adjacent segment. Hence, if the transfer function alters, the locus of points which the subject behaviourally defines as corresponding to his left arm should be a straight line which deviates from the true position by 11°, with its origin at the shoulder. This assumes that there is full adaptation and no decrement of effect during the time spent collecting the results.

As can be seen, the results support this contention in so far as both subjects show a greater linear error from true arm position as the distance from the shoulder increases. Full angular adaptation is not shown, however, which shows the need for more rigorous treatment of the problem.

The most parsimonious explanation of this result is that it is based on a change in the transfer function of joint receptor output. To explain the result using the motor outflow component is difficult, bearing in mind that the immobile limb shows no on-going activity as recorded by electro myographic techniques[8]. Presumably, then, there is no motor-outflow which can be used to give the subject information about limb position in this situation.

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Intermodal Transfer of Adaptation to Displacement

It has been reported[1] that after adaptation of pointing behaviour in a prism-wearing situation, subjects will mislocate the position of an auditory stimulus if blindfolded and asked to point directly at it. The direction of this error of location is identical to that which would be expected if the subject were asked to point at a visual target after adaptation.

Before interpreting this result, it is necessary to know the generality of the phenomenon. If it could be shown that a subject exposed to a situation in which he received inaccurate auditory information as to the position of his pointing arm, then mislocated visual targets, there would then be strong evidence to suspect the implication of a change in the transfer function relating the output of joint receptors to some other component of the system, probably in the central nervous system, but as yet unspecified.

The experiment was carried out in three parts: (*a*) the subject pointed to visual targets without seeing his pointing limb at any time, and the investigator measured errors of location; (*b*) the subject pointed to a clicking auditory 'point-source' while blindfolded and with the pointing limb splinted. Pointing was carried out solely by horizontal abduction and adduction. Knowledge of success was given the subject when he depressed a switch which clicked a small loudspeaker which he thought was mounted directly above his pointing hand, but which in fact was offset by 12°. The task of the subject was to become as accurate as possible. After these adaptation trials, part (*c*), identical to (*a*), was carried out.

The results indicate that such auditory training leads to a change in pointing behaviour to visual targets at a level of confidence for t far in excess of 0·001.

It has been shown that there is no transfer of adaptation between limbs when the head is restrained[1]. The present cross-modal transfer of adaptation thus provides very strong evidence for change in transfer function for the output of the position receptors of the joints concerned. This is further confirmed in another article[2]. Alternative explanations could be put forward, but cannot satisfactorily explain how the subject could respond coherently if the joint was signalling information as to limb position which was incompatible with visually-derived information about the limb.

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STATISTICS

Determination of the Solid Volume Percentage below Detectable Size in Coulter-counter Analysis

In a recent paper Harris and Jowett[1] suggest an extrapolation technique for determining the solid volume percentage below detectable size in Coulter-counter analysis. The technique is based on the assumption that the Gates–Gaudin–Schuhmann or the Rosin Rammler distribution is valid for the particles in question, and it is presupposed that, if a mathematical distribution function fits the experimental data, this function also holds for the undetectable part of the physical distribution.

From a logical point of view there is usually no strict connexion, if any relationship at all, between a physical particle-size distribution and the mathematical equation used to fit the physical data. Frequently the point is to find a curve, a graph of some suitable mathematical function, which runs through the experimental points with satisfactory precision. Often, however, it is rather difficult to obtain complete overlap, and in such cases the temptation to believe in the smoothed curve more than in the actual experimental points will always be present. Thus the application of mathematical distribution functions in order to estimate the fine end percentage of a measured particle-size distribution may introduce errors in the total volume. First, even if complete overlap is obtained, this does not prove that the mathematical function also holds for the undetectable part of the physical distribution. Secondly, if complete overlap is not obtained the evidence that an extrapolation of the mathematical function will coincide with the physical distribution is further decreased. These points have also been emphasized by Harris and Jowett[1].

In cases where the purpose of using the mathematical function is merely to estimate the total solid volume, I have found an alternative, 'non-mathematical', method very useful. The method will be illustrated using the data of Harris and Jowett[1]. The extrapolation has, of course, to be based on a more or less 'non-quantitative' valuation, but, as the following example shows, it is possible to obtain a visual impression of the plausibility of the extrapolation.

The primary data from the Coulter-counter give a cumulative number distribution over stated size, but this distribution may easily be recalculated to a volume or weight basis, as illustrated by the data of Harris and Jowett[1]. In Fig. 1 these data are plotted as a frequency histogram, instead of applying the commonly used integral (cumulative) form of the size distribution. If $\bar{v}_P$ is the mean particle volume in a narrow size class of Δn particles and Δx the size range of that class, the frequency is equal to $\frac{\Delta n \cdot \bar{v}_P}{\Delta x}$. The different frequencies are given in Table 1. Δv is here identical with the product $\Delta n \cdot \bar{v}_P$.

In fact, the histogram in Fig. 1 includes the whole experimental information available from the Coulter-counter analysis, and some extrapolation in the small particle range is necessary to obtain the total area under the frequency curve, which is a measure of the 100 per cent