Combined measures of mimetic fidelity explain imperfect mimicry in a brood parasite-host system.

Electronic supplementary information

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Calculating areas of scribbles and blotches

To confirm that cuckoo finch eggs painted with scribbles and blotches had approximately the same area of markings added to them, we used ImageJ to estimate the areas of these added markings on scaled egg images (scaled to 29 px/mm, as described in main text). The mean ±SD scribble treatment area per egg (n = 7) was 6.12 ±0.37 mm^2, and the mean ±SD blotches treatment area per egg (n = 7) was 5.98 ±0.20 mm^2. These areas were not significantly different from each other ($t_{9.1}$ = 0.92, P = 0.38). Therefore, the added area for the scribble and the blotch treatment was approximately the same.

Testing whether painted scribbles and blotches have a similar colour to prinia egg markings

We tested whether the artificial markings that we added to cuckoo finch eggs were similar in colour to prinia markings, according to avian visual models. We used almost identical methods to [1]. We took photographs, each with a prinia egg and an artificially-marked cuckoo finch egg, along with a 40% Spectralon grey standard (Labsphere, Congleton, UK), using a Nikon D7000 camera with a quartz conversion (Advanced Camera Series, Norfolk, UK) with a Micro-Nikkor 105 mm lens. Images

were taken from about 50 cm, in a dark room. For each pair of eggs, a human-visible image was taken using a Baader UV-IR blocking filter (Baader Planetarium, Mammendorf, Germany; transmitting 420–680nm), and a UV image was taken using a Baader UV pass filter (transmitting 320–380nm). The ISO was set at 400 and aperture at f13. Shutter speed was varied to control exposure.

We selected regions of interest (ROIs) as small dark regions of scribble and blotch markings on prinia eggs, and small regions of painted scribbles or blotches on cuckoo finch eggs. We extracted raw pixel values from the visible and UV images using the MICA toolbox in ImageJ [2], and converted these to cone-catch values based on the blue tit (*Cyanistes caeruleus*) visual system. These cone-catch values were used to calculate just noticeable differences (JNDs) between true prinia markings and artificial cuckoo finch markings, again based on the blue tit visual system, using the R package *Pavo* [3].

The mean ±SD JND between prinia markings and painted cuckoo finch markings (n=4 pairs of eggs) was 1.37 ±0.58. JNDs of less than 1 are predicted to be indiscriminable, with JNDs greater than 3 predicted to be discriminable [4,5]. Thus, the colour of added scribbles and blotches to cuckoo finch eggs was almost indistinguishable from that of naturally occurring scribbles and blotches in prinias.

Coefficients of traits included in the FDA

Trait	Coefficient
First principal component of colour traits	20%
Second principal component of colour traits	-18%
Marking Size	-3%
Variation in marking size	-19%
Pattern contrast	10%
Total pattern coverage	4%
Extent to which pattern is dispersed between blunt and narrow poles of egg	-22%
First principal component of traits extracted from NPM	-6%
Second principal component of traits extracted from NPM	18%
ΣEuler	-36%
$\Sigma(P^2/A)$	50%

Table S1. the coefficients of the traits included in the FDA. A higher absolute value of a coefficient indicates that the corresponding trait is more informative for distinguishing prinia and cuckoo finch eggs. Positive coefficients indicate that prinias have larger values for that trait than do cuckoo finches; negative values indicate that cuckoo finches have larger values than prinias. See main text for explanation of traits and how they were extracted.

References

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