

In different species offspring demand food from their parents through an array of movements and vocalizations known as 'begging behaviour'. Our study explores sex differences in the begging behaviour of a brood parasite, the common cuckoo (*Cuculus canorus*), fostered by the great reed warbler (*Acrocephalus arundinaceus*). As adult male cuckoos are larger than adult females, we predicted that male parasitic chicks would vocalize more than females. We predicted that the frequency of pecking ('pecks' were described as 'attacks' by Khayutin et al. 1980) towards a host parent would be higher in males than females. We also expected a higher frequency of pecking in older chicks than in younger ones.

Our study confirmed that there are no sex- nor age differences in the common cuckoo chick's vocal begging signals. However, we found that older chicks tended to deliver more pecks towards their hosts and that chicks with lower body weight spent more time producing host-absent begging calls. Our study suggests that due to the lack of competition among nest-mates, there may be no sex-specific differences in the begging behaviour of the common cuckoo chicks. The pecking behaviour in older chicks could be a strategy for getting more food from hosts without increasing host-present begging vocalisation.

I think everything is excellent, especially the way you ordered the sentences. I have made only few insignificant changes.

Is There a Sex-Specific Difference Between Parasitic Chicks in Begging Behavior?

KEYWORDS: Begging vocalization; cuckoo; *Cuculus canorus*; host-absent begging; pecking.

Introduction

Begging is the main form of communication between parents and their offspring (Anderson et al., 2010; Dreiss et al., 2013; Velando et al., 2013). Through begging, chicks convey their requirements to the parents, and the parents adjust the intensity of their care according to chick demand and availability of resources. Although begging is beneficial to chick fitness (Smith and Montgomerie, 1991), some studies have indicated its negative effects in increased nest conspicuousness and the subsequent higher probability of nest predation (Cotton et al., 1996; Haff and Magrath, 2011). Increased begging also becomes costly for the chicks or parents when chick demands are higher than

parents are willing to provide (Godfray, 1995). Both experimental and empirical studies have demonstrated that offspring have the ability to adjust their begging behavior in accordance **with their capacity to withhold resources** (Roulin et al., 2009). In asynchronously hatching species, chicks are able to regulate their begging intensity according to the number of siblings and their size and/or begging intensity (Rivers, 2007).

Another important factor that can affect the amount of food delivered by the parents is offspring sex. Studies on the allocation of food by parents confirm that males usually get greater attention than females (Moreno-Rueda et al., 2009), possibly due to the higher intensity of their calls (Saino et al., 2003). Parental care could also be based on nestling size, with the larger (usually male) chick getting a greater portion of parental investment (Saino et al., 2008; Bonisoli-Alquati et al., 2011) despite having equal or lower begging intensity compared to its smaller siblings.

Competitive abilities dictated by the sex or **age** of the nestlings can emerge from a continuous effect of asynchronous hatching or from distinct allocation of resources over different time frames (Cotton et al., 1999; Uller, 2006). This imbalance in competition may cause smaller chicks to beg more often as they are more prone (due to size disadvantage) to obtain less food (Kim et al., 2011). Therefore, success in competition may depend on the chick's sex, hatching order, and the gender of its competitors. Male and female chicks can also differ in their sensitivity to rearing conditions (Lindström, 1999). In the scramble competition, bigger and older (usually male) chicks are expected to benefit from size-related benefits (Uller, 2006); on the other hand, they are more susceptible to changes in weather conditions (Nager et al., 2000).

All these cases refer to the situation in which several related chicks are raised together in one nest. However, about 1% of birds (Rothstein, 1990) are known to adopt brood parasitism as a reproductive strategy. The common cuckoo *Cuculus canorus* (hereafter cuckoo) is an evictor parasite whose chicks are raised alone in host nests. The majority of studies on this topic have focused on the chicks' abilities to mimic host begging signals (e.g. Davies et al., 1998; Kilner et al., 1999), or on host

provisioning rates to the parasitic nestlings (e.g. Brooke and Davies, 1989). However, the possible effect of the sex of parasitic young on its begging behavior and food acquisition has never been considered. Studies dealing with sex differences in food demands in other host-brood parasite systems are rare – there is only one study which showed that brown-headed cowbird (*Molothrus ater*) males beg more than females and consequently achieve higher weights (Hauber and Ramsey, 2003).

The aim of this study was to test sex-specific differences in the begging behavior of cuckoo chicks raised by the great reed warbler (*Acrocephalus arundinaceus*), the main host species in our study area. There are sex-specific mass differences in the adult parasitic cuckoos, with males growing larger than females by 83% (Krüger et al. 2007). This scenario created adequate conditions for testing for potential differences in begging behavior between the sexes of the parasitic chicks. We expected to find that parasitic chick males, which in adulthood are bigger than females, beg more intensely than females. A number of studies demonstrated that, due to a higher level of testosterone, male chicks are more aggressive and have higher advantages when competing for food than their female siblings (Collis and Borgia, 1992; Quillfeldt et al., 2006; Noguera et al., 2013). Alternatively, because there is no sibling rivalry between cuckoo and host chicks after the eviction of nest-mates, there is a

This was good, although the beginning will need to be organized somewhat more. The text seems to take a while to make a point. Good use of references.

Be careful with linking expressions – they do help very well to maintain flow in a text but can be sometimes overused

All texts were converted to:

Times New Roman, pt. 12, justified, double spaced, US English, with titles and captions capitalized and in bold.

Of course each journal has its own requirements and authors/editors should check this, but I made them consistent for a typical journal requirements.

possibility that male and female parasites would not differ in their begging.

