

THE ROLE OF HEAD MOVEMENTS IN THE LOCALIZATION OF SOUND

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Under the normal conditions of daily life, sounds are heard as right, left, above, below, and in other positions. The head is ordinarily in motion and these head movements change the binaural pattern of stimulation. If head movements could be completely ruled out of the picture, what would result?

To study the rôle of head movements in sound localization the pinnae were acoustically detached from the head by means of tubes and trumpets, and fastened to a frame of reference independent of the subject. The arrangement guaranteed that head movements would not change the pattern of acoustic stimulation as they normally do.

When effective head movements were ruled out of the experimental conditions the total auditory field was restricted to a semicircular arc entirely outside of the visual field. The plane of this arc was generally horizontal, but individuals differed, and it was sometimes vertical or in an intermediate position. The subjects were able to discriminate right and left and intermediate directions with moderate ease and objective reliability, but such distinctions as up, down, front, back, etc., did not exist.

Inasmuch as normal sound localization has an unrestricted tridimensional field coextensive with visual-tactual space and since discriminations other than mere right and left may be made in a manner superior to chance, it is assumed that changes in the stimulus-pattern produced by head movements are the direct conditions of the unrestricted tridimensional type of sound localization.

A test of the hypothesis may be found in an experiment with the reversing pseudophone in which right and left ears were acoustically interchanged but the artificial ears still moved with the head as under normal conditions. Apart from a complete right-left reversal of auditory space the localizations resembled the normal type. The auditory field was of an unrestricted type and discriminations of front, back, up, down, etc., were possible.

The study indicates that head movements are responsible for reliable localization in an unrestricted, tridimensional space. When conditions are such that head movements can not change the stimulus-pattern, the auditory field is greatly restricted and objective reliability is limited to two dimensions.