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SHORT NOTE

Did Molly Falla observe an instance of active tactical deception in the kea (*Nestor notabilis*)?

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Kea (*Nestor notabilis*) are a species of large parrot from New Zealand exhibiting a variety of unusual adaptations. These include cold tolerance, and (partial) carnivory (Diamond & Bond 1999). They are also known for their exceptional intelligence, and are used as a model organism in the study of so-called 'technical' intelligence in birds, which encompasses a suite of flexible behaviours allowing for goal-directed problem solving, via means-end reasoning, the appropriate application and coordination of psychomotor skills, understanding of the relationships between objects and functions, and probabilistic reasoning (among other faculties) (see Huber & Gajdon 2006; O'Hara *et al.* 2012; Bastos & Taylor 2020). Kea are adept at social learning also, being able to (rapidly) learn solution rules to problems once solved (O'Hara *et al.* 2012).

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One potential corollary of 'technical' intelligence is the capacity for active (or intentional) tactical deception. This form of tactical deception involves an animal utilising behaviour to actively manipulate another via misrepresentation in order to gain an advantage (McNally & Jackson 2013). This is distinct from what could be termed passive tactical deception, where instinctual adaptations (such as sound mimicry and other behavioural fixed-modal action patterns) or features of morphology (such as in the case of Batesian mimicry) can be used to deceive predators or competitors. Active tactical deception has been studied in various primates in both naturalistic and experimental contexts (Whiten & Byrne 1988; Hare *et al.* 2006). Moreover, recent phylogenetic comparative examinations have found strong correlations between physical-technical and social cognitive abilities, such as tactical deception in non-human primates (Reader *et al.* 2011; Fernandes *et al.*

2014; Fernandes *et al.* 2020). These results strongly suggest that technical and social intelligence coevolved as part of a domain general cognitive dimension. Among birds, the use of strategic interference against opportunities to observe the location of cached food has been studied as a possible instance of active tactical deception in the common raven (*Corvus corax*) (Bugnyar & Kotrschal 2002). Similarly, field experiments with piping plovers (*Charadrius melodus* and *C. wilsonia*) have found that these species "feigned" having wing injuries when confronted with intruders, in order to draw attention away from nesting sites (Ristau 2013). Although, it could be argued that feigning an injury operates as a fixed-modal action pattern, the experimental evidence indicates that the birds actively monitor the intruders' activity, thus, this behaviour features at least moderate flexibility (Ristau 2013).

Thus far, the capacity for active tactical deception among kea has not (to our knowledge) been studied; however, an anecdotal report of this behaviour that is evidently extremely obscure was recently bought to our attention. The report is sourced from a very brief book written by Elayne Mary (Lady) Falla (1903–1978) in the 1970s about the (tragically short) life of her pet kea. Molly (as she preferred to be known) was the wife of noted New Zealand ornithologist Sir Robert Alexander Falla (1901–1979). She was a talented wildlife artist (Falla 1966, 1970), although her work is relatively obscure today. The book, entitled *A kea on my bed* concerns the life and antics of a hand-raised kea collected by her husband in 1948 . The bird was retrieved from a nest burrow in the New Zealand Southern Alps at an altitude of 1,380 m a.s.l. The bird was estimated to be three-weeks old at time of capture and appeared to have been abandoned (it was found to be sharing its nest with a dead sibling at the time). The bird was then presented by Robert to Molly as a pet, subsequently to be named "Mr Kea" (although judging from the photographs the bird was almost certainly a hen, given its relatively small upper mandible), whereupon Molly proceeded to document the bird's life up until its death some five months later from unknown causes (although poisoning was suspected). The book is richly illustrated and chocked full of interesting, albeit somewhat embellished observational accounts of the young kea's behaviour. It also includes a plea to end the persecution of kea, which at the time was ongoing (kea were not fully protected in New Zealand until 1986; Diamond & Bond 1999).

Among the observations made by Molly Falla, one in particular stands out, as it is suggestive of active tactical deception. The relevant description is as follows:

> "One morning, Bob accidentally trod on his foot and Mr Kea's reaction was most vociferous. After being caressed and comforted, however, he apparently quite forgot about the sore foot, such as a child might have done when it has been kissed and "made better". That evening, he began to run as usual to the door to welcome his master home. Suddenly, a few feet from the door, he pulled up and scowled at Bob and, lifting one foot, came limping back to me. As he had shown no sign whatever of limping during the day, the family's mirth was prodigious – it became more so when we realised he was holding up *the wrong foot*!" (Falla 1975, p.35, italics in original).

Clearly there is a heavy dose of anthropomorphism in this report, e.g. "scowled at Bob", and it is even conceivable that the report was fabricated in order to enliven the author's reverie; however, the intriguing possibility also exists that this might be a sincere (if embellished) report of what could potentially be a manifestation of active tactical deception on the part of this kea. In this instance, it is presumed that the bird came to associate its (very mild) injury at the feet of Bob with significantly increased attention from Molly, so opted to affect the outward appearance of being injured upon encountering Bob again in order to subsequently manipulate Molly into giving it more attention. Being mindful of Morgan's canon, another simpler explanation is that the bird simply learned to contingently associate the foot lifting behaviour with attention from Molly. This alternative account would not require the action of more elaborate cognitive processes such as those that subserve active tactical deception. Additional caution should be exercised in interpreting anecdotal reports such as these given the problem of the lack of standardization among observational case reports of behavioural rarities (Sándor & Miklósi 2020). Relevant to this is a recent debate surrounding a possible instance of spontaneous tool use in the Atlantic puffin (*Fratercula arctica*) which was based on a single second of footage (Fayet *et al.* 2020). This observation proved highly controversial and was the subject of vigorous criticism (Auersperg *et al.* 2020; Dechaume-Moncharmont 2020; Farrar 2020; Sándor & Miklósi 2020; von Bayern *et al.* 2020).

Nevertheless, the plausibility of the hypothesis that Falla (1975) documents an actual instance of active tactical deception in a kea is enhanced when considered in the context of data indicating that kea are highly cooperative (Huber *et al.* 2008). This is because cooperation seems to be a major source of selection favouring this behaviour (McNally & Jackson 2013). The presence of such behaviour in

kea would also further strengthen the presumed comparative psychological convergence between this species and other highly intelligent taxa such as primates (Huber & Gajdon 2006), as these are also known active tactical deceivers (Whitten & Byrne 1988; Hare *et al*. 2006).

In re-reporting this possible instance of active tactical deception in kea we have attempted to follow as many of the suggestions put forward for standardizing case reports of behavioural rarities by Sándor and Miklósi (2020) as possible. These researchers also suggest proposing protocols for exploring these behaviours under experimental conditions. Given the possibility of cognitive and behavioural convergence between kea and primates (Huber & Gajdon 2006), it may be possible to generalise an active tactical deception experimental protocol designed for the latter to the study of this behaviour in the former. One such protocol involves competition between humans (*Homo sapiens*) and experimental subjects over an item of food. In experiments involving chimpanzees (*Pan paniscus*) it was found that a number of chimpanzees approached the contested item indirectly in ways that were hidden from the human participant's view, sometimes even taking highly elaborate routes to the item (Hare *et al.* 2006). Hare and colleagues (2006) note that "[t]hese findings not only corroborate previous work showing that chimpanzees know what others can and cannot see, but also suggest that when competing for food chimpanzees are skillful at manipulating, to their own advantage, whether others can or cannot see them." (p.495). Such an experimental paradigm could conceivably be adapted to study this behaviour in the context of both human-kea interactions and possibly also conspecific interactions among kea (involving birds exhibiting different degrees of social dominance).

The Falla (1975) observation also serves to highlight the significance of behavioural insights gained from birds raised in captivity, which can yield substantively novel ethological data owing to the opportunities for close observation that such context affords. Examples of this include the work of Lambert *et al.* (2015) and Woodley of Menie *et al.* (2021) on spontaneous tool use and physical cognition respectively in captive greater vasa parrots (*Coracopsis vasa*), the work of Auersperg *et al.* (2021) on spontaneous tool use in a captive Goffin's cockatoo (*Cacatua goffini*), the work of Cory (2012) on rule governance in a captive white-necked raven (*Corvus albicollis*), and various instances of tool use in captive kea (Auersperg *et al.* 2011; Bastos *et al.* 2021), to list but a few relevant examples. Indeed, virtually everything that is known of the behaviour of the (now extinct) Norfolk Island kaka (*Nestor productus*) comes from observational records made by John Gould (1865) of a captive bird in the possession of a Major Anderson, of Sydney, in about 1838.

Finally, it is hoped that this note will also raise awareness of Molly Falla, who was evidently a most talented individual with a keen naturalist's eye, and who is sadly very little known relative to her eminent husband. It is possible that she was the very first to record a remarkable behaviour in a remarkable species of bird.

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