Parrot Cognition and Behavior:  
40 Years and Counting  
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Abstract: It is important to acknowledge and to deal with the intelligence and cognitive abilities of parrots to prevent behavior problems. The first part of the presentation (Pepperberg) provides evidence of parrot cognitive processes (probabilistic reasoning, visual working memory) that are as good as, or better than those of 6- to 7-year-old human children.

The second part of the presentation (Hooimeijer) examines how to use this intelligence to avoid and correct behavior problems. Ignoring parrots’ abilities to respond to negative effects of human body language and human attitude can contribute to behavior problems. The questions will be addressed: How to ensure the parrot’s experience to be approached and treated with respect and how to create mutual respect and trust?

A 5-step protocol is developed and will be discussed as a tool to show respect for parrots as intelligent prey animals, to create and reward desired behavior, to reduce the stress of handling, and to create mutual trust. Definitions of normal behavior, unwanted behavior, desired behavior, enforced behavior, and displacement behavior are described as tools to understand parrot behavior. Understanding and using displacement behavior is crucial as a method to prevent behavior problems and as tool to solve behavior problems. Lack of privacy will be discussed as reason for behavior problems and as reason for health problems. Furthermore, wing clipping can make it possible to offer parrots more freedom as companion birds and to become part of the family flock inside as well as benefit outside from the social interaction, exercise, the sun and fresh air. Lastly, the disadvantages of having a parrot on the shoulder are discussed.

Part I. Cognitive Processes

The first study replicates work performed with children by Piaget. We examined whether a nonhuman might succeed in an experiment based on probabilistic reasoning, specifically, the ability to make inferences about a sample based on information about a population. A grey parrot (Psittacus erithacus) previously trained to use English labels referentially to identify objects, observed a human researcher deposit two different types of items in a 3:1 ratio (ie, three corks and one piece of paper) into an opaque bucket. One item was then randomly withdrawn while hidden from the parrot’s view. When asked to identify the still-hidden object, the parrot’s vocal responses tracked this 3:1 ratio over a large number of trials. Some levels of probabilistic reasoning therefore are not limited to humans, nonhuman primates, or even mammals.

The second study involves abilities to store and manipulate information in visual working memory (VWM), which stands at the cornerstone of intelligent behavior. Demonstration of a 3- to 4-item storage limit in humans and other species implies a
homologous storage mechanism. In contrast, evolutionary bases underlying VWM manipulation remain unexplored. Here, we used a task akin to the “shell game” to examine whether the ability to manipulate information is uniquely human. We compared human performance on a computerized version of this task with that of a grey parrot on a live version adapted for animal testing, administered by a human experimenter. In both tasks, a varying set size (2-4) of colored objects was presented briefly, after which objects were covered by occluders.

Occluders either remained stationary (storage: 0 swaps) or pairs of occluders swapped positions a number of times (manipulation: 1-4 swaps). A target color was subsequently presented and participants had to indicate the location of the cued color. Storage trials require only that color-location bindings be stored in VWM; whereas manipulation trials additionally require these bindings be updated as objects swap. Performance accuracy on storage trials exhibited by humans and the parrot were both consistent with a 3- to 4-item storage limit; the parrot also was perfect on 5 items (humans were not tested). Manipulation-related performance was near ceiling for both groups on set size 2 trials; however, humans experienced a systematic decrease in accuracy as swaps increased for set sizes 3 and 4. Interestingly, the parrot generally remained near ceiling for all set size 3 dynamic trials, and matched human decrement in ability for set size 4 at 3 and 4 swaps. These results suggest that VWM manipulation is not unique to humans, inviting further investigations into whether VWM manipulation is supported by common versus separate mechanisms across species, and whether differences exist for computer-based versus live trials.

Part II. Behavioral Interventions


Introduction.

In general, there is still a lack of awareness that parrots are nondomesticated prey animals being kept in captivity under unnatural circumstances as highly intelligent animals with remarkable cognitive abilities. Without understanding normal behavior and underestimating the high intelligence and cognitive abilities of parrots a wide variety of behavioral problems are apt to occur depending upon the individual parrot, species, and circumstances surrounding the bird.

Behavior

Behavior in nature is based on innate behavior and founded on learning, experience, intelligence, and cognitive abilities. Behavior is driven by the urge to survive as individual and as species. Dealing with parrots in captivity we need to understand that the behavior of parrots is determined by different factors including hereditary factors. To understand behavior we have to understand and learn about the principles of ethology. Looking through the eyes of parrots we have to consider that our body language and attitude determines the body language and behavior of parrots.
Parrots are built and behave as prey animals

Parrots are prey animals in nature. The fear of being killed as a prey animal determines a major part of normal behavior in nature. Fear of getting killed as prey animals also can be expected as normal behavior within captivity. A typical anatomic feature of parrots as prey animals is the positioning of their eyes. The eyes of parrots are positioned at the side of their head enabling parrots to observe the whole environment. The eyes of predators are positioned so as to enable the animals to watch straight ahead using binocular vision. The eyes of humans are positioned the same as in predators such as: dogs, cats, owls, and birds of prey, which also have binocular vision. Humans that are talking and smiling to the parrot, showing their teeth, can be perceived by a parrot as being intimidated by a predator. Dealing with parrots without understanding the consequences of the specific characteristics of parrots as prey animals is a likely reason for parrots to develop insecure/defensive behavior. Parrots are intelligent birds with amazing cognitive abilities. Furthermore, from studies demonstrating the intelligence and cognitive abilities of parrots, we can infer that they understand human intentions, posture, and attitude.

Parrots learn by observing other birds, other animals and humans as part of their environment. Parrots evaluate information, make inferences, and behave accordingly. Dealing with parrots in a way resembles dealing with children who are eager to show and demonstrate what they have learned. The Model/Rival technique, as described by Pepperberg, acknowledges this intelligence and observational learning skills of parrots. Allowing myself (JH) some anthropomorphism: “From the viewpoint of parrots, it must be a frustrating experience not to be appreciated for their intelligence and talents but just to be considered as beautiful, funny and cute.

Consultancy Practice for Birds: Definitions of Behavior.

Normal behavior

Normal behavior is species-typical individual behavior that is not meant to manipulate the caretaker. Examples are eating, drinking, grooming, playing, sitting in the cage, perching on the hand. It is the experience of the author (JH), the outcome of rewarding normal behavior is the bird will develop additional behavior patterns that are then used to manipulate the caretaker to get attention. These additional patterns can be considered undesired behavior.

Undesired behavior

Undesired behavior is intended to manipulate the behavior of the caretaker. This may include screaming, talking, biting, feather picking. A human response of fear, frustration, anger, concern, and laughter might be considered a reward by the bird for such behavior and thus as encouragement to act in this manner. Consequently, demonstrating that a bird’s behavior is problematic and may increase its occurrence.

Desired behavior

The definition, used within the Clinic for Birds, for desired behavior is behavior that is created and manipulated by the caretaker. It is behavior that the caretaker would like to see repeated in the future. Desired behavior is not behavior that is the result of a command or a request. Desired behavior also is not behavior the bird is showing to get a treat. Desired
behavior involves (but is not limited to) actions such as the bird demonstrating an interest in novel toys or actions. Rewarding desired behavior, including rewarding intelligence, is a way to show respect for the bird and can aid in creating self-esteem, mutual respect, and might prevent undesired behavior.

**Enforced behavior**

Enforced behavior is the result of a command, any kind of force, or behavior motivated by a treat or food. Enforced behavior also is behavior out of fear of punishment.

**Displacement behavior**

Displacement behavior Tinbergen, one of the founders of ethology, has described displacement behavior in gulls during territorial behavior, when a gull generally either defends its territory or cedes to another individual (eg, fight or flight).(2,3) Displacement behavior can be considered as the ultimate alternative behavior when a fight or flight response are not the best choices or even impossible. Instead of a fight or flight response, the gulls started to preen themselves, started to pull at grass as if they were collecting materials to improve the nest, and looked away from their competitors. Note that a “freeze” response also might occur. (4,5) In a conflict situation in nature as well as in captivity, parrots also have the choice between a fight or flight response and displacement behavior. Displacement behavior seems to be completely “out of order” but has the effect that the other parrot or the human caretaker becomes distracted and a new situation is created. Typical examples of displacement behavior are nail biting, scratching, grooming, flapping the wings, shaking the tail, shaking the head, and looking up with the head tilted sideways. Grooming and preening have been associated with normal behavior that birds perform when they are comfortable but can also be a form of displacement behavior that is displayed in a conflict situation.(6) When humans respond to displacement behavior in a way that is rewarding for the bird, this behavior, which is normal in a conflict situation, becomes an undesired behavior.

When dealing with parrots, we can expect to see displacement behavior in different conflict situations. The most common conflict situation is when parrots, as prey animals, are approached by humans in an intimidating manner; that is, face forward with the typical characteristics of a predator with their eyes in the front of their face, just like dogs, cats, owls and birds of prey.(1) We also observe displacement behavior of parrots that are inside or up on their cage showing territorial behavior (eg, defending their space in an aggressive manner). Under those circumstances it is important to know how an avian species analyzes and combines its perceptual experiences to understand what is happening in the surrounding world.(7) There are reasons to hypothesize that parrots utilize extensive information processing (eg, at least to some degree, they do not simply react mindlessly to environmental stimuli) but they actually process the stimuli and choose to react in a certain ways.(8)

When displacement behavior is not recognized nor understood and caretakers are responding to displacement behavior in a way that is considered as rewarding, displacement behavior can easily result in abnormal repetitive behavior (also known as maladaptive behavior), without the primary trigger that was causing the conflict situation.(9) It can be one of the explanations when we are dealing with complex behavior problems, like feather destructive behavior. It can be assumed the type of displacement behavior has a genetic component and the type of displacement may, therefore, differ between species. It can help explain why some species are more prone to feather destructive behavior.(10) It can be
postulated the way displacement behavior is expressed also will be influenced by environmental factors and the observational learning ability of the parrots. Because of that, it has been argued that hand feeding baby parrots is contraindicated because birds need to learn by observing normal behavior of their parents, including normal displacement behavior in conflict situations. (11)

**How to deal with displacement behavior:** It is important to recognize and acknowledge displacement behavior and to consider that the parrot is showing this behavior because it perceives itself to be in a conflict situation. Any direct response to the bird at that moment can potentially be rewarding to the animal and can create maladaptive behavior. By improperly reacting to displacement behavior when in the role of caretaker or veterinarian, we are interrupting normal behavior; however, displacement behavior can be an important tool for humans to use when dealing with parrots.

**5-Step behavior protocol to deal with and manipulate a parrot.**

The most important aspect of dealing with parrots is the attitude of the person or persons caring for the parrot. A basic protocol for veterinarians and caregivers of parrots can be summarized in 5 steps. This protocol also can be used with any parrot showing any behavior problem.

**Step 1:** Show the parrot that you have no negative intentions by acknowledging the fact that parrots are prey animals. For example, avoid staring directly at the bird. Allow the bird to observe you and your actions from a short distance, as though it was in the audience of a play. Relax your body, show that you are not (overtly) attending to the bird, and playfully interact with objects in your environment. For example, toss and catch a parrot toy, shake the toy, fiddle with your pen, tear up pieces of paper, rub a towel on the side of your face. In that way, be a positive role model. Engage in these actions without any interaction with the parrot; do not look directly at the bird. Note via peripheral vision whether the bird is attending and try different playful actions until it does. Parrots are more likely to feel comfortable with people who are comfortable with parrots and with themselves. Your actions (e.g., positive, confident, or nervous, insecure) around the parrot will provide the bird with the information it needs to decide how to react. People often must act and play a role around the parrot. What we create by doing so is desired behavior.

**Step 2:** This step can be considered rewarding the behavior that has been created and manipulated by your attitude in performing step 1. You have created an environment that encourages the bird to exhibit desired behavior—interest in your actions—and you reward this interest to by telling the parrot that it’s the most beautiful creature on this planet and how precious the bird is to you.

**Step 3:** Establish yourself as the best teacher for the parrot. You do this by showing respect for the bird’s intelligence by describing, in detail, what there is to see around it (e.g., birds in the trees, toys on the table, their colors, shapes, sizes, materials). You also can describe the color of the tail or beak. Parrots genuinely enjoy observing and learning. Pepperberg has shown that birds will request labels for novel items in their environment. (12) Reward the bird for its intelligence in a nonintimidating way (e.g., be aware of the direction of your gaze).

**Step 4:** After rewarding the intelligence, allow the bird to touch your pen, toy, paper, or towel and praise the bird enthusiastically. Only let them touch items when you tell it is okay. When
they reach out for anything, just take it away without a word and present it later after telling
that now it is okay to touch or even bite into the item. They are, in general, very gentle in
touching with their tongue. Ask the bird to participate in the learning process by offering him
new, small, unthreatening objects. Tell the bird that it may touch and feel the objects and
allow it to investigate. Praise each positive move. You also can present your hand and tell the
bird that it may step up and praise the bird for doing so. This is the opposite of giving a
command or making the bird step up to get a treat.

**Step 5:** Because, in the previous steps, you have shown the parrot that you are safe to be
around, you can now extend the experience to new situations. When the parrot shows fear, do
not reassure the bird. Reassurance can easily exacerbate the bird’s sense of fear and insecurity
as it can function as a reward for the behavior. It is the experience of the author (JH) that after
steps 1-4, a situation of mutual respect and mutual trust is established. When the parrot fears a
place or object like the towel, simply start over again with step 1 of the protocol. The bird will
eventually realize that there is no reason for fear. Then tell the bird how smart and wonderful
it is. This will help to stimulate the self-esteem that all parrots need to display normal parrot
behavior. The outcome is to create a situation in which a parrot can accept novel situations
like an examination, taking blood, grooming, wing clipping, gently towelling and others.
(1,13)

**Dealing with behavior problems of parrots**

Dealing with behavior problems involves looking for a diagnosis. (11) It is important
to consider the circumstances and to understand the reason for the behavior and its
consequences. In general, unwanted behavior of parrots in captivity can be considered
behavior that started as normal behavior under unnatural circumstances. When dealing with
unwanted behavior, we must consider that unwanted behavior will become more and more a
problem when the consequence of engaging in that behavior results in a reward for the parrot.
Any response, whether positive, negative, emotional, or even subconscious, to the (unwanted)
behavior, including ignoring a behavior, could be a reward for the (undesired) behavior.

**Preventing undesired behavior**

Preventing undesired behavior requires understanding the reason for the undesired
behavior: looking at the circumstances, the consequences, the natural behavior, and body
language of parrots as a social, intelligent prey animal. Preventing undesired behavior
involves optimizing health and welfare by making sure that birds benefit from certified
organic pelleted food, sunlight, fresh air and exercise. Preventing undesired behavior is
accomplished by creating an enriched environment in which the parrot is allowed to express
its intelligence and skills, providing toys, and providing food in a way that it stimulates
parrots to express normal foraging behavior. Preventing undesired behavior is enabled with
social interactions with other birds, other animals, and humans. Taking a bird outside for a
walk, a bike ride, a picnic, or a family visit (with appropriate safety measures) will prevent
undesired behavior. Preventing undesired behavior also includes understanding that the cage
of a bird can be considered by the bird as its nesting site. In nature, birds spend their time
during the day and during the night at the same location when they are breeding as part of
their reproductive cycle. Being at what it sees as its nesting site, the bird can feel threatened
by interlopers and try to defend its nest site by displaying territorial behavior. To prevent
undesired behavior, an owner can create a more natural day-night routine in which the bird
gets 10-12 hours of sleep in a special small sleeping cage that is located in another room of
the house, away from the location the bird spends the daylight hours. The underlying reason for this is that birds in nature do not sleep at night where they spend their daytime hours, foraging and drinking. Preventing undesired behavior is about understanding that birds prefer to sit in a high position when they feel insecure. For that reason, allowing the bird to sit on the shoulder is not encouraged. This point will be discussed in further detail during the talk.

Redirecting undesired behavior, displacement behavior.

We have to consider that every response to undesired behavior can be perceived as a reward. Instead of responding to the behavior of the parrot and instead of ignoring the behavior, the advice is to act in a way that signals to the bird that there is no perceived problem with a demonstration of displacement behavior. Part of the displacement is “looking away” (i.e., using only peripheral vision) and distracting the bird with your interest in objects with which you wish the bird eventually to engage. The result of demonstrating displacement behavior is that insecurity and aggression are replaced by interest in these objects. Over the years, the author (JH) has observed this behavior both as a birdwatcher in nature and as an avian veterinarian dealing with parrots in captivity. In a situation of undesired behavior, step 1 of the 5-step behavior protocol can be considered as showing displacement behavior, resulting in desired behavior that can be rewarded as step 2. Using this protocol in this order prevents undesired behavior from being rewarded. Having the bird watch us when we are not looking at the bird, acknowledging and rewarding their intelligence and rewarding the behavior by allowing the bird to touch, feel and even bite a specific object can all be done within 30 seconds. Using this protocol, undesired behavior is redirected into desired behavior and the bird is rewarded for that.

Wing Clipping

In the wild, flying is essential for the survival of parrots, with the typical exception of the kakapo (Strigops habroptilus). Flying enables parrots to find food, water, and a safe place to sleep. Flying is a way to escape from predators; flying in flocks also offers protection from predators. For parrots in captivity that are kept as companion birds, flying is no longer essential for their survival. Within the Consultation Practice for Birds, clipping can be recommended for safety reasons but is mainly recommended because it makes it possible to provide the parrot more freedom and social interactions both inside the house and during the daily outside activities with the caretaker; the bird has a wider range to become more a part of the family (flock). In the experience of the author (JH), wing clipping done with a parrot-friendly attitude helps prevent behavior problems and prevents parrots from ending up in parrot rescue facilities.

Hand-rearing Baby Parrots

Basically, the necessity for hand rearing baby parrots in the past was the result of management failures concerning housing, nutrition and care complemented with a lack of knowledge about the natural breeding behavior of parrots. Over the years hand-rearing baby parrots became a commercial activity because females produced more eggs. The Dutch Parrot Foundation, supported by the Consultancy Practice for Birds, has been successfully campaigning in the Netherlands against the hand-rearing of baby parrots and the trade in unweaned baby parrots. The outcome has been that since July 1, 2014, it is not allowed to separate a baby parrot from the parents until the baby parrot is fully weaned (i.e. able to eat completely on its own). The new legislation puts parrots on the existing list with dogs, cats,
rabbits, chimpanzees, and other species for which the timing of separation of youngsters from the parents has been regulated for many years. The new regulation is based on the data that have become available during the past 15 years showing the negative consequences of separating baby parrots from their parents. A range of behavior problems and welfare issues have been recognized as consequences of separating youngsters from the parents, particularly before or during the important first imprinting phase. Some of the behavior problems can occur after months or even after years, especially when the bird becomes reproductively active. Insecure behavior, phobic behavior, biting, feather picking and self mutilating can become serious consequences of separating a baby parrot from the parents. (14,15) Some researchers have shown that enrichment at an early age is important in maintaining good interactions later in life. (16)

Conclusions

We must learn how to interact with parrots by looking at the world through their eyes. Parrots belong to the most charismatic, intelligent and social animals on the planet that can have a very long-life expectancy when provided with the appropriate living environment. Consider and acknowledge parrots as prey animals. By adjusting our body language, we show respect for parrots instead of showing an intimidating posture, creating insecure and defensive behavior. By showing respect for their social skills and intelligence, we demonstrate respect for parrots. The natural learning process involves observing the behavior and skills of their parents, other members of the flock, and humans in captivity. Showing that we have a problem with a parrot’s behavior can create insecurity and behavior problems. Instead, using the 5-step behavior protocol can help create a relationship based on mutual trust and respect. It is vital to reward desired behavior, but in the appropriate manner. It is vital to reward the intelligence and acknowledge the cognitive abilities in parrots, but, again, in the appropriate manner. It is vital not to reward normal behavior. It is vital not to reward undesired behavior. It is important to recognize displacement behavior and to use displacement behavior when we are in a conflict situation. Taking care of the health, welfare, well-being, and conservation of parrots in the world is our primary responsibility as avian veterinarians. Parrots’ behavior patterns show whether you are doing a good job, just as children show whether their teachers are doing a good job. In that way parrots have become my best teachers because they correct me when I’m wrong. I’m grateful for the parrots in my life because they force me to be a better avian veterinarian.

If Not Us, Who? If Not Now, When?

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References


For additional references, contact info@vogeladvies.nl.