = 0.027$	$P = 0.042$	
	N.S.	N.S.	
	Significance level (Position)		

N.S., not significant.

The tentative conclusion to be drawn from these findings is that the acoustic image of a word is scanned as well as the visual stimulus. The results would seem to suggest that the acoustic image is examined for characteristics normally associated with the presence of an e in the printed word and that the e is more likely to be missed if an acoustic correlate is lacking.

The high proportion of missed e's in 'the' could possibly be due to three factors: (a) because the e in 'the' is normally pronounced /ə/; (b) because the e is in the terminal position; (c) because 'the' is a highly redundant word, which may be 'taken for granted' and thus not scanned. The first possible explanation (a) is probably inadmissible. A comparison was made between words in which the e was pronounced /ə/ as in *we* or inserted with those in which it was pronounced /ɛ/ (as in 'set') or /i/ (as in 'seat') and it was found that /ɛ/ or /i/ were, if anything, the more likely to be missed, but this difference was quite insignificant. (The words used in this comparison were selected such that chance positional factors were controlled.) The second possible explanation (b) may be partly true, but cannot be the only explanation, since the e in 'the' is much more likely to be missed than terminal e's in other words (see Table 2). The third explanation (c) would therefore seem preferable, but further work is needed to establish the case positively.

It is of interest that, since the e's pronounced /ə/ were certainly no more likely to be missed than e's pronounced /ɛ/ or /i/, the nature of the acoustic correlate seemed to be unimportant.

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