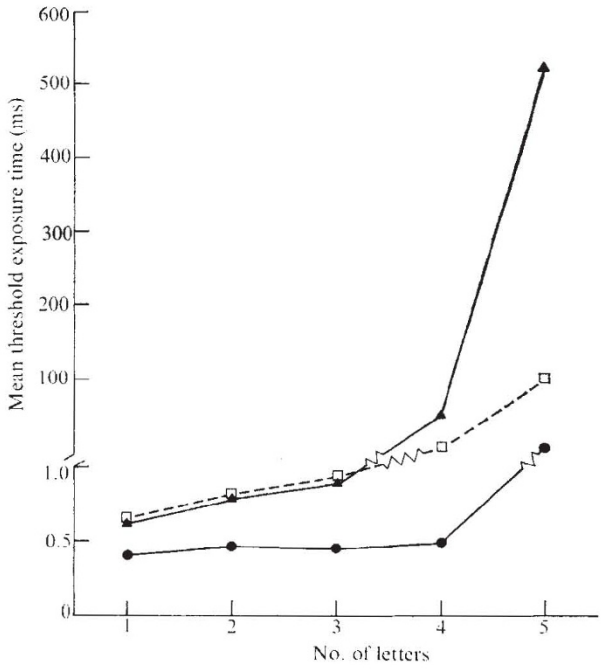

Fig. 1 Absolute thresholds of time exposure for correct identification of varying numbers of letters by different age groups. ●, 20–30 age group; □, 40–50 age group; ▲, 60–70 age group.

rise in 'noise' level, could result in a linear increase of decision time. Welford[2] suggests that the constant age effect occurs when signals are brief, whereas when perception is not limited, proportionate increases are manifested. We report here an example of a constant difference between age groups in absolute time thresholds followed by an abrupt change in a situation where signals are brief. The implication seems to be that two different deficiencies are operating, both of which could perhaps ultimately be attributed to 'noise'. Participants in the experiment were required to identify varying numbers of letters and the sudden increase in required time indicates a reduction in the visual perceptual span of older people.

A modified staircase method[3] was used to determine the absolute time thresholds for correct reporting of 1, 2, 3, 4 and 5 upper case consonants. In estimating thresholds for more than 1 letter, correct order of report was required. Black stimuli (Letraset 719, 60-point spaced 10 mm centre to centre) were printed in the middle of a white card and displayed binocularly in a 3-channel tachistoscope with a dark pre- and post-exposure field. After every successful or unsuccessful trial the stimulus was replaced by a member of a set of 20 at each level of difficulty. Five male and five female volunteers in each of the age ranges 20–30, 40–50 and 60–70 were tested. To equate for age differences[4], subjects in the young, middle and old age groups were dark adapted for 5, 7 and 10 min respectively, the experimental room having very low illumination (one 25-W red light bulb). Calculations are based on the mean of two estimates of threshold for each subject, order of presentation being 2, 3, 1, 4, 5, 3, 2, 4, 1 and 5 letters.

Results are given in Fig. 1 and show a dramatic increase in the exposure time required by the oldest group to identify 5 letters. Among that group there was only one exception to the very large time increment. Two members of the middle age group demonstrated a comparable increase, and there was one case in the oldest group with a similar increase at 4 letters. The youngest group had significantly lower thresholds than the two older groups for 1, 2 and 3 letters as well as a lower threshold than the oldest for 5 letters. The difference between the middle and oldest group was only significant for 5 letters.

When stimuli were below threshold all age groups made most of their errors in the middle letters of a series. It is therefore unlikely that the limited perceptual span of the elderly is the result of poorer peripheral vision. For the same reason, output interference is contraindicated as the primary explanation, since such interference should lead to more frequent errors in the report of the last letter of a series. Nevertheless, a sensory memory storage deficit could be a major component in the reduction of perceptual span with age. This possibility is not excluded by the equivocal results of Abel's study[5] using Sperling's[6] partial report method, where exposure times of one half second were used. Many older participants in the present experiment made statements implying that they had seen a letter, but that it had disappeared before it could be identified. Similar comments have been reported from younger subjects in previous investigations[7] and were made by members of younger age groups in a study we ran on time thresholds for more than five letters. The sudden increase in time we found with 5 letters among older people occurred at 6 or 7 letters in the young. Here, too, sensory storage is likely to be a major factor in limiting perceptual spans. Indeed, it would not be wrong to describe the perceptual span as a sensory memory span, since readout follows the disappearance of the stimulus and therefore must be formed from a lingering image.

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Errata

In the letter "Inhibition of adenyl cyclase by an exotoxin of *Bacillus thuringiensis*" by D. G. Grahame-Smith, P. Isaac, D. J. Heal and R. P. M. Bond (*Nature*, **253**, 58; 1975) Figs 1 and 2 were transposed. The legends are correct as they stand.

In the letter "Sustained oscillations of acetylcholine during nerve stimulation" by Y. Dunant, P. Jirouneck, M. Israël, B. Lesbats and R. Manaranche (*Nature*, **252**, 485; 1974) the label on the abscissa of Fig. 1*a* should read 'Time (s)' and not as printed.

In the article "New observations of the angular diameter–redshift relation for radio sources" by A. Hewish, A. C. S. Redhead and P. J. Duffett-Smith (*Nature*, **252**, 657; 1974) there is a misprint on page 659. In line 18, 0.17″ ±0.3″ should read 0.17″ ±0.03″.

In the article "Two types of resistance to polyene antibiotics in *Candida albicans*" by C. C. HsuChen and D. S. Feingold (*Nature*, **251**, 656; 1974), the following corrections should be made to the legend of Table 2. In line 2, for CH_3COOH read MeOH; the expression in lines 4 and 5 should read [(c.p.m. of given phospholipid)/(total c.p.m. in phospholipid fraction)] × 100, and not as printed.