

# CUCKOO FORGERY

## THROUGH A BIRD'S EYE



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Photo: GETTY

- Common cuckoos, *Cuculus canorus*, lay eggs in the nests of other species, leaving all parental care to these hosts.
- Different races of cuckoo selectively target specific hosts.
- Cuckoo eggs often match the colour and pattern of host eggs, which reduces risk of detection and rejection.
- Most studies of egg mimicry rely on human assessments, which fail to account for avian vision.
- We used models of bird vision to quantify egg pattern and colour mimicry in the common cuckoo.



Cuckoo

Host

PHOTOS: M.C. STODDARD  
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### How well do cuckoo eggs match host eggs, from a host bird's point of view?

#### COLOUR

- Birds have four single colour cones in their retina. Humans only have three.
- The additional cone in birds is sensitive to ultraviolet wavelengths.
- Birds can see a wider range of colours than humans can.

##### METHODS

We mapped egg background colours in avian tetrahedral colour space, in which each vertex represents one of the four colour cone-types (Figure 1).

To measure how well each cuckoo race matched its specific host, we compared egg background colour distributions in avian colour space (Figure 2).

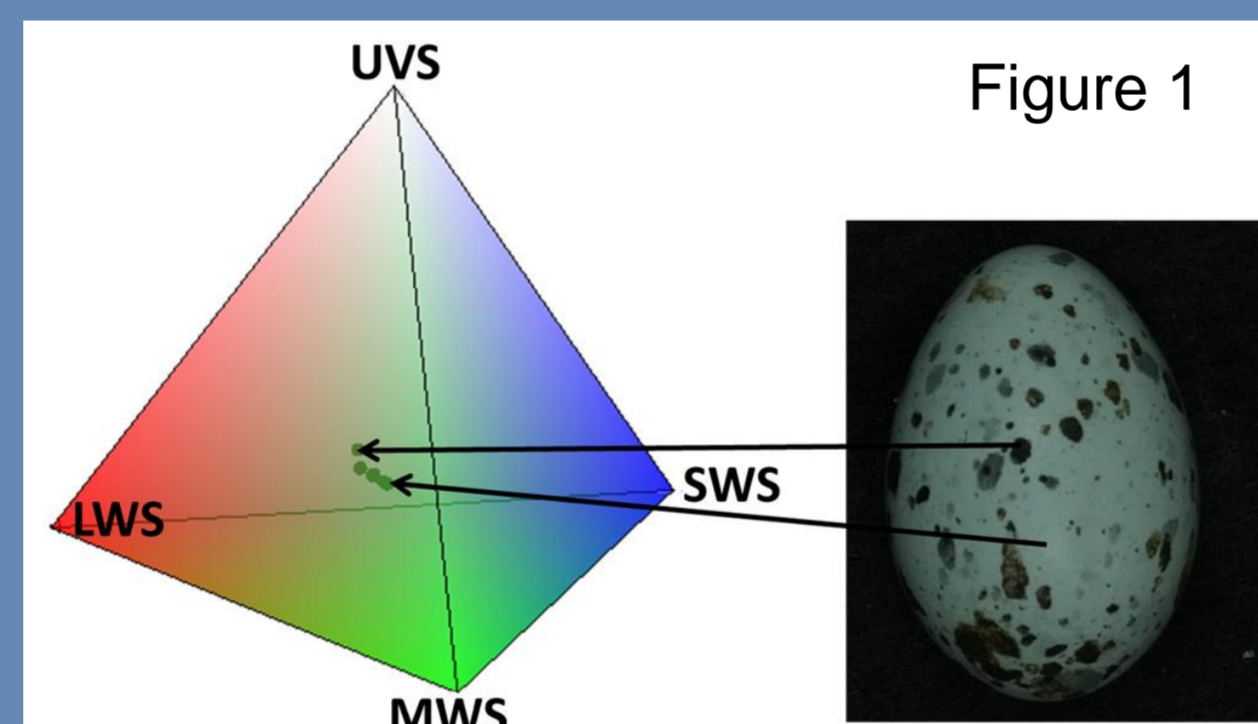


Figure 1

##### RESULTS

Some cuckoo distributions (red) prominently overlap those of their hosts (blue), while others remain isolated in colour space (Figure 2).

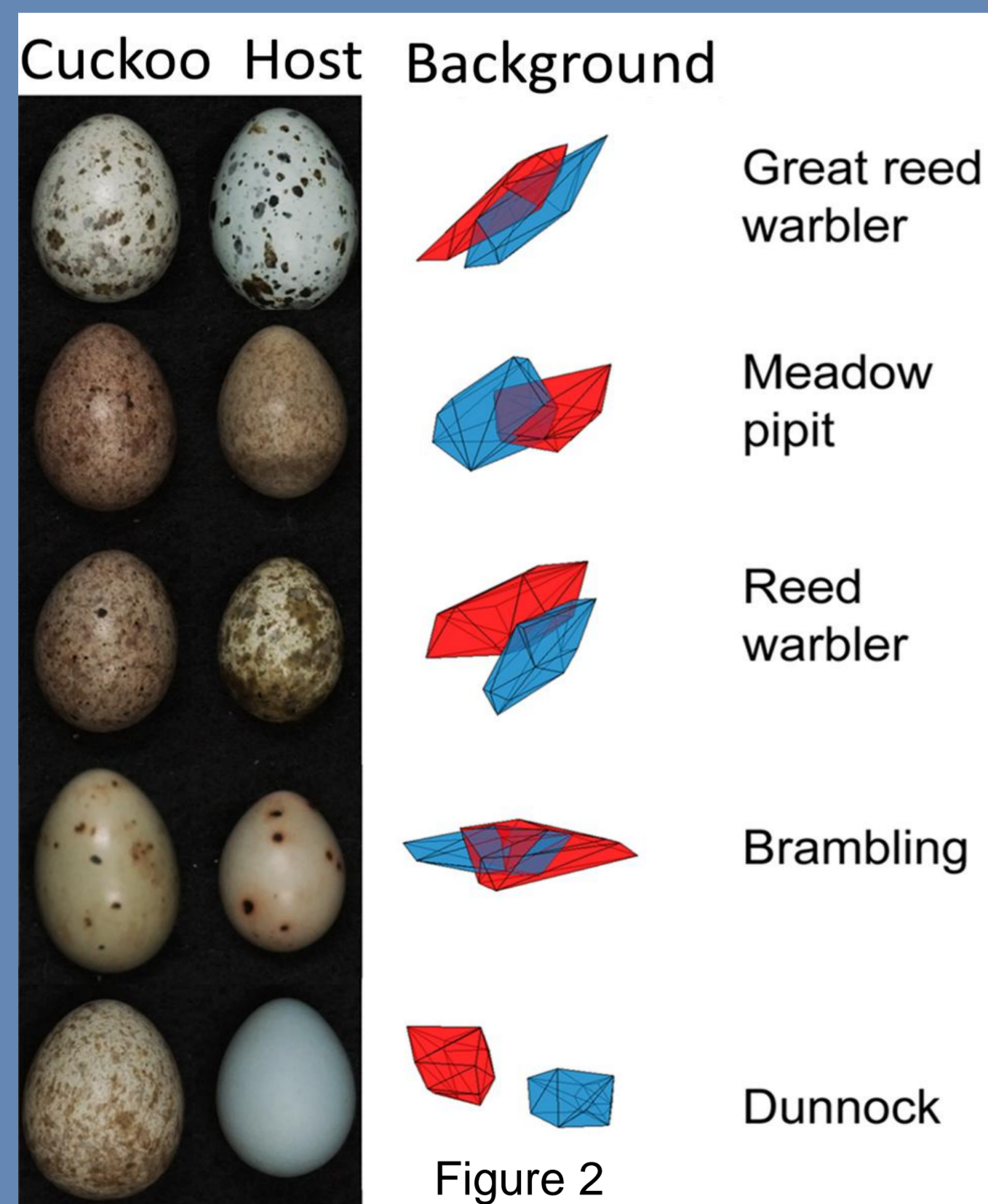


Figure 2

##### CONCLUSIONS

- Cuckoo and host background colours increasingly overlap as hosts exhibit stronger rejection (Figure 3).
- Cuckoo colour mimicry is better for hosts that are good at picking out the odd egg.

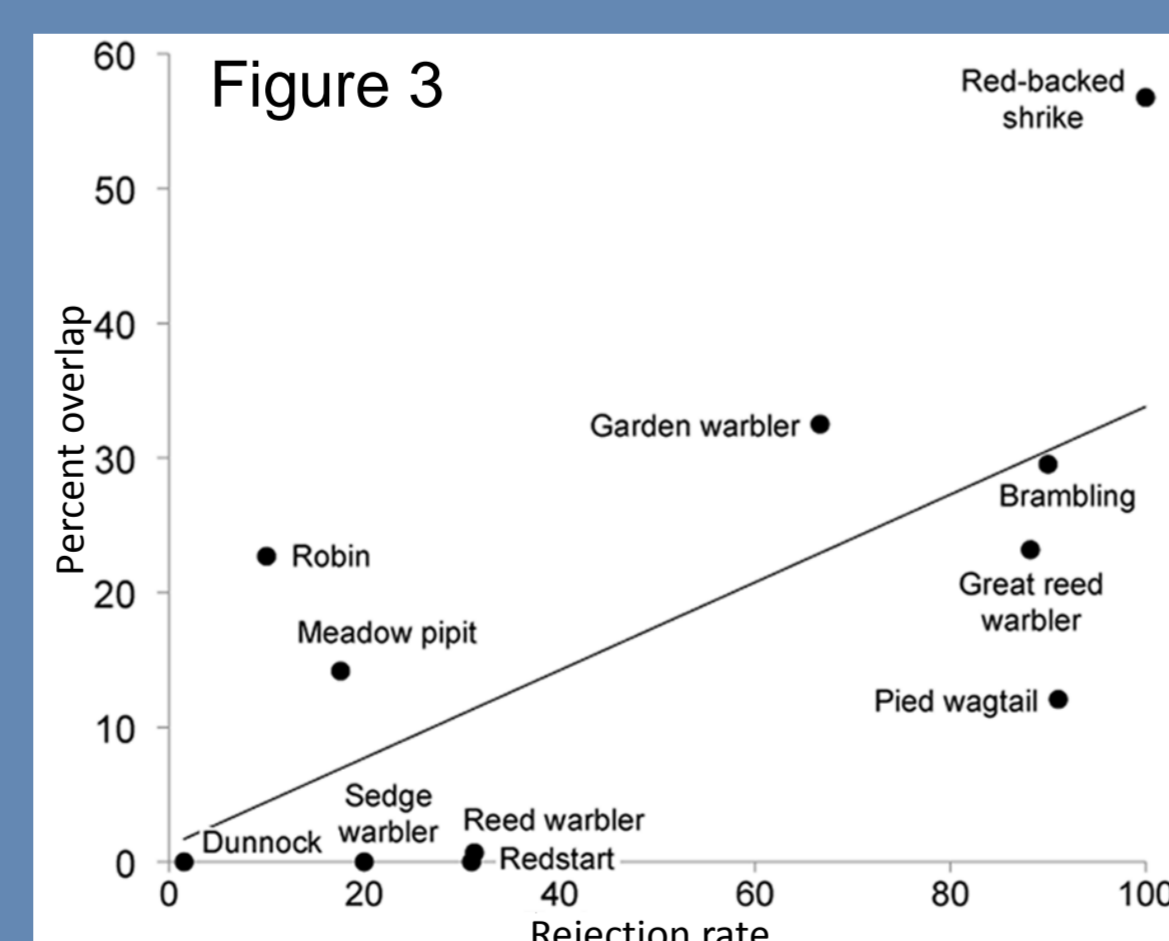


Figure 3

#### PATTERN

- Birds also have double cones, which function in pattern and texture discrimination.

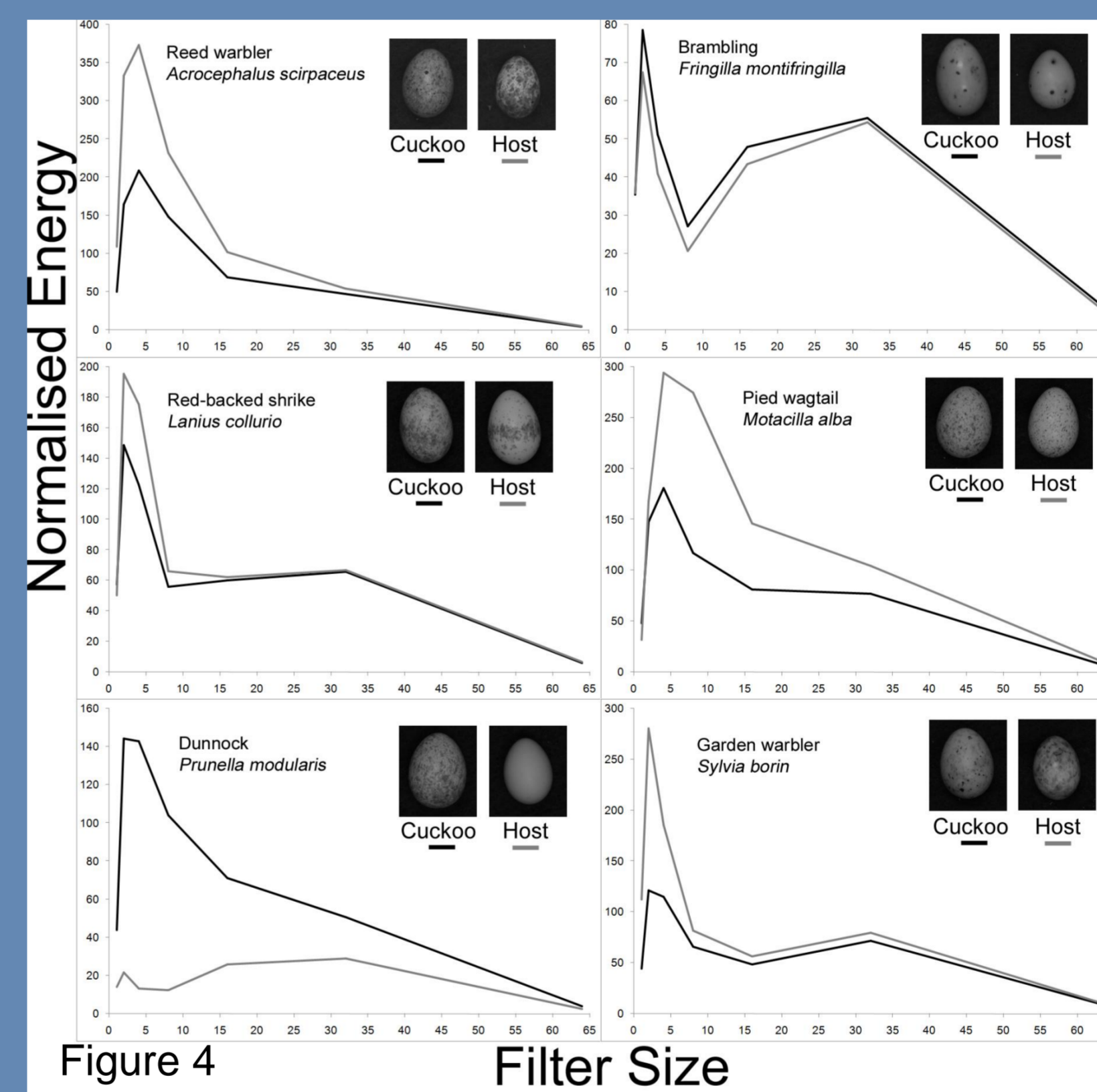


Figure 4

##### RESULTS

The pattern profiles show varying degrees of match between cuckoo and host eggs. There is a nearly identical match in some instances (e.g. brambling) but no match in others (e.g. dunnock) (Figure 4).

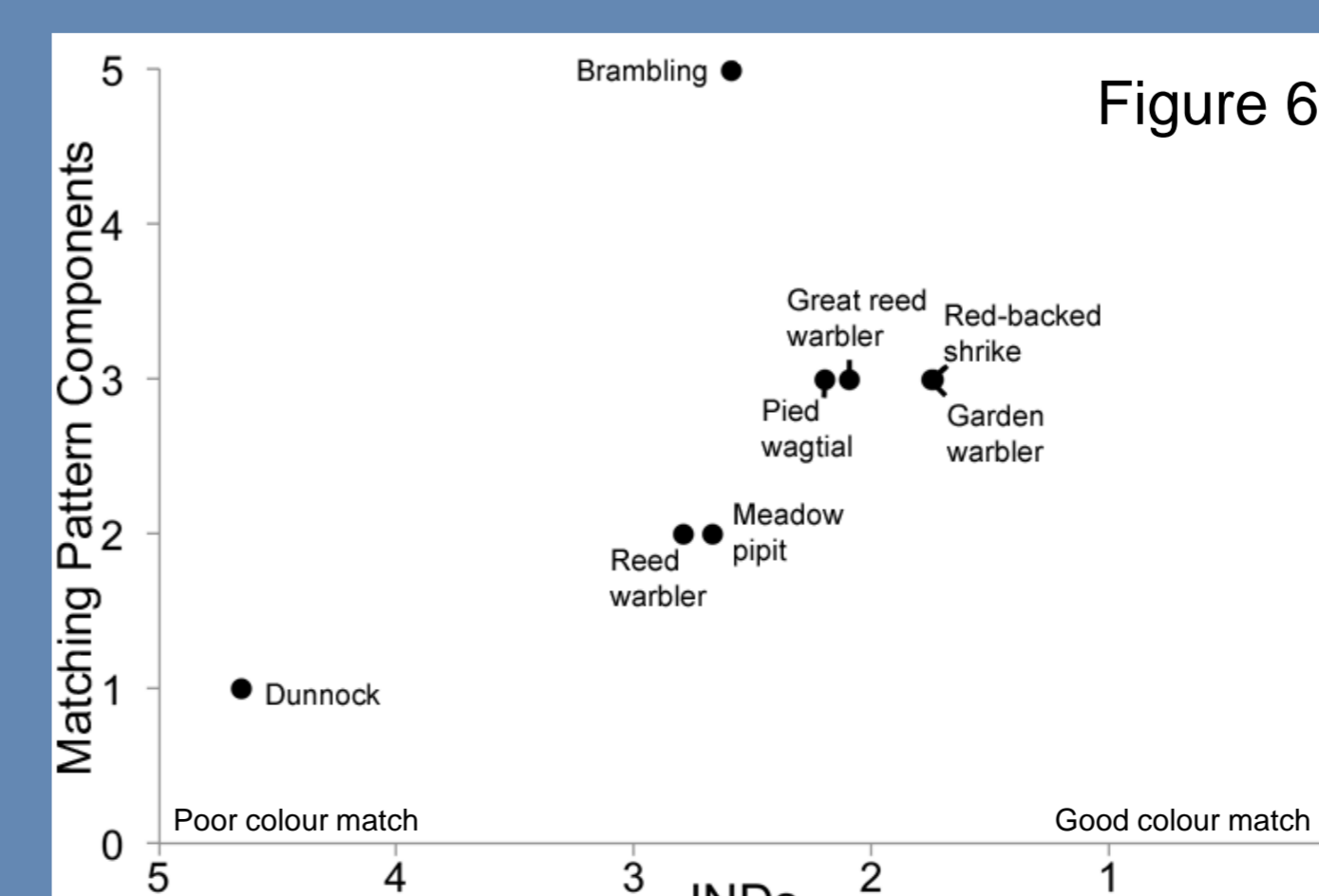


Figure 6

##### METHODS

We used digital image analysis and modelling of avian double cones (luminance vision) to quantify pattern mimicry (Figure 4).

We used Fast Fourier Transform analysis to calculate a range of pattern attributes, including marking size, diversity in size, contrast, coverage, and dispersion.

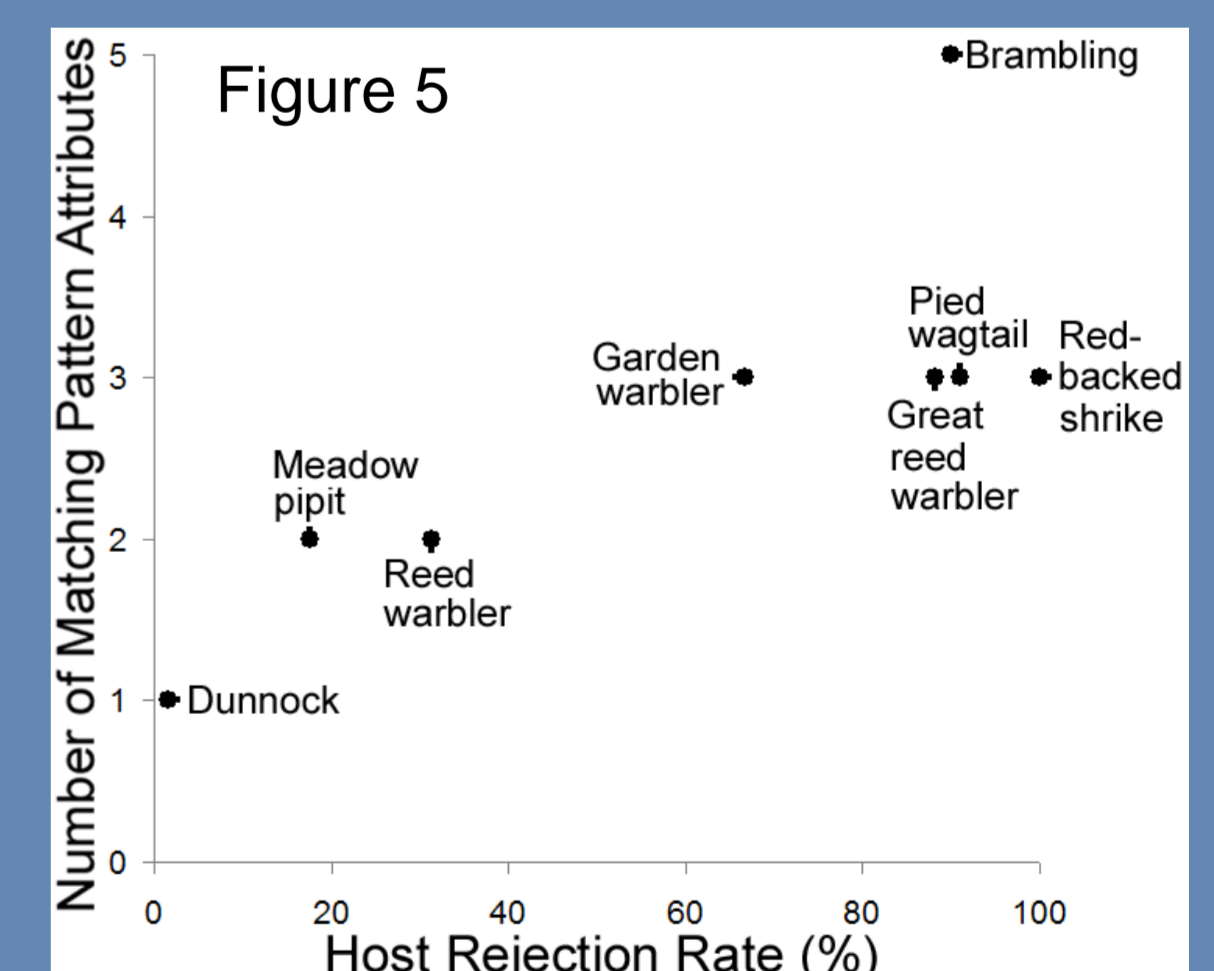


Figure 5

##### CONCLUSIONS

- Cuckoos have evolved better pattern mimicry for host species that show stronger egg rejection (Figure 5).
- Cuckoos that have evolved the best colour mimicry also have the best pattern mimicry (Figure 6).

There is more than meets the human eye:  
cuckoo egg mimicry is more complex than we previously thought.