

# Effects of bill pigmentation and UV reflectance during territory establishment in blackbirds



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## Introduction

Many diurnal birds are known to be sensitive to ultraviolet (UV) light. Because UV vision and sexually selected traits are so prevalent in birds, there has been increasing interest in the function(s) that UV vision might serve. The existing UV literature has focused on inter-sexual interactions even though UV-based signals may also play an important role in intra sexual encounters.

Blackbirds (*Turdus merula*) defend well-defined territories and form long term pair bonds. Blackbirds show marked sexual dimorphism: adult males have black, and females brown, plumage. In addition, bills are yellow to bright orange in males and brown to dark brown in females. Male bill pigmentation varies considerably within a population and is the only conspicuous sexually selected trait.



Fig. 1 Adult male, female and juvenile blackbird (from Heather and Robertson 1996)

## Questions

- Does ultraviolet reflectance from the bill influence territorial interactions of blackbirds?
- Does bill pigmentation influence territorial interactions of blackbirds?

## Methods

- We examined the responses of male blackbirds to bill pigmentation and UV reflectance during territory establishment (May - August, Southern Hemisphere) when male-male competition is intense.
- We presented stuffed male blackbird models with brown (first year male), yellow or orange bills, with (+UV) and without (-UV) UV reflectance on 33 territories (Fig. 2 and 3).
- Clear nail enamel was applied to the bill of each model to eliminate UV reflectance without altering reflectance in the visible wavelengths.
- We measured the response of the blackbird territory owners by comparing approach distance and display intensity directed at the model intruder.



Fig. 2 Example of a stuffed blackbird model

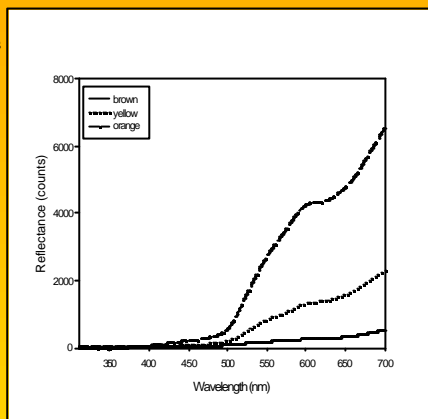


Fig. 3 Reflectance measured at 15 ms for brown, yellow and orange bills of models used in the experiment

## Results

### Does ultraviolet reflectance from the bill influence the territorial interactions of blackbirds?

#### Males

**NO:** There were no significant differences between resident male responses (approach distance and intensity of aggressive display) towards model intruders with and without UV reflectance (Fig. 4).

#### Females

**YES:** In 44% of presentations, females also responded to the intruder models (unexpected response). Females spent more time >10m from models without UV than with UV (Fig. 4).

### Does bill pigmentation influence territorial interactions of blackbirds?

#### Males

**YES:** Resident males spent more time >10m from models with brown bills than from models with yellow or orange bills and a greater proportion of time >2m from orange billed models than from yellow-billed models (Fig. 4). Resident males also displayed more quickly (but not more aggressively) to models presented with orange bills than to models presented with yellow bills.

#### Females

**NO:** There was no significant difference between female approach distance to models with brown, yellow or orange bills. No females were observed directing aggressive displays towards the model intruders.

## Conclusions

UV reflectance from a blackbird's bill did not appear to be important during male-male interactions.

Resident male blackbirds might have identified the brown-billed models as subordinate birds posing little threat to territory defence and therefore did not approach closely during presentations.

Orange and yellow bill colour in male blackbirds is probably produced by the deposition of carotenoid-based pigments. Orange-billed models might have been perceived as higher quality individuals and thus as a greater threat to male territory ownership than yellow billed intruders (Fig. 5).

Females appeared unaffected by the pigmentation of the models bill while showing some degree of responsiveness to UV reflectance.

Male and female blackbirds may be attentive to different properties of bill appearance, at least during the period of territory establishment

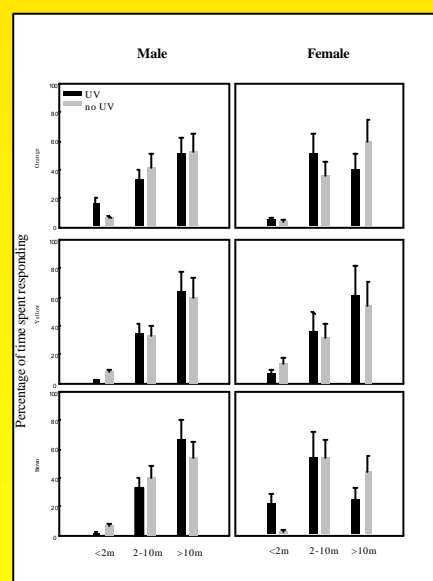


Fig. 4 Percentage of time spent by males and females at each distance category and for each type of model presented



Fig. 5 Adult male in an aggressive posture

Reference:

Heather, B.; Robertson, H. 1996. The field guide to the birds of New Zealand Viking New Zealand