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## PSYCHOLOGICAL DEVELOPMENT IN CHILDREN

*Die Seele des Kindes, Beobachtungen über die geistige Entwicklung des Menschen in den ersten Lebensjahren.*

Von W. Preyer, ordentlichem Professor der Physiologie an der Universität und Director des physiologischen Instituts zu Jena, etc. (Leipzig: Th. Grieben, 1882.)

THIS is a large octavo volume, extending to over 400 pages, and consisting of daily observations without intermission of the psychological development of the author's son from the time of birth to the end of the first year, and of subsequent observations less continuous up to the age of three years. Prof. Preyer's name is a sufficient guarantee of the closeness and accuracy of any series of observations undertaken with so much earnestness and labour, but still we may remark at the outset that any anticipation which the reader may form on this point will be more than justified by his perusal of the book. We shall proceed to give a sketch of the results which strike us as most important, although we cannot pretend to render within the limits of a few columns any adequate epitome of so large a body of facts and deductions.

The work is divided into three parts, of which the first deals with the development of the Senses, the second with the development of the Will, and the third with the development of the Understanding.

Beginning with the sense of Sight, the observations show that light is perceived within five minutes after birth, and that the pupils react within the first hour. On the second day the eyes are closed upon the approach of a flame; on the 11th the child seemed to enjoy the sensation of light; and on the 23rd to appreciate the rose colour of a curtain by smiling at it. Definite proof of colour discrimination was first obtained in the 85th week, but may, of course, have been present earlier. When 770 days old the child could point to the colours yellow, red, green, and blue, upon these being named.

The eyelids are first closed to protect the eyes from the sudden approach of a threatening body in the 7th or 8th week, although, as already observed, they will close against a strong light as early as the second day. The explanation of their beginning to close against the approach of a threatening body is supposed to be that an uncomfortable sensation is produced by the sudden and unexpected appearance, which causes the lids to close without the child having any idea of danger to its eyes; and the effect is not produced earlier in life because the eyes do not then see sufficiently well. On the 25th day the child first definitely noticed its father's face; when he nodded or spoke in a deep voice, the child blinked. This Prof. Preyer calls a "surprise-reflex"; but definite astonishment (at the rapid opening and closing of a fan) was not observed till the 7th month. The gaze was first fixed on a stationary light on the 6th day, and the head was first moved after a moving light on the 11th day; on the 23rd day the eyeballs were first moved after a moving object without rotation of the head; and on the 81st day objects were first sought by the eyes. Up to this date the motion of the moving object must be slow if it is to

be followed by the eyes, but on the 101st day a pendulum swinging forty times a minute was followed. In the 31st week the child looked after fallen objects, and in the 47th purposely threw objects down and looked after them. Knowledge of weight appeared to be attained in the 43rd week. Persons were first distinguished as friends or strangers in the 6th month, photographs of persons were first recognised in the 108th week, and all glass bottles were classified as belonging to the same genus as the feeding-bottle in the 8th month.

With regard to the sense of Hearing, it is first remarked that all children for some time after birth are completely deaf, and it was not till the middle of the 4th day that Prof. Preyer obtained any evidence of hearing in his child. This child first turned his head in the direction of a sound in the 11th week, and this movement in the 16th week had become as rapid and certain as a reflex. At 8 months, or a year before its first attempts at speaking, the infant distinguished between a tone and a noise, as shown by its pleasure on hearing the sounds of a piano; after the first year the child found satisfaction in itself striking the piano. In the 21st month it danced to music, and in the 24th imitated song; but it is stated on the authority of other observers that some children have been able to sing pitch correctly, and even a melody, as early as 9 months. One such child used at this age to sing in its sleep, and at 19 months could beat time correctly with its hand while singing an air.

Concerning Touch, Taste, and Smell, there is not so much to quote, though it appears that at birth the sense of taste is best developed, and that the infant then recognises the difference between sweet, salt, sour, and bitter. Likewise, passing over a number of observations on the feelings of hunger, thirst, satisfaction, &c., we come to the emotions. Fear was first shown in the 14th week; the child had an instinctive dread of thunder, and later on of cats and dogs, of falling from a height, &c. The date at which affection and sympathy first showed themselves does not appear to have been noted, though at 27 months the child cried on seeing some paper figures of men being cut with a pair of scissors.

In the second part of the book it is remarked that voluntary movements are preceded, not only by reflex, but also by "impulsive movements"; the ceaseless activity of young infants being due to purposeless discharges of nervous energy. Reflex movements are followed by instinctive, and these by voluntary. The latter are first shown by grasping at objects, which took place in Preyer's child during the 19th week. The opposition of the thumb to the fingers, which in the ape is acquired during the first week, is very slowly acquired in the child, while, of course, the opposition of the great toe is never acquired at all; in Preyer's child the thumb was first opposed to the fingers on the 84th day. Up to the 17th month there is great uncertainty in finding the mouth with anything held in the hand—a spoon, for instance, striking the cheeks, chin, or nose, instead of at once going between the lips; this forms a striking contrast to the case of young chickens which are able to peck grains, &c., soon after they are hatched. Sucking is not a pure reflex, because a satisfied child will not suck when its lips are properly stimulated, and further, the action may be originated centrally, as in a sleeping suckling. At a later

stage biting is as instinctive as sucking, and was first observed to occur in the 17th week with the toothless gums. Later than biting, but still before the teeth are cut, chewing becomes instinctive, and also licking. Between the 10th and the 16th week the head becomes completely balanced, the efforts in this direction being voluntary and determined by the greater comfort of holding the head in an upright position. Sitting up usually begins about the 4th month, but may begin much later. In this connection an interesting remark of Dr. Lauder Brunton is alluded to ("Bible and Science," p. 239), namely, that when a young child sits upon the floor the soles of its feet are turned inwards facing one another, as is the case with monkeys. When laid upon their faces children at earliest can right themselves during the 5th month. Preyer's child first attempted to stand in the 39th week, but it was not until the beginning of the 2nd year that it could stand alone, or without assistance. The walking movements which are performed by a child much too young to walk, when it is held so that its feet touch the ground, are classified by Preyer as instinctive. The time at which walking proper begins varies much with different children, the limits being from 8 to 16 months. When a child which is beginning to walk falls, it throws its arms forwards to break the fall; this action must be instinctive. In the 24th month Preyer's child began spontaneously to dance to music and to beat time correctly.

A chapter is devoted to imitative movements. At the end of the 15th week the child would imitate the movement of protruding the lips, at 9 months would cry on hearing other children do so, and at 12 months used to perform in its sleep imitative movements which had made a strong impression while awake—*e.g.* blowing; this shows that dreaming occurs at least as early as the first year. After the first year imitative movements are more readily learnt than before.

Shaking the head as a sign of negation was found by Preyer, as by other observers, to be instinctive, and he adopts Darwin's explanation of the fact—*viz.* that the satisfied suckling in refusing the breast must needs move its head from side to side. In the 17th month the child exhibited a definite act of intelligent adjustment, for desiring to reach a toy down from a press it drew a travelling-bag from another part of the room to stand upon. We mention this incident because it exhibits the same level of mental development as that of Cuvier's orang, which on desiring to reach an object off a high shelf drew a chair below the shelf to stand upon. Anger was expressed in the 10th month, shame and pride in the 19th.

Between the 10th and 11th month the first perception of causality was observed. Thus on the 319th day the child was beating on a plate with a spoon and accidentally found that the sound was damped by placing the other hand upon the plate; it then changed its hands and repeated the experiment. Similarly at 11 months it struck a spoon upon a newspaper, and changed hands to see if this would modify the sound. In some children, however, the perception of causality to this extent occurs earlier. The present writer has seen a boy when exactly 8 months old deriving much pleasure from striking the keys of a piano, and clearly showing that he understood the action of striking the keys to be the antecedent required for the production of the sound.

The third part of the book is concerned, as already stated, with the development of the Understanding. Here it is noticed that memory and recognition of the mother's voice occurs as early as the second month; at 4 months the child cried for his absent nurse; and at 18 months he knew if one of ten toy animals were removed. In Preyer's opinion—and we think there can be no question of its accuracy—the intelligence of a child before it can speak a word is in advance of that of the most intelligent animal. He gives numerous examples to prove that a high level of reason is attained by infants shortly before they begin to speak, and therefore that the doctrine which ascribes all thought to language is erroneous.

Highly elaborate observations were made on the development of speech, the date at which every new articulate sound was made being recorded. The following appear to us the results under this head which are most worth quoting.

Instinctive articulation without meaning may occur as early as the 7th week, but usually not till the end of the first half year. Tones are understood before words, and vowel sounds before consonants, so that if the vowel sounds alone are given of a word which the child understands (13 months), it will understand as well as if the word were fully spoken. Many children before they are six months old will repeat words parrot-like by mere imitation, without attaching to them any meaning. But this "echo-speaking" never takes place before the first understanding of certain other words is shown—never, *e.g.* earlier than the 4th month. Again, all children which hear but do not yet speak, thus repeat many words without understanding them, and conversely, understand many words without being able to repeat them. Such facts lead Prof. Preyer to suggest a somewhat elaborate *schema* of the mechanism of speech, both on its physiological and psychological aspects; but this *schema* we have not sufficient space to reproduce.

Although the formation of ideas is not at first, or even for a considerable time, dependent on speech (any more than it is in the case of the lower animals), it constitutes the condition to the learning of speech, and afterwards speech reacts upon the development of ideation. A child may and usually does imitate the sounds of animals as names of the animals which make them long before it can speak one word, and, so far as Preyer's evidence goes, interjections are all originally imitative of sounds. Children with a still very small vocabulary use words metaphorically, as "tooth-heaven" to signify the upper gums, and it is a mistake to suppose that the first words in a child's vocabulary are invariably noun-substantives, as distinguished from adjectives or even verbs. As this statement is at variance with almost universal opinion, we think it is desirable to furnish the following corroboration. The present writer has notes of a child which possessed a vocabulary of only a dozen words or so. The only properly English words were "poor," "dirty," and "cook," and of these the two adjectives, no less than the noun-substantive, were always appropriately used. The remaining words were nursery words, and of these "ta-ta" was used as a verb meaning to go, to go out, to go away, &c., inclusive of all possible moods and tenses. Thus, for instance, on one occasion, when the child was wheel-

ing about her doll in her own perambulator, the writer stole away the doll without her perceiving the theft. When she thought that the doll had had a sufficiently long ride, she walked round the perambulator to take it cut. Not finding the doll where she had left it she was greatly perplexed, and then began to say many times "poor Na-na, poor Na-na," "Na-na ta-ta, Na-na ta-ta"; this clearly meant—Poor Na-na has disappeared. And many other examples might be given of this child similarly using her small stock of adjectives and verbs correctly.

According to Preyer, from the 1st week to the 5th month the only vowel-sounds used are *ü* and *a*. On the 43rd day he heard the first consonant, which was *m*, and also the vowel *o*. Next day the child said *ta-hu*, on the 46th day *gö, örö*, and on the 51st *arra*. All the vowel sounds were acquired in the 5th month. We have no space to go further into the successive dates at which the remaining consonants were acquired. In the 11th month the child first *learnt* to articulate a certain word (*ada*) by imitation, and afterwards repeated the taught word spontaneously. The first year passed without any other indication of a connection between articulation and ideation than was supplied by the child using a string of different syllables (and not merely a repetition of the same one) on perceiving a rapid movement, as any one hurriedly leaving the room, &c.; but this child nevertheless understood certain words (such as "Handchen geben") when only 52 weeks old. Inefficient attempts at imitative speaking precede the accurate attempts, and at 14 months this inefficiency was still very apparent, being in marked contrast with the precision whereby it would imitate syllables which it could already say; the *will* to imitate all syllables was present, though not the *ability*. At the beginning of the 14th month on being asked—"Wo ist dein Schrank?" the child would turn its head in the direction of the cupboard, draw the person who asked the question towards it (though the child could not then walk); and so with other objects the names of which it knew. During the next month the child would point to the object when the question was asked, and also cough, blow, or stamp on being told to do so. In the 17th month there was a considerable advance in the use of sign-language (such as bringing a hat to the nurse as a request to go out), but still no words were spoken save *ma-ma, pa-pa*, &c. In the 20th month the child could first repeat words of two unlike syllables. When 23 months old the first evidence of judgment was given; the child having drunk milk which was too hot for it, said the word "heiss." In the 63rd week this word had been learnt in imitative speaking, so it required  $8\frac{1}{2}$  months for it to be properly used as a predicate. At the same age on being asked—"Where is your beard?" the child would place its hand on its chin and move its thumb and fingers as if drawing hair through them, or as it was in the habit of doing if it touched its father's beard; this is evidence of imagination, which, however, certainly occurs much earlier in life. At the close of the second year a great advance was made in using two words together as a sentence—*e.g.* "home, milk," to signify a desire to go home and have some milk. In the 1st month of the 3rd year sentences of three or even four words were used, as "Papa, pear, plate, please." Hitherto the same word would often be

employed to express several or many associated meanings, and no words appeared to have been entirely invented. The powers of association and inference were well developed. For instance, the child received many presents on its birthday, and being pleased said "bursta" (= Geburtstag); afterwards when similarly pleased it would say the same word. Again, when it injured its hand it was told to blow upon it, and on afterwards knocking its head it blew into the air. At this age also the power of making propositions advanced considerably, as was shown, for instance, by the following sentence on seeing milk spilt upon the floor—"mime atta teppa papa oï," which was equivalent to "Milk fort (auf den) Teppich, Papa (sagte) pfui!" But it is interesting that at this age words were learnt with an erroneous apprehension of their meanings; this was particularly the case with pronouns—"dein Bett," for example, being supposed to mean "das grosse Bett." All words which were spontaneously acquired seemed to be instances of onomatopæia. Adverbs were first used in the 27th month, and now also words which had previously been used to express a variety of associated or generic meanings, were discarded for more specific ones. In the 28th month prepositions were first used, and questions were first asked. In the 29th month the chief advance was in naming self with a pronoun, as in "give me bread"; but the word "I" was not yet spoken. When asked—"Wer ist mir?" the child would say its own name. Although the child had long been able to say its numerals, it was only in this month that it attained to an understanding of their use in counting. In the 32nd month the word "I" was acquired, but still the child seemed to prefer speaking of itself in the third person.

The long disquisition on the acquirement of speech is supplemented by a chapter conveying the observations of other writers upon the same subject. This is followed by an interesting chapter on the development of self-consciousness, and the work concludes with a summary of results. There are also lengthy appendices on the acquirements of correct vision after surgical operations by those who have been born blind, and on the mental condition of uneducated deaf mutes; but we have no space left to go into these subjects. Enough, we trust, has been said to show that Prof. Preyer's laborious undertaking is the most important contribution which has yet appeared to the department of psychology with which it is concerned.

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#### SCLATER'S "JACAMARS AND PUFF-BIRDS"

*A Monograph of the Jacamars and Puff-birds, or Families Galbulidæ and Buccconidæ.* By P. L. Sclater, F.R.S., &c. 1 vol. roy. 4to, half-bound Morocco. (London: Dulau and Co., 1882.)

THE completion of another illustrated Ornithological Monograph is an event worthy of record in the columns of NATURE, although the subjects of it are, perhaps, of somewhat limited interest to the scientific world in general. "Jacamars" and "Puff-birds" are, no doubt, well-known groups to the ornithologist, but confined as they are in life to the dense forests of South and Central America, and invisible to most persons even as inhabitants of our Zoological Gardens, their names