Grant Proposal Preparation

- Topic
- Hypotheses
- Subject
- Organization
- Evaluation
- Searching for articles

Choose a topic

- Identify a question
  - Build on previous work
  - Identify controversy, ambiguity, or untested hypotheses
  - Use lecture material, your text, or read through recent issues of journals, e.g.
    - *Animal Behaviour*
    - *Behavioral Ecology*
    - *Behavioral Ecology and Sociobiology*
  - Either proximate or ultimate questions are ok

Develop testable hypotheses

- Propose alternative answers (hypotheses) to your question
  - Try to be exhaustive
  - Try to make your hypotheses mutually exclusive. If not, you will need to test each.
- Choose an appropriate study organism
  - Justify your choice using prior research
  - The project must be feasible!

Proposal organization

- Title (short and descriptive)
- Purpose and objectives (1-2 paragraphs)
  - State the question and briefly describe the study
- Background (1 pg)
  - Justify choice of question by explaining why this work is needed
  - Justify choice of organism and location of study
  - Explain your hypotheses

Organization (cont.)

- Proposed work (2 pgs)
  - Describe how you will test each hypothesis
    - Generate predictions
    - Test assumptions
  - Present enough information about the experimental or observational design so that someone else could do the work
  - Mention sample sizes, avoid pseudoreplication
  - Cite others for details and to justify feasibility of methods

Organization (cont.)

- Potential results (optional, 1 pg)
  - Explain how you will interpret both positive and negative results. Ideally, both will be informative
- Impact (1 paragraph)
  - Provide a realistic closing statement that explains how your work adds to general knowledge or has an impact on the discipline, environment, conservation, human health, etc.

References

- Sources
  - Find and use at least **6** (BSCI 360) or **12** (BIOL 708B) primary references
  - Do not use **internet sources**, newspapers or lay magazines, e.g. Scientific American, Science News, Newsweek, Time, etc.
- Citations
  - Indicate author and year in the text: Smith (1970) or (Smith, 1970)
  - For each article you cite, give the complete reference in a References Cited section
    - Smith, J.G. 1970 Leopard seal foraging behavior on penguins. Mar. Biol. 2:43-50.
  - Use a consistent reference style

Suggestions

- Use subheadings to highlight topics
- Provide tables or figures if appropriate
- Be organized. Work from an outline.
- Write clearly and concisely. Check spelling and grammar. Have someone else proof read.
- Hand in 5 copies, put name on 2 copies, no name on 3 copies.

Evaluation

- Three students will read each proposal, write a review, and rate it as Excellent, Very Good, Good, Fair or Poor using the following criteria
  - Please provide a frank, critical appraisal of this project proposal. Evaluate the grant on creativity in choice of subject and design of research, adequacy of experimental or observational protocol in testing hypotheses, logic and clarity of presentation, and potential impact of the research on the scientific community as well as on society.
- Those 3 students will discuss the proposal in Friday sections. Come prepared!
- At the end of each class, we will vote to identify the two most fundable projects.

Example

- Question:
  – When do birds use magnetic cues for navigation?

Searching for Sources

- Use Web of Science (best) or Google Scholar (ok) to search for journal articles by topic
- If you find a recent article
  - Check related articles
  - Check references that were cited
- If you find an older article
  - Check references that cite this article
  - Check other references by same author

BSCI 360/708B, Fall 2012

Principles of Animal Behavior

Instructor:

Dr. Gerald Wilkinson

Syllabus	Schedule	Reading List	Problems
Library	Videos	Web Sites	Field Trips

BSCI 360 Principles of Animal Behavior

INSTRUCTOR: DR. GERALD WILKINSON

This guide will assist you in locating resources for BSCI 360. Due to licensing agreements, some of the electronic resources available by remote search are restricted to current students, faculty, and staff at the University of Maryland, College Park. E-mail Tom Harrod, the subject area specialist, or call 301-405-7253 for more information.

CONTENTS

REFERENCE SOURCES

- **Access Science** (McGraw-Hill Encyclopedia of Science & Technology)
- **Animal Behavior Desk Reference: A Dictionary of Animal Behavior, Ecology, and Evolution**

University of Maryland Libraries

RESEARCH PORT

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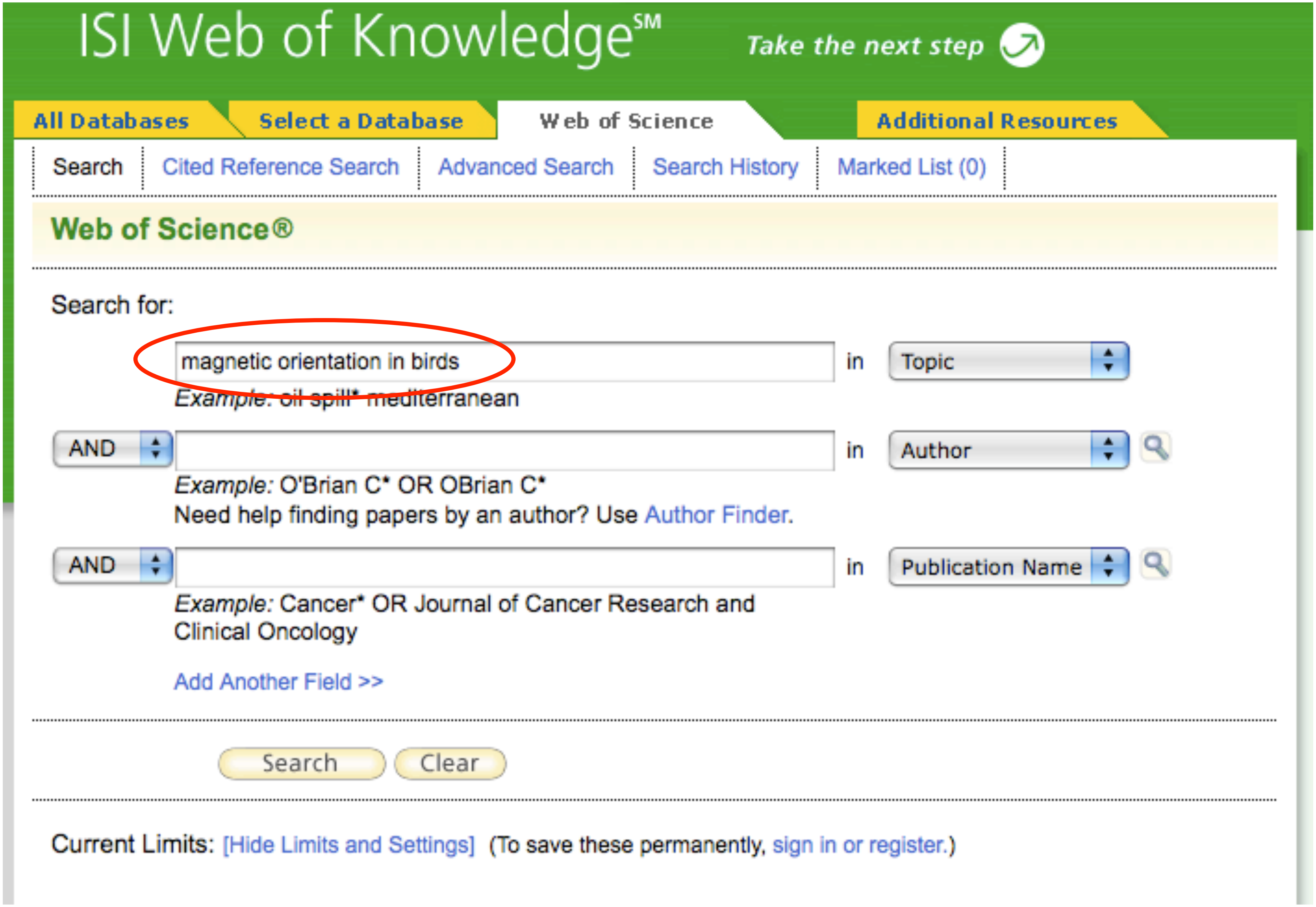
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3. Title: **Not all songbirds calibrate their magnetic compass from twilight cues: a telemetry study**
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4. Title: **A customizable 3-dimensional digital atlas of the canary brain in multiple modalities**
Author(s): Vellema Michiel; Verschueren Jacob; Van Meir Vincent; et al.
Source: NEUROIMAGE Volume: **57** Issue: **2** Pages: **352-361** DOI: **10.1016/j.neuroimage.2011.04.033** Published: **JUL 15 2011**
Times Cited: **0** (from Web of Science)
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6. Title: Magnetoreception of Directional Information in Birds Requires Nondegraded Vision
Author(s): Stapput K, Gunturkun O, Hoffmann KP, et al.
Source: **CURRENT BIOLOGY** Volume: **20** Issue: **14** Pages: **1259-1262** Published: **JUL 27 2010**
Times Cited: 2
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7. Title: Daily and seasonal activity patterns of partially migratory and nonmigratory subspecies of the Australian silvereye, Zosterops lateralis, in captivity
Author(s): Funnell JR, Munro U
Source: **JOURNAL OF ETHOLOGY** Volume: **28** Issue: **3** Pages: **471-482** Published: **SEP 2010**
Times Cited: **0**
find it

8. Title: Geomagnetic field affects spring migratory direction in a long distance migrant
Author(s): Henshaw I, Fransson T, Jakobsson S, et al.
Source: **BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY** Volume: **64** Issue: **8** Pages: **1317-1323** Published: **AUG 2010**
Times Cited: **0**
find it

9. Title: Orientation of the pied flycatcher Ficedula hypoleuca: cue-conflict experiments during spring migration
Author(s): Gaggini V, Baldaccini NE, Spina F, et al.
Source: **BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY** Volume: **64** Issue: **8** Pages: **1333-1342** Published: **AUG 2010**
Times Cited: **0**
find it

10. Title: Theoretical Evaluation of Magnetoreception of Power-Frequency Fields
Author(s): Vanderstraeten J, Gillis P
Source: **BIOELECTROMAGNETICS** Volume: **31** Issue: **5** Pages: **371-379** Published: **JUL 2010**
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Current Biology
Volume 20, Issue 14, 27 July 2010, Pages 1259-1262

doi:10.1016/j.cub.2010.05.070 | How to Cite or Link Using DOI

Report

Magnetoreception of Directional Information in Birds Requires Nondegraded Vision

Katrin Stapput[1, 4], Onur Güntürkün[2], Klaus-Peter Hoffmann[3], Roswitha Wiltschko[1] and Wolfgang Wiltschko[1]

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[2] Abteilung Biopsychologie, Fakultät für Psychologie, Ruhr-Universität Bochum, D-44780 Bochum, Germany

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Received 7 April 2010; revised 4 May 2010; accepted 5 May 2010. Published online: July 8, 2010. Available online 8 July 2010.

Summary

The magnetic compass orientation of birds is light dependent [[1] and [2]]. The respective directional information, originating in radical pair processes [[3], [4] and [5]], is mediated by the right eye [6]. These findings suggest possible interactions between magnetoreception and vision, in particular with the perception of contours, because the right eye has been found to be dominant in discrimination tasks requiring object vision [[7], [8] and [9]]. Here we report tests in the local geomagnetic field with European robins wearing goggles equipped with a clear and a frosted foil of equal translucence of 70%. Robins with a clear foil on the right eye and a frosted foil on the left eye oriented in the migratory direction as well as birds using both eyes. Birds with a frosted foil that blurred vision on the right eye and a clear foil on the left eye, in contrast, were disoriented. These findings are the first to show that avian magnetoreception requires, in addition to light, a nondegraded image formation along the projectional streams of the right retina. This suggests crucial interactions between the processing of visual pattern information and the conversion of magnetic input into directional information.

Current Biology 20, 1259–1262, July 27, 2010 ©2010 Elsevier Ltd All rights reserved DOI 10.1016/j.cub.2010.05.070

Report

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[1]Fachbereich Biowissenschaften, J.W. Goethe-Universität Frankfurt, Siesmayerstraße 70, D-60054 Frankfurt am Main, Germany
[2]Abteilung Biopsychologie, Fakultät für Psychologie, Ruhr-Universität Bochum, D-44780 Bochum, Germany
[3]Abteilung Allgemeine Zoologie und Neurobiologie, Fakultät für Biologie und Biotechnologie, Ruhr-Universität Bochum, D-44780 Bochum, Germany

Summary

The magnetic compass orientation of birds is light dependent [1, 2]. The respective directional information, originating in radical pair processes [3–5], is mediated by the right eye [6]. These findings suggest possible interactions between magnetoreception and vision, in particular with the perception of contours, because the right eye has been found to be dominant in discrimination tasks requiring object vision [7–9]. Here we report tests in the local geomagnetic field with European robins wearing goggles equipped with a clear and a frosted foil of equal translucence of 70%. Robins with a clear foil on the right eye and a frosted foil on the left eye oriented in the migratory direction as well as birds using both eyes. Birds with a frosted foil that blurred vision on the right eye and a clear foil on the left eye, in contrast, were disoriented. These findings are the first to

findings suggest that perception of the geomagnetic field for compass orientation is associated with the visual system of the right eye. In consequence of the almost complete crossover of the optic fibers in birds and few interhemispheric commissures, the visual input of the right eye is predominantly processed in the left hemisphere of the brain. Interestingly, earlier studies had revealed a functional division between the two brain hemispheres, with the right eye/left hemisphere dominant in discrimination tasks requiring object vision [7–9]. This raised the question of whether these two functions—object vision and magnetoreception—could possibly be interrelated.

To test this hypothesis, we studied the effect of blurring vision on magnetoreception, again using migratory orientation as an indicator. Our test birds, European robins, were made to wear special goggles that consisted of a clear foil on one side and a frosted foil on the other (Figure 1). Both foils were of equal translucence, allowing 70% of the light to pass, but whereas the clear foil allowed object vision, the frosted foil disrupted it completely. We used the same funnel-shaped test cages as in previous experiments [1–6], but in order to enhance the visual features for the birds, the cages were modified by adding radial lines running from the top to the bottom of the funnel walls (see Experimental Procedures). The tests took place in the local geomagnetic field at a light level of 2 mW/m^2.

The mean headings of the individual birds and the resulting grand mean vectors are presented in Figure 2, with Table 1 giving the numerical results and indicating statistical differences between the test conditions. (For the mean vectors of

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Large-scale navigational map in a mammal

Author(s): Tsoar, A (Tsoar, Asaf)[1]; Nathan, R (Nathan, Ran)[1]; Bartan, Y (Bartan, Yoav)[1]; Vyssotski, A (Vyssotski, Alexei)[2]; Dell'Omo, G (Dell'Omo, Giacomo)[3]; Ulanovsky, N (Ulanovsky, Nachum)[4]

Source: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA **Volume:** 108 **Issue:** 37 **Pages:** E718-E724 **DOI:** 10.1073/pnas.1107365108 **Published:** SEP 13 2011

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Abstract: Navigation, the ability to reach desired goal locations, is critical for animals and humans. Animal navigation has been studied extensively in birds, insects, and some marine vertebrates and invertebrates, yet we are still far from elucidating the underlying mechanisms in other taxonomic groups, especially mammals. Here we report a systematic study of the mechanisms of long-range mammalian navigation. High-resolution global positioning system tracking of bats was conducted here, which revealed high, fast, and very straight commuting flights of Egyptian fruit bats (Rousettus aegyptiacus) from their cave to remote fruit trees. Bats returned to the same individual trees night after night. When displaced 44 km south, bats homed directly to one of two goal locations-familiar fruit tree or cave-ruling out beaconing, route-following, or path-integration mechanisms. Bats released 84 km south, within a deep natural crater, were initially disoriented (but eventually left the crater toward the home direction and homed successfully), whereas bats released at the crater-edge top homed directly, suggesting navigation guided primarily by distal visual landmarks. Taken together, these results provide evidence for a large-scale "cognitive map" that enables navigation of a mammal within its visually familiar area, and they also demonstrate the ability to home back when translocated outside the visually familiar area.

Document Type: Article

Language: English

Author Keywords: cognitive map; spatial memory; true navigation; movement ecology; global positioning system

KeyWords Plus: MAGNETIC COMPASS; TRUE NAVIGATION; COGNITIVE MAPS; HOMING ABILITY; BAT; ANIMALS; CUES; ORIENTATION; CALIBRATION; BEHAVIOR

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4.	Title: **Hippocampal-dependent familiar area map supports corrective re-orientation following navigational error during pigeon homing: a GPS-tracking study** Author(s): Gagliardo Anna; Ioale Paolo; Savini Maria; et al. Source: EUROPEAN JOURNAL OF NEUROSCIENCE Volume: **29** Issue: **12** Pages: **2389-2400** DOI: **10.1111/j.1460-9568.2009.06793.x** Published: **JUN 2009** Times Cited: 5 (from All Databases) find it [View abstract]	42	7

Example

- Modified Question:
  - How do migrating bats acquire a cognitive map?
    - Need to choose animals large enough to radio-track. Best options are flying foxes in Australia.
- Hypotheses
  - First year bats form a map during their first migratory trip by habitat imprinting
  - First year bats follow older individuals and learn landmarks
  - Bats inherit a map cues, e.g. magnetism
- Experiment
  - Translocate young bats prior to migration either to two new locations
  - Follow individuals using radiotelemetry