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FROM THE NEWSLETTER EDITOR

So, a whole year with COVID restrictions, and one year since we took the unprecendented decision to postpone the ISBE Congress until 2022. It has been a strange year indeed, with many of us working from home, teaching online and with many cancelled trips to colleagues and field sites. Among the things I miss the most is meeting students and going to conferences.

One positive side effect is that I've found a little more time to read. Normally, I struggle to make any dent in the half metre stack of books-to-read on my bedside table, but the COVID way of life has helped a little bit. And judging from the interest to contribute book reviews, this may be a trend among ISBE members. I would like to thank all contributors to this issue, especially the book reviewers. If you are struggling to find the time to read a new text book: why not sign up for a book review? It may provide that extra little push you need. So please check out the books-for-review list on page 13. You may of course suggest any other book that you think is relevant to your fellow behavioural ecologists.

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www.isbe2022.com

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CONTRIBUTIONS TO THE NEWSLETTER

Your contribution is important!

The ISBE Newsletter publishes Book Reviews, Conference/Workshop Reviews, Job postings and other advertisements, as well as Commentary Articles of interest to the International Society for Behavioral Ecology. The ISBE Newsletter will only consider work that is not already published or intended to be submitted for publication elsewhere.

Book Reviews: Persons involved in the publishing of books who would like these to be considered for review in the Newsletter should contact the editor so that they can be added in the books-for-review list. Authors may submit a list of possible reviewers. Members who wish to review a particular book should contact the editor. The editor will provide reviewers with instructions. Reviews are typically 1500-2000 words. For a list of books currently available for review, see the end of this Newsletter.

Workshop/Conference Reviews: Workshop and/or Conference reviews can be prepared in one of the following formats: *Brief synopses* (around 1500 words) and *Longer reports* (around 3000 words). Graduate students and postdocs are strongly encouraged to consider contributing to writing these reports.

Cartoons: Cartoonists and other artists are encouraged to submit artwork, either in hardcopy, or as TIFF or high resolution (>300 dpi) gif or jpg files. All cartoons published in the Newsletter will be credited to the illustrator.

Spotlight on young scientists: Early career members (PhDs/ postdocs) are encouraged to participate in the section "Spotlight on"; please provide name, education, current address, research interests and selected papers in an email to the editor.

Upcoming conferences and events: Please submit information about events that are relevant to the Society. Do this by emailing the Newsletter
editor so that it can be included in the "Conference calendar"

> **The deadline for contributions to the next issue is Sep 30, 2021**

This is my first time of writing in the newsletter since taking over from Andrew Cockburn as President of ISBE in August 2020, so I'd like to begin by thanking Andrew for the huge of amount of work that he has done for Society throughout his career, and especially during his tenure as President. It's a difficult act to follow!

I'm sure you will all remember that the start of 2020, Bob Wong and his colleagues in Melbourne, Australia were on track to deliver a superb conference for us all. But soon after registration closed, the pandemic intervened to deprive of us of all that – and much else too of course. So we missed our usual opportunity to gather as a society, to discuss and reflect, to support and encourage our younger members, and to laugh and enjoy each other's company. The Executive took the decision to postpone the Melbourne meeting until September 2022, and now we must watch and wait to see how exactly those plans will unfold.

Bob, and his local organizing committee in Melbourne, have been tireless in their efforts to plan their way through this crisis, in a safe and cost-effective way for us all. They continue to work closely with their professional conference organiser and are exploring a range of options to ensure that they are able to deliver an effective, safe, and inclusive conference for the Society. On the plus side, Australia has managed Covid-19 far better than many other countries, with very few cases. The whole academic community has had to adapt in a variety of ways to ensure effective engagement and communication of our research and interaction with our peers and this kind of flexible thinking will be employed in planning the ISBE conference in 2022. We will of course keep you updated as those plans develop, and the conference Twitter account @ISBE2022 is the ideal way to keep up to speed. The dates for your diary are 11-16 September.

Although we were deprived of the chance to meet in person in 2020, the Executive met online instead, in a meeting that spanned more time-zones than there were participants: it was 10 pm for the Australians when the meeting began, but 5 am for those in California. One point to note from those discussion is that ISBE will be looking for a new Treasurer, to start in post from September 2022. Trish Schwagmeyer has worked magnificently for us all in this role and will oversee the transition as she passes this mantle on. The Society's accounts are held in the US and so, for practical purposes alone, it would be simplest if the Society's next Treasurer was a US resident too. If this is a role you are interested in taking on, please let me know and contact Trish for further details about the work involved.

The pandemic has brought tough times for us all, but one silver lining is the opportunities it has presented for new ways of working, communicating and staying connected. I hope we can be imaginative and creative as a Society in embracing some of these new opportunities as we plan our work in the years ahead, so that we have the capacity to rapidly and flexibly adapt to changing circumstances, and can find new ways of diversifying and strengthening the community of researchers working in behavioral ecology. If you have ideas for how the Society can develop opportunities for working more effectively in these different ways, please do let me know.

I spent last weekend in the company of Sidnie Manton, distinguished British zoologist, former member of my Department and relentless optimist. Immersed in a new volume of her diaries and letters, I travelled with her by boat to Australia, for research the Great Barrier Reef. We left in December 1928 and were home again in time for tea the following September. Travelling in my mind's eye is the only way I can see the world at the moment, and meet other people. I cannot wait for the chance to travel to Australia in person, to see its amazing natural history again for myself, and to gather with you all at our next conference.

Rebecca Kilner
ISBE President

The conference circuit remains in a state of turmoil, due to COVID-19. Many meetings have been cancelled, others are postponed or have moved online. Please check the conferences' web sites for up-to-date information

The European Human Behaviour and Evolution Association conference
March 24-27, 2021, online   https://ehbea2021.com/

British Ornithology Union Annual Conference
March 30-April 1, 2021, Nottingham UK. BOU Annual Conference: Restoring bird populations
www.bou.org.uk/bou-conferences/

ASAB Easter Virtual
April 14-16 2021 Univeristy of Bristol, UK (online)
Aimed at research students and early career researchers. www.asabvirtual.org/

ASAB Interdisciplinary Workshop
Impacts of Human-Generated Sounds on Wild & Captive Animals
April 21-23 2021 Venue: Virtual (online)
www.asab.org/conferences-events

Human Behavior & Evolution Society
June 2–5, 2021 in Palm Springs, CA, USA
 http://www.hbes.com/conference/

The Evolution conference (ASN/SSB/SSE) virtual
June 21 - 25, 2021   www.evolutionmeetings.org/

International Society for Human Ethology
July 5-9 2021. Virtual conference http://ishe.org/

Ecological and Evolutionary Ethology of Fishes
July 12-14 2021, Berkeley USA
https://nature.berkeley.edu/eeef2021

International Society for Applied Ethology
Aug 2-6, 2021, in Bangalore, India
https://www.applied-ethology.org/Events.html

Animal Behaviour Society conference ABS2021
Aug 3-6, 2021 Virtual
www.animalbehaviorsociety.org/2021

European Society for Evolutionary Biology (ESEB)
August 22–27, 2021 in Prague, Czech Republic.
https://www.eseb2021.cz/

ISWE Virtual Event
August 16-17 2021. Glucocorticoids in wildlife.
www.iswe-endo.org/virtual-event/   See also page 5.

American Ornithological Society conference
Aug 23 - 28, London, Ontario, Canada.
https://americanornithology.org/meetings/

European Ornithologists' Union Conference
Sep 2021, University of Giessen, Germany
https://eounion.org/about/giessen-2021

International Society for Applied Ethology (ISAE) Congress www.applied-ethology.org/Events.html
6-10 September, 2021. Republic of North Macedonia

9th Internat. Conference of Poeciliid Biologists
Sep 15-17, 2021, Wageningen, the Netherlands
www.wur.nl/en/activity/9th-International-Conference-of-Poeciliid-Biologists.htm

World Owl Conference
Sep 20 - 24, 2021. The World Owl Conference will be held in Onalaska/La Crosse, Wisconsin, USA.
www.internationalowlcenter.org/futureconferences

15th Pan-African Ornithological Congress
Nov 15-19 2021. Elephant Hills Conference Centre Victoria Falls, Zimbabwe
www.paoc15.org

Society for the Study of Evolution meeting
June 24-28, 2022 in Cleveland, OH, USA
(ASN/SSB/SSE)   www.evolutionsociety.org/

International Society for Human Ethology
July 4-8 2022. Liverpool, UK http://ishe.org/

International Society for Applied Ethology
Aug 2022, in the Republic of North Macedonia
www.applied-ethology.org/Events.html

International Ornithologists' Union (IOU)
Aug 14-20, 2022. Durban, South Africa The 2022 conference will be a hybrid conference encouraging virtual presentations and attendance,
https://iocongress2022.com/

ISBE 2022
September 11-16, 2022. International Society for Behavioural Ecology conference in Melbourne, Australia,
www.isbe2022.com/

ISBE 2020 ABSTRACT PRIZES

One of the sad things about the cancellation of the Congress in Melbourne last year was contemplating all the hard and excellent work that people had put into the Abstracts that they submitted in order to qualify for the Travel Grants to attend the conference. The quality of the Abstracts left us all feeling that the future of behavioral ecology is in good hands.

The Executive Council has looked at the Abstracts and decided to award the Abstracts that impressed us most a small cash prize.

Congratulations and wishing you all the best in your studies, and commiserations to the authors of the many excellent Abstracts that missed out. We believe we have the correct addresses for the winners, and will be sending the prizes out soon, but if you have not heard from us by 2 April 2021 could you please contact our Treasurer, Trish Schwagmeyer (plsch@ou.edu)

With very best wishes

Andrew Cockburn, Past President

The winners were:

Rebecca Boulton
Liisa Hämäläinen
Nora Carlson
Rose O'Dea
Cedric Pascal van den Berg
Beniamino Tuliozi
Revathe Thillaikumar
Louise Alissa de Morais
Evangeline Rose
Raphaël Royauté
Xin Tong
Mauricio Neves Cantor Magnani
Camille Le Roy
Jose Trujillo
Brian Whyte
Pietro D'Amelio
Jacqueline Sahm
Lea Pollack
Lorenzo Arduini
Shun Satoh
Joanna Clarke
Catheline Yasmin-Magali Froehlich
Marcelo Araya Salas
Erika Estefania Paez Vargas

ISWE VIRTUAL CONFERENCE

Game Theory in Biology: Concepts and Frontiers

John M. McNamara and Olof Leimar
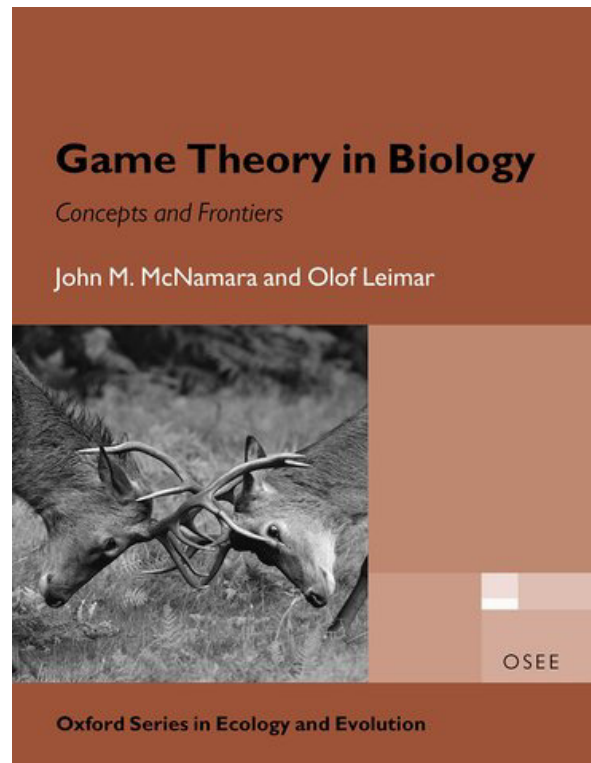
Rethinking the origins of biological games

Evolutionary game theory connects multiple disciplines, ranging from economics and mathematics to theoretical ecology and population dynamics. Over the decades, the biological questions at the core of evolutionary game theory have moved beyond their origins in evolutionary ecology and became truly interdisciplinary. Fields such as cultural evolution, animal behaviour, population genetics, psychology, and neuroscience with the latest inclusion of machine learning and artificial intelligence, have all touched upon issues related to evolutionary games. The book by McNamara and Leimar chronicles game theory's evolution in biology keeping pace with these developments, reviewing the past and chalking out a future of game theory in biology.

Since the topic's breadth is massive, to condense the essence of the concepts, the authors acknowledge the assumptions being made upfront. Dynamics are sacrificed for equilibrium results and phenotypic effects prioritised over their genetic determinants. Going through concepts and definitions being used in this book from the start helps the reader expect what is to come. The readership is assumed to be evolutionary biologists and behavioural ecologists, and one can nicely follow the intermingling of the ideas as one progresses through the chapters.

What games in biology are…

The first three chapters set the stage for the book, defining the core concepts and highlighting their use in the so-far standard examples of game theory in biology. From simple animal contests, fighting over resources to their more complicated versions of state-dependent decision-making in resource acquisition, the authors discuss these problems in their classical settings. The issues are then rephrased in the context of behavioural ecology. Explicit inclusion of decision making, learning strategies, behavioural plasticity and further complications build upon the classical scenarios. The authors provide a resolution to the complications while simultaneously provoking the reader to question the solution's assumptions, strategically moving the book forward.

The exposition of parental investment games illustrates the authors' strategy: In chapter 3 a game between parents deciding on their investment in an offspring is introduced. In its classical formulation, this problem reduces to deriving the Nash equilibrium. But the authors go much further than that and pose a problem about the one parent's responsiveness to the lethargy (or overeagerness) in caring by the other parent. Such notions of bargaining, negotiations and situational learning are the processes that can enhance the reasoning mechanisms (supported by experimental studies e.g. Iserbyt *et al.* 2019). The resolution of this line of thinking is provided further in chapter 8. The slow build at questioning the established notions — that the authors just introduced — follows a route similar to teaching in physics, where classical models that are now superseded still form the basis of teaching and understanding.

Numerous such examples are taken from evolutionary biology about behaviour and cast them explicitly in the light of processes studied in detail in behavioural ecology and psychology. Typically books on game theory do involve a disproportionately large focus on the popular problem of cooperation and the sociobiological aspect of the issue. This book blends the famous social evolution concept into ecological and behavioural examples with smooth transitions where variation allows for riskiness, leading to signalling further cascading into reputation building and indirect reciprocity, one of the mechanisms for the evolution of cooperation.

…and what they may become.

While the historical perspective is extremely well rooted, the questioning style of the authors induces the reader to stop reading and start thinking more deeply. The book therefore feels like a mix between a textbook and a more personal journey through the

developments of the field in the past decades. The authors do come back to their own criticisms and resolve most of them, but mostly they stimulate the reader to imagine beyond the traditional ways of doing game theory in biology. The exercises, provided at the end of the main chapters, are excellent for practicing the logic presented in the chapters but assume a certain familiarity with the techniques and jargon of the field. A novice especially coming from neighbouring fields of science might find the methodologies contrived to start with. We would recommend some of these exercises (which come with solution proposals, a very laudable development!) to be excellent for a lecture series.

The book builds naturally on publications of McNamara and Leimar and their collaborators (famous as the "Lobster team"), leaders in the field for decades. This allows them to go into details of the impressive breadth of their own work and to provide detailed exposition for their arguments. At the same time, however, this leaves less space to explore some contemporary developments of games in biology by numerous other authors. Stackelberg type of games are described in the textbook, but the connection to the growing body of literature on their use in cancer evolution is not explored (e.g. Staňková et al., 2019). Similarly, the development of stochastic evolutionary game dynamics in the past decades, a very active field in mathematical biology, is not covered in the book - which is understandable from the perspective of Leimar and McNamara . They explicitly state that "the overwhelmingly most productive application of evol-utionary dynamics to game theory has been and still is the study of invasion of a rare mutant into a resident population". So far, this is certainly true and it still remains to be seen if in practical applications such as evolutionary ecology, e.g. the concept of evolutionary stability in finite populations will prove useful in the long run.

The textbook "Game-Theoretical Models in Biology" by Mark Broom and Jan Rychtár is an excellent comparison which encompasses the variety within game theory itself - with expositions connecting game theory and population genetics and discussing the more theoretical development of nonlinear and multiplayer games. These developments are often driven from the theory side and not from the biological application. While "insight precedes application", these developments of course happen in parallel. Some of us aim to focus on the finer details of the mathematical models and sometimes may lose sight of the biology that motivated these models. McNamara and Leimar choose instead to focus on their strong connection to behavioural ecology and presenting challenges for the future of game theory in biology. In this respect, we believe that the ISBE members will find a natural connection and a great introduction to strategic analysis and game theoretic thinking.

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Broom, M., Rychtár, J. 2013. Game-Theoretical Models in Biology. Chapman and Hall/CRC. New York 520 pp.

Iserbyt, A., Griffioen, M., Eens, M., Müller, W. 2019. Enduring rules of care within pairs - how blue tit parents resume provisioning behaviour after experimental disturbance. Scientific Reports 9, 2776.

Staňková, K., Brown, J.S., Dalton, W.S., Gatenby, R.A. 2019. Optimizing Cancer Treatment Using Game Theory. JAMA Oncology 5, 96-103

Biostatistics with R
An Introductory Guide for Field Biologists

Jan Lepš and Petr Šmilauer

An introductory statistics book - is there a need for another one? I would say yes. As a teacher of undergraduate statistics, I am constantly looking for that perfect textbook that does all I want it to. Some books excellently explain statistical theory, others expertly teach you some stats software. In my world, the ideal textbook should explain statistical fundamentals, with biological examples, while teaching the reader the basics of the program R. Is this that book?

But first, why R? I strongly believe students need to learn R, just like they need to learn Excel and Powerpoint. R has risen to become the *Lingua Franca* of biostatistics. In addition, is free, and it is extremely powerful. University IT departments love free software so no problems getting them to install R on the department computers. R being free also means a graduated biologist will not have to ask a future employer to pay for an expensive license. As anyone is allowed to write expansions for R, its complexity and applicability is potentially endless. I therefore tell my students: "R may not be the first statistical software you need to learn, but it will be the last". The downside of R, as you may know, is the steep learning curve. It is in fact a programming language and most students are not used to writing code where "every comma matters". In fact, even many professors shy away from R for this reason. They instead tell their PhD students "Please take that R course, and then teach me some". The second part rarely eventuates. However, the reluctance of more aged academics to learn R is a passing problem. R-savvy students are slowly but surely replacing the retiring R illiterates.

Lepš and Šmilauer's new book appears to be the perfect book for teaching stats to beginners. The sleeve reads: "We will never have a textbook of statistics that satisfies everybody. However, this book may come closest." That sounded promising to me.

The authors have previously written an advanced book on Multivariate analysis. Both are ecologists, which naturally shapes the book, both in its examples, and in their choices of advanced methods in the later chapters. In terms of covering the fundamentals, it does a very good job. I believe that when a student graduates, he/she must know the basics well enough to perform simple tests unaided. How, then, should we define the basics? To me, a minimum includes: *sampling and estimation, descriptive statistics and graphs, confidence intervals, simple experimental design, t-tests, ANOVA, correlation, regression, simple frequency analysis, test assumptions and data transformations*. These topics are covered nicely in the first half of the book. They are not in the exact order I would prefer them to, but that is a matter of taste.
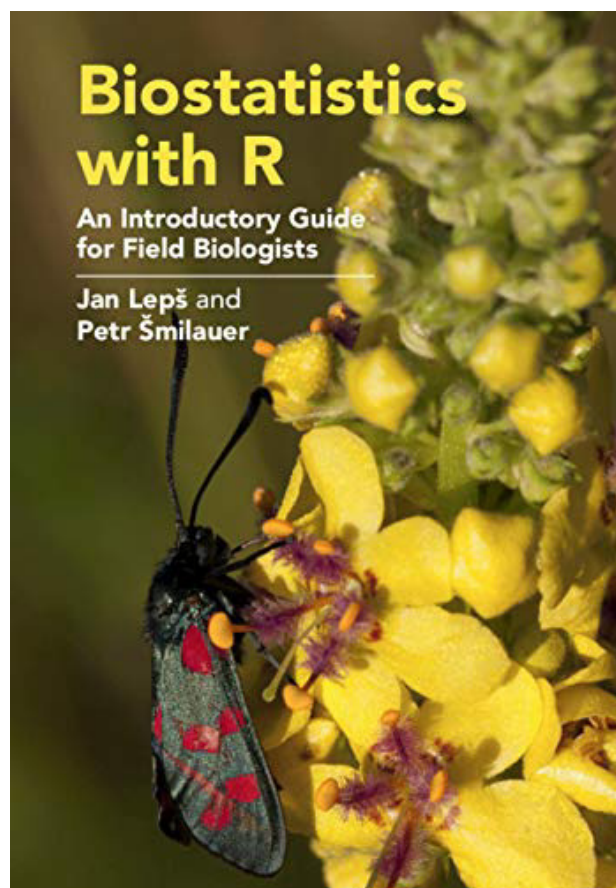
As statistical methods become more complex, they increase in number as well as the space required to describe them. To keep a book under 400 pages will require some hard decisions on what to include and what to omit. In the second, more advanced part, Lepš and Šmilauer have chosen to include *2-way ANOVAs* of different types, a short chapter on *generalized linear models,* as well as *non-linear regression, structural equation models, spatial pattern analyses, classification, regression trees* and *ordination*. Many of these methods need a book of their own to be fully explained, but we are given a good introduction. The selection of advanced methods will probably fit traditional field ecologists better rather than the experimental behavioural ecologist, but given the book's title, this is no real surprise.

What was a surprise, however, was the chapter on *survival analysis*. It will be useful to many researchers in animal behaviour, because it can be applied to "time-to-event data". Behavioural experiments often measure the time until something happens (e.g. courtship, feeding, emerging from cover, solving a task), and this data typically have the problem of some individuals never performing the behaviour within the given time. This creates so called "censored data", and if you have such data, survival analysis is your friend.

There is also a short section on Bayesian statistics, together with some critique of traditional P-value testing. It is very good to see it here. One could argue that it should have been more fleshed out, but neither Bayesian methods nor statistical theory is the primary focus of the book. Many biologists, especially

ecologists, have now embraced Bayesian statisics, and there are several other books on this topic.

Throughout the book, step-by-step R code is presented. One can always have opinions on the best way to write an R script, but overall, the scripts are neat and well explained. The book also has an appendix called "First steps with R software", aimed to get R-newbies started, and on the book's website there is an Excel file with all the data. However, the appendix is less than 20 pages and should ideally have been longer. For example, it would be great with some simple exercises that help the reader to get past the very first hurdles.

Learning to use R can be daunting, especially to first-year students. Some teachers therefore use "R commander" in the first stats modules. This is a point-and-click interface for R that can perform many basic statistical methods and which resembles other menu-driven statistics programs (such as SPSS, Stata and Minitab). It would have been great with an appendix showing how to do the calculations also in R commander (when possible), but I realize this would expand the book considearbly.

Overall, the structure of the book is clear. Sometimes sections show up in somewhat odd places, and I suspect this can be explained by the structure of the lectures that the book seems to be based on. For example, the section about data transformation comes inside a chapter about ANOVA, despite it being relevant to previous chapters. However, the detailed contents and index makes it easy to find the topic you are looking for.

A very nice touch is that each chapter ends with a section called "Reporting analyses: Methods & Results". Here, advice is given on what to include when writing up a report, and this will help many students. The authors also present some scripts for figures and graphs. It would have been nice with a section of how to make publication-quality figures for the inclusion in journal manuscripts, as this is one of the strong points of R.

For many of the tests, the authors discuss the assumptions that are made about the data, how these assumptions can be checked and what to do when they are not fulfilled. They forget this for some of the nonparametric tests, which is unfortunate, because a common misconception among biologists is that such tests lack all assumptions.

The books includes a few questionable advice, such as reporting the tests for the main effects before interpreting the interaction effect in an ANCOVA, or omitting assumption testing in maximum likelihood models. Some of these happen to be my personal pet peeves, so I may be overly sensitive. In general, the statsitical advice are sound and up-to-date. There are some ongoing discussions about the best methods (e.g. to Yate's or not to Yate's a contingency table, or whether assumptions should be tested formally or assessed graphically). Most of us biologist are forced to simply trust the advice from those with better math skills, and we must be open to change our ways if the consensus among "real statisticians" changes. The authors sometimes mention that certain points are being debated, which is great.

When I look at my bookshelf I wonder: how come so many stats books are written by biology teachers? Probably because we all have slightly different ideas of what should be included in a basic text, but also that we prefer examples to come from our own field of science. Also, our teaching styles often reflect how we personally "cracked the code" once upon a time. I suspect all these books come about in pretty much the same way: a teacher thinks "None of the books out there does *exactly* what I want. Perhaps I should just write my own?"

Lepš and Šmilauer have done a great job fitting basic R instruction, introductory statistics, and some advanced methods, into a neat volume. I would definitely recommend it to anyone wanting to learn R, especially if they are ecologists.

Will it fit perfectly with how I teach statistics in my courses in Evolution and Behavioural Ecology? Not quite. Perhaps I just need to write my own.

P. Andreas Svensson
Linnaeus University
Sweden

Essential Ornithology, 2nd ed.

Graham Scott

This textbook aims to be concise yet comprehensive, and it does a lot in seven chapters. (For comparison, another Ornithology textbook that I have at hand uses three times as many chapters and four times as many pages for the same subject.) The chapters vary in how much behavioral ecology they feature. The first two chapters, "Evolution of birds" and "Feathers and flight" are primarily about birds. The next two chapters, "Movement: migration and navigation" and "Eggs, nests, and chicks" mix general principles with specifics from birds, such as how eggs spin down the uterus as the shell is rendered. Chapter 5 "Reproduction" and Chapter 6 "Foraging and Avoiding Predators" feature general principles of behavioral ecology, many of which we have learned while studying birds. The final chapter, "Population, communities, and conservation" is an overview of general problems and potential solutions featuring birds. It wraps up including readers in "those of us who have a love of birds" with the implicit idea that we will work to conserve what we love.

Whether you find this book useful for teaching will depend on whether you think a textbook should be a scaffold be a frame around which the course is built or a buffet from which the course is selected. This book is less than what most instructors assign for a course. (What students actually read is a different matter.) If you are looking for a book that covers everything, this is not your book. This book will help students through the essential core knowledge, and free you up to dazzle students with the wonders of birds and science. I see this book as inviting the instructor to spend a substantial fraction of the course on whatever that instructor finds most exciting.

This book could be very useful as the core of what students read. The text points to "key references" in each section, and students should understand that a textbook is a first rather than a final source for the field. In reading the chapter on Foraging and Avoiding Predators, for example, I appreciated the mix of classic and recent studies mentioned, and I kept thinking of studies that were not mentioned. Unfortunately, including everything I might want would make the chapter decidedly less clear and concise for students and other instructors. If I were to teach using this chapter, I would use it as a jumping off point for talking about my favorite studies, including my own studies. We cannot all rely on textbooks to introduce us by name before revealing to students that we do research, and they can too.
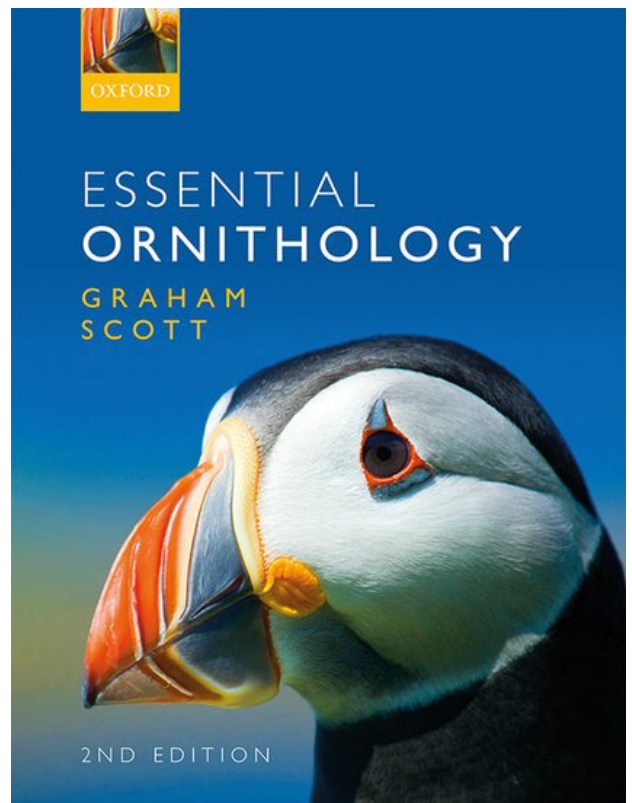
This book is admirably direct and organized in conveying its points. While it uses the words and phrases of academic biology, its careful and caring tone makes it consistently readable. A textbook that students can read is an obvious virtue. A textbook that students can afford is another virtue -- and this book is much less expensive than many textbooks. In principle, a comprehensive textbook could be treasured for life. In practice, the price makes many students rent their books. For ornithology, I wrestle with the notion that students would do better to invest in decent binoculars than in a big book to keep.

My essential review is that this book is very successful in what it sets out to do. The process has brought a question to my mind: Is a field captured by the things all its practitioners know? I feel something must be said for what they also value and try to do. Personally, I wanted to be a behavioral ecologist before I knew much or could do anything in research. As a field, I think behavioral ecology condensed around a way of asking questions, not around an accumulation of answers. The essence of behavioral ecology might be found in asking a handful of behavioral ecologists what used to puzzle them, and what still puzzles them. From this perspective, as we recruit others to be behavioral ecologists we should share that puzzling over fitness value of behavior leads to rigorous, respectable science, and can be a lot of fun.

Peter A. Bednekoff
Eastern Michigan University
Ypsilanti, MI, USA

Perturbation, Behavioural Feedbacks, and Population Dynamics in Social Animals
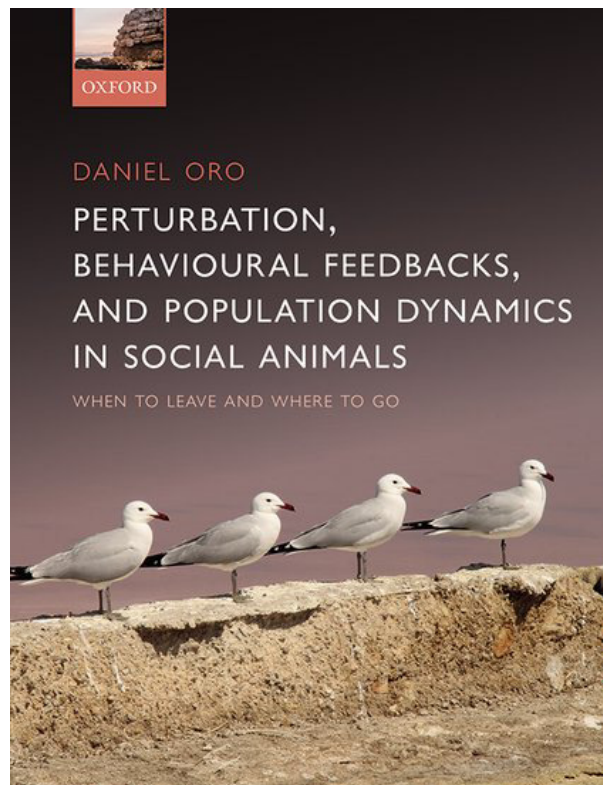## When to leave and where to go

Daniel Oro

Oxford University press, 2020, 176pp
ISBN: 9780198849834

I reviewed Oro's book, predominantly focusing on dispersal, while my own movement was very limited. *When to leave* was immaterial as we did not know when the new restrictive lockdown would end, and *where to go* was limited to the local park or the supermarket for essentials only. Still, the idea of unfettered movement and its fascinating consequences for population dynamics was a welcome distraction.

The book starts with Acknowledgements and a Prologue, including a rumination on an ex-relationship of the author. The book is shot through with personal touches like this which give a strong feeling of the author and their personality, which I enjoyed and means the book rarely feels dry like a textbook. Sandwiched betwixt these sections is a glossary, filled with the entrancing lingo of complexity theory such as "bifurcation", "hypercycles", and "hysteresis". I maintain a small candle for complexity theory (see Fisher & Pruitt, 2019) and so I am always excited when someone is using these ideas to explore and explain problems in ecology and evolution. On this aspect, Oro does not disappoint.

The best chapters for me were 2, 3, 4, and 6. My favourite chapter was no. 2, where we are introduced to Audouin's gulls and the curious rise and fall of Punta de la Banya as their main port of call. This peninsula in the delta of the Ebro river initially held no gulls, then was rapidly populated to hold almost 75% of the world's population at one point in time, before being even more rapidly de-populated to 5% of the world's population. How could a single patch of habitat change in population size so rapidly? In some ways, the main thesis of this book is to explain this phenomenon, and presumably similar phenomena in other systems, by reaching for ideas in complexity theory such as perturbations, feedback loops, and non-linear dynamics. Armed with an array of examples, models, and graphs Oro does this for me, convincingly arguing how copying during colonisation and then perturbations combined with runaway dispersal with could have caused the rapid rise and fall of Punta de la Banya.

Chapter 3 then goes on to consider whether other populations of social species might be governed by the same dynamics, and how they might consistently differ from populations of solitary species. Oro moves from data to models to anecdotes and back, covering a range of species, although none in the depth as his beloved gulls in chapter 2. Indeed, gulls and other seabirds do get a heavier focus than any other species, which is perhaps a little bit of a shame but not overly surprising given it is for seabirds we possess the sort of long-term datasets where these patterns are detectable. Chapter 4 focuses in on runaway dispersal as the most important process governing rapid population declines in migratory species. The specific patterns we expect under runaway dispersal are thrashed out in theory and then hunted for in empirical datasets, largely confirming the author's suspicions that runaway dispersal is an important process in populations of social animals. I could not quibble any of the conclusions draw from the data presented but I would have liked to see more of a review on the individual behavioural processes that lead to copying and whether we have good evidence individuals are specifically copying the dispersal decisions of others. I also noted that there is an entire passage of text copied on p. 68 & p. 95.

I will gloss over chapter 5 for now (as should readers) and find myself dodging populations crashing to extinction in chapter 6. This was my second favourite chapter, laced with ever-more fascinating models for population growth including Allee effects and runaway dispersal that show just how these forces can drive seemingly stable populations to their doom We are introduced to "ghosts" and "haunting philopatry" within this book and I loved the somewhat mysterious aura this gave to the idea populations are doing things we simply do not think they should be. Chapter 6 finishes with "quasi-extinctions" which again showcase populations misbehaving and refusing to die out when all logic and evidence suggests they should.

I did not enjoy all chapters as much as these, however. Chapter 1 (perhaps) intends to be a tour-de-force, touching on all a wide range of ideas, but honestly it felt unfocused and unnecessarily long. Chapter 5, for reasons not entirely clear, delves into the evolution of sociality and never convinced me that doing so was a good idea. Chapter 7 is titled "Conclusions and

Prospects". At this point at the end of the book it is hard to remember all that was covered earlier, and so I think it would have been helpful to have conclusions at the end of each chapter rather than together at the end as a single chapter. As is, each chapter ends abruptly and without warning, when a clear set of take-home messages would have really helped cement the value of the preceding text. The book also often jumps from one topic to another between paragraphs without any warning, which adds to the disjointed feeling. As part of the final chapter there are several interesting prospects identified but, as not doubt everyone always asks and is always disappointed, more detailed guidance on the current gaps in our knowledge and the next steps to fill these would have been nice.

Ultimately, I found the overall arc of the story, starting with some hard-to explain natural phenomena, a tour of the theory and data that can help us explain it, and then further consequences of the newly identified processes, to be spot on. Ideas from complex systems theory are sometimes inserted into places they do not belong, with inauspicious consequences, but here they find a ready home and really prove their worth. Supported by interesting examples in various animal species and bolstered by data both from Oro's own very detailed work and from other published sources, I finished reading feeling very positively towards the main ideas of this book. If you want an insight into how simple interactions can lead to fascinating non-linear population dynamics, draped around a good detective story featuring Punta de la Banya and its Audouin's gulls, you will very much enjoy this book. I also think it would make a good introduction to various ideas in complexity theory for population ecologists looking to make head or tail of them, and so should find a good home on many bookshelves.

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Reference
Fisher, D.N, and Pruitt, J.N. 2019. Insights from the study of complex systems for the ecology and evolution of animal populations. Current Zoology, 66 1-14.

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