

Dolphins

What ARE they saying?

DENISE HERZING

People often ask me how and why I came to study dolphins in the wild, and why I would devote my life to such an endeavour. I usually talk about my teenage years, watching Jacques Cousteau explore the underwater world. Boy I wanted to be in that world, to be part of it. Simultaneously Jane Goodall was out in the wild for 20 years observing a society of wild chimpanzees. The same could be said for Dian Fossey and her gorilla study, or Cynthia Moss and her time with wild elephants. I was determined to find a place in the world where I could observe, for a minimum of 20 years, a group of wild dolphins so I could understand their society and communication system. In 1985 I went to the Bahamas to document a free-ranging group of Atlantic spotted dolphins, having heard they were friendly, or at least somewhat tolerant of humans in the water. My goal was to correlate sound and underwater behavior and try and figure out how they communicated.

Intraspecies Interactions: Spotted Dolphins

So, over the years I documented their spot patterns, their sexes, their ages, and of course their social behavior. Dolphins are great acousticians but also have pretty good vision. So, we analyze their postures as well as their

sounds. Most fascinating has been the observations of how young dolphins learn and develop into fully-fledged adults. At first glance dolphin play might look frivolous and wasteful. But like other social mammals, play often functions to help young animals test and learn social rules, without endangering themselves or their peers. In the early 1990's I had already observed adult male spotted dolphins fighting, so I knew a lot of their body signals and vocalizations. Coalitions of adult males acted in synchrony and coordinated not only their body motions but their vocalizations. They looked like a well-oiled machine. As I looked closer and closer at small groups of male juvenile spotted dolphins I began to notice that they were trying very hard to coordinate their movements. Sometimes they were sloppy and missed the mark. Other times they would start synchronous movements, then eventually start rhythmically synching the timing of their little squawks. Soon they were a tight little unit and fighting machine. Sometimes one dolphin just couldn't make the grade and was left out. Coalitions started forming at their latter juvenile age, around 7 or 8 and usually lasted through their adulthood. Of course, coalitions have many reasons to form. They coordinate chasing a female in estrus and monopolize





her from other coalitions, they can chase away a shark as a coordinated unit, and they can take on the larger bottlenose dolphins, or each other, during aggression. So, when I first recognized that these juvenile dolphins were developing their adult behavior right in front of me, I was ecstatic. In biology, understanding the process and mechanism of something, is often key to understanding the organism. In essence, dolphins have to learn, practise, fail and prevail, during their younger years, to become fully-functional adult dolphins in their society.

Interspecies Interactions: Spotted Dolphin/Bottlenose Dolphin

Sometimes we observe spotted dolphins interacting with the resident bottlenose dolphins. In my very early years, I recall jumping in the water, very murky water, and seeing some spotted dolphins head-to-head with bottlenose dolphins amongst a cacophony of vocalizations. My passion is correlating sounds with behavior to better understand their communication system, so I was devastated with the poor visibility and disappointed that I might never see such a unique, interspecies interaction again, but luckily I was wrong. Over the next few years, we documented many interactions between the spotted dolphins and bottlenose dolphins. Turns out these interactions are quite regular and normal. Although they often, and overtly, took the form of fights, we also observed interspecies play, foraging, babysitting, and mating. This type of interaction was very unexpected and continues to this day to provide us with more questions than answers. What are they fighting about? Is there a hierarchy to who fights whom? Do they

understand each other's communication signals? If so, how much?

Interspecies Interactions: Dolphin/Human

Dolphins also interact with us human researchers in the water. The story I often tell is that of Paint, a female spotted dolphin, and her first calf Brush. Paint was a dolphin from the northern cluster of Little Bahama Bank dolphins. Most dolphins greet us by swimming circles around us and emitting their signature whistle. That's the typical greeting if they know us. But Paint was always different with me. To greet me, Paint dove down in front of me and hung vertically in the water, looking up. So, naturally I thought the polite thing to do was to mimic her. That is what we would do to greet each other; Paint first, then me. As the years went by Paint finally became pregnant and had her first calf Brush. One day I was swimming behind Paint and her new little calf and Paint did her typically greeting, diving vertically. I of course mimicked her and dove vertically and hung in the water column with her. I resurface to catch a breath and as Paint stationed back in front of me with her calf, little Brush then dove down and hung vertically. Wow I thought. Is Paint teaching her calf how to greet me in her unique way? Quickly I dove down and hung in the water with little Brush. And to this day Brush will often greet me this way, even though she herself is a grandmother of 35 years. This really should have been my first hint about the strong influence of personality and uniqueness that is manifest in every mammal society. It was just so striking, and such a privilege to be also remembered as an individual human to the dolphins.

Deciphering Dolphin Sounds

Part of my current work involves sifting through our 35 years of acoustic data and applying machine learning techniques, to look for language-like structures in their sounds. Let me say that again. We are looking for evidence of potential language in the dolphin's complex acoustic system. You may think that this has already been done, but it has not. And these tools hold a promise of finally taking a serious look at what nonhuman animals are saying to each other. We have also developed an underwater computer CHAT (Cetacean Hearing Augmentation Telemetry) that we have used to try some direct playback and experiments with the



dolphins, to see if they might use an acoustic keyboard as apes have learned to use a visual keyboard. Designed by Dr. Thad Starner and his team at Georgia Tech in Atlanta, CHAT receives sounds via two hydrophones, and produces sounds through an underwater speaker. With the help of my colleagues Dr. Adam Pack and Dr. Fabienne Delfour, we have created a few basic artificial sounds, specifically whistles (outside of the dolphin's natural repertoire) to label a few play objects (Sargassum – a natural play toy, scarf, and rope – toys that humans bring in the water).

From past studies we know that dolphins can easily mimic whistles, both in captivity and sometimes spontaneously in the wild. We also know that dolphins can learn to associate sounds (whistles) with objects. The hallmark of referential communication is to talk about, or refer to, something out of time or space by labeling it. Chimpanzee researchers used a physical keyboard to represent words that allowed Kanzi to see visual images and trigger the keyboard by touching. Alex, the African Grey Parrot, could both see objects and use English words to communicate (since parrots have the vocal ability to mimic words).

What dolphins CAN do in the wild is mimic sounds, and we are banking on their ability to mimic sounds from CHAT

and learn the functional use of these whistle mimics when interacting with researchers in the water. And we know that dolphins have names called signature whistles, which essentially are a label for an individual and can be thought of as an example of a referential signal. They can also call their friend over by their name, or whistle. So, time will tell. But with new technology, and our long-term familiarity with the dolphin community, no doubt we will learn something. Maybe we will find out what they are saying after all!

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