



# Recognition & discrimination of prey by great tits (*Parus major*).

Zuzana Karlíková, Petr Veselý, Roman Fuchs

University of South Bohemia in České Budějovice,  
Branišovská 31, 37005 České Budějovice,  
Czech Republic



Unpalatable insect usually advertise its unprofitability to potential predators using visual and chemical cues. Optical signal doesn't consist of the aposematic component only. It also encompasses the typical body shape (Kauppinen & Mappes 2003; Nelson et al. 2006). The question is if bird predators are able to discriminate between palatable and unpalatable prey on the basis of these other optical components. And if they are, do they recognize it at the first sight or do they have to learn the difference?

Contact e-mails: karlikova.zuzka@seznam.cz; karliz00@prf.jcu.cz Web: www.cke.cz

## Methods

- 30 wild-caught adult great tits (*Parus major* L.)
  - 10 birds – preferential type of experiment
  - 10 birds – alternating type of experiment (cockroach first)
  - 10 birds – alternating type of experiment (firebug first)
- Prey carrying paper sticker with cockroach photo (Fig. 1)
  - edible – cockroach (*Blattica dubia*)
  - inedible prey – firebug (*Pyrhocoris apterus*)
- 14 presentations (each lasting 3 minutes)
- 2 sessions (A and B after a week)
- Attacking and killing observed
- Influence of particular parameters on prey attacking – GLM, logit link function, binomial data
  - Explanatory parameters
    - Type of experiment
    - Session A or B (1. or 2. week)
    - Presentation (1. – 14.)
    - Prey (cockroach or bug)
  - Particular comparisons – HSD Tukey post hoc test
  - Differences in terms of one session – logarithmic regression



Fig. 1 Prey: cockroach and bug.

## Results

When prey was presented simultaneously birds attacked it fewer than when presented alternately (Tukey HSD; alternating experiment, cockroach first vs. preferential:  $p < 0,001$ ; alternating experiment, bug first vs. preferential:  $p < 0,001$ ). Differences in rates of attacking between the first and the second session were significant (Tukey HSD; prey more attacked in the second week:  $p = 0,002$ ), though attacking rate in the first compared with the second week was significantly different just in case of edible prey (Tukey HSD; cockroaches more attacked in the second week:  $p < 0,001$ ; different rate of attacking bugs in different weeks:  $p = 1$ ). Cockroaches were attacked significantly more than bugs in all types of experiments (Tukey HSD;  $p < 0,001$ ; preference of edible prey in the first week:  $p < 0,001$ ; preference of edible prey in the second week:  $p < 0,001$ ). Significant effect of learning was proved just in case of cockroaches except the first session of preferential type of experiment (Fig. 2 – 4).

| FACTOR                          | Df | F      | P       |
|---------------------------------|----|--------|---------|
| Type of experiment              | 2  | 19,552 | <<0,001 |
| Session (week)                  | 1  | 10,209 | 0,001   |
| Presentation                    | 13 | 0,969  | 0,480   |
| Prey                            | 1  | 87,139 | <<0,001 |
| Interaction of session and prey | 1  | 9,424  | 0,002   |

Tab. 1 Factors affecting likelihood of prey attacking.

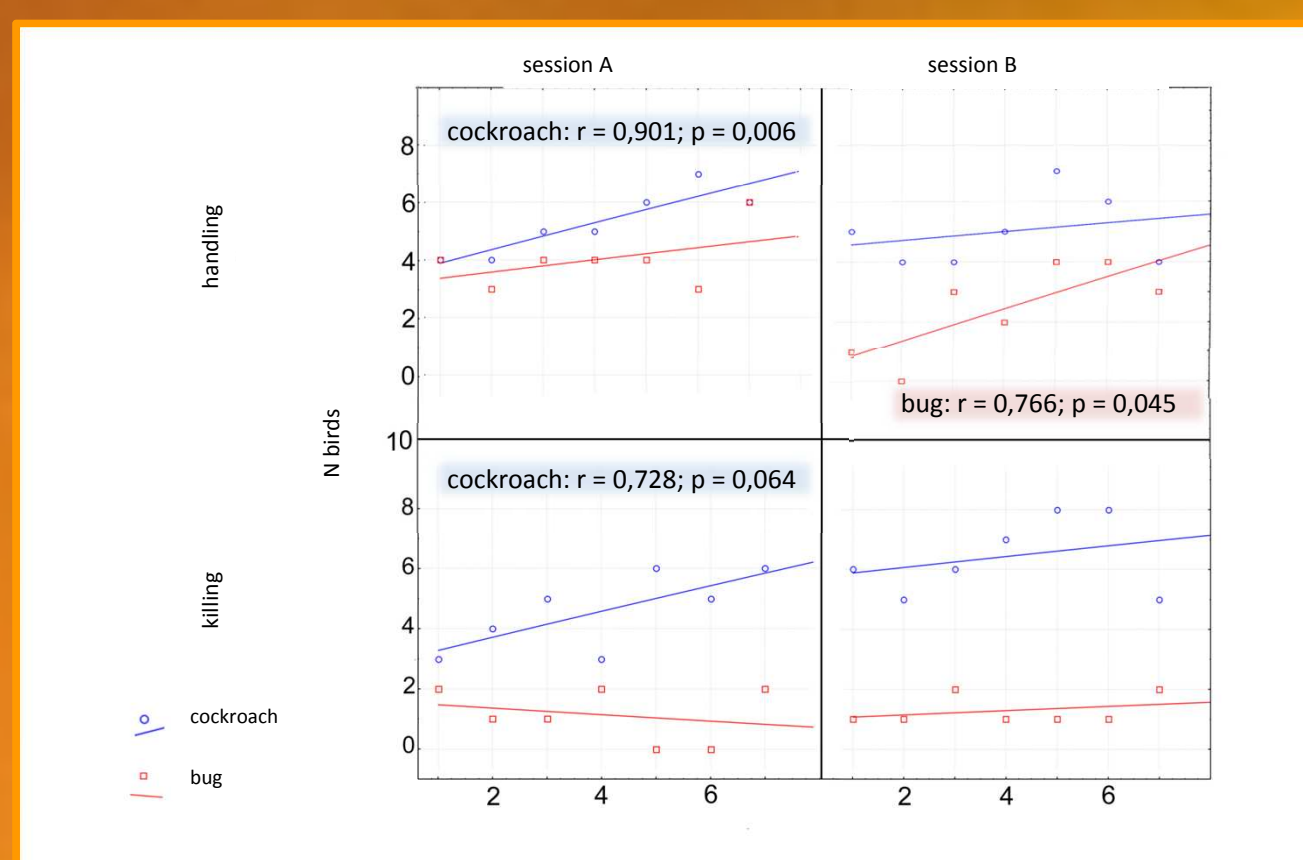


Fig. 3 Alternating type of prey presentation, cockroach first.

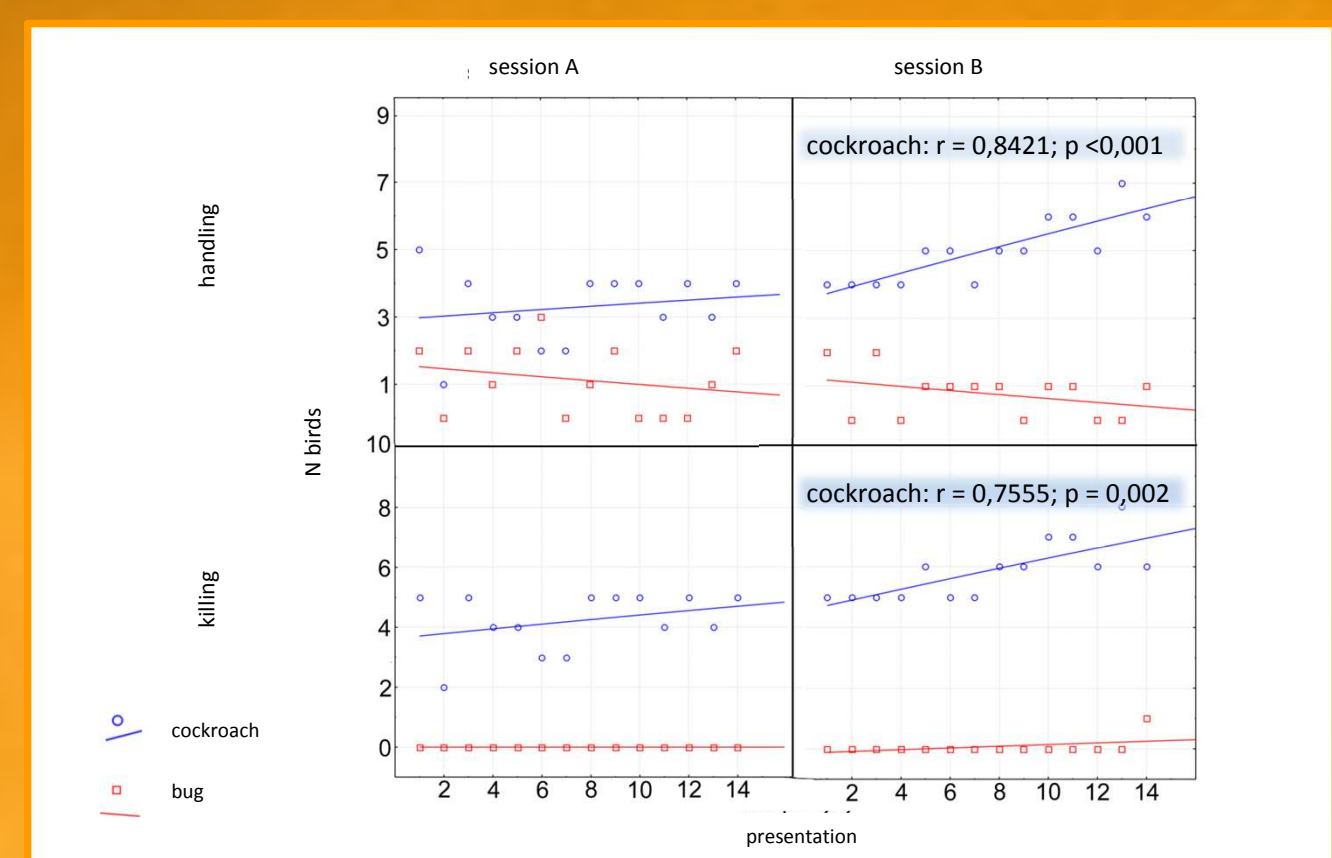


Fig. 2 Preferential type of prey presentation.

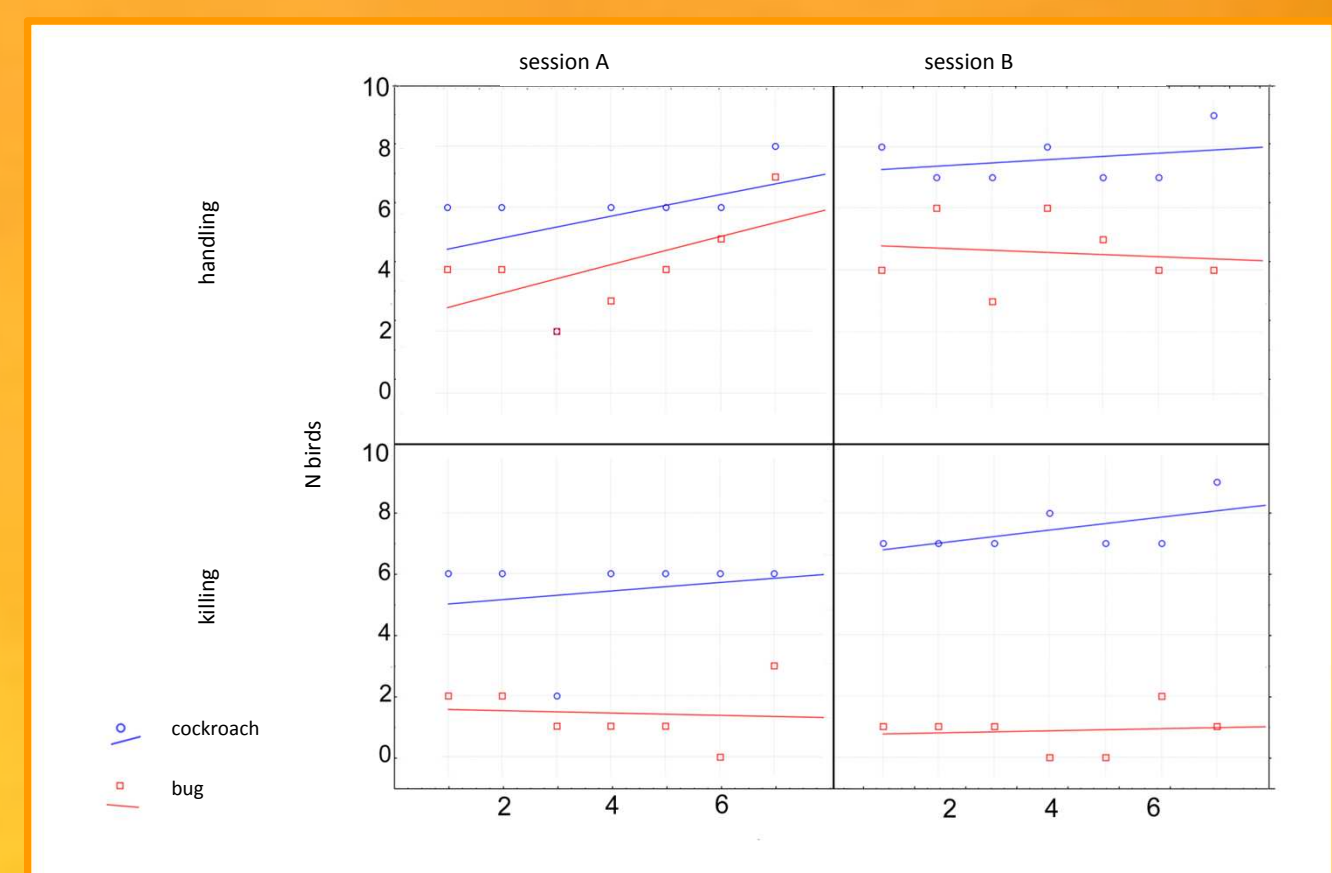


Fig. 4 Alternating type of prey presentation, bug first.

- Tits discriminated edible and inedible prey safely
- Birds attacked prey more carefully when it was presented preferentially than alternately
- Learning process was recorded during 14 presentations more in case of edible prey
- After a week birds attacked edible prey in higher rate than inedible prey but only in preferential type of experiment
- **Birds are able to recognize edible and inedible prey despite it has the same colouration – that means that they use other visual cues for prey recognition**
- **However the ability to recognize the prey is getting worse if birds see both these types of prey together**
- **The ability to recognize edible prey improves both during a short time and after a week too**

## REFERENCES:

Kauppinen, J. & Mappes, J. (2003): *Animal Behaviour*, **66**: 505 – 511.  
Nelson, X. J., Jackson, R. R., Li, D., Barrion, A. T. & Edwards, G. B. (2006): *Biological Journal of the Linnean Society*, **88**: 23 – 32.

We thank Academy of Sciences of the Czech Republic (IAA601410803), Grant Agency of the Czech Republic (206/08/H044) and Ministry of Education, Youth and Sports (MSM 6007665801) for financial support.