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PICTORIAL RECOGNITION AS AN UNLEARNED ABILITY: A STUDY OF ONE CHILD'S PERFORMANCE

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Anecdotes about primitive people who are unable to identify pictured objects suggest the hypothesis that pictorial recognition is a learned ability.¹ In a weaker form of this hypothesis, learning might be held essential for the recognition of line-drawings (compare Gibson's 'ghost shapes'),² while the naïve recognition of photographs, with their higher 'fidelity,' would be admitted. The present investigation was designed to determine whether a child who had been taught his vocabulary *solely* by the use of objects, and who had received no instruction or training whatsoever concerning pictorial meaning or content, could recognize objects portrayed by two-dimensional line-drawings and by photographs.

Answers to these questions were desired for two reasons. First, the psychophysical exploration of outline-representations has begun to provide some promising, lawful relationship.³ Although the predictive equations would remain just as interesting regardless of whether they are based on 'learned' or 'innate' processes,⁴ somewhat different sets of further hypotheses might suggest themselves if the entire realm of responses to outline-representations of spatial objects turned out to be the product of arbitrary associations between symbols and things—a sort of assigned visual language. Secondly, if pictorial perception did indeed turn out to be a learned ability in this arbitrary sense (which it did not), we should have a starting point for the investigation of the possible lines of its development and of individual differences therein.

It should be stressed that this investigation does not directly bear upon the general question of nativism vs. empiricism in space-perception, which is too broad to be submitted to so specific a test. If space-perception were itself an 'unlearned' ability, the representation by flat pictures might not be feasible without specific learning. If recognition of solid objects in two-dimensional representation were at least in part unlearned, it might still

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¹ The only study in point is that of W. Hudson, Pictorial depth perception in sub-cultural groups in Africa, *J. soc. Psychol.*, 52, 1960, 183-208, which is concerned with differences in spatial localization rather than in recognition of objects.

² J. J. Gibson, What is a form?, *Psychol. Rev.*, 58, 1951, 403-412.

³ Julian Hochberg and Virginia Brooks, The psychophysics of form: Reversible-perspective drawings of spatial objects, this JOURNAL, 73, 1960, 337-354.

⁴ Hochberg, Spatial representation: Theme 10, *Proc. Int. Congr. Psychol.*, 1957.

develop without formal training as a by-product of a more general process of learning to perceive space.

Training. Since birth, the subject (*S*), a boy, had been exposed to and taught the names of a wide variety of toys and other solid objects. With two exceptions discussed below, the color of each of these objects was either uniform, or it was divided into functional areas (*e.g.* face-coloration, hair-shade, and dress-color on

TABLE I
STIMULUS-PRESENTATIONS AND JUDGES' INTERPRETATIONS OF *S*'S RESPONSES

Part 1					Part 2				
Stimulus-picture	Interpretation of responses				Stimulus-picture	Interpretation of responses			
	Parents	Judge A	Judge B	Parents		Judge A	Judge B		
(1) car	+	car	car	(1a) car	+	car	car		
(2) car	+	car	car	(2a) car	+	car	car		
(3) shoe	+	shoe	shoe	(3a) car	-	Jody§	Jody§		
(4) shoe	+	shoe	shoe	(4a) shoe	+	shoe	shoe		
(5) shoe	+	—	—	(5a) shoe	-	—	—		
(6) Jody (sister)	+	Jody	—	(6a) Jody	+	Jody	Jody		
(7) dolly	+	—	dolly	(7a) dolly	+	dolly	dolly		
(8) dolly	-	shoe‡	shoe‡	(8a) dolly	+	dolly	dolly		
(9) dolly	-	shoe‡	—	(9a) car	+	car	car		
(10) car	+	car	car	(10a) car	+	car	car		
(11) car	+	car	car	(11a) rocky	+	rocky	rocky		
(12) rocky	+	rocky	rocky	(12a) rocky	+	rocky	rocky		
(13) rocky	+	rocky	rocky	(13a) rocky	+	—	—		
(14) rocky	+	—	—	(14a) key	+	key	key		
(15) keys	+	key	keys	(15a) dog	+	dog	—		
(16) key	+	key	key	(16a) spoon	-	—	key		
(17) key	+	key	key	(17a) Mommy	- †	—	—		
(18) wawaw	-*	wawaw	wawaw	(1c) box	+	box	—		
(19) fcahr	+	car	car	(2c) box	+	—	car		
(20) fcahr	+	car	car						
(21) Mommy	-	—	shoe‡						

* Since no response could be elicited during Part 3 to the solid object, and since the parents do not agree as to the certainty of the name in previous handling, all identifications of this stimulus are doubtful.

† Much amusement.

‡ "Shoe" may be the judges' misinterpretation of *S*'s "thank you" in response to being given the pictures.

§ Misidentification due to sister's entry into the room.

dolls). That is, no objects were depicted as surface-decoration. Even so, *S* never was told (or allowed to overhear) the name or meaning of any picture or depicted object. In fact, pictures were, in general, kept from his immediate vicinity.

This is *not* to say that *S* never had been exposed to pictures. There was a Japanese print on one wall of a room through which he frequently passed; a myriad of billboards fronted the highways on which he traveled frequently; a few times (six in all) he accidentally encountered a picture-book (which was gently withdrawn) or caught a glimpse of the label of a jar of baby food (these were normally re-

moved or kept covered). (All these encounters were unaccompanied by instruction or naming-play.) Furthermore, one toy (a top) had pictures of elves on it and, accordingly, it was available for play only under strict supervision to prevent any naming in his presence; and a high chair had a decal of babies on it, which could be glimpsed (without parental comment) only when *S* was being placed in the seat.

The constant vigilance and improvisation required of the parents proved to be a considerable chore from the start—further research of this kind should not be undertaken lightly. By 19 mo. of age, the child began actively to seek pictures, and continuation of the constraints became both pediatrically and methodologically un-



FIG. 1. PICTURES SHOWN *S* IN PART 1

desirable. Two incidents terminated this stage of the investigation: (a) *S* became aware of events on the TV set in the next room, managed to obtain a glimpse of the screen on which a horse was being depicted, and excitedly cried "dog"; (b) he squirmed around in his highchair about the same time, and, pointing to the decal, said "baby." It was evident that some form of parental response to such identifications would soon become unavoidable. The testing procedure was begun at this point.

Testing: Part 1. The set of 21 pictures listed in the first part of Table I, and shown in Fig. 1, was prepared on 3×5 in. cards. In all cases but one (No. 12), the series was so arranged that the outline-drawing of any object preceded any photograph of the same object; recognition could not, therefore, be made first from the photograph and then transferred to the drawing. The drawings were handed one at a time to *S*, a somewhat unsuccessful attempt being made to convert the test to an interesting game. Responses were obtained by tape-recording.

Part 2. Immediately after Part 1, *S* was given a large store of picture-books. For a period of one month, he had free (but monitored) access to still pictures, but motion pictures, TV, and picture-naming play still were completely avoided. (It was feared that motion pictures would provide a basis for attaching names or three-dimensional 'meanings' to the still pictures which do, after all, appear even in cinema-sequences.) A great variety of naming-reactions appeared during this period, but special pains were taken not to respond to any of these. Vocabulary-building by means of object-naming games continued during this month, but at special times, and with no pictures present. At the end of the month, the testing

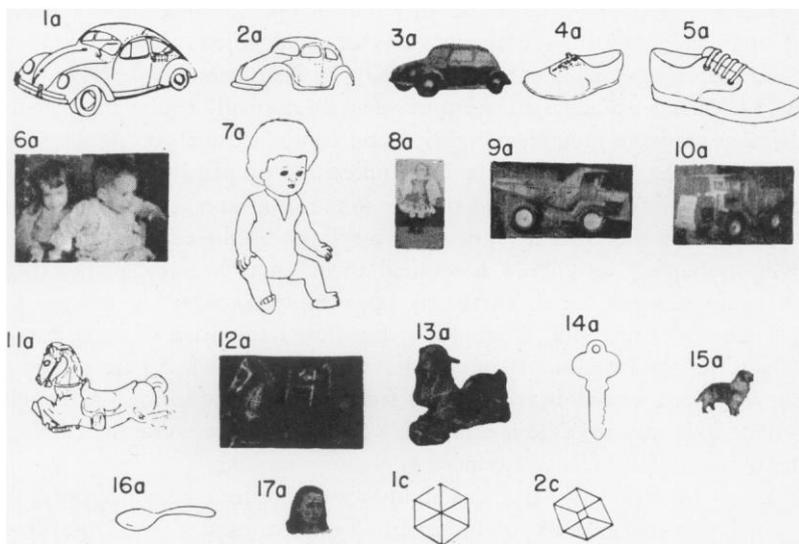


FIG. 2. PICTURES SHOWN *S* IN PART 2

procedure of Part 1 was repeated with the new set of stimuli listed in the second part of Table I and shown in Fig. 2.⁵

Scoring. A set of objects, consisting of most of those whose pictures appeared in the two testing series, then was presented to *S*, and *his* naming-responses were tape-recorded. These provided two judges (*A* and *B* in Table I), who had not been present during the two testing sessions, with experience of the child's pronunciation. The judges then were told that those words would be used, in any order and with any number of repetitions, in the recordings of the two testing sessions, and their task was to determine the order of presentation of the objects, using only the child's responses as recorded during those sessions.⁶ (This scoring procedure was undertaken separately by the two judges.)

⁵ The object represented in 1c and 2c was a box constructed of rigid wire, approximately $\frac{1}{8}$ in. in diameter, and 8 in. on a side. Introduced as a toy, it was involved in naming-games only during the month which elapsed between Part 1 and Part 2.

⁶ The judges were permitted as many repetitions as desired. The first two presentations in Part 1 had been edited to remove extraneous chatter. Since the third

Results. Those pictures which were considered to be correctly identified by the parents (who did know the stimulus-series) are shown in Table I; the interpretations of each of the judges also are shown. If we consider only the line-drawings which both judges correctly identified in Part 1 (given eight possible names which, they were told, could appear in any order with any number of repetitions), the probability of a chance relationship is well under 0.01. The judges thus correctly identified objects from the S's responses to the line-drawings.

It seems clear from the results that at least one human child is capable of recognizing pictorial representations of solid objects (including bare outline-drawings) without specific training or instruction. This ability necessarily includes a certain amount of what we normally expect to occur in the way of figure-ground segregation and contour-formation. At the very least, we must infer that there is an unlearned propensity to respond to certain formal features of lines-on-paper in the same ways as one has learned to respond to the same features when displayed by the edges of surfaces. "Ghost shapes," as Gibson has called them,⁷ may be anemic, but they are by no means deceased. There may, however, be considerable ontogenetic difference in structuring or emphasis; the clear recognition of Stimulus 1c as a "box," and the uncertainty of response to Stimulus 2c, are certainly not what one would have expected from adult performance.⁸ Although order-effects may have been responsible for the poor response to Stimulus 2c, the immediate identification of 1c was unexpected.

It may be maintained that this ability would not have been displayed by a child who had never been exposed to any pictures at all, and who had not had such extensive experience with patterned surfaces as had the present S. This may be true (although consideration of the inhomogeneities of the normal *apictorial* environment make it seem quite improbable to us), but, even if it is, the complete absence of instruction in the present case (the absence of 'association' between picture and represented object) points to *some* irreducible minimum of native ability for pictorial recognition. If it is true also that there are cultures in which this ability is absent, such deficiency will require special explanation; we cannot assert that it is simply a matter of having not yet learned the 'language of pictures.'

presentation proved to have elicited 'extraneous' responses which might be interpretable by judges as part of the series, editing of the remaining presentations was restricted to the elimination of overly-long interruptions; the residual chatter and gabble made judgment a difficult task.

⁷ Gibson, *op. cit.*, 412.

⁸ Hochberg and Brooks, *op. cit.*, 347.