



International Society for Neuroethology

Newsletter November 2003

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Next International Congress: August 9-13, 2004. Hotel Nyborg Strand, Nyborg, Denmark

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The ISN President's Column

Albert S. Feng (afeng1@uiuc.edu)
Univ. of Illinois, Urbana, Illinois, USA

The third quarter of 2003 was a busy one for the ISN. The Executive Committee (EC) and other ISN committees addressed many matters of importance for the Society. Below is a summary of our progress:

A New Management Firm for the ISN. The EC met on August 2 and conducted the final screening of management firms to replace Panacea Associates. The three finalists were more thoroughly evaluated and additional queries were made by phone to clarify any remaining ambiguities. The evaluation was concluded in September. We are pleased that Allen Marketing and Management (AMM; the association management division of Allen Press) will be our new management firm. AMM is located in Lawrence, Kansas, USA, and has a long history of managing scientific organizations. The firm currently manages 75 not-for-profit organizations and uses a team approach to serve the individual clientele to ensure a continuity of services. AMM also has extensive experience organizing conferences and handling on-line registration and abstract submission. Furthermore, the resources available through Allen Press provide us access to the latest publishing technology should the need arise. We are about to sign a multi-year contract with AMM, with services beginning officially on January 2, 2004. A transition plan is being developed. AMM will be working with Panacea Associates and Albin/Walker (ISN's web design firm) in early December to ensure continuity of services and access to the ISN website through the transition period. Given a carefully designed transition plan, we anticipate that all will go smoothly; nonetheless, some problems may occur. We ask for your understanding and patience during this time. When the plan is fully developed, we will provide additional details. ISN Treasurer Sheryl Coombs deserves many thanks for working tirelessly to lead the selection process for the new management firm and for developing the transition plan.

The Nyborg Congress in August, 2004. The Congress Committee, chaired by Sarah Bottjer with Martin Giurfa as co-chair, and its subcommittee (the Local Organizing Committee chaired by Axel Michelsen) have made great strides in preparing for the 2004 Congress. The Congress schedule is now in place and the program is being finalized (see next article). The two Committees worked tirelessly to prepare grant applications that were submitted to US and Danish funding agencies for possible support of the Congress. These grants will enrich the conference program, reduce our costs, and provide support for students. Watch for detailed Congress information (place, program, accommodations, local attractions, etc.) on the ISN website beginning in the new year. In the meantime, start thinking about your abstracts!

ISN Website. Albin/Walker Web Design is working closely with the Web Oversight and Education Committee (chaired by Zen Faulkes) to overhaul the Society website. Keith Albin has been very helpful in advising us to have AMM host the "secure" part of the Society website, and to place the "open" part (for outreach and education purposes) on a different host that will be independently managed by the ISN through Albin/Walker. The second site will be linked seamlessly to the main website.

Student Membership: New Initiatives. At the August EC meeting, Don Edwards (Chair, Membership Committee) reported that the ISN has only a small number of student members (~5%). Given that students in neuroethology represent the future of the ISN, the EC felt it vitally important to implement effective mechanisms for attracting student members. Therefore, two mechanisms were created: (1) Beginning in 2004, student membership will be FREE. The revenue from student membership dues is very small, so this change will have little financial impact on ISN. **Please encourage your students to join ISN.** (2) Beginning in 2004, the ISN will offer 6 or 7 Heiligenberg Student Travel Awards (HSAs; see article below) annually to qualified students who wish to present their studies in the field of neuroethology at national and international scientific meetings. The awards can be used to cover expenses such as travel, conference registration fee, and/or housing costs up to a total of \$600. The ISN will make the initial investment towards the HSAs but we hope that members' voluntary donations at the time of annual dues payments will meet the needs for HSAs in future years. Finally, we have asked the Membership Committee to implement avenues for recruiting new members and for connecting with existing members to increase both student and regular membership in the ISN in future years.

Young Investigators Awards (YIAs) for the Nyborg Congress. The original deadline for applications/nominations for YIAs was November 1, 2003. Due to the long delays in international mail delivery, several applicants asked for extensions, so the final deadline was November 15, 2003. After consulting with the Congress Committee, the following members were selected to (and agreed to serve on) the Selection Committee: Carl Hopkins, Gwen Jacobs, Ian Meinertzhagen, Harald Wolf, and Troy Smith (a former YIA). I will serve as the Chair to ensure timely selection of the awardees.

Nominating Committee. After consulting with the Council, I have appointed a Nominating Committee [Malcolm Burrows (Chair), Kentaro Arikawa, Darcy Kelley, Edward Kravitz and Annmarie Surlykke] which is responsible for preparing the slates of candidates for ISN officers and Councilors to be elected in 2004 (see article on page 5). The duties of this Committee include: (a) to announce a Call for Nominations and to solicit nominations for the ISN officers and Councilors; (b) to prepare the slates of candidates for the elective offices; (c) to secure the consent of the candidates to be on the

2004 INTERNATIONAL CONGRESS OF NEUROETHOLOGY SCHEDULE

Time	Sun, 8 th	Monday, 9 th	Tuesday, 10 th	Wednesday, 11 th	Thursday, 12 th	Friday, 13 th
08:30 am		Plenary Lecture	Young Investigator Award Talks	Plenary Lecture	Plenary Lecture	Plenary Lecture
09:30 am		Plenary Lecture		Plenary Lecture	Plenary Lecture	Plenary Lecture
10:30 am		Refreshment Break	Refreshment Break	Refreshment Break	Refreshment Break	Refreshment Break
11:00 am		Symposium 1 Symposium 2	Symposium 3 Symposium 4	Symposium 5 Symposium 6	Symposium 7 Symposium 8	Symposium 9 Symposium 10
01:00 pm		Lunch	Lunch	Lunch	Lunch	Lunch
02:00 pm	Registration & Reception	Poster Session & Exhibits	Poster Session & Exhibits	Business Meeting	Poster Session & Exhibits	Departure
		Refreshment break <i>Ad-Hoc</i> Presentations	Refreshment Break <i>Ad-Hoc</i> Presentations	EXCURSION	Refreshment Break <i>Ad-Hoc</i> Presentations	
06:00 pm		Dinner	Dinner			
08:00 pm		Free time & Socials	Walter Heiligenberg Lecture		Founder's Lecture	

slates; and (d) to announce the slates at the Business Meeting at the 2004 Congress.

With best wishes for a bright New Year! ❖

Everything You Need to Know About the 2004 International Congress of Neuroethology in Nyborg, Denmark

Axel Michelsen (A.Michelsen@biology.sdu.dk)
Univ. of Southern Denmark, Odense, Denmark

The 7th International Congress of Neuroethology (ICN) will be held at the Hotel Nyborg Strand (meaning Hotel Newcastle Beach), Denmark, from Sunday, August 8, to Friday, August 13, 2004. Nyborg is located in a beautiful setting on the western shore of the Great Belt.

Participants arriving at Copenhagen airport can reach Nyborg by train in about one hour. The hotel has meeting rooms of various sizes and a large number of guest rooms for the participants. All meals are served in the restaurant of the hotel. Special food (vegetarian, non-gluten) will be available upon request.

Program. The scientific program of the meeting will include 10 plenary talks, 2 to 4 talks by recipients of ISN Young Investigator Awards, 10 symposia, poster ses-

sions (ca. 400 posters), ad-hoc presentations (15-min presentations that attendees sign up for on-site), and scientific socials to facilitate discussion within specific focus groups. The registration desk will open on Sunday at 2:00 PM, with an Opening Reception later that evening. On Wednesday evening there will be a general excursion with BBQ dinner for all participants to Egeskov Slot ("Oakwood Castle"), which is one of the most magnificent water castles in Europe. On Monday, Tuesday, and Thursday, other excursions will be organized if a sufficient number of people subscribe to them. The scientific program includes the following highlights:

Plenary Speakers

Kentaro Arikawa (Yokohama City Univ., Japan). How do Butterflies see Colors?

Michael Bate (Univ. of Cambridge, UK). Embryonic Origins of Movement in *Drosophila*.

Michael Dickinson (California Institute of Technology, USA). The Neural Control of Aerodynamics.

Michael Fanselow (Univ. California, Los Angeles, USA). The Hippocampus and Pavlovian Fear Conditioning: A Rodent Model of Episodic Memory?

Ron Hoy (Cornell Univ., USA). *Heiligenberg Lecture*. Animal Communication Signals: the Bridge between Neuroethology and Behavioral Ecology.

Franz Huber (Max-Planck Institute of Behavioural Physiology, Seewiesen, Germany). *Founder's Lec-*

ture. Memories, Impressions and Experiences from Guiding Figures in Neuroethology.

Larry Katz (Duke Univ., USA). Encoding Social Signals in Mammalian Chemosensory Systems.

Eve Marder (Brandeis Univ., USA). The Balance between Stability and Plasticity in Adult and Developing Networks.

Kiisa Nishikawa (Northern Arizona Univ., USA). Neuromuscular Control of Ballistic Movements: Model Systems, Simple Questions, New Ideas.

Monika Stengl (Univ. of Marburg, Germany). How the Peptide PDF Orchestrates Circadian Oscillators in Insects.

Symposium Topics

Walking, Running, and Scratching: Central Mechanisms of Limb Coordination.

Chemical Cues in Context: How CO₂ and Volatile Organic Compounds Influence Insect-Plant Interactions.

Temporal Processing in Neural Systems.

Orchestration of Behavior by Neuromodulators.

Auditory Processing of Vocal Communication Signals: What Happens in Subcortical Structures?

Effects of Experience on the Developing Nervous System.

Complex Patterns of Social Behavior: Genes, Neurons & Neuromodulators.

Seeing on the Move.

Neuroethology of Attention.

Neuromorphic Approaches to Neuroethology.

Home page. The ICN home page (<http://neuro.biology.sdu.dk>) will be linked to and accessible through the ISN home page around December 1, 2003. This site will contain the detailed scientific program, a full description of the excursions and updated news about the Congress. Later, submission of abstracts, registration and payment for the registration fee, lodging, meals and excursions will also be carried out from this site. Before the Congress, it will be possible to view and download the titles and abstracts of all talks and posters from this site.

Abstracts. Abstracts for talks and posters should be submitted via the ICN home page by the deadline of **May 1, 2004**. Please follow the instructions on the ICN home page and remember to include an e-mail address.

Registration details. The registration fee is 200 Euros (at present, one Euro is ~1.17 USD) for ISN members, 250 Euros for non-members, and 50 Euros for student members (student membership in ISN is free beginning in 2004). The registration deadline is **June 1, 2004**. Participants registering after the June 1 deadline must pay an additional fee of 80 Euros (see explanation below). Participants registering after the deadline are not guaranteed lodging and meals at the hotel and may thus have to find other accommodations.

It is expected that most participants will wish to stay at the hotel and take their meals in the hotel restaurant.

We have an agreement with the hotel management for moderate, low-season prices for lodging and meals. A condition for this attractive price is that the exact number of participants is provided to the hotel two months in advance of the Congress. It is therefore necessary to reserve and pay for lodging, meals, and excursions, together with the registration fee, by June 1.

The Opening Reception on Sunday evening is open to all participants. Full board (from Monday morning to lunch Friday, including a banquet on Thursday evening) costs 250 Euros. Participants on a limited budget can buy a ticket for all coffee breaks and lunches for 115 Euros, and abstain from the dinners. Tickets for single dinners will be available.

All excursions cost 35 Euros, which covers bus transport, entrance fees, a guide, and a meal (BBQ dinner with the general excursion; lunch with the other excursions).

Accommodation is available at various prices and comfort levels (all prices are for 5 nights): 370 Euros for single rooms, 290 Euros for double rooms and 225 Euros for shared rooms with 3 to 5 persons. A small number of rooms at lower prices are also available, some of which are in a neighbouring hotel. Budget-conscious participants should indicate their interest in less expensive accommodations during registration; the lucky winners will receive a refund for the price difference at the registration desk upon arrival in Nyborg. ♦

Heiligenberg Student Travel Awards

Six or more (depending on the availability of funds) Heiligenberg Student Travel Awards (HSAs) will be awarded annually to qualified students who wish to present work in the field of neuroethology at selected national and international scientific meetings. The highest priorities will be for the International Congress of Neuroethology (ICN) and the Gordon Research Conference (GRC) in neuroethology, during the years when these conferences take place. During the off-years for the ICN and GRC, the awards can be used to support attendance at "major" regional meetings, such as the Society for Neuroscience, Göttingen neurobiology conference, European Neuroscience meeting, or Asia-Pacific Neuroscience meeting. The award is given in honor of Professor Walter Heiligenberg, who was a distinguished neuroethologist and pioneer in the field. The awards may cover expenses such as travel to and from the conference site, conference registration fee, and/or housing costs up to a total of \$600.

Qualifications. Both the student and the student's research mentor must be ISN members at the time of application. The HSA Selection Committee is Mark Konishi (Chair), Catherine Carr, Walter Metzner and Stephanie White. Applicants must be registered gradu-

ate students at a university and must plan to present their work at the conference. Priority will be given to applicants with demonstrated academic excellence and research potential, as evidenced by the abstract of the work to be presented and letters of recommendation. Applicants with demonstrated financial need will also be considered for these awards. Preference will be given to applicants who have not previously received HSAs.

Applicants should fill out the short application form that will be posted at the ISN website and have letters of recommendation from two ISN members submitted to the Society Office before the application deadline (date to be announced). In addition, applicants should submit (1) a copy of the abstract of the work to be presented at the conference and (2) a short statement describing the applicant's dissertation research (including title if it is known) and career plan. The abstract and statement are limited to two pages. ♦

Call for Nominations for ISN Officers and Councilors

Malcolm Burrows (mb135@hermes.cam.ac.uk)
Univ. Cambridge, UK

At the end of our Congress in Denmark 2004, members will be invited to vote to elect a President-Elect, Secretary and Treasurer, who will serve three-year terms, and seven councilors who will serve six-year terms. The Nominating Committee [Malcolm Burrows (chair), Edward Kravitz, Kentaro Arikawa, Darcy Kelley, and Annmarie Surlykke] invites nominations for each of these positions. The current holders of these posts are:

President-Elect: Edward Kravitz (to assume the Presidency following the 2004 Congress)

Secretary: Janis Weeks

Treasurer: Sheryl Coombs

Councilors who will continue for 3 more years: Horst Bleckmann, Allison Doupe, Martin Giurfa, Eric Knudsen, Claire Rind, Mandyam Srinivasan, and Harold Zakon.

Councilors who will retire after the 2004 Congress: Catherine Carr, Martin Heisenberg, Gwen Jacobs, Ian Meinertzhagen, Alison Mercer, Michael O'Shea, and Harald Wolf.

We would like to achieve a good spread of candidates from the standpoint of gender, geography and research area. The committee is charged with ensuring that: "The slate ordinarily shall have no fewer than two, nor more than three, names for each vacancy. Candidates for President-Elect shall normally come from countries on opposite sides of the Atlantic Ocean in alternate election years. Candidates for Secretary shall normally be from English-speaking countries, and candidates for Treasurer shall normally be from the United States." The expectation therefore is that our President-Elect should come from a country other than the USA.

Could you please send your nominations and the name of the person seconding that nomination to Malcolm Burrows (mb135@hermes.cam.ac.uk) as soon as possible, and no later than 30 days before the start of the Congress (i.e., **July 9, 2004**). ♦

Field Behavior: "Hey Ed, we've heard it before!"

Edward A. Kravitz, special columnist to the newsletter

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I mean, discussions of big versus little science have been going on for decades. We've heard all the arguments. Big science costs big dollars and will drain all the funding from little science. Big science limits creativity. Big science and high tech become ends in themselves, with the technology and not ideas driving the science. Big science provides awful training for next-generation scientists. Big science wastes staggering amounts of money. Yadda, yadda, yadda. So what can you tell us that's new? Why is this at all relevant for neuroethologists? Why bring it up here, and why now?

Big science wastes staggering amounts of money. Yadda, yadda, yadda. So what can you tell us that's new? Why is this at all relevant for neuroethologists? Why bring it up here, and why now?

Well for one thing, neuroethology research tends to be small science. Not exclusively small science, mind you, but it's rare to find a 20 or 30 person neuroethology laboratory. It's even rarer to find a one to several million dollar annual budget for a neuroethology laboratory. In fact, unless you're working with mice and knocking out genes, or with flies and worms and manipulating genes, or with primates and taking advantage of their supposed resemblance to us, or directly on human disease, it's hard to get grants funded at all. What makes things worse is that a key element in hiring and promotion decisions, at least at medical schools in the United States, seems to be how much research funding a person is likely to bring in. My home institution, Harvard Medical School, pays lip service to whether a new hire or a candidate for promotion is an excellent teacher, or a good mentor, or even is doing creative and innovative science, if the organism being used is not a big-dollar one. I recognize that teaching is a more important part of the equation at smaller colleges and even at some universities. Nonetheless, considerations of how much grant support an individual is likely to bring in seem to be growing in importance at large private universities and these considerations seem to be filtering down to state universities and smaller college campuses.

How did total numbers of dollars become such an important part of the equation? Aren't academic institutions places where research, teaching and scholarship are our primary concerns? We have chosen this pathway to avoid the world of giant corporations and multiplexed businesses and money being our only goal in life, in order to allow us to pursue higher goals, right? When did the bottom line become "how much money is a new faculty hire likely to bring in"? When did the notion of "a community of scholars" become a "community of dollars"? Maybe more important questions are "how did this happen" or even "how did we allow this to happen"?

Am I making a mountain out of a molehill in pushing this theme? Well, perhaps it's worthwhile at this point to examine a recent space density policy at Harvard Medical School and ask if this is the handwriting on the wall for similar policies at other academic institutions. On February 1, 2000, the Dean of the Medical School sent out a notice entitled "Implementation of a Quad-Wide Research Density Policy." This document outlined in great detail a policy that was adopted and put into effect, presumably by the Dean's council of advisors, on January 1, 2000. The first paragraph in the document states:

"The target research density for each Quad-based department (the basic science departments at Harvard Medical School located on the main medical campus) will be \$180 in Total Direct Costs per square foot (TDC/sf). This \$180/sf is equivalent to the "prudent buyer" rate the federal government has targeted as the appropriate TDC/sf rate for research (and the associated indirect costs) at all medical schools."

This sounds pretty official, and suggests that somehow or other, a space density charge has been mandated by the US federal government. The last section in this part of the document (Target Research Density) concludes:

"The School reserves the right to implement space adjustments in the event a department is not successful in doing so."

And this sounds like a threat, doesn't it? Bring in the correct numbers of grant dollars or lose your research space. Not that you must bring in enough grant dollars to pay for your research, mind you. That, after all, is something we all understand. You must bring in \$180 TDC/sf of space you occupy, or you will lose your research space. If you're not meeting the imposed rate, and if your department head won't reduce your space, then the central administration of the medical school will do the space chopping. Either way — if you don't bring in the dollars, you're going to lose your research space. Sounds an awful lot like we are paying rent for the privilege of doing research at Harvard Medical School.

Since this policy sounded more than slightly wrong-headed to me, I decided to investigate. Was there, in fact, some Federal guideline stating that Harvard Medical School had to recover \$180/sq.ft. in direct costs on research grants from all of its researchers? I didn't see

how such a policy could exist, since I saw no way that the Federal Government could set such a policy for universities. Still, I thought it worth checking out. First I went to friends and colleagues at NIH, and they had never heard of a "prudent buyer" or of a federally mandated space density policy. Then I went to colleagues at many universities and found out that some, but not many, had dollar *guidelines* for research space allocation. The amounts of money involved, however, usually were smaller than the Harvard Medical School rate, and none, as far as I could tell in my small survey, were being as ruthlessly applied as at Harvard Medical School.

I was told that because of the low level of research support I was bringing in with the 4 grants I held at the time, I would be moved to 850 square feet of research space. . . Since this left my laboratory group no space in which to do research, I asked further if they realized they were asking me to give up my career.

In fact, there are no written guidelines in any Federal documents that talk about such items. Instead, when Federal negotiators from the Division of Cost Allocation within the Department of Health and Human Services come to negotiate an indirect cost (overhead) rate for HMS, they use a "rule of thumb" calculation of how much grant money (in total direct costs) an average Harvard Medical School investigator brings in, per square foot of research space they occupy. This figure is used as a portion (but only a portion) of their calculation of what the overhead rate is to be. Of course the Federal investigators want to set this "rule of thumb" estimate as high as possible so that they can keep the overhead rate that HMS collects as low as possible. According to a Harvard Medical School administrator involved in such negotiations, the government's concern at other institutions supposedly was the following: "it's fine with us if the University chooses to be generous in allocating laboratory space to investigators. However, we believe the federal government should not support inefficient use of space and so there is an expected density of research that we will support through the Facilities and Administrative Reimbursement rate." So it isn't the government at all that sets the \$180 TDC/sf rate, its Harvard Medical School, and the implementation of that rate is entirely one of choice by academic home institutions.

A visit to my office by a pair of high-level administrators shortly after the policy was implemented demonstrated just how ruthless the policy was to be. I was told that because of the low level of research support I was bringing in with the 4 grants I held at the time, I would be moved to 850 square feet of research space from the 2400 square feet I then occupied. In response to a direct question, I was told further that the 850 square feet would include my office, the post-doc and student office, and the lobster, cold and equipment rooms. Since this

left my laboratory group no space in which to do research, I asked further if they realized they were asking me to give up my career. This drew no response. In fact, there was no discussion of any positive contributions that my research activities or national or international position in the field might be making to Harvard Medical School. There was no comment about my teaching one of the most highly rated graduate courses at the medical school (the *Neurobiology of Disease* course that has served as a model for similar courses at other universities). There wasn't even anything said about whether I was bringing in enough grant money to actually support our ongoing, still productive research activities. Apparently the crime I had committed for which my career was to be ended was not some horrendous act of scientific misconduct, which as far as I knew was the only way you can be invited to leave an academic career. It was just that I wasn't doing big enough science to satisfy our corporate-minded administrators. While I'll add that I had the dubious pleasure of throwing the two visitors out of my office to terminate the discussion, I won't detail this sad history further here, since problems I might be having with the medical school administration are not the point of this essay. Suffice it to say that after much angst, the matter was resolved. We still have a laboratory at the medical school and, it seems to me, we still continue to do pretty good science. Now, unfortunately, with a sword of Damocles hanging over my head and the heads of all faculty at our august institution. It seems like something is wrong here, doesn't it?

Now I know that friends and colleagues at academic institutions throughout the world will say, "Well, that's Harvard Medical School, and what do you expect? We don't have problems like that at our institutions." Or do we?

Now I know that friends and colleagues at academic institutions throughout the world will say, "Well, that's Harvard Medical School, and what do you expect? We don't have problems like that at our institutions." Or do we? In the US, federal and state budgets are running enormous deficits, and raising taxes to meet those deficits is unacceptable to the public. Prime targets of budget cutters are the universities and colleges that receive large sums of money from state or federal treasuries. On top of that, a plunging economy is dramatically reducing private support for educational and research infrastructure. Despite these fiscal woes, ambitious deans, provosts and presidents continue to build research enterprises, often pushed by department chairs and faculty demanding more space for research. Thus at colleges, universities and medical schools throughout the United States, new research buildings continue to be constructed, often completely deficit financed. In the present fiscal climate, who is to pay for these buildings and their maintenance if not the faculty who are de-

manding the expansion? Will members of the administration of your academic institution be visiting you in the not distant future, to let you know that you are not bringing in enough research dollars to pay for your fancy new research space? Where will neuroethology research, with its generally smaller grant budgets, be carried out in the future? Will science divide so that small science is done at smaller institutions, and big science is done at medical schools and larger universities? Is this healthy? Removing the study of animal behavior from medical schools may be a mistake. After all, people behave too, don't they?

Addendum (September 2003). Several times during the last few months I requested the use of an unused laboratory that is immediately adjacent to our new and now reduced research space. We need this space as an office for the increasing numbers of post-doctoral fellows, students and visitors who are working with us these days. My most recent request for the use of this space was once again rejected with a letter including comments like "your people density does not exceed the industry benchmarks of roughly one person for every 150-200 sf." (*I wonder what industry this well-paid dean is talking about?*) and "The Research Density Policy will be followed with increasing vigor this year" (*my research density profile is \$170/sf and they have now set the HMS profile at \$239/sf - a 33% increase in 3 years even before our new research building with the waterfalls opened*). Seems like at Harvard Medical School they would rather let an unused laboratory go unused rather than have it occupied by someone who can productively use the space, if the someone is not meeting the ever-increasing dollar demands of the corporate executives running the school.

Be forewarned readers! These things can happen at your institutions too. ♦

A Mathematician's Road to Neuroethology

Todd Troyer (ttroyer@glue.umd.edu)
Univ. of Maryland, College Park, Maryland, USA

The research in the "Neural and Behavioral Dynamics Lab" focuses on understanding the neural basis of complex temporal behaviors. Major projects include the study of song learning in zebra finches and theoretical studies of the dynamics of simple model neurons. The lab is still getting off the ground, and concrete results lie in the (not too distant) future. Confronted with the task of writing a lab profile, I've decided to trace the roots of this research and provide a somewhat personal account of my winding path toward neuroethology.

My background is as a mathematician, having received my Ph.D. in mathematics from the University of California, Berkeley (USA) in 1993. But even before graduating, I had turned toward biology. For this, I should primarily thank my thesis advisor, Morris Hirsch.

A person of extraordinary breadth, Moe encouraged my wanderings in the burgeoning field of neural networks. I also collaborated with Bill Baird, a former student of Walter Freeman. Bill had worked on a model of olfaction in which the sniff cycle segmented the stimulus on the 100-300 ms time scale. Bill was also working on the problem of rhythm learning, under the assumption that segmentation plays a crucial role in auditory processing and that this segmentation follows the natural break points in the auditory stream. While I made minor contributions to this work, far more important was the excitement in working with Bill as he attempted to connect dynamics, the brain, music, and more.

The hours of programming eventually paid off, and I discovered that looking at the data along the correct axis revealed a spiral structure within the map of wind direction — a “Eureka!” moment.

However, at the professional level, it became clear to me that the grand consilience¹ of neurobiology, psychology, and computation promised by the new field of neural networks would remain more an ideal than a reality. Already hooked on the brain, I began auditing graduate neuroscience courses at Berkeley. I was lucky enough to take a course taught by Gwen Jacobs, who introduced me to her work on the functional anatomy of the cricket cercal sensory system. Gwen was accumulating a database of reconstructed axonal arbors from identified sensory neurons, and was beginning to integrate this data into a functional map. Here was an incredibly rich set of data — someone just had to put it together and look at it! Drawn by the Siren song of the cercal system, as a class project I proposed to extend a 3D computer visualization system begun by a graduate student, Jay Levin. The semester soon passed, but I continued programming and started attending lab meetings run by Gwen and her colleague, John Miller. Thus began my habit of leading a double life, continuing to work on my math thesis while working on a completely separate project in the Miller-Jacobs lab. The hours of programming eventually paid off, and I discovered that looking at the data along the correct axis revealed a spiral structure within the map of wind direction — a “Eureka!” moment. I also successfully completed my thesis, proving some convergence results concerning Hebbian learning in two-layered networks.

After several crazy weeks of multiple decisions and high drama, I landed a postdoctoral position modeling visual cortex with Ken Miller at the University of California, San Francisco. Allison Doupe had just joined the faculty at UCSF and was starting up a birdsong lab. Given that zebra finches learn a sequence of song elements (“syllables”), I offered to present an overview of some neural network sequence learning algorithms at

lab meeting. Reading a few review papers, I began to see connections with issues that I had mulled over with Bill Baird. Here was a temporally complex task, organized on multiple time scales, naturally segmented into 75 to 250 ms-long syllables. I was hooked. I asked Allison whether I could continue coming to lab meetings, and she responded with an enthusiastic yes. Once again I was living a double life, this time studying cortical dynamics and song learning.

In building a model of the song system, I was searching for specific hypotheses consistent with the available behavioral, physiological and anatomical data. I gave myself an additional constraint by restricting myself to the Hebbian mechanisms familiar from my thesis work. The song system posed a number of basic problems. First was the issue of sensory feedback delay, which poses a problem in any rapid sensorimotor task; there is a delay between premotor activity and the signals carrying the evaluation of the resulting action. Second, experimental evidence suggested that outputs of the song nucleus IMAN might carry an evaluation of the developing bird’s song, but IMAN efferents synapse downstream of the sensorimotor nucleus HVC, thought to play an important role in generating song sequence. Finally, auditory feedback needed by IMAN would have to pass through HVC without interference from ongoing HVC motor activity. After numerous discussions and staring for countless hours at box and arrow diagrams of the song system, I connected two ideas: the possibility of a motor-to-sensory mapping, or efference copy, within HVC, and the proposal that the efference copy plays a significant role in sequence generation. Another “Eureka!” moment.

Luckily, during my postdoc I had attended the Neural Systems and Behavior course at Woods Hole. This is the best crash course in neuroethology on the planet...

Exploring these general hypotheses via gedanken experiments was fine, but would the parts fit together? Setting out to embed these ideas into a computer simulation, I was faced with three large unknowns. First, how is song represented in patterns of neural activity? Second, how can Hebbian mechanisms lead to learning that is stable yet flexible? Finally, what exactly is being learned? Song learning is a complex task with multiple subcomponents. How do birds learn syllables, rhythm and sequence, and how do these processes interact? These questions had to be addressed to build a simulation, yet there was very little experimental evidence to go on. By positing a very simple neural representation, after much struggle I was able to assemble the pieces into an integrated model. Although far from perfect, I felt that the model highlighted some important gaps in our knowledge of the song system, and presented a plausible framework of ideas that could drive future experiments. Convincing reviewers of the model’s value was another battle, but eventually the model was published.

¹ From *Consilience: the Unity of Knowledge*, by E.O. Wilson (1999)



Figure 1. Current recording set-up with an adult zebra finch in the middle cage and two of his sons (aged 53 days) on either end. Juvenile birds are housed in recording chambers before they start to sing and remain until song has become crystallized. Acoustic differences between the mature and developing songs are used to separate out adult vocalizations. Two directional microphones (arrows) are used to determine which juvenile is singing. As the young birds mature, the tutor is removed. (Sound isolation chamber obtained from Peter Marler's old lab at UC Davis.)

Meanwhile, in my other life in the Miller-Jacobs lab, I published a paper related to spike variability and another related to orientation tuning in visual cortex. It was time to hit the job market. The most important decision was whether to start up an experimental lab or to stick exclusively with modeling. Jobs for pure modelers are scarce, but starting an experimental lab — having never published an experimental paper — would be tricky. Luckily, during my postdoc I had attended the *Neural Systems and Behavior* course at Woods Hole. This is the best crash course in neuroethology on the planet, and after many late nights in Loeb hall I emerged with the confidence that I could be an experimentalist.

I had the good luck to land a position in the psychology department at the University of Maryland in College Park (USA). College Park is a center for neuroethology research, has a number of active computational faculty, and has a young and growing interdisciplinary graduate program in Neuroscience and Cognitive Science (NACS). Continuing my habit of pursuing a double life, one part of the lab is focused on the dynamics of simple model neurons and other projects directed are toward songbird learning.

... computers are becoming so fast and memory so cheap that mountains of "raw" data can be stored and analyzed relatively easily, opening the way for a whole new generation of behavioral studies.

While the theoretical work followed naturally from my postdoctoral research, the next step in studying song learning was much less clear. As a mathematician, the question that I struggled with most was that the underlying problem was ill-defined — what exactly was being learned during song learning? Taking a closer look at song behavior seemed like a natural direction. The ease of collecting acoustic data would get me started with experiments, while analyzing a process as complex as song learning would tap my computational strengths. Moreover, computers are becoming so fast and memory

so cheap that mountains of "raw" data can be stored and analyzed relatively easily, opening the way for a whole new generation of behavioral studies.

Our main approach in the lab can be summarized as "collect all vocalizations during song learning and then analyze the data." We are housing juvenile zebra finches and their tutors in separate small cages within sound isolation chambers, and using directional microphones to determine who is singing. While "collect everything and analyze" makes for a good sound bite, the reality is significantly more challenging. To keep things simple, we've focused on a one-on-one tutoring paradigm. However, some tutors have more than one son in the same clutch. We have tutored the "extra" sons by introducing an additional tutor part way through the critical period. Although our focus is on the development of the juvenile's song, we record the tutor as well. Anecdotally, we've been surprised at how often the juvenile sings along with the tutor, although we have yet to develop the tools to quantify this. Recently, we introduced a new protocol in which the tutor bird is placed in a third cage between two of his sons, doubling the number of juveniles recorded and allowing us to examine vocal interactions between siblings during learning (Figure 1).

Right now we are knee deep in observational data (roughly two gigabytes per day) and struggling to catch up. The longer-term plan is to use these data as a source for generating more refined hypotheses. These can then be tested experimentally using high intensity behavioral analysis combined with other classic neuroethological approaches as well as modeling. We're already taking our first steps in this direction, and will soon study the effect of lesions performed midway during the period of song learning. We will analyze both short-term and long-term effects, examining the data in the context of the entire behavioral record up to the time of the lesion.

In many ways, I've strayed quite a distance since my early days as a graduate student in a math department. But even as I've become fascinated with temporal dynamics and the brain, I retain a mathematician's focus

on defining the underlying problem. When it comes to neuroscience, the fundamental question is to explain how the brain gives rise to behavior. So maybe it's not so surprising that I ended up a neuroethologist after all.



Faculty Research Grants at MBL

Albert and Ellen Grass Faculty Grants. The Grass Foundation (www.grassfoundation.org) has established a generous new grants program to support collaborative research in any area of neuroscience at the Marine Biological Laboratory in Woods Hole, Massachusetts, USA. Grants of up to \$50,000 per year, renewable for up to 3 years, are available for collaborative groups of two or more neuroscientists at the assistant or associate professor level. The grants, which can be used to pay travel, lab rental, small equipment and supply fees, require a minimum of six weeks of collaborative effort at the MBL during the months of May through August. The application deadline is **January 30, 2004**. Additional details can be found at: http://www.mbl.edu/research/summer/fellowships_neuro.html. For application materials, contact Sandra Kaufmann at (508) 289-7441; (skaufman@mbl.edu). For further information about the grant program contact David Bodznick, Program Coordinator, at (860) 685-3489 (dbodznick@wesleyan.edu). ♦

Meetings and Courses

Gordon Research Conference on *Genes and Behavior*. There is a new Gordon Conference series called "Genes and Behavior." The goal is to foster a broad approach to this topic by bringing together scientists who primarily use model genetic systems to study behavior, with scientists who primarily use model behavioral systems to study behavior. The conference series seeks to help foster a synthesis that involves molecular biology, neuroscience, behavior, ecology and evolutionary biology; lab and field studies; and both mechanistic and evolutionary perspectives. Sessions for the first conference will be devoted to the following topics: social structure; foraging and ingestive behavior; sensory systems and communication; behavior analysis in model genetic systems; nature/nurture; theoretical approaches to genes & behavior; and reproductive behavior. The first Gordon Conference on Genes and Behavior will be held 8-13 February, 2004, in Ventura, California, USA. For information on registration please check <http://www.grc.org/>. Gene Robinson, Conference Chair; Bob Hitzeman, Vice-Chair; Chris Boake, Felix Breden and Allen Moore, Program Committee. ♦

Marine Biological Laboratory Summer Course, *Neural Systems and Behavior*. Woods Hole, Massachusetts, USA. June 14 - August 8, 2004. Directors: Cath-

erine Carr, University of Maryland, and Richard Levine, University of Arizona. NS&B is an intensive eight-week laboratory and lecture course for 20 students, focusing on the neural basis of behavior, from the cellular and synaptic levels to the analysis of complex systems. The course is intended for graduate students, postdoctoral students, and independent investigators. The central theme of the course is how neurons and neural circuits produce behavior and plasticity. Laboratory and lecture components combine state-of-the-art neurobiological techniques with behavioral and developmental analyses. The lecture series begins with a consideration of electrophysiological and anatomical principles of neuronal function. Topics then move on to how properties of individual neurons come together in simple neural networks for behaviors such as locomotion, escape, and the generation of rhythmic patterns of activity. Modulation of neural activity and neural circuits by transmitter and hormone action, long-term potentiation, and genetic approaches to the analysis of neural circuits and behavior are also covered. Finally, emphasizing computational approaches, the course considers such questions as how animals process complex auditory stimuli or accomplish spatial and vocal learning. Weekly seminars are given by invited lecturers and distinguished Scholars-in Residence. The heart of the course is the laboratory, where advanced techniques in cellular neurobiology are brought to bear on neural systems. Methods taught include intracellular recording; single cell dye-injection; single and double-electrode, patch, and whole-cell voltage clamp; analysis of synaptic transmission and plasticity; brain slice; computational and behavioral approaches. A variety of vertebrates and invertebrates serve as experimental systems. For further information and application forms, see the course web site: <http://courses.mbl.edu/>. The application deadline is **February 2, 2004**. ♦

Summer Course at the Bermuda Biological Station for Research, *Chemosensory Neurobiology in the Marine Environment*, June 6-26, 2004. Faculty: Dr. Charles Derby, Georgia State University (USA); Dr. Hank Trapido-Rosenthal, Bermuda; and Dr. Tim McClintock, University of Kentucky (USA). This will be the 5th biennial version of this 3-week summer course. We will study chemosensory neurobiology in the marine environment at the physiological, biochemical, and molecular levels. Lectures will deal with chemoreception in a variety of marine organisms. In laboratory exercises and research projects, the olfactory system of the spiny lobster, *Panulirus argus*, will serve as the main teaching and research tool. Emphasis is on experimental techniques and approaches to the study of chemosensory biology. Receptor cell electrophysiology, immunocytochemistry, BrdU labeling of cell proliferation, molecular biology (PCR, sequencing, analysis of sequence data, etc.), and biochemistry of receptor and perireceptor phenomena will be taught and applied to the study of novel research questions relating to chemical sensing, including basic function and applications (e.g., environmental

biology). The course is designed to benefit graduate students and advanced undergraduates with interests in organismal, systems, cellular, or molecular biology. Competitive scholarships are available to cover tuition, room, and board. For more information, contact: Charles Derby, Dept. of Biology, Georgia State University, PO Box 4010, Atlanta, GA 30302-4010, USA, (404) 651-3058, cderby@gsu.edu, <http://www.gsu.edu/~biocdd>. For applications, see <http://www.bbsr.edu/Education/summercourses/sumemrcourses.html>.

Book Announcement

Bacon, S. P., Fay, R. R., Popper, A. N. (2004) *Compression: From Cochlea to Cochlear Implants*. Springer-Verlag, New York. The mechanical response of the basilar membrane in the cochlea plays a fundamental role in hearing. This volume, #17 in the Springer Handbook of Auditory Research (SHAR) series, discusses the main aspects of cochlear compression, including anatomy and physiology, the perceptual consequences of compression in normal hearing, the effects of hearing loss on compression, and its function in hearing aids and cochlear implants. ♦

Positions available

Assistant or Associate Professor in Neurobiology. The Division of Biological Sciences at the University of Missouri-Columbia (www.biology.missouri.edu), USA, seeks a tenure-track assistant or associate professor who studies behaviorally-relevant neural components and networks in motor and/or sensory systems. MU features a strong Interdisciplinary Neuroscience Program (<http://www.neurosci.missouri.edu>) and a major new Life Sciences initiative. We offer highly competitive salaries, start-up packages, research laboratories and support facilities. *We are firmly committed to fostering ethnic, racial, and gender diversity in our faculty and thus strongly encourage applications from women and minorities.* Send applications by e-mail to: neuro@missouri.edu. Attach a PDF document that includes a vita and statement of research and teaching interests. Mail three letters of reference to: John David, 105 Tucker Hall, Univ. of Missouri, Columbia MO 65211. Application review begins December 1, 2003, and continues until the position is filled. MU is an Equal Opportunity-Affirmative Action Employer. ♦

Assistant Professor in Genetics of Neural Systems and Behavior. We invite applications for a tenure-track Assistant Professor appointment in the Division of Biology at the California Institute of Technology (USA). We are seeking highly qualified candidates who are committed to a career in research and teaching. The applicant should conduct research at the interface of

molecular biology and systems neuroscience aimed at understanding neural circuits and the control of behavior. We encourage applications from individuals working on vertebrate or invertebrate systems. The initial appointment term is four years, and appointment is contingent upon completion of all the requirements for a Ph.D. The California Institute of Technology is an affirmative action/equal opportunity employer. Women, minorities, veterans and disabled persons are encouraged to apply. Applicants should submit a CV, list of publications, a brief statement of research interests and teaching experience, and arrange for three letters of recommendation to be sent to: Chair of Genetics of Neural Systems and Behavior Search, Division of Biology 216-76, California Institute of Technology, Pasadena, CA 91125, USA. ♦

Postdoctoral position available in beautiful New Zealand for a neuroethologist interested in working on the relation between reproductive behavior and singing in songbirds. The position is funded by a grant from the Marsden Fund of New Zealand to Dr. Martin Wild, Department of Anatomy, University of Auckland, and is available for one year in the first instance, with a possible extension to further years. Start date is negotiable, but preferably earlier (e.g., early 2004) rather than later. The project entails behavioral, neuroanatomical, neuroendocrine and electrophysiological studies. Experience in confocal and electron microscopy would be an advantage. Please email expressions of interest to jm.wild@auckland.ac.nz. ♦

Postdoctoral research and research/teaching positions at Columbia University, in New York City, USA. Several sorts of postdoctoral positions are available in the laboratory of Darcy Kelley as of July 1, 2004. Current research focuses on the neurobiology of male and female vocal communication (see <http://www.columbia.edu/cu/biology/faculty/kelley/index.html>). Postdoctoral training can focus entirely on research or be combined with training in undergraduate instruction through programs supported by the HHMI and by Columbia University. For information, e-mail Darcy Kelley (dbk3@columbia.edu). ♦

Material for Future ISN Newsletters

We welcome material for future newsletters in a number of categories. Advertisements for positions are limited to 150 words. Announcements of new books (copyright 2003 or later) *written or edited by ISN members* should include the full citation information (including ISBN) plus a 40-50 word description of the book (note: if an ISN member contributes only a chapter to a book it is not appropriate for inclusion in the newsletter).

We also welcome announcements of courses and future meetings, reports on recent meetings, discussions

of research areas or topics of interest to neuroethologists, laboratory profiles, editorials, and memorials. Word limits depend on the type of article. Have an idea for an article that you or someone else would write? Contact the Secretary!

All material must be submitted electronically, preferably as a file attached to an e-mail message. Send queries or submissions to Janis Weeks (weeks@uoneuro.uoregon.edu). The deadline for the March issue is **February 15, 2004**. ♦

Add our link to your website!

Adding a link to ISN (<http://neuroethology.org>) on your website will help raise our profile in the scientific community. ♦

Did you know.....? More Facts about Denmark, Site of our 2004 Congress

- Median age (years): male, 38.1; female, 40.1 (2002)
- Only bordering country: Germany
- Suffrage: 18 years of age, universal
- Chief of state: Queen Margrethe II (since January, 1972)
- Number of airports: 104
- Number of airports with paved runways: 28 (2002)
- Radio broadcast stations: AM 2, FM 355, shortwave 0 (1998)
- Population that lives in the greater Copenhagen area: about 25%
- Electricity produced by nuclear power: 0%
- Unemployment rate: 5.1% (2002)

From *The World Factbook*, 2003 ♦



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