

UNIVERSIDADE FEDERAL DO PIAUÍ



EDUCAÇÃO
CIÊNCIA
ARTE
INCLUSÃO
SOCIAL

COPESE
COORDENADORIA PERMANENTE DE SELEÇÃO
UNIVERSIDADE FEDERAL DO PIAUÍ

EXAME DE PROFICIÊNCIA DE LEITURA EM LÍNGUA ESTRANGEIRA

DATA: 28/01/2012

HORÁRIO: 8 às 11 HORAS

CADERNO DE PROVA

Idioma:

INGLÊS

Área de Pesquisa:

**(1) CIÊNCIAS BIOLÓGICAS, CIÊNCIAS AGRÁRIAS
E CIÊNCIAS DA SAÚDE**

LEIA ATENTAMENTE AS INSTRUÇÕES

- Esta prova é constituída de um texto técnico-científico em língua estrangeira, seguido de 5 (cinco) questões abertas relativas ao texto apresentado.
- É permitido o uso de dicionário impresso, sendo vedados troca ou empréstimo durante a realização do Exame.
- As respostas deverão ser redigidas em português e transcritas para a **Folha de Respostas** utilizando caneta esferográfica, **tinta preta** ou **azul, escrita grossa**.
- A **Folha de Respostas** será o único documento válido para correção, não devendo, portanto, conter rasuras.
- Será eliminado o candidato que identificar-se em outro espaço além daquele reservado na capa da **Folha de Respostas** e/ou redigir as respostas com lápis grafite (ou lapiseira).
- Nenhum candidato poderá entregar o Caderno de Prova e a Folha de Respostas antes de transcorridos 60 minutos do início do Exame.
- Em nenhuma hipótese haverá substituição da **Folha de Respostas**.
- Ao encerrar a prova, o candidato entregará, obrigatoriamente, ao fiscal da sala, o Caderno de Prova e a Folha de Respostas devidamente assinada no espaço reservado para esse fim.

ECOLOGY

The Cost of Fear

Thomas E. Martin

What should parents do when they detect indications of more predators nearby that might eat their babies? This scenario is commonly faced by parents in the wild, and the consequences are important. The number of offspring that organisms produce has a major influence on fitness and, when averaged across a population, affects whether this population will increase or decrease. Offspring production thus has critical implications for evolution via fitness, and ecology and conservation via demography. On page 1398 of this issue, Zanette *et al.* (1) show that the fear of predation can, by itself, strongly affect the number of offspring produced over an annual cycle by song sparrows (see the figure).

Food abundance was long thought to be the main limitation for offspring production in birds (2, 3). However, many

studies of food limitation were based on birds that nest in boxes, where predation is minimized. Predation was thus neglected as a limitation on offspring production (4). Yet, among the much larger diversity of birds that nest in open cups placed on the ground or in vegetation, nest predation is commonly the primary and overwhelming source of nestling mortality (5). The direct effects of nesting mortality from predation can strongly affect offspring production, limit population growth, and influence evolution of species (5–8). However, there may also be indirect effects of predation risk on reproductive output caused by altered behaviors, and these effects may be underestimated across taxa (9).

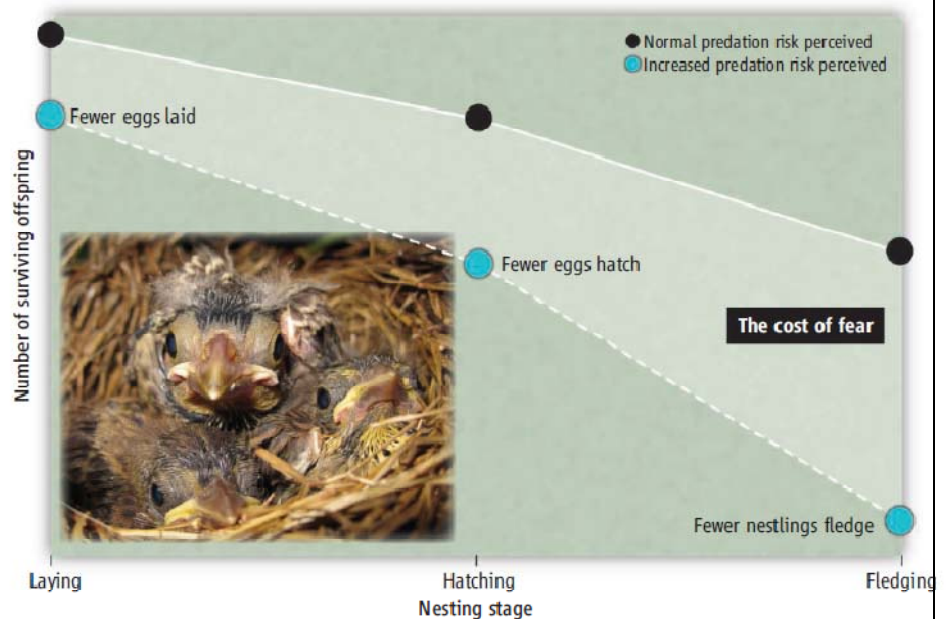
Wild animals can assess at least some predation risks in the environment and adjust behaviors to attempt to reduce those risks, possibly resulting in reduced offspring production (6, 8, 9). However, such indirect effects of perceived predation risk are often entangled with reduced offspring production from poorer environmental quality or direct predation mortality. To disentangle these effects, Zanette *et al.* manipulated vocal cues that can reflect the risk of predation while holding environmental quality constant and eliminating the direct effects of predation mortality using netting and electrical fencing. They could thus unambiguously assess the effects of parental adjustments on offspring production that arise from perception of increased predation risk alone.

Whether nesting birds can assess risk in their environment may depend on the types of predators. In habitats where predators are diverse and difficult to detect, parents do not adjust offspring production in response to differences in risk (10). In many other habitats and species of birds, however, nest predators can be vocal and visible, and birds adjust behaviors that can affect offspring production (8). This is the situation explored by Zanette *et al.*, who used playback of predator sounds to simulate increased risk of predation for some nesting pairs of song sparrows. In a control experiment, the authors exposed other pairs of song sparrows to playback of nonpredator sounds. The results show that parents assessed predation risk and adjusted their behaviors in ways that reduced offspring production (see the figure).

The demographic consequences of adjusting behaviors in response to perceived predation risk arise in two ways. First, parents can reduce the number of offspring they attempt to raise by reducing clutch size (the number of eggs produced) (6, 8). Some recent experimental and correlative studies have found such effects, but other experiments found that not all species reduce clutch size in the face of increased risk (6, 8). Zanette *et al.* do observe reduced clutch sizes in their predator playback experiment (see the figure).

Second, perception of increased risk can cause behavioral shifts of parents: It can affect choice of habitat for nesting sites (5), incubation behaviors (8), and the rates at which parents visit the nest to feed nestlings (8, 11).

Song sparrows produce fewer offspring when they perceive a higher predation risk, even in the absence of actual predation.



Perceived risk. In Zanette *et al.*'s study, the total number of offspring produced over the season at nests of Song Sparrows decreased across the nesting cycle when there was a higher perceived risk of predation, even though actual predation on nests was eliminated. This effect results from both clutch size reduction and altered parent behaviors that cause increased death of offspring. (Inset) Nest of song sparrows (*Melospiza melodia*).

Zanette *et al.* found that song sparrows modified all of these behaviors in response to greater perceived predation risk. Females spent less time on the nest keeping eggs warm, which can compromise development of the embryo (12, 13) and caused reduced hatching success. Adjustments in nest site selection may have magnified these temperature effects, because parents selected denser habitat, which can provide a less suitable microclimate (5, 14). The authors also observed that parents reduced feeding rates of nestlings, confirming previous findings (8, 11). Mortality of nestlings as a result of these combined effects dramatically reduced the number of offspring that successfully left the nest (fledging) (see the figure).

Such strong cumulative loss of offspring across the nesting season due to shifting parental behaviors has not been clearly documented previously. The degree of attrition may vary among species and habitats. Nonetheless, the dramatic effects of perception of risk on offspring production are striking and important in demonstrating that the demographic effects of predation may be strongly underestimated based on direct predation mortality alone.

Increased risk can reflect an increased probability of predation, but it does not mean that an individual nest actually will be depredated. Parents produce fewer offspring than possible when they adjust their behaviors to reduce risk but predation does not occur. Why do parents incur such costs? Shifting behaviors can reduce the likelihood that predation actually happens (8, 9), and it can allow parents to save energy for enhanced offspring production in the future if the current attempt is lost to predation (8, 15). Still, the reduction in offspring production from behavioral responses to fear of predation is a cost if the current attempt is not lost to predation. This cost needs to be integrated into predation theory.

References and Notes

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16. I thank S. Auer, D. Barton, J. Maron, J. C. Oteyza, and R. Ton for helpful comments. Supported by the U. S. Geological Survey Climate Change Research Program, and the National Science Foundation.

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EM HIPÓTESE ALGUMA SERÁ CONSIDERADA A RESPOSTA NESTE CADERNO

Observando a coesão e a coerência textuais, responda às questões de acordo com o texto **The Cost of Fear**.

QUESTÃO 01 - Explique a escolha do título de acordo com o gráfico e os elementos nele apresentados.

QUESTÃO 02 - O argumento de que a abundância de alimentos seria o principal fator de influência na produção de descendentes dos pássaros está sendo contestado pelo autor da pesquisa em função de outro argumento. Explique esta afirmação e apresente este novo argumento e os efeitos diretos e indiretos da causa apresentada para a alteração na geração de descendentes.

QUESTÃO 03 - Com base nas informações contidas nos parágrafos 3 e 4, indique os procedimentos da pesquisa realizada por Zanette e seus colegas.

QUESTÃO 04 – Descreva as três mudanças/ajustes de comportamento parental, em resposta à percepção do risco de predadores, observadas pelos pesquisadores.

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QUESTÃO 05 - Na conclusão, o autor afirma que uma crescente possibilidade da existência de predadores indica um aumento de risco, mas não necessariamente a depredação de um ninho. Sendo assim, quais as explicações encontradas para os pais se sujeitarem aos custos mencionados ao longo do texto?
