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Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía,
Lingüística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 35, 2019, Especial N°

19

Revista de Ciencias Humanas y Sociales

ISSN 1012-1587/ ISSN: 2477-9385

Depósito Legal pp 198402ZU45



Universidad del Zulia
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Maracaibo - Venezuela

Evolutionary basis of communication facilitating human-pet interaction

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Abstract

The paper describes processes occurring in heterospecific systems and the products generated by such systems, and the differences between the animal communication system and the human language via the method of observation for pet behavior and keeper behavior during the communication process. As a result, the signals that an animal sets to its keeper are always in the context of the situation and perceived by the keeper only in this context. In conclusion, there are general basic representations about the world in human and animals that facilitate heterospecific communication.

Keywords: Heterospecific, psychology, interaction, communication, systems.

Bases evolutivas de la comunicación que facilitan la interacción hombre-mascota

Resumen

El artículo describe los procesos que ocurren en los sistemas heteroespecíficos y los productos generados por dichos sistemas, y las diferencias entre el sistema de comunicación animal y el lenguaje humano a través del método de observación del comportamiento de las mascotas y el comportamiento del cuidador durante el proceso de comunicación. Como resultado, las señales que un animal establece para su cuidador están siempre en el contexto de la situación y son percibidas por el cuidador solo en este contexto. En conclusión, hay representaciones básicas generales sobre el mundo en humanos y animales que facilitan la comunicación heteroespecífica.

Palabras clave: heteroespecíficas, psicología, interacción, comunicación, sistemas.

1. INTRODUCTION

According to expert research, there is a steady increase in the number of pets all over the world. Why has the urge to acquire a pet become increasingly common all over the world? For the past couple of decades, there has been a tendency for keepers to acquire pets in lieu of a social partner. Moreover, humans start to perceive pets as family members Kruger & Serpell (2006) and treat them like significant others. This typically occurs in urban populations, where people often alienate themselves from one another. The fact of cohabitation and joint life activities of humans and pets dictates to analyze their interactions in the context of a small group concept. Basic notions. The usual definition of a small group is two or more individuals connected to each another by social relationships. However, a small group (or a dyad) of human-human is not identical to a human – animal group. Therefore, before formulating a definition of a heterospecific group, it is necessary to define what a heterospecific interaction actor is. Theoretical prerequisites. In order for communication between the two species to be possible in principle, it is necessary that both the human and the pet have some common basic mental representations about the environment in which this interaction takes place. Here, for example, how Pinker describes modern languages (Pinker, 2007). A Language operates with such basic concepts as an event, a state, an object, a direction, a property within the framework of:

- Systems of relations that connect these concepts with each other - action, movement, existence, possession;
- Classification and systematization: human-non-human, animate-inanimate, an object-a substance, one-many, etc.
- Spatial concepts defining the place and direction;
- Time – instant events, events limited to certain intervals, simultaneous events, events that follow one another, etc.
- Causal relationships: coercion, permission, promotion, prevention, obstruction, encouragement;
- The concept of purpose and distinction of purpose and means.

What of these basic representations do animals have? Obviously, there are events in the daily experience of animals otherwise, learning would be impossible. There are objects of the surrounding world in their experience, especially objects that are critical to survive. Animals distinguish the direction, which is confirmed by numerous experiments (Dor et al., 2014). It is obvious that animals distinguish the properties of significant objects (hot cold, moving-static, dangerous-safe, etc.). In the process of daily experience, the animal determines that its own actions lead to various consequences (Thorndike's experiments). Animals distinguish between moving and static objects. Animals are able to classify objects, as evidenced by numerous experiments. Animal has

perceptions of the place and direction (the need to obtain food and water under natural surroundings suggests that animals represent the place where the food or water source is located and represent the direction leading to the source). Classical conditioning is based on the concept of simultaneity or sequence of events. Let us consider the causative forces. Is it possible to say that pets have ideas about causality? Pinker distinguishes the following language concepts related to causality: coercion, permission, promotion, prevention, discouragement, encouragement (Pinker, 2007; Waljinah, 2019). Animals have the ability to allow (not to interfere) with certain actions of conspecifics and representatives of other species, to compel others to perform certain actions (make a conspecific to run away), promote the actions of conspecifics (especially the cubs).

Finally, the representation of the goal and the distinction between goal and means. Probably, animals have a mental representation of the goal, as a need object (food, water, shelter, etc.). There is also a mental representation of the means of achieving it - to go to a watering place, a shelter or to places for feeding. The arising need triggers a certain behavior. If the behavior is unsuccessful, it is corrected during the next attempt to satisfy the need. Although it seems that each subsequent attempt (a mean) is presented in conjunction with the goal, i.e. the goal and the means of its achievement are not differentiated. Taking the above, the concepts of the human language built on the human perception of the world, and the representations of animals, at least of highly developed animals, reveal a common perceptual basis. Chuprikova (2007) notes in the article *Why and how the brain produces the psyche and subjective phenomena of consciousness*, where she describes the mechanisms of

space reflection and orientation that are common to the scorpion, bat and human.

Arising from heterospecific communication. Any animal is equipped with its own communication system (animal communication system – ACS). Since any human language is significantly different from the ACS, it is necessary to find those elements of communication that allow us to build heterospecific interaction. In the opinion of many linguists, ACS was the initial material on which the language has been later building. There was a certain behavior in the form of signals, vocalizations, and gestures, used in animal's communication. Such communicative behavior had evolved, being separated from the presented situations associated with adaptation to the current conditions. Due to the ability to refer to things in space and time and communicate about things that are not present, human language had gotten the feature of displacement that ACS does not have (Luhmann, 1988). In the language, words are separate from specific situations and associated with certain concepts (dog concept, for example). ACS is associated with the situations that exist now. Animal signals are designed to influence the behavior of conspecifics, causing a specific reaction. ACS primarily manipulates the behavior of another, and informative function of such communication is secondary. In human language, on the contrary, the primary function is informative. Language first provides information, and only then provides the ability to manipulate (Hauser, 2006).

Those, when interacting with a pet, the keeper tries to inform and then manipulate. The animal, in turn, tries to manipulate, and only partly to inform. That leads to some imbalance in a heterospecific dyad.

Similarly, the function of any interaction should be understood in the context of the function for both actors, rather than one of the actors. Each biological species is functionally equipped to use its own methods of interacting, but there must be some overlap between these methods for meaningful interaction to occur. The experience of this overlap will lead to modifications for future methods of interacting. As a result, the two species gradually acquire a set of heterospecific interactive elements in the form of transformed conspecific structures that are adapted to interspecies relationships. This set of structures assimilated by each actor will by definition, develop into more than a structure characteristic of its species. Instead, the set becomes a condition for meaningful interaction; it opens opportunities for new stages of development not previously attainable.

This theory can be demonstrated by Niklas Luhmann's theory of social systems (Luhmann, 1988), which claims that there is a structural connection between language and the surrounding world, implying that language excludes a good deal and includes little. In conversational speech, all noises, with the exception of several sounds, are excluded. Insignificant variations make communication across language barriers impossible. Communication among animals occurs in a similar fashion. In certain experiments, baboons were allowed to listen to the sounds produced by other baboons during communication. At first, the sounds were played as they had been recorded, and then they were played in reverse order. The researchers then compared the two instances to see how attentive the baboons were as they listened to both recordings. As it turned out, they spent more time listening to the anomalous sequence of signals, which suggested that they were able to spot the abnormality (Dor et al., 2014). Luhmann explained that a living creature will react to what it

perceives as abnormal (for instance, the wrong sequence of communicative signals) and noted that, in the surrounding world, this sequence is not seen as an abnormality (different species did not perceive an abnormality the wrong sequence of signals in ape communication). Therefore, as Maturana's thesis explained, information is always inside the system and the method of processing it depends on the basic structures built into the system.

Communication occurs only when somebody understands a message sent to him or her. Even if the communication is misunderstood, it is still possible to continue communication. Understanding, therefore, is the basic condition of communication. The messenger knows beforehand whether he will be understood. Informative, meaningful methods of communication have images or structures perceived to have a message. As in Maturana & Varela (1987) theory, here too, structures are formed on the necessity of recurrence and recognition of a communicative situation. This means that communication, as well as the perception and education processes, requires the ability to identify and generalize. The communication system offers standardized, repetitive sounds or gestures used in different contexts. The system can function only under these conditions. Communicative facts synchronize because of certain structural models handed down from generation to generation. However, there are no such structural models handed down from generation to generation in human-pet communication.

Ontological understanding of an actor Bryman (2012) proposes the idea that performance and evolution of the actors only based on their interaction with the environment for the purpose of organization and

regulation of their life activities. Thus, a heterospecific interaction actor is an individual, characterized by (1) self-activity, activity towards the environment and other actors; (2) ability to experience external and internal effects and change of state; (3) communication capability. The ontological paradigm principles, where both individual and the environment create a single system that generates some psychic reality, are theoretical and methodological prerequisites for the study of heterospecific interaction. Therefore, the research analyses the dyad human – pet as a self-developing system in the form of a heterospecific group. Having combined different approaches, a heterospecific group is a person and an animal united by joint ability to live with each other and occupy joint territory, having psychological contact with each other, mutual emotional relationships and specific rules of behavior in relation to each other. Then, heterospecific interaction is a method of heterospecific group members' life activities organization, which consists of mutual effects on one another in order to achieve their own goals. Therefore, the basis for effective interaction that satisfies both participants of the interspecies groups is certain mental phenomena. In case of disorder of one of such the phenomena, the heterospecific interaction suffers (Author, 2014). One such phenomenon is interspecific communication. Below, I clarify the sources of heterospecific communication and determine the factors on which the quality of heterospecific communication depends.

2. METHODOLOGY

I conducted focused interviews with 132 keepers of dogs and cats (68 dog keepers and 64 cat keepers). With method of observation for pet

behavior and keeper behavior during the communication process (15 cat keepers were interviewed earlier together with their cats and 15 dog keepers were also interviewed earlier with their dogs), gathering of the focused interviews was the first stage of the survey and observation of the pet's behavior was made at the second stage. At the second stage of the survey, 15 dog keepers and 15 cat keepers were chosen from those questioned in the first stage. These 30 keepers agreed that the observer could visit them at home, and that their pets were not afraid of strangers, which could interfere in their interaction with the keepers. In the situation of straight interaction between men and their pets, the following parameters of men's behavior were evaluated: pose, facial gesture, intonation while speaking those words that are understood by the pet; situational context (for example, approaching the fridge or dish after the word meal, approaching the front door after the word walk etc.). The evaluated parameters of the pet's behavior are: ear moves, tail moves, eye moves, following the keepers, focusing its stare at the keepers, approaching or distancing itself from the keepers, approaching the named object (toy, bone etc.), vocalization, time between getting the command (sit, come here, go away) and fulfilling the command, total level of the pet's excitement and how it changes during interaction (physical activity, respiratory rhythm, vocalization). The author followed instructions regarding publication ethics.

3. RESULTS

The author's own research has shown that despite the apparent variety of words correctly perceived by dogs and cats, all these words can be classified on two grounds: agents of action (the animal and family members), and motivations to action with agents and objects, where the object and action with it are syncretic unity. Differentiation of motivations to action into imperative and non-imperative depends on situational context, previous relationship history, and an animal's individual experience. Separate words that a keeper uses to address his pet affect communicative events. Pet's actions in the process of interactions with the keeper do not depend much on the language, but on the actions of others, and/or the social environment. The animal (if it is not specifically trained to) understands (takes action) not the words spoken by the keeper, but the word in the context of a specific given situation. Given that a pet is trained a lot, it may differentiate called objects and phenomena, split them into elements, but unlike a child, such words differentiation is limited in animals.

The animal knows objects and situations of its world regardless of learned words or gestures. Understanding the relevant gestures and words serves to a better adaptation of the pet to its keeper, but does not facilitate, as it occurs in a child, differentiation of the world. Single words that are significant in the life of the animal are perceived and decoded outside the situational context. Even when a signal-word is released of context, these words are in the syncretic unity with the subsequent actions of the animal and the expected actions of the keeper based on the previous experience of the animal. Thus, there is no differentiation of word meanings and own

activity associated with word-signal in animals, as there is no isolation of word-signals which indicate separate objects from the context. In the process of heterospecific interaction, the signals that a pet sets to its keeper in the same situation may be differentiated where the keeper responds in a similar manner to the similar nuances of animal behavior. All the signals given by dogs and cats to their keepers are motivations or compulsions to action with the agents and objects. Differentiation of motivations for action on motivation itself and enforcement depends on the situational context, the previous history of the relationship, and the individual experience of the animal.

The animal's ability to differentiate the signals given to their keepers depends on the situational context. Correspondingly, there are resistant integral complexes of the objects and phenomena of the environment in an animal's mental representations, but separate objects and phenomena that are included in these complexes generally do not trigger a behavioral complex, urging the keepers to make some action. As with a living organism, our system or heterospecific group contains structures responsible for selecting irritants. Actors or system components then process these irritants to categorize its specific possibilities. The resultant information is then used throughout the individual's life, including in communication. Moreover, animals, especially group animals, can generate sophisticated communicative systems to regulate the group's life activity, including systems with the function of organizing joint activity and lowering the chances of conflict situations. Thus, using their own specific capabilities to enter into communication, each component of the system learns to identify received communication cues from the others and teaches the others to recognize the sent

communication signals. System-specific language is formed in the process of the collective learning of the system components. Language, generated within the heterospecific group, starts to control the behavior of the actors, contributing to the group's system development and the personality structure of each actor.

Various situational contexts determine the choice of actions during close interactions and communications between humans and animals. Since they have close interactions with the humans, the animals know their responses to various acts and expect similar responses to similar acts; consistency creates a specific interaction pattern. Each act performed by both actors during their interactions and communications presumes that the author of the act expects a response from the partner. Finally, each subsequent action depends on the partner's individual perception of the previous one and on the established group rules. There is a certain formal sequence of actions by the partners, in which the participant expects a reciprocal action from the partner in the process of heterospecific communication. Situational context, relationship history, and the established rules and norms of interaction determine the choice of actions. Thus, the animal learns that certain signals influence social actions in some predictable way. Since pets have a need for interaction with humans, such signals give them the opportunity to build their interaction with humans more effectively. The signals begin to be used as a way of interaction. The animal learns that:

1. Successful joint actions cause a certain sequence of events,

2.The actions of the animal are complementary to the actions of people and vice versa.

That is, animals develop a kind of proto-language behavior, which they do not use when dealing with conspecifics, but that is necessary for adaptation to the human environment.

4. DISCUSSION

I described the heterospecific communication system and showed that humans create zone proximal development for the animals. Humans provide animals with psychological tools, or such stimulation aids as gestures or object naming which, along with the perception of humans' non-verbal and unconscious signals, help the animals understand what humans want. The above enables animals to orientate themselves in the context of situations and enter into communications with the humans, which promotes the animals' development through learning and joint activities during interactions. According to a recent study, children and dogs show more similarities in social skills than children and chimpanzees. Dogs, like children, are able to use non-verbal human signals and make similar mistakes in the search for hidden objects, focusing on human communicative signals. Based on these studies, the authors put forward the hypothesis of domesticated social intelligence; namely, the social intelligence of dog's based on the convergent social evolution of human and dog (Maclean et al., 2017).

Considering one of many language origin theories, namely, the theory of the social origin of language, according to which the language arose as a necessity for the development of social and cultural relations (Dor et al., 2014), I can assume that the joint evolutionary history of human and dog led to significant changes in the intelligence of dogs and, most probably, cats. Such change allowed humans to establish the most effective heterospecific interaction with pets. Taking the above into consideration, it becomes clear how the internal structure of the animal is enriched in interaction with a human. However, what does heterospecific interaction with pets give to humans? According to the niche construction theory (Odlingmee, 2013), the evolution of organisms stems from a constant mutual influence, constant feedback between the organism and the environment. That is, the actions of animals direct their development. This idea has been exploited by ecopsychology of development, the essence of which is that people and the environment mutually influence each other, and development takes place during the mutual influence. Thus, any heterospecific group human-pet creates its ecological and social niche, where the features of each species, as well as the features of the cultural-historical environment of the human, interacting with the animal, direct the development of each other and the group (niche) as a system.

Above I described what cats and dogs understand in their communication with keepers. The results may be included in the context of general differentiation – the integrated approach to the study and development of mentality. In the first approximation, these results are analogous with globally integral states of the early development of children's mentality and language, which is set up in many development psychology research (Werner, 1957). According to this research, a subject

and an object are fused into a syncretic unity for a child. Objects do not exist by themselves; they are things of action. This is what one sees in the behavior of animals. An animal does not perceive the naming of the object itself, but only in combination with one or another action with the object. Nevertheless, the same phenomenon present in the behavior of the keepers, for whom a certain set of behavioral cues of their animal carries information, galvanizing into action with an agent or an object (to play with the pet, put food in the bowl). Since such signals differentiation in an animal is limited, this, in turn, limits the keeper's responses. Describing the development of the meanings of words, Chuprikova notes that there are two directions of differentiation of words' meanings. The first one is to release the words as the signals in the context of a situation that occurs in animals in relation to certain well-known and significant actions connected with human verbal signals (Chuprikova, 2007). At the same time, the signals that an animal sets to its keeper are always in the context of the situation and perceived by the keeper only in this context.

Along with this, there is a different process, based on the mechanism of enrichment of words' meaning due to the inclusion of new features of objects and phenomena in their composition. One could probably say that a similar process occurs in animals, for example, when the word toy or play differentiate to stick, ball, mouse, etc. However, it seems that this process in animals has been developed only up to certain limits. Koshelev (2008), describing a child's cognitive development, talks about the differentiation of mental representations of a child. A child begins to understand that objects perceived previously as a whole, are part of a system or set of their physically or functionally related parts. Based on the obtained data, it is reasonable that dogs and cats have mental

representations that include objects and situations, own actions of animals with the objects and in situations, and expectations of keeper responses in these situations. However, animals do not learn partitives of objects, objects and situations for them are integral, syncretic mental representation, not differentiated into parts. Moreover, in the situation of heterospecific communication, this partitives learned by humans in the process of ontogenesis gives way to the perception of whole behavioral complex if the form in which the pet demonstrates communicative signal. Out of the situational context, the behavioral complex demonstration will cause misunderstanding and confusion in the keepers (for example, dog's behavior associated in a keeper with the dog's request about walking, demonstrated during the walk).

In the process of heterospecific communication, human forces to reduce his ability to differentiate meanings and returns to the global-undifferentiated state of early stages of mental development. Thus, Bickerton (2009), describing the origin of the language, believes that the language formed during the exploiting the niche of aggressive scavengers by the first homo sapience. Back to that time, the information about a large dead animal had to be passed on to those members of the group who did not directly see this carcass (displacement feature of language). This proto-language did not yet have syntax and consisted of dozens of words, distributed according to the categories of obtaining food, survival (danger signals), raising children and social contacts. To which categories can be attributed signals that are mutually understood by a modern human and a pet? In fact, with the exception of raising children, these are the same categories where the category of social contacts has the greatest weight. It can be hypothesized that in the early stages of domestication of the dog,

the categories of survival and food provided were much more significant. The scheme for the development of heterospecific communication considering the development of the language in the following order: ACS – proto-language – language (Figure 1).

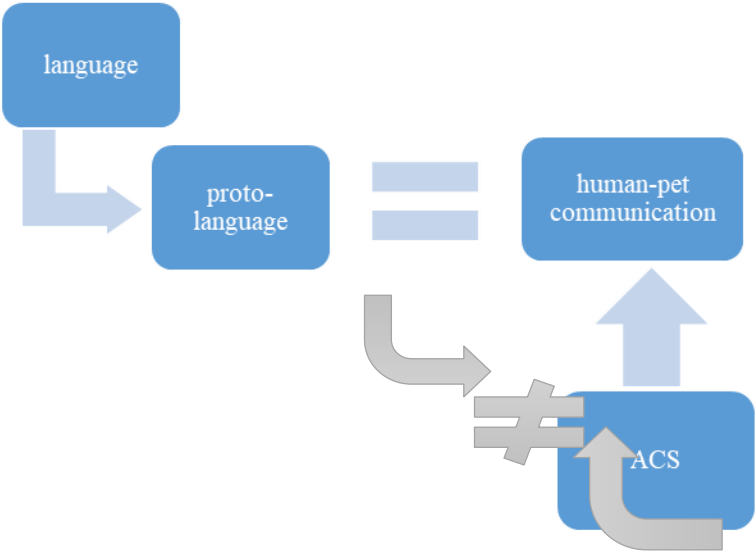


Fig. 1. Development of human-pet heterospecific communication

As can be seen from the diagram, modern humans reduce their ability to language to a kind of proto-language. This protolanguage and the language of interaction with the animal differ in that the interlocutor interacts at the level of non-verbal, including sound, signals. Note that the syntax used by a person in an interaction with the pet is extremely simplistic and reduces to the simplest combinations (give a toy).

5. CONCLUSION

Considering the communication that arises in the heterospecific group human-pet, I have shown that communication in such groups is both a product and process of interaction, in contrast to intraspecific communication, where communication signals are given initially, and communication is a process of interaction. Heterospecific communication based on the rules established in the group, and depends on the situational context. There are basic categories of the environment, perceived by humans and pets. Mutual understanding based on these categories. The animal, forced to adapt to the human communicative system, learns to connect the signals given by the keeper to the objects of the external world, expanding the communicative system inherent in its biological species. The keeper reduces the inherent communicative system to a kind of proto-language. The statement presented that there are general basic representations about the world in human and animals that facilitate heterospecific communication. These representations are as follows: Systems of relations that connect these concepts with each; classification and systematization; spatial concepts defining the place and direction; time; causal relationships; the concept of purpose and distinction of purpose and means.

6. ACKNOWLEDGMENT

I am grateful to reviewers and editors for advising on improving the framework of the paper.

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Revista de Ciencias Humanas y Sociales

Año 35, Especial N° 19, 2019

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.
Maracaibo - Venezuela

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