

Perceptual behavior of 8- to 10-week-old human infants¹

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The perceptual behavior of 8-, 9-, and 10-week-old infants as a function of different stimulus forms, individuality, and activation level was observed by means of a time-sampling rating method. The proportion of variance accounted for by differences between stimuli is found to increase with age; at the same time the effect of autonomic activation processes is decreasing. At 10 weeks but not at 8 weeks of age, circular forms elicit a relaxed approaching tendency, in contrast to a tense aversion, which is elicited by irregularly-shaped forms.

When confronted with a sudden and slightly intense, but otherwise unspecified visual stimulus, an infant reacts in a characteristic manner (Meili, 1957). After an initial motor inhibition some of the infants quickly recover, seem to enjoy the unusual stimulation, smile and attempt to grasp; with other infants the initial irritation grows into a state of heightened tension, and ends with motionless staring, aversion of the head, or sometimes, frightened crying. Both, intuitive global judgments and behavioral criteria (eye blink rate and course and amount of movement), mainly based on motion pictures, have been used to describe and measure the reaction (Lohr, 1960). It was conceptualized as a differential psychological continuum of "irritability" or "positive vs. negative attitude towards the outer world." The reaction at 3 to 4 months allowed the prediction of the behavior of the same children in different situations until at least their 8th year (Lang, 1962). It seems to involve both hereditary and environmental determinants (Lohr et al, 1964).

In an attempt to analyze more closely the general psychological meaning of this reaction, the present investigation used a somewhat complex, yet practicable, observation method based on these earlier studies. The perceptual behavior of 29 infants of both sexes as a function of individuality, activation level and different stimuli was studied in a three-way analysis of variance design at each of three age levels.

Method

Dependent Variable. Beginning with the presentation of the stimulus, the behavior of the infant was rated every 10 sec. on a 9-point scale of pleasurable relaxation vs. aversive tension. Low scale values include smiling and tendency to orient towards the stimulus; high values include either motionless tension or convulsive movements, crying, anxious mimic, and/or head aversion. Neglecting the time-dependent course of the reaction (which will certainly be essential in a more thorough analysis based on a more exact

method) all the ratings during each 3- (occasionally 2- or 4-) min. stimulus presentation were averaged and multiplied by 100, making for a Relaxation-Tension score with a theoretical range between 100 and 900. The correlation between the scores of two observers, one of them not aware of the nature of the stimuli, was $r = .88$.

Independent Variables. (1) Individual infants were allotted values of one variable in accordance with the above mentioned importance of individual differences. But no attempt was made in the present context to identify the continuum. Infants' parents were contacted by letter and phone; the experiments took place in their homes at a day when the infant was ± 2 days of the desired age. (2) As a rough approximation of activation level the state of the infant before and after the meal was used, assuming higher activation before and lower activation after the meal. (3) The stimulus forms reproduced in Fig. 1 were presented, one at a time, as a bright figure on a medium-grey screen, 25 cm above the eyes of the infant lying in its crib. The visual angle was approximately 19° ; area and contour length of the 4 forms were equal. The stimuli were selected to represent (a) degree of regularity, orderliness, or redundancy (circular vs. irregular form), and (b) the aspect of continuity vs. discontinuity (line vs. points) which has produced differences in fixation preference (Graefe, 1963).

Results

The Relaxation-Tension scores of independent samples at three age levels were separately analysed and the variance components of the significant effects ($p < .01$) calculated. The percent components are presented in

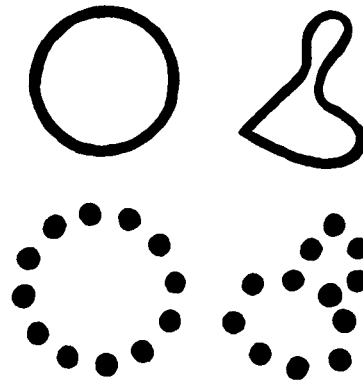


Fig. 1. The 4 stimulus forms, circle, irregular curve, circular points and irregular points, arranged for the aspects of regularity and continuity.

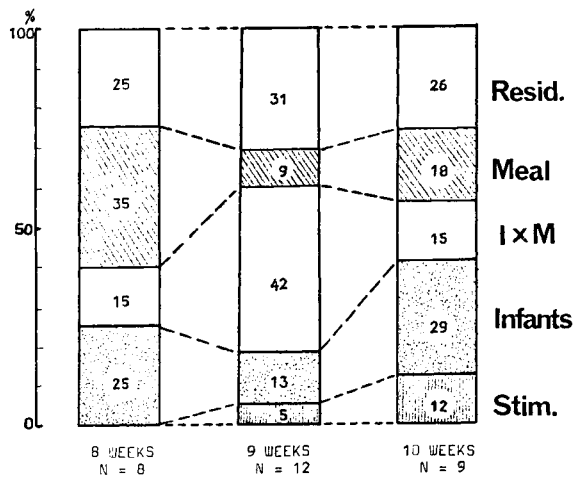


Fig. 2. Percentages of significant ($p < .01$) variance components in three-way analyses of variance at 3 age levels.

Fig. 2, giving a developmental picture of the relative importance of the analysed conditions of perceptual behavior.² Individual differences account for approximately one fourth of the variance. The proportion of variance accounted for by differences between stimuli is found to increase with age from zero to 12%. At the same time the effect of autonomic activation processes (Meal) decreases from one third to one fifth. As it was expected the higher activation level leads to a more tense reaction, the overall means before meals being 647, 601, and 598 for 8, 9, and 10 weeks respectively, as compared with 514, 539, and 511 after the meal. The overall means for the different stimulus forms are presented in Fig. 3. A clearly developing differentiation between the circular and the irregular forms is evident, indicating a more relaxed approaching tendency toward the "good" forms in contrast to a more tense aversion from the "bad" forms at 10 weeks. No significant differences are found for the stimulus aspect of continuity. At the age of 8 weeks no differential

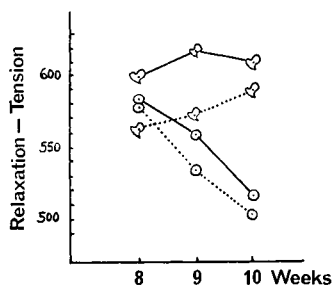


Fig. 3. Relaxation-Tension averages for the 4 stimulus forms at 3 age levels. Circular and irregular forms are indicated and connected by either a continuous line or points according to the nature of the stimuli. The null hypothesis of no difference between single stimuli is rejected for circular points vs. irregular curve at 9 weeks and for both circular forms vs. both irregular forms at 10 weeks (Duncan's Multiple Range Test).

perceptual behavior towards the four stimulus forms could be established by the present method.

Discussion

The results might be explained in the context of a System Theory of behavior and personality which elaborates Lewinian thoughts (cf. Lang, 1966). It is assumed that, in the absence of existing traces of external patterns, the incoming information is integrated into one of two inborn response classes which are further developed under the influence of experience (see also Schneirla, 1965). One of these is initially constituted by aversion tendencies and the expression of nuisance, the other by approach tendencies and the smiling response. These response tendencies provide a basis for the development of the motivational system. In addition, the approach tendency is considered crucial in the development of the perceptual-cognitive organization of the personal world, of which the distinction of regular forms may be one of the earliest instances. The postulation of an autochthonous component in the processing of incoming stimulation seems warranted, since it is not feasible to assume more experience with circular forms during the 9th and 10th week than with our irregular shape resembling a nipple. Emphasis is also put on individuality and on environmentally stirred and/or damped activation, both influencing the building up of the motivational and the perceptual-cognitive systems.

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Notes

- This investigation is a contribution to the Bernese Longitudinal Studies in Personality Development. It was conducted at the Psychological Institute of the University of Bern, Switzerland. The author wishes to express his indebtedness to Richard Meili. Thanks are due to Leonard J. Goldsmith for assistance in style. For a detailed exposition of theory, method, results and discussion of further problems, among them the relationship between the present method and the method of preferred fixation customary in infant perception research, the reader is referred to Lang (1966).
- At 9 weeks the Infant by Meal interaction component seems to be large at the cost of the respective main effects. This is probably due to sampling bias and should be interpreted with caution, although it leads to interesting speculations and further questions (cf. Lang, 1966).