

Theory of Mind in the Bottlenose Dolphin

Introduction

In my essay I am trying to look into various evidences of different levels of theory of mind in the bottlenose dolphins (*Tursiops truncatus*, later referred to as dolphin), outline ideas for possible further research and express my opinion on the research that is being done.

Firstly I would like to briefly describe the dolphins. Dolphins belong in the family Delphinidae, class Mammalia. They are not capable of living out of water. The means of communication in a dolphin is a variety of sounds, their communicating skills are highly developed and each dolphin can even produce its own specific signature whistle. Dolphins live in highly complex social units and they are characterized by exceptionally large brain (25% heavier than the average adult human brain and a degree of fissurization and surface area exceeding that of the human brain), high degree of sociability, and easy trainability (Bekoff, Allen, Burghardt & Griffin, 2002). It is not surprising that dolphins have been a subject of many long-term and short-term research projects.

Joint Attention

First of the researches that I would like to introduce was conducted by Adam A. Pack and Louis M. Herman of The Dolphin Institute, Honolulu, USA. These scientists and their team studied social cognition and joint attention in dolphins. As for joint attention, it is a triadic transaction between an informant; a receiver; and an object and may involve the informant gazing and/or pointing at the item of interest. Aside from humans, the ability to follow the head gaze (head and eyes moving in concert) of conspecific informants to something that is out of an observer's direct view has been demonstrated in several ape species and domesticated goats (Pack & Herman, 2006).

The dolphin study comprised of testing six empirically testable issues: can dolphins follow a gaze or a point, can dolphins choose an object being gazed at or pointed to, which particular indicative cues do the dolphins need to understand communication, is gazing and pointing understood geometrically and referentially, can a dolphin act as an informant – using pointing or gazing and how much does the informant and receiver know about their shared mental state

towards the object of joint attention. The study was carried out with ten dolphins coming from three different backgrounds because they were from different laboratory facilities. The results confirmed mainly positive answers to the studied questions. It turned out that dolphins were capable of following gaze and pointing of the researcher, they could choose an object being pointed to or gazed at. When it comes to the specific components of the cues that the dolphins can use to understand the intention of the communication, head-gazing was the most important cue and the quickness with which they reacted to it was remarkable. Dolphins could also understand that the cue is directed to a specific object and easily distinguished between pointing cues to near vs far objects in the same linear plane (Pack & Herman, 2006). Regarding the production of indicative cues, dolphins proved that they can use their rostrum and body to point to the object of their interest. As for the final problem – whether the dolphins know about shared mental state, there still does not exist clear and satisfying solution to it. There has not been done enough research to confirm or prove false this assumption yet. As much as the findings of joint attention in dolphins are notable, I believe that they should not be mixed up with theory of mind. In my opinion, joint attention is a rudimentary form of sharing mental states. It does not explain understanding other individual's thoughts, feelings, faiths or priorities and separating them from one's own which I see as essential characteristics of theory of mind.

Mirror Self-Recognition

Joint attention is not the only theory of mind related cognitive phenomenon that is being studied in the dolphins. A study from 2001 by Diana Reiss and Lori Marino in association with New York Aquarium in Brooklyn, NY is looking into existence of mirror self-recognition in the dolphins. Mirror self-recognition is not very common in animals and has been found in certain kinds of birds and great apes.

Reiss and Marino came up with two-phase experiment in which they examined two dolphins, 13-year-old one and 17-year-old one, both born in captivity. The dolphins were placed in a pool with differently reflective walls (Phase 1) and a pool with nonreflective walls and a mirror fixed to one of them (Phase 2). The aim of the experiment was to watch dolphins behaviour in a pool when they were marked, sham-marked (marked by a marker filled with water) or not marked at all. These marks were visible to the dolphins only in front of a mirror (or highly reflective surface). The dolphins behaviour at the mirror (reflective surface) was labeled as Self-directed, Non-directed, Ambiguous or Social. The three main tested assumptions were: dolphins should display no social behaviour at the mirror, they should

spend significantly more time at the mirror (reflective surface) when marked. Furthermore, the dolphins should exhibit shorter latencies in the temporal interval from the release signal from its stationed position to mirror use after being marked or sham-marked than after sessions when not handled. (Reiss & Marino, 2001). There were four observers that recorded how the dolphins reacted when they were released into the pool upon their non/marking. As for the first prediction, dolphins succeeded in displaying no social behaviour when looking at themselves at the mirror. When it comes to the second prediction, both dolphins stayed significantly longer at the mirror when marked than under any other circumstances. The third prediction was fulfilled as well, seeing that the dolphins swam to the mirror significantly faster when they were marked or sham-marked. Concluding from these findings, we can say that the dolphins can use a mirror correctly to look at parts of their body that are marked and they can recognize themselves in it.

Conclusion

I introduced two researches that deal with some forms of theory of mind in the dolphins. They both resulted in very promising findings since the dolphins showed high abilities in both joint attention and mirror self-recognition tests.

The joint attention study seems better developed to me since the researchers tested ten individual animals. In my opinion, a problem with the mirror self-recognition test may be that only two individuals were tested. It is not known how other dolphins would behave and generalizing the results of testing two dolphins to whole dolphin population may be misleading.

There is also a question of how much can the joint attention and mirror self-recognition be taken as a part of theory of mind. It seems difficult to me to compare human and animal theory of mind since there are obviously differences in cognitive level functioning between dolphins and humans. One of the best means to show that someone has a good theory of mind and can attribute mental state to others is a false belief test which has not been done with the dolphins yet. There might be struggle with coming up with an idea how to apply this test to dolphins. But until someone manages to confront the dolphins with a false belief test, I think that we cannot be certain whether the dolphins have theory of mind in the human sense or not. The question of dolphin theory of mind unfortunately still remains unanswered and open to further research and I hope that it will motivate more scientists and I look forward to seeing results of more studies in the future.

Sources

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