they are so different in the two lysine tRNA's. It is interesting that the sequence C-C-U-U-G-U-U near the 5'-terminus is preserved even though three changes have occurred in the nucleotides on the other side of the stem.

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References and Notes

1. Abbreviations used: tRNA, transfer ribonucleic acid; A, adenosine; C, cytidine; G, guanosine; U, uridine; p or -, phosphate residue, on the left of the nucleoside symbol a 5'-phosphate and on the right a 3'-phosphate; ψ, pseudouridine; T, ribothymidine; m, methyl group whose position is indicated by the superscript; m_2^2G, N^2,N^2-dimethylguanosine; D, dihydrouridine; (U), uridine makes up about 25 percent of the nucleosides at this position; S, 2-thio-5-carboxymethyluridine methyl ester; Z, derivative or degradation product of S; T^6A, *N*-[9-(β-D-ribofuranosyl)purin-6-ylcarbamoyl]-L-threonine; X, unidentified nucleoside; A* and A^+, adenosine derivatives; G* and G^+, guanosine derivatives; Phe, Val, Gly, Glu, Lys, Ser used as superscripts indicate tRNA specific for phenylalanine, valine, glycine, glutamic acid, lysine, and serine, respectively.
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Unilateral Increase of Auditory Sensitivity following Early Auditory Exposure

Abstract. *A 30-second exposure (priming) to a loud noise induced a long-lasting susceptibility to audiogenic seizures and a 15-decibel decrease in threshold to the Preyer acoustic startle reflex in C57BL/6J mice. Both effects were absent when the subjects were primed in one ear and subsequently tested in the contralateral ear. It was postulated that the primary effect of priming is an increase in auditory sensitivity due to changes in the ear itself or in those parts of the auditory system which receive their input exclusively from one ear.*

This experiment investigated the long-term effects of a brief, high-intensity auditory exposure on subsequent sensitivity to high-intensity sounds. The data suggest that the initial 30-second exposure resulted in a 15-db increase of sensitivity after 5 days which could be restricted to either the right or left auditory pathway.

Inbred mice of the C57BL/6J and SJL/J strains are normally resistant to sound-induced convulsions (*1*). However, a 30-second exposure to a loud noise during a sensitive period of development (*2*) can render both strains highly susceptible to the audiogenic seizure syndrome (*3*). Fuller and Collins (*4*) devised an ingenious technique whereby this effect was confined to a single ear of the SJL/J mouse by having the other ear temporarily plugged with glycerine during priming and subsequent testings. The present experiment used this technique to demonstrate that an independent measure of auditory sensitivity—the Preyer acoustic startle reflex (*5*)—shows an identical response.

Fifty inbred mice of the C57BL/6J strain were acoustically primed in either the right ($N = 25$) or the left ($N = 25$) ear at 16 (± ½) days of age. This was accomplished by flooding one ear with glycerine and placing the subject in a cylindrical glass jar (30 by 30 cm). An electric bell was then mounted atop the container, and the subjects were exposed to 30 seconds of 110 db (absolute) (in reference to 2×10^{-4} dyne/cm^2) noise. None of the subjects exhibited audiogenic seizures during this acoustic priming exposure. The acoustically primed ear was then flooded with glycerine to compensate for the effects of glycerine per se.

At 21 days of age, 30 mice were reexposed to 30 seconds of bell ringing. In 15 subjects, the same ear was plugged as during priming (ipsilateral condition), while another 15 mice were tested with glycerine in the opposite ear (contralateral condition). The incidence of audiogenic seizures was observed in these mice. Similarly, another 20 subjects were tested for threshold response to the Preyer reflex with glycerine blocking either the ipsilateral or the contralateral ear. These mice were successively exposed to a series of shaped (10 msec rise and decay time) bursts of 15-khz pure tones of 1 second duration. The equipment has been described elsewhere (*6*). The stimulus intensity was increased in increments of 2 db (method of ascending limits) to ascertain the threshold of the Preyer reflex, defined as the minimum intensity of sound that elicited a reflexive ear movement 50 percent of the time in each subject.

Fuller and Collins' ipsilateral effect of priming of audiogenic seizures in SJL/J mice was replicated with C57-BL/6J mice in this study. All of the 15 ipsilateral subjects exhibited an audiogenic seizure, with an average latency of 4.2 seconds. Fourteen of the 15 contralateral subjects failed to convulse (Fisher's exact probability test, P ipsilateral > contralateral = 1.33×10^{-8}).

The thresholds to the Preyer reflex exhibited an equally extreme effect. Those ten ipsilaterally tested subjects had a mean threshold of 73.8 db, while the ten contralaterals had a mean threshold of 89.2 db. There was no overlap between the distributions (range of 68 to 80 for ipsilaterals; 86 to 92 for contralaterals, $t = 12.3$; d.f. = 18; P ipsilateral > contralateral << .0001).

The effects of acoustic priming on audiogenic seizures could be explained in a variety of ways: a lowered threshold to the propagation of epileptiform activity in neural structures which are associated with auditory pathways, creation of an epileptic focus in auditory or associated regions, or a lowered auditory threshold. The Preyer reflex data suggest that the latter interpretation is more likely correct. This reflex has widely been used as an index of auditory sensitivity. Although the correlation is not invariable, it typically parallels the curves for auditory nerve-evoked responses and for cochlear microphonics. Because the Preyer threshold is approximately 70 db higher than these other indices, it serves as a good index of sensitivity to moderate to intense sounds. I can think of no mechanism by which acoustic priming can decrease the absolute auditory threshold, so it appears more likely that it exclusively increases sensitivity to high-intensity sounds. This could occur by a disruption of the reflexive uncoupling of the auditory ossicles in response to intense sounds. Similarly, damage to the olivocochlear bundle of Rasmussen could eliminate the centrifugal gating properties of this tract (*7*). Both of these postulated mechanisms would be in agreement with the unilateral effects of acoustic priming on audiogenic seizures and on the Preyer reflex, since they could be readily confined to a single ear or auditory nerve. They also agree with the conclusion of Fuller and Collins (*4*) that the locus of acoustic priming is either "in the ear or in those portions of the auditory system receiving input only from one side."

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Decay of Information in Short-Term Memory

Abstract. *Self-paced recall in Broadbent's simultaneous listening task shows particular temporal patterns associated with report strategies. Accuracy is a decreasing function of the interval between presentation and report of an item, irrespective of report strategy. Results are related to an interaction between strategies of response selection and decay of information from memory.*

It is difficult for subjects to report accurately verbal information from more than one source arriving at the ears simultaneously. This is true whether such information is presented dichotically as a different word to each ear (*1*), or binaurally as two simultaneous messages distinguishable only by voice quality (*2*). Broadbent (*1*) showed that while handling simultaneous material was difficult, reporting dichotically heard digits successively (first all the digits heard in one ear, then all of those from the other) was significantly easier than reporting them pair by pair (alternating responses between the left and right ears). That this difference was most pronounced at rapid rates of presentation (one pair arriving every half second) led to the dual postulate that (i) some minimum time is required to shift attention from one message to the other, and (ii) the fast rates of presentation did not allow sufficient time for such switching before the onset of the next pair.

The general difficulty in handling simultaneous material was attributed by Broadbent (*3*) to a limited capacity filter that can pass information for identification or coding from only one source or "channel" at a time. Material not first attended is held up temporarily in a rapidly decaying "echoic" store (*4*) while the attended information is analyzed. Thus, successive report has its primary advantage in requiring the filter to switch only once, while attempts at pair-by-pair report require multiple switching as the system alternates between each source for each pair of presented digits. A great variety of subsequent theoretical and research effort has included both contradictory results and important theoretical alternatives (*5*), for example, that of Yntema and Trask (*6*). The central issue, however, has largely remained that of accounting for Broadbent's original finding that successive recall is more accurate than pair-by-pair report.

In the split-span task, auditory information arrives at the ears simultaneously, or "in parallel," while the report of what has been heard must necessarily be sequential. If the presentation of any list is considered and a constant rate of output is assumed, the interval over which the subject must retain particular items would necessarily be different for different orders of report. Such differences in "storage time" are crucial to any analysis of time dependence in simultaneous listening. This would be especially true if there are particular temporal output patterns associated with different report strategies.

The stimuli were 90 six-digit lists, randomly generated from the spoken numerals 1 to 9. The lists were recorded as sequences of three pairs of simultaneous digits, one member of each pair spoken by a male speaker, and the other member by a female. The lists were presented to both ears through headphones, at a rate of one pair every half second.

All the subjects heard an equal number of lists under two recall conditions. In successive recall, the subject reported the three digits heard in the male voice and then the three digits spoken by the female (or, for half of the subjects, vice versa). In pair-by-pair report, the subject was to give the three pairs in their order of receipt: the two digits of the first simultaneous pair, the second pair, and then the third. Half of the subjects began their report with the male voice of each pair, and half began with the female. Fifteen practice lists were followed by 30 test lists for each condition, with the order of conditions varied between subjects. The subjects, six university undergraduates, were encouraged to respond rapidly after hearing each list but to speak clearly as their responses were being recorded.

As each list was presented, it was rerecorded on one channel of a two-track tape recorder, while the subjects' responses were recorded on the second channel. This series of tapes, bearing a complete record of the experiment (both stimulus lists and responses for each subject), was monitored by a voice-operated relay associated with an ink-writing oscillograph. This produced a visual record of the temporal pattern of stimuli and responses. Time intervals were measured to the nearest 10 msec.

Figure 1 shows for both recall strategies the percentage of each of the six stimulus digits recalled correctly in their appropriate serial positions. The abscissa reflects the mean latency for reporting these items after the termination of the stimulus list (*7*). The individuals' superior ability in handling successive over pair-by-pair report is seen both in the number of digits reported correctly [87.4 percent compared with 55.5 percent, $F(1,5) = 29.314$, $P < .01$] and in the shorter delay before