

Crane dances as play behaviour

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All species of crane (Gruidae) engage in a spectacular behaviour known as dancing (Ellis *et al.* 1998). Crane dances have inspired humans since the Stone Age (Russell & McGowan 2003), and imitation dances are known in numerous human cultures worldwide (Armstrong 1943). However, the function of this behaviour is poorly understood, and explanations for it are sometimes contradictory.

Lorenz (1963) considered crane dance to be an appeasement ceremony. However, this explanation cannot be true in many situations in which dances are performed. Cranes dance most often when relaxed, and often while not involved in any obvious social interaction; they also sometimes dance while alone (Potapov *et al.* 1987; V. Dinets pers. obs.).

It is known that dances are particularly common in unpaired sub-adults; a common explanation is that dancing facilitates socialization and pair formation (Archibald & Meine 1996). However, sub-adults in well-established flocks dance more often than in those in recently formed flocks, where the need for socialization would presumably be higher (Potapov *et al.* 1987). Also, birds begin dancing very early in life, sometimes when just 2 days old, long before they are old enough to form pairs (Archibald & Meine 1996). In the re-introduced flock of Whooping Crane *Grus americanus* in Louisiana, year-old birds in flocks dance frequently (V. Dinets pers. obs.), even though cranes of this species do not start breeding until they are at least 2, and more commonly 3 years old (Allen 1952). Interestingly, yearlings that are not in flocks dance less often (V. Dinets pers. obs.); adults in established pairs seldom dance (Archibald & Meine 1996). So while it seems likely that dancing is a form of social behaviour, it seems unlikely that its primary function in sub-adults is socialization and pair formation.

Dancing can also serve as displacement activity when cranes are nervous, but in most cases it is not performed in response to readily apparent stimuli (Archibald & Meine 1996). It usually occurs when the birds are relaxed and at ease (Potapov *et al.* 1987) and is often contagious (Archibald & Meine 1996). At the autumn staging grounds of Demoiselle Crane *Antropoides virgo* in Mongolia, thousands of individuals can sometimes be seen dancing at the same time (V. Dinets pers. obs.).

Finally, it is important to note that courtship rituals of cranes involve prolonged bouts of dancing. In this case, the function of dancing seems to be obvious. But this is unlikely to apply to dances by immature birds, unpaired adults and migratory/wintering flocks.

Cranes are known to be playful birds. Although no study of play behaviour in cranes has been published, people working with captive cranes report that play behaviour is common, particularly in juveniles and sub-adults. Such observations exist for Whooping and Sandhill *Grus canadensis* Cranes (J. Chandler pers. comm.), for Red-crowned *Grus japonensis*, White-naped *Grus vipio*, Common *Grus grus*, Siberian *Grus leucogeranus*, Hooded *Grus monachus* and Demoiselle Cranes (V.E. Flint pers. comm.), and for Grey Crowned-crane *Balearica regulorum* (B. Machedra pers. comm.). Re-introduced Whooping Cranes (yearlings) in Louisiana have been reported to play with Styrofoam duck and geese decoys, sometimes breaking them apart in the process (P. Lamartiniere pers. comm.). On some occasions, dancing is combined with object play (T.L. Perkins pers. comm.). It is reasonable to suggest that dancing is also a form of play behaviour, at least when performed outside a pair-forming context. This has been suggested before (Archibald & Meine 1996), but only in passing.

Burghardt (2005) developed a set of five criteria for determining whether a certain behaviour can be classified as play. These criteria are now widely

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accepted in both the psychological and the ethological literature (e.g. Pellegrini 2009, Pellis & Pellis 2009, Smith 2009).

- 'The performance of the behavior is not fully functional in the form or context in which it is expressed; that is, it includes elements, or is directed towards stimuli, that do not contribute to current survival.' This criterion is apparently met: dances do not seem to have any immediate adaptive value, except in situations in which they might be a part of pair formation process.
- 'The behavior is spontaneous, voluntary, intentional, pleasurable, rewarding, reinforcing, or autotelic (done for its own sake).' All of this seems to be true of crane dances; inevitably, we have no evidence that dances are pleasurable for the birds, but the fact that cranes dance most frequently when relaxed and at ease certainly hints at such a possibility.
- 'It differs from the "serious" performance of ethotypic behavior structurally or temporally in at least one respect: it is incomplete (generally through inhibited or dropped final element), exaggerated, awkward, or precocious; or it involves behavior patterns with modified form, sequencing, or targeting.' Again, this criterion is met for dances performed outside of pair-forming context, if we consider them a 'non-serious' performance of behaviour that is also involved in courtship. Unlike during courtship, dances in other situations are not followed by duets or pre-copulatory displays.
- 'The behavior is performed repeatedly in a similar, but not rigidly stereotyped, form during at least a portion of the animal's ontogeny.' This is certainly true: crane dances follow the same general pattern of leaps and wing flapping, but there is no rigid sequence. Bouts of dances can last from a few seconds to several minutes, and may be repeated from one to dozens of times during the day (Potapov *et al.* 1987; also V. Dinets pers. obs.)
- 'The behavior is initiated when the animal is adequately fed, healthy, and free from stress (e.g. predator threat, harsh microclimate, social instability), or intense competing systems (e.g. feeding, mating, predator avoidance). In other words, the

animal is in a "relaxed field".' As mentioned above, this is true for the majority of crane dances.

So, all five criteria are met by crane dances performed outside a pair-forming context. But what about the notion that dancing can serve as displacement activity when the birds are nervous (Archibald & Meine 1996)? Interestingly, this is often true for play behaviour in other animals. For example, in a study by Burghardt and Dinets (in prep.) of object play in male *Pseudotropheus* cichlids, it was found that some individuals increased the frequency of play attacks on an object (a thermometer) when exposed to other males in adjacent tanks. So the occasional use of dancing as displacement behaviour does not contradict the suggestion that most crane dances are play.

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