which corresponds to a pressure range of 1.32 to 150 lb/in.^{2}. Approximately 10 percent of the total experimental void volume is filled by the time the pressure reaches 150 lb/in.^{2}, owing in part, most probably, to the compression of the samples as a whole. At higher pressures, the rate of filling of the void volumes increases rapidly, as is shown by the sharp rise to a peak in each distribution curve, and then gradually decreases so that each curve approximates the base line at 0.1 μ or 1015 lb/in.^{2} (Fig. 1). The data place about 90 percent of the total experimental void volume within a radius range of 0.7 to 0.1 μ, thus agreeing with the channel dimensions as predicted in a preceding paragraph from the description of the filters.

In this region, the void volumes per leaf—the areas beneath the curves (*1*)—are approximately equal for the two samples, but the distribution according to pore-radius dimensions is different. Sample A shows a consistently smaller effective radius than sample B, and the peaks of the distribution curves occur at 0.48 and 0.58 μ, respectively. Since the porosities of the samples are equal, 79 percent, the distribution in the radius range below 0.7 μ is in qualitative agreement with the permeability data (*15*), which show that sample A has a resistance to flow 33 percent greater than sample B at various pressure differentials.

If the channels are cylindrical, the porometer data indicate that the radius dimensions of the channels in sample A are smaller than those of sample B. An alternate interpretation could ensue from a consideration of the definition of effective radius: the radius of a hypothetical circular pore which would admit mercury at the same pressure as that required to force passage through the actual pore regardless of its cross-sectional shape (*5*). The channels in sample A may have the same cross-sectional areas as those in sample B, but they may deviate more from a circular toward an elliptical cross section. They therefore would exhibit a smaller effective radius and screen out smaller particles and, likewise, would present more resistance to flow, since flow is influenced similarly by the cross-sectional shape of the channels.

In general, the results indicate that the effective pore sizes, calculated from mercury-intrusion measurements on the basis of Eq. 2 and its underlying assumptions, are reasonably accurate. The pore-size distribution data obtained by this method should prove useful in theoretical and practical investigations dealing with the characteristics of these and of similar type filters, and, in fact, of a variety of porous materials.

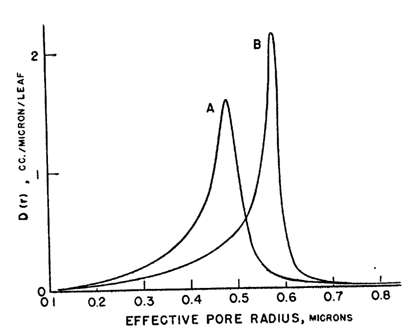

Fig. 1. Pore-size distribution curve, that is, distribution function $D(r)$ versus effective pore radius.

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25 June 1954.

Processes of Motion Perception

Rayford T. Saucer*

Department of Psychology, Georgia Institute of Technology, Atlanta, Georgia

In an earlier paper (*1*) I discussed the nature of lateral transfer of perceptual organizations. It is believed that a matrix theory of perception can be used as the basis of a unified theory of motion perception. Present theories commonly divide motion perception into two parts. Real motion, in which the perception of movement arises from the movement of an object in real space, is considered different from subjective motion, in which the perceptual organization arises out of the given spatiotemporal complex of stationary stimuli.

It is felt that the two can be related or unified by recourse to a theory of a dual set of organizations, the one corresponding to the perception of motion and the other to the perception of pattern or detail. The basis for this theory lies in two sets of phenomena observed in apparent motion studies.

It is well known that apparent motion perception can be optimized for a particular set of dynamic variables. Below the optimal point, motion tends to disappear and is replaced by the successive appearance of the stimuli. Above the optimal point, it is replaced by simultaneous appearance of the stimuli. Under stimulus conditions reported (*1*), the second stage is characterized by a phenomenon that I have called "Omega." The Omega complex is reported as (i) a black shutter or door that opens to reveal the light source, (ii) a hole in nothing, and (iii) as various moving objects having object-character derived from the subject's own experiences. This perception evidently corresponds closely to the experience of a moving object under scotopic conditions.

Under optimal conditions, Beta movement (where the moving stimulus corresponds to the physical stimuli) is reported. Beta and Omega are not reported simultaneously. It is felt that the Omega is isomorphic to a movement signal generated by certain temporal aspects of the recurrent stimulus.

We may formulate a tentative law which states that if an area X' is stimulated some time before an area Y' is stimulated, the necessary condition for the perception of motion alone has been met. Detail vision will be a function of the energy level of the stimulus and its temporal duration. If the detail component is barely above the limen, then the motion signal will capture the detail complex. If the energy level of the stimulus is raised, the detail component will register isomorphic to the real space projection of the stimulus, but the temporal conditions necessary to generate the motion signal need not be violated.

The detail component is thus related to the energy level or contrast relationships of the stimulus and ground, whereas the motion component is related to the timing or subjective velocity of traverse of the visual field. Obviously, such organic characteristics as delay time and adaptation act to interrelate the two components.

The foregoing formulation is a restatement of Korte's laws of apparent motion extended to include the case of all perceived motion. It will serve to relate real motion perception, the phenomena of apparent motion, and certain observed perceptual changes in moving objects.

We postulate two neural organizations, one primitive organization, which corresponds to motion perception, and another, isomorphic to detail. The more primitive motion perception mechanism is similar to scotopic vision. It is also more resistant to disruption, so that the detail complex may cease to be associated with the motion signal. If the necessary conditions of successive stimulation of retinal areas is maintained, the perception of Beta motion will break apart into the detail complex and the motion signal.

In this case, we expect the temporal ordering of the stimulus to be the largest single factor in determining motion perception, since the Omega is largely a function of timing, whereas the detail component tends to lose significance at a level barely above the limen. If the energy or contrast level is raised, it merely reflects more detail and will eventually come to anchor the perception of the stimulus object to its real location in space.

When the spatiotemporal aspect of a stimulus configuration duplicates the necessary condition for the motion complex, the assignment of object character to the movement perception arises out of the proximity of the source of energy necessary to create the motion signal. Each component can be isolated and studied under laboratory conditions. Does this mean that we have succeeded in isolating the components of a perceptual organization, or does it mean that perceptual organizations are holistic but tend to combine in a nonlinear manner to form new organizations? Certainly logic will not predict Beta movement from the motion complex and an object in the visual field. Perception is thus removed to a supraordinate level.

Perception of Omega is the perception of a dynamic signal stating that "something has moved" from X to Y. It is entirely distinct from the organization of neural elements which transduce the static physical characteristics of the stimulus object. The supraordinate process combines the two organizations into a new item of intelligence: the moving object is an object in the spatial field.

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* Present address: Psychology Service, Veterans Administration Hospital, Gulfport, Miss.

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11 June 1954.

Communications

Induction of Tooth Defects by Thermal Shock

The large increase in incidence of tooth decay in the United States since the turn of the century has undoubtedly considerable connection with our changed eating habits. One of the changes in eating habits is that of eating intensely cold and hot foods at the same meal. The practice, for example, of eating piping hot food, served at say 150°F, and a moment later taking a swallow of an iced drink, or vice versa, exposes the teeth to some thermal shock. One effect of thermal shocks on vitreous materials is to induce small cracks, which accelerate mechanical breakdown. In the case of teeth such small cracks could also furnish entrance sites for bacterial decay. How important is such thermal shock to the teeth?

To obtain a preliminary idea of how to attack the problem, a number of extracted healthy teeth free of fillings were subjected to repeated thermal shock, then subjected to a smashing action. A comparison was then made of the proportion of the teeth that survived the smashing with the proportion of teeth surviving that had not undergone thermal shock cycling. The test conditions chosen were extremely simple but severe and were intended only to indicate probable trends in tooth behavior.

From the original batch of 160 teeth, half were