

THE SINGLE WING-FLICK DISPLAY OF THE BLACK-CAPPED CHICKADEE¹

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The Black-capped Chickadee (*Parus atricapillus*) is a wide-ranging species that has been the subject of numerous studies on social behavior, including communication. Within the subject of communication, vocalizations have undoubtedly received the most attention. After the pioneering work of Odum (1942), Ficken et al. (1978) published an excellent overview of the vocal repertoire of Black-capped Chickadees. Recent work on various calls such as the *chick-a-dee* call complex (Hailman et al. 1987), the gargle call (Ficken and Popp 1992) and the whistled "fee-bee" song (e.g., Horn et al. 1992, Otter and Ratcliffe 1993, Shackleton and Ratcliffe 1994) have increased our understanding of adult vocalizations. The work of Clemmons (1995a, 1995b), Kroodsma et al. (1995), and Shackleton and Ratcliffe (1993) has provided much new information about how such vocalizations develop in young chickadees.

Considerably less has been published on the visual displays of Black-capped Chickadees. One major reason for this may be that most of these displays are very brief, several types lasting only for a split second. Perhaps another reason is the perception, stated by S. T. Smith in her book on communication in Carolina Chickadees (*Parus carolinensis*), that visual signals and displays can generally be considered redundant, simply repeating messages whose primary means of communication are through vocalizations (Smith 1972).

Regardless of the reason, visual displays of chickadees are relatively poorly known; indeed, two of the more common ones: ballet (Popp et al. 1990) and body ruffling (Piaskowski et al. 1991) have only been described in any detail within the last few years.

I report here on a little known display of the Black-capped Chickadee: the single wing-flick. This display is given by chickadees when suddenly confronted by more dominant individuals: either higher ranking flockmates or other, larger species. The display itself is extremely brief and involves the chickadee facing its opponent and suddenly lifting up and extending one wing (Fig. 1); the wing is immediately folded again. Although this may sometimes be repeated, it is usually given just once. While I suspect that either wing can be involved, most, if not all, of the displays I have seen so far have been done with the bird's right wing. Typically, when a chickadee gives a single wing-flick at a food source,

the displayer then quickly grabs an item of food and flies off.

Both males and females give single wing-flicks. I have 11 records of this display, all being observations done at feeders during the winter. Two of these records involve Black-capped Chickadees giving this display to Tufted Titmice (*Parus bicolor*): one by the alpha male of an 8-bird flock, and the other by the top-ranked female of a 10-bird flock. My other two interspecific records were directed at a White-breasted Nuthatch (*Sitta carolinensis*), performed by an alpha male of a 10-bird flock, and at a House Finch (*Carpodacus mexicanus*), given by the top-ranked female in a 12-bird flock. All four displayers were adult chickadees.

The other 7 records all involve one chickadee giving this display to another, higher-ranked member of its flock (Table 1). All of the displayers were low-ranked birds, so it is not surprising that they were also all yearlings (that is, in their first winter). The average rank disparity for these intraspecific displays was 5.86 positions (range: 3-11; Table 1). Clearly single wing-flicks are elicited most frequently when a chickadee is stimulated to approach or remain close to another, much higher-ranked individual.

Although I did not record the outcome of these displays, my impression is that most, and likely all, resulted in the displayer succeeding in obtaining a piece of food before retreating. None of the 11 displayers was attacked by the object of their display.

This display may be most common during the winter. Cold conditions and relatively low food levels may make for conditions in which subordinate birds are more likely to risk approaching rich food sources such as feeders even in the presence of more dominant individuals. However, single wing-flicks also have been performed by chickadees when predator models are placed close to their nests (Clemmons and Lambrechts 1992).

A number of other parids have somewhat similar displays involving the wings, but in each case, both wings are spread simultaneously. For example, both Great Tits (*Parus major*) and Blue Tits (*P. caeruleus*) may move both wings in aggressive encounters, where the displaying bird is more "agitated" than its attacker (Hinde 1952). It is not immediately clear from the descriptions whether or not such wing movements are simply the relatively prolonged wing quivering that is so prevalent in ordinary aggressive encounters (Smith 1973; Lambrechts et al. 1993) or the quicker movements usually described as wing flicks. However, the Carolina Chickadee (*P. carolinensis*) has a display termed the "wing flick" by Smith (1972); here both wings are very rapidly lifted over the back. This may

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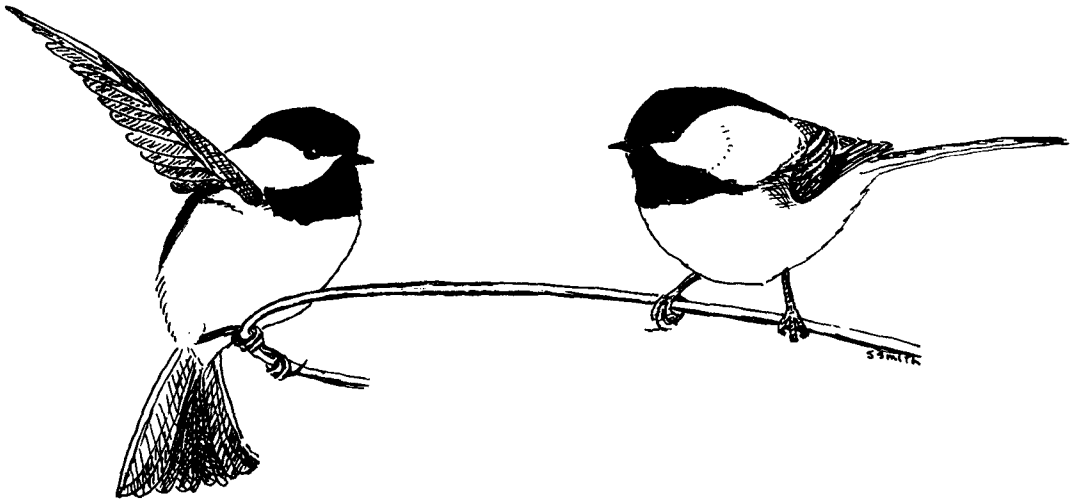


FIGURE 1. The single wing-flick (left). The displayer faces its rival, then flashes out its wing very quickly, before immediately folding it again. Based on a photograph by the author.

be repeated several times in a row, with the flicks at least one or more seconds apart. S. T. Smith (1972) stated that in Carolina Chickadees, this display, like the wing-flicks of Great and Blue Tits, is typically given by birds experiencing a fairly high level of uncertainty. Thus, Carolina Chickadees give wing flicks when making hesitant approaches to a feeder or to another, perhaps higher-ranked bird.

In my recent book on Black-capped Chickadees (Smith 1991), I wrote that Black-capped Chickadees had a rarely-given wing-flick display that, like that of Carolina Chickadees, involved both wings at once. My statement was based on a paper by Brewer (1961), which suggested that this was the case. However, since no other report exists of double wing-flicks by Black-capped Chickadees, it may be that what Brewer actually saw was, in fact, single wing-flicks.

The single wing-flick of Black-capped Chickadees may be analogous to the double wing-flicks given by Carolina Chickadees, and perhaps also Great Tits and Blue Tits. Certainly the context is similar; these displays are all given when a bird suddenly finds itself driven to approach or remain in close proximity to a

larger or higher-ranking individual. The signaler is constrained, perhaps by hunger, not to retreat immediately, but rather to stand its ground long enough to be able to snatch a piece of food. Perhaps the flick of the wing momentarily increases the apparent size of the chickadee, thus helping to prevent, or at least delay, attack. Thus the single wing flick is, if not outright manipulative, at least persuasive, in that the results of the display are to the advantage or benefit of the sender (Maynard Smith 1979, Hinde 1981, Krebs and Dawkins 1984).

LITERATURE CITED

- BREWER, R. 1961. Comparative notes on the life history of the Carolina Chickadee. *Wilson Bull.* 73: 348–373.
- CLEMMONS, J. R. 1995a. Development of a selective response to an adult vocalization in nestling Black-capped Chickadees. *Behaviour* 132:1–20.
- CLEMMONS, J. R. 1995b. Vocalizations and other stimuli that elicit gaping in nestling Black-capped Chickadees (*Parus atricapillus*). *Auk* 112:603–612.

TABLE 1. Records of intraspecific single wing-flash displays in Black-capped Chickadee flocks.

Object of display	Displayer				Rank difference between displayer and object
	Sex	Age	Rank	Flock size	
Top-ranked male	male	yearling	4	8	#4 to #1: 3
Top-ranked male	male	yearling	4	10	#4 to #1: 3
Top-ranked male	male	yearling	6	12	#6 to #1: 5
Top-ranked female	female	yearling	12	12	#12 to #7: 5
Second-ranked male	female	yearling	8	8	#8 to #2: 6
Second-ranked male	female	yearling	10	10	#10 to #2: 8
Top-ranked male	female	yearling	12	14	#12 to #1: 11
					Average: 5.86

- CLEMMONS, J. R., AND M. M. LAMBRECHTS. 1992. The waving display and other nest site anti-predator behavior of the Black-capped Chickadee. *Wilson Bull.* 104:749-756.
- FICKEN, M. S., AND J. W. POPP. 1992. Syntactical organization of the Gargle vocalization of the Black-capped Chickadee, *Parus atricapillus*. *Ethology* 91: 156-168.
- FICKEN, M. S., R. W. FICKEN, AND S. R. WITKIN. 1978. Vocal repertoire of the Black-capped Chickadee. *Auk* 95:34-48.
- HAILMAN, J. P., M. S. FICKEN, AND R. W. FICKEN. 1987. Constraints on the structure of combinatorial "chick-a-dee" calls. *Ethology* 75:62-80.
- HINDE, R. A. 1952. The behaviour of the Great Tit (*Parus major*) and some other related species. *Behaviour Suppl.* 2:1-201.
- HINDE, R. A. 1981. Animal signals: ethological and games theory approaches are not incompatible. *Anim. Behav.* 29:535-542.
- HORN, A. G., M. L. LEONARD, L. RATCLIFFE, S. A. SHACKLETON, AND R. G. WEISMAN. 1992. Frequency variation in songs of Black-capped Chickadees (*Parus atricapillus*). *Auk* 109:847-852.
- KREBS, J. R., AND R. DAWKINS. 1984. Animal signals: mind reading and manipulation, p. 380-402. *In* J. R. Krebs and N. B. Davies [eds.], *Behavioural ecology: an evolutionary approach*. Sinauer, Sunderland, MA.
- KROODSMA, D. E., D. J. ALBANO, P. W. HOULIHAN, AND J. A. WELLS. 1995. Song development by Black-capped Chickadees (*Parus atricapillus*) and Carolina Chickadees (*P. carolinensis*). *Auk* 112: 29-43.
- LAMBRECHTS, M. M., J. R. CLEMMONS, AND J. P. HAILMAN. 1993. Wing quivering of Black-capped Chickadees with nestlings: invitation or appeasement? *Anim. Behav.* 46:397-399.
- MAYNARD SMITH, J. 1979. Game theory and the evolution of behavior. *Proc. R. Soc. Lond. B* 205:475-488.
- ODUM, E. P. 1942. The annual cycle of the Black-capped Chickadee—3. *Auk* 59:499-531.
- OTTER, K., AND L. RATCLIFFE. 1993. Changes in singing behavior of male Black-capped Chickadees (*Parus atricapillus*) following mate removal. *Behav. Ecol. Sociobiol.* 33:409-414.
- PIASKOWSKI, V. D., C. M. WEISE, AND M. S. FICKEN. 1991. The body ruffling display of the Black-capped Chickadee. *Wilson Bull.* 103:426-434.
- POPP, J. W., M. S. FICKEN, AND C. M. WEISE. 1990. How are agonistic encounters among Black-capped Chickadees resolved? *Anim. Behav.* 39:980-986.
- SHACKLETON, S. A., AND L. RATCLIFFE. 1993. Development of song in hand-reared Black-capped Chickadees. *Wilson Bull.* 105:637-644.
- SHACKLETON, S. A., AND L. RATCLIFFE. 1994. Matched and counter-singing signals escalation of aggression in Black-capped Chickadees. *Ethology* 97:310-316.
- SMITH, S. M. 1973. An aggressive display and related behavior in the Loggerhead Shrike. *Auk* 90:287-298.
- SMITH, S. M. 1991. *The Black-capped Chickadee: behavioral ecology and natural history*. Comstock Publishing, Cornell Univ. Press, Ithaca, NY.
- SMITH, S. T. 1972. Communication and other social behavior in *Parus carolinensis*. *Publ. Nuttall Ornithol. Club*, No. 11.