

Object Play in a Laughing Kookaburra *Dacelo novaeguineae*

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EMU Vol. 92, 106-108, 1992. Received 18-1-1991, accepted 13-2-1991

Descriptions of play behaviour in birds are largely anecdotal (Ficken 1977; Fagen 1981), although Pellis' (1979) comprehensive study of the play behaviour of the Australian Magpie *Gymnorhinus tibicen* is a notable exception (see also Pellis 1981a, 1981b, 1983). Moreover, the range of avian species in which play has been described is small compared to the large number of mammalian species in which it occurs. However, this probably reflects a lack of attention given to avian play rather than a distinct taxonomic difference (Fagen 1981). Given that birds and mammals have independent phyletic origins yet show convergent evolution under similar selective pressures (Fagen 1981), the study of the similarities and differences in the play of birds and mammals should provide invaluable insights as to the function of play. I report here on an instance of object play in a Laughing Kookaburra *Dacelo novaeguineae* that strongly resembled the action they use to kill large prey.

The observation was made from a canvas hide at dusk on 23 September 1985 at the University of New South Wales' Cowan Field Station in the Muogamarra Nature Reserve near Sydney, Australia. I observed a wild Laughing Kookaburra apparently foraging in the enclosure some 5-10 m away. I could not determine the age or sex of the bird because there is little sexual dimorphism in size or plumage and juveniles resemble adults in appearance (Parry 1970, 1973). However, it had a brown coloured rump which is more often a female character and it did not have the short tail or beak characteristic of fledglings. A few minutes after my initial awareness of the bird, I was distracted by an unusual banging sound. On inspection, I observed the kookaburra perched on a tree branch about 7 m away. By flicking its head sideways and down it was hitting against a branch a stone measuring about 2-3 cm in diameter that it held in its bill. This sequence was not observed fully but it hit the stone against the branch at least four times before dropping it. The kookaburra stared in the direction of the fallen stone and then swooped down and landed on the ground 1 m from the stone. From this point on, I recorded the sequence on videotape.

The kookaburra picked up another stone of similar size in its bill and flew back to the top of a steel mesh fence about 7 m away from me. After pausing and apparently surveying its surroundings, it began to hit the stone against the upper steel cross-support of the fence. It did this a total of six times to both the left and right. Between changes in the side to which it hit the stone and often between each hit, the bird paused. During pauses it either remained motionless, turned its head as if looking around, or manipulated the stone in its bill as if to either obtain a better grip or to turn the stone so that a different face was exposed to being hit. Pauses varied from 2-8 s in duration. About 6 s after the last hit, the bird dropped the stone while trying to manipulate it in its bill. It stared in the direction in which the stone fell and immediately swooped down and landed next to it. It picked up the stone and flew to a tree branch some 15 m from me. As before, it began to hit the stone against the branch after a pause on alighting. In a manner similar to that already described, it hit the stone a total of five times on the branch, again to both its left and right. Immediately after the last hit, the bird appeared to stare at the spot it had been hitting with the stone before looking to the right and wiping its bill on the branch. During the wiping action it dropped the stone. It stared in the direction in which the stone fell then flew down from the branch and landed on the ground about 7 m from me. After 25 s of apparent foraging activity, it caught and consumed some sort of invertebrate prey. The total duration of the sequence from the time I first heard the banging sound to the bill-wiping action was at least 180 s.

The behaviour was categorised as play for a number of reasons. First, the hitting action was repeated many times. Repetition of acts or sequences of acts, particularly with pauses in which the animal engages in an apparently unrelated activity, is a commonly ascribed characteristic of play (Bekoff & Byers 1981; Fagen 1981). Second, the action strongly resembled that used by Laughing Kookaburras to kill large prey such as rodents, lizards and snakes which form a large proportion of its diet (Parry 1970) yet the bird was clearly not

confusing the stone with food. It made no obvious attempt to swallow the stones (i.e. the sequence lacked the consummatory act of normal predatory behaviour) and it foraged successfully immediately after the sequence. That it used two different stones suggests that it was either a very inefficient forager or was deliberately choosing stones. Third, the action was performed in silence and in the apparent absence of any nearby conspecific (though calls could be heard within 200 m). Laughing Kookaburras have a range of visual and auditory displays in aggressive or territorial encounters (see Parry 1970, 1973). Given that the bird did not perform any of these displays, it is unlikely that the sequence was part of some as yet undescribed form of agonistic or territorial display.

The obvious similarity between the behaviour observed and the technique used by kookaburras to kill large prey suggests that the observed bird was practicing its prey-killing technique. Practice of an act or sequence of acts outside the context in which it is normally performed (i.e. the functional context) is most likely to occur where the act or sequence of acts are complex and where performance in the functional context exposes the individual to significant risks (Bekoff & Byers 1981; Fagen 1981). Both criteria apply to the prey killing behaviour of kookaburras. It is possible that a poorly handled rodent, lizard or snake could injure a kookaburra by biting or clawing at it as it struggles to escape. Thus, there is a selective advantage in quickly and efficiently killing such prey. The use of inanimate objects rather than live prey minimises the risk of injury during practice and minimises the time and energy devoted to finding a suitable practice item; stones and similar objects are readily available in a kookaburra's environment whereas suitable prey items are relatively scarce. Other birds in which actions normally associated with predatory behaviour have been observed as a component of their play include the European Kestrel *Falco tinnunculus* (Pettifor 1984), the Australian Magpie (Pellis 1979, 1981b) and the Black-backed Gull *Larus marinus* (Beck 1976 in Fagen 1981). The European Kestrels observed by Pettifor (1984) were all adult suggesting that predatory play is not necessarily confined to the life-history stage when predatory skills are first developing (i.e. immediately post-fledging).

The frequency of object play in kookaburras is unknown but aspects of their life-history pattern indicate that they may be particularly playful animals. Laughing Kookaburras live in social groups comprising a breeding pair, their fledglings (usually clutches of 3-4) and

often one or more offspring from previous breeding seasons. These latter individuals share with the breeding pair the raising of the atricial young which are dependent on their caregivers for 15-19 weeks from hatching to complete independence. They are also exceptionally long-lived birds for their size (Parry 1970, 1973). Thus, young are raised in social groups comprising close kin and so have a number of potential play-partners to choose from, and a lengthy period of development in which survival needs (food, shelter, heat and protection) are provided by the caregivers and in which the opportunity to play exists (Bekoff & Byers 1981; Burghardt 1984; Ortega & Bekoff 1987). While Parry (1970, 1973) did not describe any form of play in Laughing Kookaburras she did give a description of what she considered agonistic sparring in chicks that displayed features of playfighting. For example, she noted that the motor patterns associated with sparring were first directed by the young at inanimate objects such as the side of the nest. Sparring with nest-mates and caregivers occurred later in development. Such a developmental pattern is typical of a complex motor pattern whose performance is perfected through play (see Fagen 1981). Parry may not have recognised playfighting in her birds simply because she assumed any form of sparring was aggression regardless of the context in which it occurred. Since playful and nonplayful forms of behaviour are usually very similar, failure to recognise the context in which a behaviour occurs may lead to behavioural misclassification (see Fry 1987; Watson 1990).

Acknowledgements

I thank David B. Croft for his advice over the years and for his helpful comments on this manuscript. I also thank the referees, E.M. Russell and G.W. Arnold, for their useful comments on this manuscript.

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Reproduction by Captive Unplumed Male Lesser Bird of Paradise *Paradisaea minor*: Evidence for an Alternative Mating Strategy?

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EMU Vol. 92, 108-111, 1992. Received 17-4-1990, accepted 21-3-1991

Birds of paradise (Paradisaeidae) have become an important focus for testing current theories regarding sexual selection and mate choice (Beehler & Foster 1987). In the genus *Paradisaea*, the primary mating system is the lek. Colorfully plumed males gather in groups to perform elaborate courtship displays (Gilliard 1969). Females are attracted to these communal display arenas where they assess males and select a mate (Emlen & Oring 1977). Although males in full plumage gain the majority of copulations (Beehler 1983, 1988), it is known that females will occasionally mate with unplumed males (LeCroy *et al.* 1980; LeCroy 1981). The documentation of successful breedings by an unplumed male captive Lesser Bird of Paradise *Paradisaea minor* at the New York Zoological Park has caused us to speculate that wild males may delay the development of mature plumage as an alternative mating strategy. At the

very least, such males could be successful breeders when engaging in matings.

At least eight species of birds of paradise exhibit lek mating systems (Beehler & Pruett-Jones 1983). Elaborate male plumage is thought by many to be a result of runaway sexual selection, females preferring to mate with fully-plumed males (Diamond 1986). For a review of current sexual selection theory see Borgia (1987). Although often debated (LeCroy 1981; Beehler & Foster 1987; Beehler 1988), it is widely believed that one of the primary characteristics of lek systems is that the female has the ability to choose a mate (Bradbury 1981; Bradbury & Gibson 1983). However, in birds of paradise, the precise criteria upon which a female bases her decisions remain unknown (Diamond 1986).

Display by unplumed presumed males has been reported for most species of *Paradisaea* and it is not un-