

## **Cognitive and Communicative Abilities of Grey Parrots (*Psittacus erithacus*)**

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How do we measure avian 'intelligence' and communicative capacities? Two decades of study on Grey parrots (*Psittacus erithacus*) provide more questions than answers. What *is* intelligence? Can we evaluate nonhumans using human tasks and definitions? Or fairly test nonhuman sensory systems? How do nonmammalian brains process information? Do avian and mammalian cognitive capacities significantly overlap? Preliminary answers exist for the first four questions; considerable data relate to the fifth. To summarize current knowledge, I examine concepts of intelligence, review techniques for evaluating parrot cognition, and discuss results and implications.

### **How Can We Study Avian Intelligence?**

'Intelligence' garners as many definitions as researchers in the field (Kamil 1988; Sternberg and Kaufman 1998) because it is not a unitary entity, but rather *many* abilities that interact with stored information to "produce behaviour we see as 'intelligent'" (Byrne 1995:38). For me, intelligence involves not only using experience to solve current problems, but also knowing how to choose, from *many* sets of information acquired in many domains, the appropriate set for the current problem (Pepperberg 1990). Organisms limited to the first ability have learned important associations but cannot transfer and adapt information -- Rozin's (1976) hallmark of intelligence.

But how to study 'intelligence'? My choices of subject and technique exploited Griffin's (1976) suggestion to use communication as the primary tool. When I began my work, however, both choices were nontraditional.

### **Studying Avian Cognition**

Prior to mid-1970, researchers studied mostly pigeons in Skinner boxes; these birds demonstrated capacities far inferior to those of mammals (Premack 1978). Such results were thought to represent the abilities of all birds, despite evidence suggesting that some avian species might exhibit more impressive cognitive and communicative feats (Koehler 1953). Given how parrots' large-brains, long-lives, and highly social nature resemble those of primates and cetaceans, shouldn't parrots also have evolved complex cognitive capacities? Might proper training enable them to demonstrate language-like abilities comparable to those of nonhuman primates and cetaceans?

Specifically, parrots' vocal plasticity would make them candidates for evaluating intelligence via interspecies communication (Pepperberg 1981). Interspecies communication (a) directly states the precise content of questions being asked; thus an animal needn't determine the nature of the question through trial-and-error; (b) incorporates research showing that social animals respond more readily and often more accurately within an ecologically valid social context (Menzel and Juno 1985); and (c) allows data comparisons among species, including animals and humans. Interspecies communication is also an open, arbitrary, creative code--with an enormous variety of signals that allow researchers to examine the nature *and* extent of information an animal perceives. And two-way communication allows rigorous testing: Subjects can be required to choose responses from their entire repertoire rather than from a subset relevant only to a particular query's topic. Moreover, an animal that learns such a code may respond in novel, possibly innovative ways that demonstrate greater competence than required responses of operant paradigms. Interspecies communication may thus more readily demonstrate nonhumans' inherent capacities or even enable learning of more complex tasks.

Of course, nonhumans must be taught interspecies communication; here, too, techniques varied. I was among the few to emphasize socially interactive training (Pepperberg