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## Aimed Object-throwing by a Wild African Elephant in an Interspecific Encounter

WOLFGANG WICKLER & UTA SEIBT

WICKLER, W. & SEIBT, U. 1997: Aimed object-throwing by a wild African elephant in an interspecific encounter. *Ethology* **103**, 365—368.

### Abstract

A wild and presumably female African elephant (*Loxodonta africana*) was observed when she threw with her trunk various materials – mud, soil, vegetation – to an interfering white rhino (*Ceratotherium simum*). Object-throwing, a special type of animal tool-behaviour, seems to be used by elephants not only in aggression but also for exploration.

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Elephants are known to use tools with the greatest frequency and diversity of all larger non-primate terrestrial mammals. Their skilfulness obviously developed with the trunk as a prehensile organ. They use the trunk to pick up food, lift water for drinking, and squirt or blow water, mud or powdery earth to various parts of their bodies; they hold sticks in the trunk to scratch parts of their body and they prepare such sticks from selected branches which they shorten and sharpen using trunk, forefoot and molar teeth (KURT & HARTL 1995).

With respect to object throwing, literature statements are inconsistent. Captive elephants have been seen using the trunk to throw missiles (GRZIMEK 1949; KÜHME 1963; CHEVALIER-SKOLNIKOFF & LISKA 1993; KURT & HARTL 1995), but for wild elephants VAN LAWICK-GOODALL in her review on tool-using in vertebrates (1970, p. 206) did not find object-throwing reported. True, captive animals, elephants in particular, often exhibit capabilities not normally found in their free-ranging counterparts, and traditional management of Asian elephants (*Elephas maximus*) in particular helped to accumulate observations on the behaviour repertoire of this species. Yet although captives are provisioned, watered, isolated from predators, buffered from environmental extremes and therefore have more time to manipulate objects (BECK 1980, p. 193), zoo, circus and intensively kept Asian elephants were found to manifest significantly less types of tool use than their counterparts in the wild (KURT & HARTL 1995). Within 500 hours of observation these authors recorded three instances of wild-living bulls throwing branches towards jackals and a leopard.

For the African elephant, KÜHME (1962, 1963) described how a captive young and rather aggressive male would take up stones, earth or branches, turn them to and fro in the tip of his trunk and then fling them at human beings. HENDRICHS & HENDRICHS (1971, p. 161) found that wild Serengeti elephants, uncertain about a given vis-à-vis, throw dust, twigs, mud, water, or anything else at hand, into the direction under suspicion; one male threw earth mixed with stones at the observer who was on foot. DOUGLAS-HAMILTON & DOUGLAS-HAMILTON (1973, p. 214) mention that elephants throw dust and hurled a log towards the observer's car, and more recently CHEVALIER-SKOLNIKOFF & LISKA (1993) tell that in the Samburu-Buffalo Springs Game Reserve, Kenya, an elephant threw sand with the trunk at a vehicle.

By saying that "elephants have never been reported to throw at conspecifics or potential predators" although "aimed throwing at humans and their contraptions is quite common", BECK (1980, p. 34) excludes humans from the predator category. And although throwing of objects at a rival in intraspecific combats seems unknown for any vertebrate except for chimpanzees (BECK 1980, p. 82), ESTES (1991, p. 264) in his list of elements of wild African elephants' intraspecific aggressive behaviour, mentions that they sometimes pick up or rip up and throw bushes, grass, or other objects towards an enemy.

Although aimed object-throwing is a rare type of animal tool-use and of special interest, data on its natural significance are thus largely lacking.

#### A Casual Observation

While studying the various ways in which African elephants make use of their trunk, tusks and toes in different feeding situations, we witnessed object throwing in an interspecific and presumably agonistic encounter, which we videotaped, in the Hluhluwe Game Reserve (KwaZulu/Natal, South Africa) in Nov. 1993. An elephant (a female as suggested by the head profile) approached a tiny and shallow temporary water puddle and, upon reaching the surrounding muddy area, sprayed some mud on her back. When a white rhino approached the puddle from the opposite direction the elephant reacted with ears spread, raised trunk and sniffing; the rhino stopped. Maximum distance between the two at first was about 20 m and ranged from 15 to 20 m over the following 15 min where the elephant seemed to be in a constant conflict between her interests in the water and the rhino. She alternately turned to the water, took some and squirted it over her sides, back or belly, and soon turned toward the rhino again with the head raised high up in alert posture. She twisted and untwisted the trunk touching her face, moved it behind her ears, into the mouth, over the tusks and again extended it towards the rhino. Then a combination of typical threat display elements (KÜHME 1962) were directed at the rhino: head-shaking, head-tossing, spreading and slapping the ears, and forward-trunk-swishes, some accompanied by an air blast. Repeatedly she took up watery mud into the trunk, and then with an upward sway expelled it towards the subject of her threat. Several times – preparatory to waterthrowing – she charged at the rhino, stepping rapidly several m towards it. Once she knelt down in the water with her forelegs but immediately got up again and made another thrust at her adversary. The rhino constantly faced the elephant, twice upon the elephant's forward launching it made a few steps backward, though most of the time it only moved its ears and less often its tail. As time went by the elephant came

to stand on grass and forbes next to the water. Now she picked clumps of grass with the trunk and began to throw grass with roots and adhering soil, and even a bundle of forbes at the rhino. All missiles were precisely directed, but fell short of the rhino. The encounter came to an end when a herd of about 80 buffalo entered the scene to mudbath in the puddle. The elephant moved off and joined a passing group of another 4 elephants, while the rhino disappeared between the bushes.

#### Conclusions

Elephants in any encounter usually swish the trunk up toward the opponent. Using that same movement to throw objects therefore seems a likely occurrence. Captive African elephants thus throw missiles towards objects that disturb or irritate them, and they can develop throwing to great precision: GRZIMEK (1949) saw them throw sand at rans, and CHEVALIER-SKOLNIKOFF & LISKA (1993) report on a young African zoo elephant throwing dirt and objects at birds, aiming so accurately that it hit the birds or the spot where they had been. Likewise the bull described by KÜHME (1962, 1963) within three years improved accuracy to perfection, in the end throwing and hitting a motionless person out of reach without hesitation. Some captive Asian elephant bulls also aimed objects accurately up to distances of 20 m (KURT & HARTL 1995).

Wild elephants, too, throw objects at opponents. It is clear from the outset that in the absence of systematic studies attacks on humans will be the ones that become most likely known. But elephants may also be provoked by rhinos in particular. McDONALD (cited in BECK 1980, p. 34) saw a captive African female elephant throw mud at a rhinoceros in an adjacent enclosure, and the famous huntress M. TRAPPE reported cases (c.f. LETTOW-VORBECK 1957, p. 263) where rhinos in the wild have been attacked by elephants, and – in contexts that were unclear – even stabbed with the tusks and killed.

Aimed object-throwing is a special form of tool-behaviour. It is used by elephants in various aggressive situations and, given the opportunity for training, may become habitual; according to KURT & HARTL (1995) some shackled Asian elephants musth bulls tried almost permanently to throw stones and prepared sticks at their mahouts. Cases of object-throwing in free living African elephants suggest that it may also be used to make a motionless opponent move and reveal its intentions.

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## Threat Sensitivity in Bicolor Damselfish: Effects of Sociality and Body Size

GENE S. HELFMAN & DANA L. WINKELMAN

HELFMAN, G. S. & WINKELMAN, D. L. 1997: Threat sensitivity in bicolor damselfish: effects of sociality and body size. *Ethology* **103**, 369—383.

### Abstract

Threat sensitivity involves graded antipredator responses that reflect the degree of predatory threat encountered. Models of predatory Atlantic trumpeterfish (*Aulostomus maculatus*) were presented to differently sized juvenile bicolor damselfish (*Pomacentrus partitus*) that occurred singly or in small groups to test for threat sensitivity. Bicolor damselfish displayed threat sensitivity by responding more strongly: 1. To large models than to small models; and 2. As models were brought closer. Solitary damselfish showed stronger responses than did fish in small groups. However, no habituation to threat occurred, no correlation was found between response strength and fish size, and many individuals gave strong, ungraded responses to predator models. Comparisons between juvenile bicolor damselfish and threespot damselfish suggest that bicolor are weakly threat sensitive in that they respond strongly regardless of threat (hypersensitivity). Solitary fish are more hypersensitive than grouped fish. Threespot damselfish show a stronger influence of damselfish body size: small threespot exhibit graded responses in proportion to degree of threat (pure threat sensitivity), whereas large threespot show relatively weak responses (nonbalance). These interspecific comparisons indicate the potential range that characterizes threat sensitivity and the possible influence of social and ontogenetic factors on that range.

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### Introduction

The threat-sensitivity hypothesis postulates that individual prey will trade-off predator avoidance against other activities by altering avoidance responses in a manner that reflects the magnitude of the predatory threat (HELFMAN 1989). Threat sensitivity is dependent on the ability of prey to assess the degree of threat presented by a predator. The hypothesis implies that prey have a repertoire of avoidance behavior patterns, that different patterns are appropriate to differing levels of danger, and that prey response will covary with the potential danger imposed by the predator (WEBB 1982; MILINKSI 1993). Threat sensitivity has been used as an explanation for graded antipredator responses in sticklebacks, guppies,