

Environmental Enrichment in Captive Orange-winged Amazon Parrots (*Amazona amazonica*): The Importance of encouraging Naturalistic Behaviours

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Introduction

Captive parrots are commonly kept as pet and zoo animals in Australia. Many captive species are highly intelligent (Pepperberg, 2006) and social (Meehan *et al.*, 2003) with individuals having been separated from their wild conspecifics by only a few generations. Attention to captive parrot welfare is therefore of paramount importance. It has been shown that parrots kept in barren environments may not express certain natural behaviours, such as foraging and allogrooming (Graham, 1998). Furthermore, such conditions are associated with the development of behavioural pathologies, including stereotypic behaviours and feather-picking (Garner *et al.*, 2003). Research conducted over the past decade has suggested that the welfare of captive parrots may be enhanced by appropriately enriched environments (Meehan *et al.*, 2004; Meehan *et al.*, 2003; Meehan & Mench, 2002). However, commercially available items, including food and enrichment devices, are often designed for optimal handler convenience, with less emphasis placed on bird welfare. This paper considers the results of three studies into environmental enrichment of captive Orange-winged Amazon parrots (*Amazona amazonica*), focusing on both food-based and stimulus-type enrichments.

Discussion

Energy-dense pelleted diets are nutritionally adequate and their use is recommended by veterinarians and nutritionists. However, while such diets require some foraging, they may contribute to a deficient behavioural environment. Common pelleted and seed diets have relatively high metabolisable energy density as compared to alternative diets composed of vegetables and fruits. Thus, pelleted diets may reduce foraging time as parrots satisfy their energy needs in a relatively short time-span. Furthermore, the energy demands of birds in captivity are likely to be lower than that of their wild conspecifics. Rozek *et al.* (2010) conducted a study into pellet size after noting anecdotally that Orange-winged Amazon parrots interacted more extensively with pellets 20-30 times larger than the commercially recommended size. Specifically, they examined whether the parrots' activity budgets (n=6) were influenced by pellet size, whether a preference for one pellet size over another was exhibited (n=12 birds), and whether interactions with wooden cubes was altered by simultaneous provision of oversized pellets (n=12).

The study found that the summation of all feeding behaviours comprised an estimated 5.9% of light phase activity when regular pellets were fed, in contrast to 25.7% of activity when oversized pellets were provided. The latter figure more closely approximates foraging activity budgets in wild parrots. This increase in foraging time is principally due to increased time spent manipulating pellets with the foot, beak and tongue known as podo-mandibulation. Parrots displayed a preference for oversized pellets, being more than seven times more likely to choose oversized pellets than regular pellets. In the absence of oversized pellets, the birds in the study interacted much more frequently with wooden cubes. Thus, in the absence of oversized pellets, the wooden cubes may have functioned as a non-food foraging enrichment device.

The preference data collected by Rozek *et al.* (2010) prompted a study assessing the motivation of Orange-winged Amazon parrots for different diet forms and the effect of diet on motivation for a foraging enrichment. This subsequent study, conducted by Rozek and Millam (2011), tested motivation by necessitating parrots (n=10) to incrementally lift up to 480g, approximately 1.5 times the bodyweight of an adult parrot, to gain access to food pellets or wooden cubes.

Parrots showed a strong preference for oversized pellets with seven of 10 birds lifting more than their bodyweight to access them. The parrots displayed greater motivation to gain access to wooden cube enrichment devices when regular pellets were freely available in comparison to when oversized pellets were provided ad libitum. These results, in conjunction with those of Rozek *et al.* (2010), suggest that both food form and nutrient content motivate parrot appetites.

As already alluded to, environmental enrichment is commonly provided through readily available stimulus-type enrichments such as enclosure “toys”. For these devices to be beneficial, they must engage the animal. However, there is little information as to what types of stimulus enrichment maximise engagement in parrots. Colourful wound rope is frequently marketed as a combination perch and enrichment, while unwound rope is sold as an outlet for excessive preening behaviour. Webb *et al.* (2010) performed a series of preference tests to evaluate preferences in size, colour, and fray of rope enrichment devices offered to Orange-winged Amazon parrots. The study assessed each of these parameters separately in 12 parrots (six male and six female) housed individually. Greater levels of interaction with enrichment devices were interpreted as a preference for them.

The preferred properties of rope differed to the preferred properties of wooden cubes elicited in a previous study (Kim *et al.*, 2009). It is conceivable that while wooden cubes serve as foraging substitutes (Kim *et al.*, 2009; Rozek & Millam, 2011), rope functions as a surrogate for preening behaviour. This indicates that different enrichment device types may facilitate expression of separate types of motivated behaviour. Sex-specific preferences in parameters of length and diameter of rope-based cage enrichment devices were exhibited. Females showed a preference for rope of greater length and diameter, whereas males exhibited the opposite trend. Males interacted with rope enrichment devices approximately four times more than females. Females showed a greater preference for wound rope as opposed to frayed rope than did males. Feather-picking behaviours have a higher incidence in females (Garner *et al.*, 2003). Thus, if wound rope acts as a substitute for preening behaviour, such enrichment devices should be beneficial in reducing stereotypic oral behaviours in female parrots.

Conclusion

These preference and motivation studies demonstrate strong evidence that Orange-winged Amazon parrots seek opportunities to engage in naturalistic behaviours. Providing food forms or substitute enrichment devices that encourage podo-mandibulation promotes more naturalistic foraging behaviour by captive parrots and may enhance their welfare. Further, enrichment device preference is complex and thus both the type of device and sex of the parrot should be considered when selecting enrichment devices to optimally engage birds in normal behaviour. Future research should concentrate on determining the preference and motivation for different diet forms and enrichment devices in parrots commonly kept in Australia.

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