

Preface

What is Avian Cognition?

It is appropriate that this book was begun during the International Year of Biodiversity. No species exhibits more biological diversity than the 9,672 species of birds that currently populate the Earth.¹⁵²

Birds are masters of senescence; for their tiny body mass birds have achieved one of the longest life spans of all the animals on Earth.¹³⁰ Birds also have one of the largest brain size to body mass ratios.^{127, 176} Parrots in particular, out of all the bird families, have both of these traits in spades. Birds have been living on this planet about 10,000 years longer than humans. Suffice it to say that birds have learned a few things that humans have not.

Avian Cognition explores the fascinating world of avian intelligence, behavior, and individuality. The preferences, choices, motivation, and habits of species, flocks, and individual birds are discussed and compared. *Avian Cognition* investigates who birds are and why they do what they do. Daily, seasonal, and play activities, creativity, reasoning ability, problem solving skills, adjustment to changes in their environment, social interaction, life stages, vocalizations, and communication patterns are described. An important and often overlooked distinction is made between vocalizations that are learned versus those that are inherited.

Avian Cognition looks at wild birds living in their normal outdoor habitat and pet birds living indoors. A variety of birds are examined, such as Green herons (*Butorides virescens*), Great blue herons (*Ardea herodias*), black-crowned night herons (*Nycticorax nycticorax*), Yellow-crowned night herons (*Nyctanassa violacea*), Canada geese (*Branta canadensis*), Mallard ducks (*Anas platyrhynchos*), Wood ducks (*Aix sponsa*), Ruby-throated hummingbirds (*Archilochus colubris*), Cardinals (*Cardinalis cardinalis*), Zebra finches (*Peophila guttata castanotis*), and several members of the parrot family. Many of the birds were observed for five, ten, or more years. Some birds were observed for their entire lives.

This allowed:

- Specific behaviors to be put in context
- Behaviors that were unique to an individual or flock to be identified
- Behaviors that were repeated or enhanced as part of the learning process to be recognized
- Many new behaviors and vocalizations to be identified

Avian Cognition distinguishes between biological intelligence, genetic intelligence, and applied intelligence. Contemporary comparisons between human intelligence and other species are challenged. For the first time the relationship between adaptation, instinct, intuition, and intelligence are probed.

Avian Cognition will appeal to a broad worldwide audience that includes birders, ornithologists, pet bird hobbyists, animal trainers, avian veterinarians, professors, researchers, and students of animal cognition and behavior, naturalists, and others who are curious about the world around them.

Why Was *Avian Cognition* Written?

There isn't another book that examines avian intelligence, behavior, and individuality to the depth and breadth as *Avian Cognition*. Unlike other books entire chapters are devoted to a single species. More than 300 individual birds and 15 species of birds native to 6 different continents are discussed. Original photographs, original audio recordings, and statistics support the new observations and findings. With its expanded scope and depth *Avian Cognition* takes ornithology into the 21st century and opens many new topics that have not been dealt with before.

Avian Cognition was undertaken to fill an important gap in the literature by focusing on *who* birds are, not what they are, and *why* they engage in certain behaviors, not just what they do. As a result many new observations are made that have not been reported elsewhere. As Cruickshank so aptly stated in 1938:⁴⁵

"Since birds are forever shifting ranges and even modifying ancestral habits, no matter how much is learned about them there is always something new to be discovered."

Most bird books contain a one or two paragraph description by species of a bird's appearance and its behavior. While accurate at the level written, these descriptions hardly scratch the surface or tell the whole story; nor do they convey much information at all about the broad range of avian intelligence, behavior, or individuality. To really understand avian intelligence, behavior, and individuality it is essential to delve much deeper.

Other books about bird behavior have a different weakness. They may have a chapter devoted to migration, courtship, or nest building. But these books lump all 9,672 species of birds together. Within a given paragraph there may be one sentence about Mallard ducks and one sentence about Ruby-throated hummingbirds. With this arrangement it is difficult, if not impossible, to develop: (1) an understanding of who a Mallard duck or Ruby-throated hummingbird is; or (2) an appreciation of which behaviors are common to a species or unique to a flock or individual. To illustrate, whether you are talking about biology or behavior a Ruby-throated hummingbird has about as much in common with an Emperor penguin (*Aptenodytes forsteri*) as a Zebra finch has in common with an Ostrich (*Struthio camelus*).

Approach

To remedy these limitations *Avian Cognition* has taken a new approach. The information presented in *Avian Cognition* is based on firsthand observations. Fifteen species of birds and over 300 individuals native to 6 different continents were observed over a period of 30 years. In order to discern the widest spectrum of behavior the mix of birds included: —

- Well known birds and those that are not well known
- Birds that are predators and those that are not
- Birds that migrate and those that do not
- Birds that are kept as pets and those that are not

Daily observations were recorded in a standardized manner. The observations were made at varied times throughout the day, in all seasons and all types of weather, in the same locations year after year. This way the behavior could be compared and analyzed, and patterns, trends, and unique occurrences could be recognized. Likewise, similarities and differences in behavior could be identified between and within species. The observations were captured in text, photographs, and sound recordings.

Numerous new observations are made, which have not been reported before. For example in Chapters 2 through 11 readers will learn about:

- A flock of Canada geese that practices nesting dispersal
- Zebra finches that weave. (Zebra finches were moved from *Taeniopygia guttata* to *Peophila guttata castanotis* some time ago because supposedly they do not weave.)
- Cardinals that engage in play activities
- Budgerigars (*Melopsittacus undulatus*) who change roommates
- Mallard ducks that take day trips
- A 14-year old Indian ringneck parakeet (*Psittacula krameri manillensis*) who learns new native vocalizations
- Green herons that use bait and leverage the movement of Mallard ducks to catch their food. (Previously the use of bait was only attributed to green-backed herons in Asia.)
- A Meyer's parrot (*Poicephalus meyeri*) who figures out how to determine whether or not a sunflower seed is inside without removing the hull
- Canada geese and Mallard ducks who recognize individual humans, even with a change of clothes
- A Budgerigar who turns a physical disability into an advantage
- A Great blue heron that camouflages itself to avoid snapping turtles
- A Mitred conure (*Aratinga mitrata mitrata*) that uses tools
- Elderly parrots that sneak in a nap when no one is looking
- Male Mallard ducks that quack. (Supposedly only female Mallard ducks do that.)
- Juvenile Canada geese that jump off the top of 16-story buildings for fun
- Blue jays (*Cyanocitta cristata*) that weigh peanuts before deciding which one to take

Controlled experiments serve an important function, particularly in the hard sciences like chemistry and physics. In contrast, there are questions about the validity of using controlled experiments to study animal behavior and concerns about reading too much into the results. Specifically, how can one expect to observe the normal behavior of a wild bird who is used to: (a) total freedom of movement (it may migrate 2,000 miles or more each year); and (b) constant interactions with other living entities, plant and animal (it may travel around in flocks of 100 or 1,000 birds), when it is confined indoors in a lab, in a tiny cage by itself, under artificial light instead of the natural sunlight it needs to see clearly, eating strange food, and surrounded by unfamiliar sights and sounds? In short, if the objective is to identify normal behavior, the species must be observed in its normal environment. Hence, this book relies primarily on observational studies.

Several of the birds discussed in this book were given names. This practice acknowledges the fact that, although birds are members of a species and a flock, they are separate living entities. This practice also made it easier to record observations. For example, it was easier to refer to Squeaky or Mr. Rumpetail than try to remember if a given bird was Mallard duck #19 or Mallard duck #27.

Organization of the Book

Avian Cognition is scientifically sound but written in plain English, rather than the traditional dry, stilted, boring style of academe. Instead of saying, "Other atypical behaviors were infrequently observed, contrary to Smth97, Hwth01, and McFud11", *Avian Cognition* simply says, "Once in a while it was noted that ..." The purpose of *Avian Cognition* is to share information, not engage in verbal buffoonery. Over the years I have noticed that students and other people actually read and remember books that are written in an open engaging style. That is not true for dry academic tomes.

Chapter 1 begins by defining intelligence and other closely related concepts. Humans have struggled for centuries to define and measure human intelligence. Even today there is no universal

definition or measure of human intelligence, or the closely related concepts of learning, thought, emotion, and consciousness. Hence, the even greater struggle to define and measure animal intelligence.

Avian Cognition creates order out of chaos by developing a standardized definition of intelligence that is applicable to not just humans, but all life forms. There are a variety of types of life forms; hence, there are a variety of types of intelligence. *Avian Cognition* acknowledges the distinction between applied intelligence, biological intelligence, and genetic intelligence. *Avian Cognition* defines the closely related concepts of learning, thought, emotion, and consciousness. In doing so *Avian Cognition* presents the first model which integrates intelligence, consciousness, and behavior.

This foundation establishes a framework for discussing and evaluating avian intelligence, behavior, and individuality in Chapters 2 through 11. This framework is essential; it is what has been missing from previous studies of animal and avian intelligence. Simply put, before anything can be explored, observed, analyzed or compared it must first be defined. This is particularly true for properties and attributes that cannot be measured in the traditional sense with rulers, scales, or laboratory equipment. Without a clear definition of what is being assessed, there is no basis for making an assertion, such as claiming that birds are or are not intelligent, do or do not feel emotions, and do or do not experience consciousness.

Chapters 2 through 11 are each devoted to a particular bird species or closely-related group of species. To understand intelligence, behavior, and individuality, it is necessary to examine all aspects of a bird's life in total. Hence, unlike other books, everything about an individual bird or bird species is presented in the same chapter.

Chapters 2 through 11 adhere to a consistent format. Each chapter begins with general background information about the species. This is followed by interesting historical notes and the population status. A discussion of characteristics that are common to all members of the species follows, like physical appearance, diet, range, habitat, and vocalizations. Then family life, daily activities, and common behaviors are discussed.

Next individual and unique behaviors that were observed are presented. This is the longest section of each chapter. These descriptions include behaviors that were unique to one individual in a flock and behaviors that were unique to the flock under observation that are not normally associated with this species. Many new examples of individual and unique behaviors are reported in each chapter. In addition, Chapters 7 through 11 compare the behavior of birds that are kept as pets to their wild cousins. That has not been done before.

Individuality has not been acknowledged in regard to animals until very recently. All Mallard ducks or all tree squirrels (*Sciuridae sciurini*) were assumed to behave in an identical manner. The first book to break ranks was published in 1952: *Birds as Individuals* by L. Howard. There was silence until 1977 when a book published by Dr. T. Lafeber again mentioned the individuality of birds. In 1996 Dr. Skutch, one of the leading field ornithologists of the last century, raised the issue to a higher level. In 2005 the documentary, *The Wild Parrots of Telegraph Hill*, based on M. Bittner's book of the same title, caught the public's attention as he demonstrated the individuality of wild (escaped or released) parrots living in San Francisco. *Avian Cognition* presents the first serious discussion of avian individuality. Most studies and books view birds as a group from a distance. In contrast, *Avian Cognition* views birds up close as individuals.

In the last section of each chapter (Discussion) common, individual, and unique behaviors are analyzed, compared and interpreted. Rather than just say what a bird did, *Avian Cognition* explains why a bird engaged in a particular behavior. Each behavior is put in context. The significance of each behavior is examined for indications of intelligence and individuality.

Many chapters conclude by highlighting ideas and inventions humans appropriated from a particular species. This important step is often overlooked when assessing avian intelligence. After all, if an idea was good enough for humans to appropriate from birds, it must have been rather intelligent.

There are many cross references between chapters. However, Chapters 2 through 11 are self-contained and can be read in any order.

The book concludes with a discussion of avian communication patterns in Chapter 12. This chapter provides background information for the two audio CDs that accompany the book. Through these CD's readers are given an opportunity to hear the birds and experience the variety and complexity of vocalizations within and among species as they go about their daily lives. Three tracks are linked to specific photographs in the text.

Current bird CDs consist of a 15 to 20 second recording of the signature call from a species. While this is useful for identifying a particular species in the field, it does not convey much information about the variety or complexity of avian communication patterns. In contrast, *Avian Cognition* captures original recordings of the full range of vocalizations and complete conversations among multiple birds in different settings. In doing so many new vocalizations were identified.

The text is supplemented by numerous original photographs which illustrate biological intelligence, genetic intelligence, applied intelligence, and specific behaviors. No special equipment or spotting scopes were used. Rather, the photographs were taken at short range for the simple reason that it is difficult to notice or understand the subtle nuances of behavior from a distance. These first-of-a-kind photographs capture many attributes that have not been featured in bird books before, such as images illustrating:

- The serrated rim of a Canada goose's bill
- The lamellae of a mallard duck
- The inner and outer eyelids of a Canada goose
- A father mallard duck escorting his 1-day old ducklings. (According to the literature only female mallard ducks do that.)
- A Canada goose with a white forehead
- The development of goslings and ducklings from the time they are 1-day old until they are full size 8 weeks later

The photographs reflect events as they occurred. The photographs are not layered; nor were any special effects used. Only minor editing has been performed, such as cropping, adjusting the lighting of an image that was shot at dawn or dusk, or deleting a bird dropping here and there. Often several images are grouped on one page to illustrate a sequence, progression, or variation in behavior. All photographs are accompanied by an explanatory caption and referred to in the text, for example "See Photograph 9.5".

Annex A presents a glossary of terms, acronyms, and abbreviations as they are used in *Avian Cognition*.

Annex B contains a complete bibliography of the sources consulted. Annex B is organized in four parts: publications, videos, websites, and correspondence.

Scientific and lay publications were consulted. Often more is written about lesser known birds in the lay press than in the scientific press. This is particularly true of the parrot family. Pet bird hobbyists have spent more time observing certain types of parrots than scientists. Hence, lay sources of information about bird behavior should not be ignored.

It was noted that older publications, especially those published in the late 1800's and early 1900's, contain more accurate descriptions of birds and their behavior than contemporary publications. That is probably true because those authors relied on personal field observations more than paper studies.

Most books written about birds today fail to include any citations. That is a serious oversight. Consequently, *Avian Cognition* includes citations. Not the cumbersome McFudd11—which is difficult to read over—but the less intrusive.²⁷ Citations accomplish two important things. First, they give credit where credit is due. Second, they allow readers to locate the original source of information in Annex B, should they so desire.

Annex C describes the locations in which the birds discussed in this book were observed. Information is also provided about the specific populations observed and the timeframes in which they were observed.

Annex D is a tribute to Perky, my first budgerigar. This annex presents a positive way for children to be introduced to and learn about pet birds. Hopefully this will help stem the tide of impulse buying which results in so many innocent pet birds—particularly budgerigars—being dumped en masse on parrot adoption and rescue organizations.

Annex E identifies external factors avian veterinarians should consider when giving a bird a medical exam, consistent with the mind/body connection.