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ANIMAL LEARNED GENETIC COGNITION AND THE LIMITS OF ANTHROPOMORPHIC APPROACH

Abstract

This article discusses the cognitive function of instincts in animal world. The undertaken research demonstrates that the formation of individual's ability for a certain (complex) action requires having a corresponding specific inborn genetic capacity – the scheme of instinct for that action. Using anthropomorphic approach and the critical verification of its application, authors of this article have revealed the elementary inborn cognitive capacities lying at the basis of the main types of animals' learned behavior. Special attention is given to the inborn mechanism of animal learning by imitation. The suggested conception of the schemes of instinctive behavior is applied to the analysis of the level of cognitive skills that could be achieved by exercising and training.

Keywords: instincts, inborn capacities, scheme of an instinct, cognition, learned behavior, elementary cognitive capacities, animals' learning by imitation, abilities and skills.

Introduction

In modern biological science, since the publication of the remarkable works of Konrad Lorenz, cognitive ethology occupies a prominent position[1]. Ethology can be defined as branch of biology studying animal behavior under natural conditions. By these times biologists have understood that there is few chance of revealing the true nature of animal behavior putting them into cages and suggesting unnatural tasks so characteristic for the period of radical behaviorism.

Readers of Lorentz works were influenced by details of his approach especially by his famous imprinting phenomenon. Readers were delighted with the picture of a group of gooslings hastily following their "mother" - strolling Professor Konrad Lorentz. There was also a significant scientific achievement: Lorentz revealed the phases of animal instinctive action. Instinctive action begins with the perception of the triggering indicator, called the "releasing stimulus". The following rigid sequence of invariant instinctive actions Lorenz called fixed action pattern (FAP). Taken as a whole, the Lorentz concept of instincts was strictly evolutionary, fundamentally based on

[1] The most influential publications of Conrad Lorenz include King Solomon's Ring, Routledge Classics (2002), Civilized Man's Eight Deadly Sins. Egmont Books (1973), Behind the Mirror: A Search for a Natural History of Human Knowledge, Mariner (1973), The Year of The Greylag Goose, Eyre Methuen (1979), The Foundations of Ethology, Springer (1981).

the principle of natural selection. "Among the driving forces of all organic formation, along with the processes of mutation and recombination of genes, natural selection plays the most important role," - wrote the founder of ethology (Lorenz, 1974).

Since the sixties of the last century the following general characteristics of instinctive behavior have been widely recognized:

- automaticity (a modern term for the rigidness of instinctive behavior),
- insuperability (in regard of individual's capacities),
- "maturation" at a certain point in the development of the individual,
- "launch" by some external indicator,
- the inherent nature for each species of animals,
- immutability for the period of activeness of the given instinct,
- not requiring any prior learning (Birney & Teevan, 1961).

Many aspects of cognitive psychology actually present philosophy of animal cognition especially when they discuss not only problems like sensual perception and memory but also such specific areas as animal reasoning and problem solving. Philosophy of animal cognition today is largely overlapped with *psychology of animal cognition*, *evolutionary psychology, cognitive ethology* and *theory of animal intelligence.* Quite naturally the philosophy and psychology of *human cognition* is far ahead of the theory of animal cognition. Consciously or unconsciously investigators of animal cognition use the results of theories of human cognition and human intelligence. Actually, this natural trend in cognitive ethology is a kind of anthropomorphism well known by its penchant for extremes. It raises doubts if wouldn't the present anthropomorphic approach to animal cognition land into errors of extremes.

Anyhow, to move forward with the strategic line of getting better understanding of animal behavior and cognition by applying anthropomorphic approach we have first to formulate strictly the means and basic principles of modern conception of human cognition. So we complete these introductory notes by a short outline of the basic statements of the theory of cognition and problem solving.

Let us start with a short overview of the theory of cognition. Cognitive system is a system composed of scope of initial (basic) knowledge capable to produce new knowledge. The history and philosophy of science prove that knowledge is a kind of relative truth that becomes more precise and reliable with the progress of sciences.

Knowledge is an answer to a certain question. The latter together with its context composes a problem. So producing knowledge requires solving intellectual problems. Producing new knowledge humans and animals achieve a better view of the world – a process which is called cognition.

Intellectual capacities we consider as the main basis of cognition and problem solving. From the standpoint of biology, mind is the cognitive function of the brain. It is not occasional that in everyday language having good mind means having brains. Thus we conclude that cognition, problem solving and intelligence are close synonyms.

From the evolutionary point of view, higher cognitive abilities provide better adaptation. Everyone could agree that cognition and knowledge are resultants of thought. But since there are more than a dozen interpretations and definitions of human thinking we will consider the term *thought* in its most narrow sense: *thinking* is first and foremost the process of searching answers to questions, the process of problem solving. Accordingly, psyche we interpret as the function of the brain for guiding organism's behavior. It is important also to take into account that humans have two levels of cognition – the sensory cognition and the abstract thinking.

Now some principle statements of problem solving approach to the processes and mechanisms of cognition. Problems are solved by problem analysis and solution synthesis (idea generation). The main means of problem analysis are

- concentration on the main factors of the problem,
- deduction of conclusions,
- division of the problem into sub-problems (by animals – extending the frame of main factors).

The above outlined problem solving approach helps to conceive that the level of (animal and human) intellect may be measured only by standard tests (by animals – in natural environment). In this line, one can define creativity as the ability for finding new solutions. In certain situations significant creative solutions are indispensible. But significant creative solutions are rare occasions in individual's life. So success is brought predominantly by good solutions backed by strong analytic abilities, sufficient amount of knowledge and will for problem solving.

In the following parts of this article we'll examine the applications of the above short sketch of the main statements of the theory of human cognition and problem solving to the main forms of animal cognitive activities thus revealing the effectiveness of applying the critical anthropomorphic approach for understanding basic phenomena of animal cognition.

Instincts and Animal Cognition

Philosophers and biologists fully agree that all the immense diversity of behavior of animals and humans belongs to two distinct classes – instinctive behavior and learned behavior. It is widely accepted today also that instinctive behavior has quite a rigid mechanism: it starts by perceiving a genetically recorded indicator (releaser) and continues in strict succession of genetically conditioned steps (actions). The genetic nature of instinctive rigid behavior, from the first glance, leaves no room for presuming a connection between inborn genetic behavior and cognitive processes.

Learned behavior by man and animal requires individual's experience and in one way or another presumes the presence of intelligence. In its simplest form, learned behavior could be gained by blind try and error activity. At this level there is no need for any high level cognitive capacity. Judging superfluously, learning by blind try and error activity needs only sensual perception and memory. But why should an individual keep on attempting errors after errors? So we should presume that to solve problems by try and error method animals need also a kind of special instinct, namely, ***the instinct for finding solutions of problems***.

Frogs and lizards have no teachers to learn hunting. Instead they have the instinct of hunting. The instinct of hunting, as any other instinct, tells them in a *generalized* form: in all cases of appearing releasing indicator (RI) follow the *scheme* of a corresponding instinctive action (IA). However, having the *general* rule of instinct is quite far from the ability to *generalize* personal experience. To be able to *learn generalization* an individual should be *endowed* by nature (by the genome of its species) the genetic instinct of generalization, more precisely, the *genetic instinctive scheme of generalization*.

Instincts of animal species comprise a fundamental encyclopedia of "knowledge" of their environment and means of survival accumulated by thousands and thousands of generations. The advantage of genetic instincts and inborn behavior are completely apparent: from the moment an individual comes to this world it knows the ways of survival – without spending a single minute of time for learning the huge scope of useful information stored in the genome of species.

Unfortunately, instinctive behavior adapted to certain environment becomes a serious disadvantage for animal species in a rapidly changing environment. In the periods of rapid environmental changes like Great Ice Age, animals could be helped by learned behavior giving a chance for adaptation to newly formed environmental conditions. Possibly, if there were no rapid climatic changes on the planet Earth the learned behavior and stronger cognitive capacities would not provide significant advantage in adaptation and to these days there would not appear yet on the Earth abstract thinking exercised by human intellect. On the other hand scarce food and fierce struggle for existence have greatly stimulated the appearance of species capable of learning behavior.

The behavior of animals and humans is divided into instinctive (genetic) and acquired (or learned) forms. The first of them is characterized as being inborn, sufficiently rigid, automatic scheme of behavior for each given biological species. The second type of behavior is based on the life experience of the individual. Within the framework of these characteristics, everything seems to be fairly clear, straightforward and not causing any discussions. Disagreements arise mainly in connection with the following question: how is principally possible the process of animal learning as such if a particular biological individual does not preempt the corresponding anatomical and physiological structures and mental qualities, in particular if he does not inherit in any form the acquired experience of the parents?

The answer to this fundamental question could be significantly facilitated if it was first considered in relation to man and then the answer, in the appropriate modification, were extended to all kinds of animals. The activity of a modern adult as a social being in general terms is characterized by a division of labor. Society is a conglomerate of people of various specialties. We can consider generally accepted the principle that *the effective and successful teaching of a given specialty requires the trainee to have a corresponding natural, innate capacity*. This conclusion becomes quite obvious if we consider modern school education. Specifying this reliable conclusion of the modern pedagogy, we can, as an intermediate prerequisite, adopt the following statement: the effective formation of a young specialist requires an *innate capacity for learning*.

As noted above, the classical instinct

contains the cognitive experience of previous generations of animals of this species. With the advent of learning behavior, animals acquire a new channel for gaining knowledge about the surrounding reality. It is quite clear that the higher is the rank of the animal species in terms of the level of development of the psyche, the higher is the possibility of learning behavior in this species and the more important is the role of the acquired experimental knowledge in the behavior and life order of this species. In this respect, the position of the human species is exceptional, since man's *ratio* can even overcome instinctive urges.

Learned Behavior and the Instinct of Making Conclusions

The instinct for finding solutions of problems may provide an individual certain advantage in the struggle for life if there would be maid useful conclusions from problem solving experience. There are three ways of deriving conclusions in human logic of reasoning:

- Deductive (necessary) conclusions from given premises,
- Inductive conclusions (generalizations of empiric data),
- Conclusions by analogy, guessing a solution for a given case on the basis of the solution of a similar case.

Which of them could be revealed or presumed in animal behavior?

Humans and animals are continuously surrounded by “noises” – different kind of stimuli having some biological significance but not related directly to any concrete indicator of instinctive or learned behavior. If a species of animals were not able ignoring noises it would spend enormous time and energy responding to noises and thus would be on the side of losers in the struggle for life. The huge amount of evidence of these arguments leads to the conclusion that in the animal world there must be an instinct (inborn genetic capacity) for distinguishing between “noise” and meaningful stimuli.

Since the noise of stimuli by its nature involves innumerable types of agents, there couldn’t be any single releasing indicator for the noise discriminating instinct. So this instinct should be a scheme of instinct oriented not towards a concrete stimulus but rather towards the absence of all biologically relevant stimuli. The instinct of discrimination must also have a threshold, as it is in every classical instinct.

A special case of noise discrimination is presented by the behavioral phenomenon of habituation (Groves & Thompson, 1970; Bouton, 2007; Domjan, 2010). Due to constant changes in conditions of existence, important incentives and vital factors become insignificant, background conditions. In order to get rid of such a background noise, animals and humans have developed a protective mechanism of ignoring such "degenerate" stimuli, in behavioral sciences called *habituation*. As many observers have mentioned, an animal ceases responding to a stimulus that previously worked as an effective means of prediction just in the result of habituation.

Let us try mental modeling, suggesting possible schemes of algorithms for cognitive activities of animals. With such modeling, the psychological phenomenon of habituation can be represented by the following steps of the “inner discourse” of animals:

A. When the first few cases of lack of confirmation of the utility of some form of response appear, put this form of response "under control", make it an object of careful consideration.
B. If the number of unconfirmed cases exceeds the specified threshold value, then turn on the mechanism of habituation – an increasingly rare and less energetic response.
C. In the rate of habituation, take into account the frequency of unconfirmed cases.

Of course, one can't be sure that just in this formulation the "algorithm of habituation" is written down genetically. Moreover, apparently, in different animal species the pattern of habituation is set by somewhat different formulations. The main thing here is that there is a certain quantitative threshold, after which the mechanism of habituation is turned on. This central moment of the phenomenon of habituation can be set by the following brief formulation: (B*) "If the number of confirmed cases of the response error has reached a given threshold value, turn on the mechanism of habituation." And this is the scheme of inference by incomplete induction: if all cases considered confirm that objects S possess property P, then we can generalize "All S are P". Thus, we have established that ***incomplete induction lies at the basis of the schematic of habituation.***

It remains to make sure that the formulated schematic of the phenomenon of habituation (B*), identified through an anthropomorphic approach, can be realized at the level of animal sensory cognition. It is easy to see that all the elements of the short formulation of the schematic of the phenomenon of habituation (B*) - *threshold value, confirmed cases, erroneous reaction, the mechanism of habituation* – all of them without any difficulty can be realized at the level of animal sensory cognition.

The most known form of cognitive activity of animals, known to mankind from time immemorial and studied in detail by scientists, is the conditioned reflex. Non-specialists may ask why Academician Ivan Pavlov was awarded the Nobel Prize for research of the conditioned reflex in the salivation of dogs? In fact, according to the exact formulation of the Nobel Committee, the prize was awarded "in recognition of his work on the physiology of digestion, through which knowledge on vital aspects of the subject has been transformed and enlarged[2]".

The connection of the conditioned reflex with digestion discovered by Pavlov so captivated physiologists that in this subject several areas of research have been formed – like forward conditioning, simultaneous conditioning, second-order and higher-order conditioning, backward conditioning, temporal conditioning, zero contingency procedure, extinction – each of them requiring its theory, models and in certain cases also equations for quantitative assessments. Researchers have mentioned also that the conditioned stimulus has a predictive function (Dayan, Kakade, & Montague, 2000; Kirsch, Lynn, Vigorito, & Miller, 2004).

Yet, in the aspect of the learned behavior, the logic of the conditional reflex is as elementary as in the above case of habituation. This logic can be set by the following brief

[2] Pavlov, I. (1904). Nobel prize presentation (www.nobelprize.org/nobel_prizes/medicine/laureates/1904/)

formulation: (B**) "If the number of cases when a stimulus S was observed before the given unconditional stimulus US has reached a given threshold value, turn on the mechanism of conditioned prediction." And this is the scheme of inference by incomplete induction: if all cases considered confirm that objects S possess property P, then we can generalize "All S are P". Thus, we have established that ***incomplete induction lies also at the basis of the schematic of conditioned reflexes***.

Many ethologists have mentioned that animals have to face a multitude of stimuli in their natural environments, very few of which could be useful as predictors. Let us think up what kind scheme of algorithm could be helpful in choosing possible pretenders for being a useful predictor? As a first approximation to the answer, we suggest the following two steps:

A. When the first few cases of some agents appear that precede a concrete unconditioned stimulus, put these agents "under control", considering them as probable predictors.
B. If the number of observed cases where an agent under control has preceded the given unconditioned stimulus exceeds the specified threshold value, then turn on the mechanism of conditioned prediction.

We would like to mention also that the suggested schematics of the conditioned prediction (B**) can be easily realized at the level of animal sensory cognition. All the elements of the suggested formulations – *threshold value, agents, observed cases, preceding cases*, *unconditioned stimulus* – without any difficulty, can be realized at the level of sensory cognition.

Some authors mention among the basic forms of animal behavior also the *learning by observation*. However, such an attitude does not seem convincing to us. In general, *all* learning is based on observation. The subject of learning is the behavior of the animal in the surrounding reality, and information about the extra-world can be obtained only by observation. One could single out learning by observation separately in its opposition to *imitation* learning. However, learning by imitation also takes "information" from observation, though this time not by observing natural phenomena, but mainly by keeping a watchful eye on parents, peers and other members of the pack. So let us concentrate on *learning by imitation*.

Serious studies of imitation in the animal world were started by Thorndike back in the late 19th century (Thorndike, 1911). Over the years, several theoretical models have been proposed for an adequate understanding of imitation: the hierarchical approach (Byrne & Russon, 1998), the structural approach (Whiten, 1998), the ethological analysis (Miklósi, 1999), the model of the mechanisms of imitation (Zentall, 2006), social-cognitive approach (Byrne, 2005), the theoretical-cognitive approach (Bates & Byrne, 2010). As a result, a non-strict concept of "true imitation" was formed, opposing it to associative learning by observation (Heyes & Ray, 2000; Heyes, 2000).

The complexity of the essence and mechanisms of learning by imitation has found its reflection in the terminology of publications. In an effort to emphasize the central role of imitation in the process of socialization, R. Byrne titled his article in the form of the famous slogan: "Social cognition: imitation, imitation, imitation" (Byrne, 2005). Some authors, however recognizing the difficulties in the theoretical understanding of imitation, preferred to return to the common characteristic of imitation as "aping" (Whiten, Horner, Litchfield, & Marshall-Pescini, 2004).

Researchers have mentioned that imitation follows the observation of a concrete behavior (Frith & Frith, 2012). But few of them asked what makes animals to imitate the observed action. One can clarify this situation by comparing the *mechanical imitation* and imitation of behavior. In the first case, imitation occurs without any understanding of the meaning and purpose of the imitated action. Wherein, there are no guarantees that even if the copy were a complete one, the imitator would use it in right place and at the right time. The main hindrance here is that the imitator does not know the goal of the imitated action, as well as does not understand its essence.

Respectively, imitation can acquire some specific behavior, if the imitator envisions what his goal is. An even greater level of understanding is required for a more or less adequate representation of the essence of the imitated action. Since each concrete action can be represented as a solution to a particular problem, the essence of an action can be interpreted as a scheme for solving the corresponding problem.

Finally, as in all the above cases of the learning behavior, three more factors should be involved in the process of learning by imitation – observation, attention and motivation. Observation is the universal feature of the living organisms. Without motivation, there can be no action. Attention to the nearest environment became a vital necessity with the advent of predators.

Now let us turn to the most effective means of cognitive activity – inferences by analogy. Being the weakest form of argumentative reasoning, analogy is indispensable as a means of discovering new ideas and solutions. All methodologists of science note the exceptional role of analogy in scientific discoveries and technical inventions (Harry, 203; Baron, 2008; Salmon, 2012). R. Djidjian even argues that the analogy is a universal means of finding solutions to all types of intellectual problems. He introduced the concept of "smart analogy", based on the essential characteristics of the objects being studied, which ensures the effectiveness of analogy when searching for the solution of the problems under study (Djidjian, 2004; 2011).

What about using analogies in animal cognition? Analogy is present in all forms of animal self-learning and independent search for solutions. The simple analogy can be presented by the following scheme of instinct: “Act as in the previous similar cases”. But how could be assessed the similarity? This could be done only by understanding. So we come to the central problem of animal understanding. (See the following section.)

The Inborn Capacity for Certain Activity

In general, every complex action, including cognitive action, has in its basis an appropriate instinct (or instinctive scheme). The main idea of this article is to introduce beside the classical instinct the conception “the instinct of a scheme of action”. The classical instinct launches a complex succession of actions by a genetically recorded indicator (*releaser)*. In contrast, the ***instinct of a scheme*** of action needs certain amount of experience and learning. The ***inborn genetic instinct of a scheme*** of action is a potential *capacity*. The cases of an individual's positive experience in the implementation of this action transform the given potential *capacity* (the potential genetic scheme of action) into effective ability and skill (acquired habit) to produce this action. Just this process of gaining positive experience in exercising the given inborn genetic scheme of action and transforming the given potential *capacity* (the potential scheme of action) into effective ability and skill (acquired habit) is called *learning*.

Learning is a cognitive action. As a ***cognitive*** *action,* it requires memory; as a *cognitive* ***action,*** it requires motivation. Learning as such requires also ***attentive observation*** – *attention* to what happens around, *observation* of environment. Positive reinforcement is important in learning since it is a means for increasing learner's motivation. Implying the conception of the schemes of instinct for action to the field of cognition one can conclude that ***learning an action requires an inborn genetic potential capacity for this action***. In short, learning requires the instinct for learning.

The genetic instinct of the capacity to a certain type cognitive action (behavior) is radically different from the instinct of action in that that it requires learning, becomes ability only through learning. Using Immanuil Kant's terms one can propose that classical instinct is *a priory* (independent of experience) while the instinctive scheme (capacity) of a certain behavior is *a posteriory,* gained with the help of individuals experience.

The phenomenon of instinctive capacity to a certain action (or behavior) demonstrates itself in the *fast learning* of this action. In human learning it is qualified as having an inborn *inclination* (aptitude or talent). Best of all the inborn inclination is demonstrated by gifted (talented) children, especially in the fields of mathematics and musical performance.

The decisive role of inborn aptitude and giftedness in achieving highest level of performance is widely accepted in modern pedagogy. The heads of the educational sphere of the United States show a great understanding of the problem of educating gifted children. A federal Act suggests the following definition for giftedness: "The term "gifted and talented" when used in respect to students, children, or youth means students, children, or youth who give evidence of high performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities[3]" (Johnsen, 2011, p. 7).

In modern pedagogy has received wide recognition the principle that giftedness is an inborn (we would say - genetic) intellectual quality which should be developed by educators into specific skill the highest demonstration of which is usually called talent (Gagne, 2000; Johnsen, 2011).

The giftedness of an individual is a potential capacity. Only hard work and exercises could transform it into high skilled talent. The role of systematic exercises is so significant that even experienced educators often have

[3] No Child Left Behind Act. P.L. 103–382, Title XIV, p. 388.

difficulties in setting apart the contribution of the inborn giftedness and hard training (Colwin, 2008; Gladwell, 2008).

Here arises the principle question: is there a limit for the strengthening the level of a certain action by appropriate exercises? Yes, this limit is contained in the definition of action. The instinctive capacity becomes an ability of performing the concrete action through learning by copying, while farther progress is made through self-learning. The latter could be realized by blind method of search and errors or by independent thinking using analysis and analogies (Djidjian, 2004).

The inborn inclination for certain activity is a potency, the content of which is realized (filled up) by accidental search and training. In large, it is the combination of instinctive behavior and learning. Apparently, every animal species has its own set of inborn inclinations.

"Talented" (more capable) animals (like humans):

A. require less examples,
B. achieve a higher skills,
C. show creativity, find new methods of action.

At the same time, both qualities are genetically assigned since the speed of learning is determined by inborn inclinations for attention, interest, motivation, imitation, understanding, competitiveness. The level of mastery achieved is determined by the amount of training exercises.

However, even the highest level of mastery belongs to the given concrete form (or skill) of action. An animal and human individual can achieve a radically new form (or modus) of action through the constant search for new ideas and solutions either by blind search, or by analogy. And this is what is called creativity.

From times of W. Kohler's famous banana problem solving experiments with chimps (Kohler, 1927), there were few studies on animal creative behavior. The situation radically changed by the end of the past century (Goodall, 1986; Boinski, 1988; Griffin, 1992; Reader & Laland, 2003). Modern ethologists have got deeply involved into studies of animal creativity. All of them are fascinated by the creative insight of the macaque Imo who was first to wash potatoes before eating them – an invention that soon started the tradition potatoes washing in her troop. Researchers claim that they have established examples of innovations in primates, marine mammals, dogs, insects, and even birds and insects. Anyway, professional ethologists have to admit that recorded cases of animal creativity are rare – by primates about two dozen (Kaufman & Kaufman, 2004).

A. B. Kaufman and J. C. Kaufman claim proposing the first model of animal creativity (Kaufman & Kaufman, 2004). They call their conception of animal creativity "three-step pyramid". Its first level comprises the ability to recognize the novelty; the second level is presented by observational learning. The third and highest level, "the actual ability to be innovative" authors define as the ability "to create a tool or a behavior that is new and different with the specific understanding that it is new and different" (Kaufman & Kaufman, 2004).

By stressing the importance of "specific understanding" in the process of innovation, A. B. Kaufman and J. C. Kaufman hit the principle point of creativity. Unfortunately, rightly accentuating the principle importance of understanding in creative innovation, they actually reject animal creativity. Because there is no scientific study proving that animals possess any level of understanding (Miklosi, 1999; Call & Tomasello, 1995; Whiten & Ham, 1992).

The well-known facts tell us that chimps can't learn human language (have not the instinctive capacity of building words), while parrots do not understand the words they hear and pronounce (since they have not the instinct of contextual use of wards). So it can be concluded that *besides the general instinct of learning there are instincts for learning a special type of action (behavior) and these are the instinctive capacities for certain actions*.

Moreover, Henri Fabre's striking experiments demonstrate unconditionally that there is no trace of understanding in the most complex and "purposeful" activities of insect (Fabre, 2002). Is not enough the example of the chimp behavior, who, imitating a person, extinguishes a small fire with a wet cloth, to conclude that he has no understanding of his actions?

And how it could be other way if we humans are so far from understanding human understanding?

Conclusions

In general, every complex action, including cognitive action, has in its basis an appropriate instinct (or instinctive scheme). The main idea of this article is to introduce beside the classical instinct the conception "the instinct of a scheme of action". The classical instinct launches a complex succession of actions by a genetically recorded indicator, in modern terms – the *releaser*. In contrast, the ***instinct of a scheme*** of action needs certain amount of experience. This process of gaining positive experience in exercising the given scheme of action is called *learning* (or learning behavior).

Learning is a cognitive action. As a ***cognitive*** *action,* it requires memory; as a *cognitive* ***action,*** it requires motivation. Learning as such requires also ***attentive observation*** – *attention* to what happens around, *observation* of environment. Positive reinforcement is important in learning since it is a form of increasing learner's motivation. Implying the conception of the schemes of instinct for action to the field of cognition one can conclude that learning an action requires an inborn potential capacity for this action. In short, learning requires the instinct for learning.

The instinct of the capacity to a certain type (cognitive) action (behavior) is radically different from the instinct of action in that that it requires learning, becomes ability only through learning.

The capacity to a certain action is set genetically, its implementation occurs due to the minimum number of examples, and the level of development of the ability is determined by the training exercises.

There are three basic schemes of the learned action – the conditioned reflex, learning by imitation and self-learning by analogy. The *seeds* of deduction are present are present in the structure of conditional reflexes. We saw incomplete induction in the basis of learning by imitation.

Learning an action requires an inborn potential capacity for this action. The capacity of learning itself requires the instinct for learning.

There are no limits for critical anthropomorphic approach to animal cognition. Anthropomorphism is the best heuristic for understanding animal psychology. It requires only introducing critical corrections to exclude all the presumptions of human abstract thinking and conceptual understanding by animals.

Analogy is present in all forms of animal self-learning and independent search for solutions. The simple analogy in animal cognitive capacity can be presented by the following scheme of instinct: “Act as in the previous similar cases”.

The phenomenon of instinctive capacity to a certain action (or behavior) demonstrates itself in the *fast learning* of this action. In human learning it is qualified as having an inborn *inclination* (aptitude or talent). Best of all the inborn inclination is demonstrated by gifted (talented) children, especially in the fields of mathematics and musical performance.

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An animal and human individual can achieve a radically new form (or modus) of action through the constant search for new ideas and solutions either by blind search, or by analogy. And this is what is called creativity.

REFERENCES

Baronett, S. (2008). *Logic*. Upper Saddle River, NJ: Pearson Prentice Hall.

Bates, L. A., & Byrne, R. W. (2010). Imitation: What Animal Imitation Tells Us about Animal Cognition. *Wiley, Interdisciplinary Reviews: Cognitive Science 1*(5), 685-695.

Birney, R. C., & Teevan, R. C. (Eds.) (1961). *Instinct: An Enduring Problem in Psychology*. Van Nostrand, Princeton.

Boinski, S. (1988). Use of a club by a wild white-faced capuchin (Cebuscapucinus) to attack a venomous snake (Bothrops asper). *American Journal of Primatology, 14,* 177–179.

Bouton, M. E. (2007). *Learning and Behavior: a Contemporary Synthesis*. M.A. Sinauer: Sunderland.

Byrne, R. W. (2005). Social Cognition: Imitation, Imitation, Imitation. *Current Biology, 15*(13), 498-500.

Byrne, R. W., & Russon, A. E. (1998). Learning by Imitation: a Hierarchical Approach. *Behavioral and Brain Sciences, 21*(5), 667-684.

Colangelo, N., & Davis, G. (2003). *Handbook of Gifted Education*. Boston, Pearson education, Inc.

Colvin, G. (2008). *Talent is Overrated: What Really Separate World-Class Performers from Everybody Else.* New York: Portfolio, Penguin Group.

Dayan, P., Kakade, S., & Montague, P. R.

(2000). Learning and selective attention. *Nature Neuroscience, 3,* 1218–1223.

Djidjian, R. (2004). *Getting Ready for Great Discoveries*. Yerevan: YSU publication.

Djidjian, R. (2011). Building the Logic of Scientific Discoveries. *Problems of Pedagogy and Psychology, 3.* Yerevan.

Domjan, M. (2010). *Principles of learning and behavior* (6th ed). Cengage/ Wadsworth.

Eisely, L. (1961). *Darwin's Century: Evolution and the Men who Discovered it.* London: Anchor Books.

Fabre, H. (2002). *The Hunting Wasps*. University Press of the Pacific.

Gagné, F. (2004). Transforming Gifts into Talents: The DMGT as a Developmental Theory. *High Ability Studies, 15,* 119-147.

Gagne, F. (2015, April-Jun). From Genes to Talent: the DMGT/CMTD Perspective. *Revista de Educación, 368,* 12-37.

Gladwell, M. (2008). *Outliers: The story of Success*. New York: Little, Brown & Co.

Goodall, J. (1986). *The Chimpanzees of Gombe*. Massachusetts: Harvard University Press.

Griffin, D. (1992). *Animal Minds.* Chicago: The University of Chicago Press.

Groves, P. M., & Thompson, R. F. (1970). Habituation: a Dual-Process Theory. *Psychological Review, 77,* 419-450.

Harry, J. (2003). *Introduction to Logic.* New York, NY: Routledge.

Hayes, K. J., & Hayes, C. M. (1952). Imitation in a Home-Raised Chimpanzee. *Journal of Comparative and Physiological Psychology, 45*(5), 450–459.

Heyes, C. M. (2000). *Transformational and Associative Theories of Imitation.* MIT Press.

Heyes, C. M., & Ray, E. D. (2000). What is the Significance of Imitation in Animals? In Slater, Peter J.B., Johnsen, S. K., (Eds.). *Identifying Gifted Students: A Practical Guide* (pp. 215-245). Waco, Texas: Academic Press.

Kaufman, A. B., & Kaufman, J. C. (Eds.) (2015). *Animal Creativity and Innovation.* Academic Press.

Kaufman, J. C., & Kaufman, A. B. (2004). Applying a Creativity Framework to Animal Cognition. *New Ideas in Psychology 22*, 143-155.

Kirsch, I., Lynn, S. J., Vigorito, M. & Miller, R. R. (2004). The Role of Cognition in Classical and Operant Conditioning. *Journal of Clinical Psychology, 60,* 369-392.

Kohler, W. (1927). *The Mentality of Apes.* London: Routledge & Kegan Paul Limited.

Lorenz, K. (1973a). *Behind the Mirror: A Search for a Natural History of Human Knowledge.* Mariner.

Lorenz, K. (1973b). *Civilized Man's Eight Deadly Sins.* Egmont Books.

Lorenz, K. (1979). *The Year of the Greylag Goose.* Eyre Methuen.

Lorenz, K. (1981). *The Foundations of Ethology.* Springer.

Lorenz, K. (2002/1949). *King Solomon's Ring*. Routledge Classics.

Miklósi, A. (1999). The Ethological Analysis of Imitation. *Biol. Rev. Camb. Philos. Soc., 74*(3), 347-374.

Reader, S. M., & Laland, K. N. (Eds.) (2003). *Animal innovations.* Oxford: Oxford University Press.

Salmon, M. (2012). *Introduction to Logic and Critical Thinking* (6th ed.). Wadsworth: Cengage Learning.

Shettleworth, S. J. (2010). *Cognition, Evolution, and Behavior* (2nd ed.). Oxford University Press.

Sternberg, R. J., & Davidson, J. E. (Eds.) (2005). *Conceptions of Giftedness* (2nd. ed.). New York: Cambridge UP.

Thorndike, E. (1911). *Animal Intelligence; Experimental Studies.* McMillan, New York.

Whiten, A. (1998). Imitation of the sequential structure of actions by chimpanzees. *Journal of Comparative Psychology, 112*(3), 270-281.

Whiten, A., Horner, V., Litchfield, C.A., & Marshall-Pescini, S. (2004). How do Apes Ape? *Learning & Behavior. 32*(1), 36-52.

Zentall, T. R. (2006). Imitation: definitions, evidence, and mechanisms. *Animal Cognition, 9*(4), 335-353.