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Imprinting and evolution of human brain

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Abstract

The article is devoted to the features of human imprinting in terms of psychology and neuropsychology. The author correlates the formative periods of attachment in children and adolescents with the phases of the formation of the brain. Imprinting occurs in specific, sensitive periods (usually in childhood and adolescence), usually with one fold, and its consequences are often irreversible. Unlike conventional learning or conditioned reflexes, imprinting has no need to be supported, the information about the impression usually is not forgotten, and negative reinforcement and painful stimuli only increase imprinting. However, some response to stimulation may be embodied only appear at the end of life through a large time interval after the imprinting has occurred. The article may be of interest not only from a theoretical point of view, but also used in the practice of psychotherapy of attachment problems and behavioral problems in general, both children and adults. The author concludes that the biological phenomenon of imprinting broadly corresponds to the psychological phenomenon of attachment and has three stages of formation, corresponding to the three stages of brain development. This approach allows a better understanding of personal problems, with children, adolescents, and adults, it links the problem of imprinting with Bowlby attachment theory, and helps to find the roots of today's problems and resource areas for their solution.

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Keywords

Age problems, child psychology, imprinting, neuropsychology, attachment, personality development, formation of brain.

Introduction

Let us begin with the definition. In a broad sense, imprinting (we could even say imitating the object of attachment) is a specific form of learning. It is a learning process that occurs in the early stages of the life of a social animal and reinforces behavioral patterns (recognizing one's congeners or their substitutes and gravitating towards them). It reinforces in the memory of animals (including humans) the attributes of objects in the formation and adjustment of inborn behavioral acts (patterns). Objects, in this case, can come as parental animals or other members of the family or community (flock, herd, etc.), potential sex partners (males or females), as well as living objects running into which constantly and/or emotionally is significant for the individual (other creatures of the same kind, enemies, food objects, etc.). This is a very broad, generalized definition based both on medical or psychological definitions and biological or ethological ones. [Bleicher, Crook, 1995; Corsini, Auerbach, 2006; Wenger, 2005; Zhmurov, 2012].

Let us now examine the specifics of this phenomenon. Imprinting occurs during certain, sensitive periods (normally, in childhood or adolescence) and, normally, at one dash, and its consequences are oftentimes irreversible. Compared with regular learning or conditioned reflexes, imprinting needs no reinforcing, as information on the impression does not usually get forgotten, while negative reinforcement and painful stimuli only augment imprinting. That said, certain reactions to an imprinted stimulus can manifest themselves only in the final stages of one's life, after a long

period of time has passed since the occurrence of imprinting. It is important to note one more characteristic: during moments of vulnerability, emotional pressure, or stress, the need for imprinting is so critical that anything can get imprinted on. K.Z. Lorenz describes a gosling which imprinted on the scientist himself and even tried to engage in sex with him [Lorenz, 1998, 51].

In relation to man, psychologists and psychotherapists normally use the term "attachment". It is quite an adequate synonym for imprinting in a broad sense. Attachment, too, ensures imitating the object of attachment and, too, occurs during strictly designated, sensitive (emotionally strained) periods, and is, too, virtually irreversible, and, in the same way, certain patterns can manifest themselves not quite right away. And exactly the same way painful emotions associated with the object of attachment make that attachment unreliable (distressful, shunning, chaotic) but do not abate it. And, likewise, in a situation of poignant emotional stress virtually anybody or anything can become an object of attachment (for instance, a toy furry chick).

At different age periods, children get various objects of attachment, which do not supplant but complement one another [Tolkachev, 1999, 12-13]. And, comparing neuropsychological studies [Luriya, 1978; Tsvetkova, 2010; Mikadze, 1999] with studies in child and developmental psychology [Obukhova, 1996; Avdulova, 2008; Pyatnitskaya, 2008], the author believes that these age periods overlap with the periods when the blocks of the brain are formed.

Periods of brain development and imprinting

70-80% of the **first block** of the human brain (the reptile brain, the upper compartments of the brainstem) form during the period of pregnancy, and it completes its formation approximately by the end of the first year of life. It is during this period (perinatal and infantile) that one develops an attachment to one's mother and the closest members of the family (one's father, grandmother, etc.). By imitating them, the child picks up facial gesturing, hand gesturing, the phonetics of the mother tongue, and bipedal locomotion. We may word the motto of this period of imprinting as "I am a man of this tribe".

The most vivid example of this is Mowgli children – children brought up by animals: their facial and hand gesturing and articulation form after the image of the

animals which became an object of attachment for them. They, normally, still do not pick up speech and bipedal locomotion.

Interestingly enough, in European and North American countries, where the father's participation in pregnancy, childbirth, and rearing infants is quite a common practice, infants get attached to the father as much as the mother and do so quite early (by the 4-5th week), are able to recognize his face and voice, smile at and reach out for him, expressing their attachment [13, pp. 134–173]. In Latin America, where rearing children is the job of a woman and married couples normally live with their expanded family, children cannot recognize their fathers (cannot single them out among other men in the family: uncles, older brothers, grandfathers) sometimes until they turn three.

The **second block** of the brain (the brainstem, the formations of the interbrain and the medial parts of the cortex) develops from the age of three until the age of seven to eight. During this period, the child picks up its gender identity by imitating the parent of its own sex (or his/her substitute) and displays its first attachment to the parent of the opposite sex. This period's motto is "I shall be a man/woman of this rank". It is apropos to note here that girls form the image of a woman collectively: a little from the mother, something from the beloved grandmother, and a bit from the nanny or the nursery teacher. It is for this reason that the image of a woman is often internally ambiguous, not logical. But, on the other hand, its formation does not depend on whether there is the mother and can form even when one loses one's major figure of attachment. With boys, the image of a male is more wholesome, since it is imprinted from only one object of attachment: the father, the stepfather, a grandfather, an uncle, an older brother, the karate coach, an apartment neighbor, etc. However, in the event of the disappearance (due to death, divorce, or moving out) of the object of attachment, there is a possibility that the image of a male can just fail to form. And, subsequently, this can really complicate a male's social and personal life. Just like any imprint behavior, that is something quite hard to adjust, and, considering the fact that most practicing psychotherapists are women, the situation gets even more complicated.

At the same age, there occurs the differentiation of the role of objects of attachment: one is associated with unconditional love, empathy, emotional reflection, and the other with support, protection, an example of how to overcome a stressful situation. It is not necessarily one's Mom and Dad, maybe vice versa as well, but it can be such

variants as an accepting grandmother and a protecting, overcoming mother, or a nanny, or any other variants. What it is important for the child is that these functions would be divided and it would "cry to Mom" and learn to "stand tall", "hold its ground" from Dad or his substitutes. This lets the child build basic relations in a team of children and pick up hierarchical relations with "significant adults", with the first, "singular", object of attachment outside the family (a nursery teacher, an instructor, a coach, etc.).

Of special importance is the "significant adult", specifically, as the object of attachment, and his/her influence on the future life of the person. Scholars most often write of the role of the first teacher and relations with him/her as the prototype of relations with a "superior" in one's future, adult life. And, since the first teacher oversees the formation of the class team [Brisch, 2014, 1-7], we can speak of the imprinting of basic social behavior (the role of a leader, victim, outsider, etc.) by the end of this period.

The **third block** of the brain (the motor, premotor, and prefrontal areas of the cortex of the frontal lobes of the brain) is responsible for the programming, regulation, and control of the flow of psychic activity. The period of its formation begins in one's early teens (9-12 years), has an active phase up until the age of 14-16, but continues in one way or another virtually until the age of 20-25. It is these functions that are crucial to one's socialization, full-scale entry into the world, outside the family. And the object of attachment at this age totally shifts outside the boundaries of the family: it can be a popular performer, actor, the leader of a teen group, an athlete, a best friend, etc. The motto here is "I am a member of this group". Fans precisely exemplify this type of imprinting. The effects of this imitation persist, if in a smoothed fashion, for the entire life: one's way of thinking, style of conduct and reacting. That is, this is just what is implied by the "programming, regulation, and control of psychic activity". It is such reactions that humans "exhibit" when in a state of emotional excitement or stress. "The initial link to lead teen at risk can be called spontaneous folding of peers with similar level of development and interests" [Bolev, 2013, 146].

This holds true for norms of sexual behavior as well. Normally, girls, unconsciously, "hone" their coquetry and flirt skills on a "safe object of attachment": the father, the stepfather, or a teacher. And it is good if the adult gets it the right way!

Furthermore, such an attachment to the object of imprinting can be reliable and unreliable. This is why a model of reliable attachment can be looked for during

one's teenage years. And this is why this characteristic of the formation is used by, for instance, British private schools. Children are, normally, put in such a school at the age of 12 and find themselves fully immersed in the environment of their co-evals, are devoid of personal time and space, the ability to express their individuality in the way they dress, behave, or any other way, aside from engaging in studies and interacting in that collective. But, on the other hand, friendly relations and norms of behavior and relations arranged at this age stay with the person for the entire life and make him/her a sort of a member of a private circle, a certain caste. In the USSR, they quite successfully pursued the ideological line of fostering reliable attachment – the idea of friendship and its paramount importance. Such friendship was a substitute for attachment to one's parents and family, for working mothers put their children in a nursery at the age of 2 months and extended days were guaranteed at school, with many putting their children in five-day schools. Friends acquired at this age remain one's friends for the entire life, and the loss of them or a betrayal on their part is taken as undermining one's reliable attachment. A "friend turned enemy" also leaves a mark for the entire life.

Conclusion

Summing up, we can say that the biological phenomenon of imprinting, in a broad sense, corresponds to the psychological phenomenon of attachment and has three formative stages which correspond to the three stages in the development of the brain. Such an approach helps get a better insight into personal problems, both of children and teenagers and adults, correlate it with J. Bowlby's attachment theory, and find the roots of today's issues and resource zones for resolving them.

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Импринтинг и развитие головного мозга у человека

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Аннотация

Статья посвящена особенностям импринтинга у человека с точки зрения психологии и нейропсихологии. Она соотносит периоды формирования привязанности у детей и подростков с фазами формирования головного мозга. Может быть интересна не только с теоретической точки зрения, но и использоваться при практической психотерапии проблем привязанности и поведенческих проблем в целом как у детей, так и у взрослых.

Для цитирования в научных исследованиях

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Ключевые слова

Возрастные проблемы, детская психология, импринтинг, нейропсихология, привязанность, развитие личности, формирование мозга.

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