

Two Best Paper Awards Presented to BEACONites at GECCO 2014

BEACON members attended the Genetic and Evolutionary Computation Conference (GECCO) in Vancouver, Canada to present their work. In total BEACONites gave 18 presentations, three of which were nominated for best paper. To be nominated, a paper must be recommended by anonymous reviewers, with at most two papers from each track receiving nominations from the track chairs. Below is the praise given to each nominated BEACON paper:

"Parameter-less Population Pyramid" by Brian W. Goldman and William F. Punch

"The paper is a new approach on the old problem of designing a genetic algorithm that gets rid of the problem of finding appropriate parameter setting. The new algorithm shows very impressive performance on a range of different test problems and in comparison with a number of competing algorithms. Among the strengths of the paper are presenting the algorithm together with a thorough empirical evaluation and theoretical analysis." - Genetic Algorithms Track Chairs

"Evolving Multimodal Behavior With Modular Neural Networks in Ms. Pac-Man" by Jacob Schrum and Risto Miikkulainen

"This paper convincingly shows not only that Ms. Pac-Man is a multimodal problem, but also that this can be solved with a modular neural network and that the task decomposition can be found automatically through evolution. These results are important both for the study of modular neural networks, and for the development of high-performing game and robot controllers." - Digital Entertainment and Arts Track Chair.

"Overcoming Deception in Evolution of Cognitive Behavior" by Joel Lehman and Risto Miikkulainen

"The paper was recognized by reviewers for revealing a potentially important insight into the conditions



Top: Brian W. Goldman received Best Paper in the GA Track.
Bottom: Jacob Schrum and Risto Miikkulainen won for the Digital Entertainment and Arts Track.

that lead to the evolution of cognitive-level behavior. In short, objective-driven or goal-oriented fitness functions may be less effective than more open-ended evolution for achieving cognitive capabilities. The reviewers' comments stand for themselves: 'A truly excellent paper.' 'Really cool paper.' 'A very good work on an important topic.'" - Artificial Life, Robotics, and Evolvable Hardware Track Chairs.

The nominees presented their work to GECCO attendees, who then voted for the winners. Of the three BEACON nominations, we are proud to announce that two, "Parameter-less Population Pyramid" and "Evolving Multimodal Behavior With Modular Neural Networks in Ms. Pac-Man," were awarded Best Paper. Congratulations to Brian, Bill, Jacob, and Risto.

SUMMER RESEARCH OPPORTUNITIES PROGRAM FOR UNDERGRADUATES

Michael Miyagi

The University of Texas at Austin, Mathematics & Biology

Using Avida to investigate the negative trend between per-site mutation rate and genome length observed in nature.

"While I have always loved scientific inquiry, coming here has helped me affirm that I really enjoy thinking about novel concepts, which is an urge that is hard to satisfy anywhere but in research."

Daniel Claiborne
Michigan State University, Zoology

Studying the social hierarchy of the spotted hyena by calculating the rank of individuals within the Talek clan based on agonistic behaviors to quantify steepness of the social hierarchy.

"The seminars provided to the students helped to demystify the application process along with exposure to the research projects being done here."

Carla Jones
North Carolina A&T State University, Biology

Testing whether fruit flies respond to the olfactory cues of jumping spiders

"BEACON-SROP has provided me with the opportunity to engage in interdisciplinary research and gain exposure to other fields."

Hervé Nonga

Michigan State University, Neuroscience

Evolving and maintaining *E. coli* bacterium cultures under silver nanoparticle treatments for qualitative results to determine the resistance of *E. coli* to silver nanoparticle antimicrobials.

"Being able to work with scientists across numerous disciplines, observe their methods and understand the unique applications of their work has impacted my decision to pursue a graduate degree extensively."

Tracey Jabbour
Michigan State University, Mathematics & Statistics

Studying the application of Markov Brains on consumer decision funnels for General Motors.

"I applied to BEACON because of its well-known reputation and the opportunity to expand my knowledge of mathematics to evolutionary science."

BRIDGING GAME THEORY AND ZOOLOGY THROUGH INTERDISCIPLINARY COLLABORATION

Evolution 2014 Poster

BEACONites Masoud Mirmomeni, Dr. Arend Hintze, Eli Strauss and Dr. Chris Adami recently presented a poster at the Evolution 2014 conference that represents interdisciplinary collaboration at its best. The poster, “Modeling all or nothing behavior in social animals,” highlighted two new extensions to the “Public Goods” (PG) game that are based on behaviors observed in groups of hyenas.

The classic models of cooperation lend cooperators to be highly vulnerable to selfish individuals. Yet in nature we see many animals have evolved cooperation behaviors. A good example would be the group hunting behaviors of hyenas being studied by Strauss.

After noting that there was no existing model that accurately modeled this group hunting behavior, members of the Adami lab and Strauss teamed up to develop one. The result was Mirmomeni developing two new extensions to the PG game that tied in to the system at hand.

The first, “Solitary Hunter,” rewarded individuals who killed their prey alone, and those who worked in groups lost fitness proportionally to group size. The study found that this reward system made individuals go after small prey items, while cooperation was used for larger kills.

The second, “Full Cooperation,” rewarded cooperation proportional to group size, and punished predators who worked alone. This encouraged large concentration of cooperation and showed a direct correlation between cooperation concentration and evolutionarily stable stratagem rates.

Both these systems are present in hyena groups. The models could



Masoud Mirmomeni and his collaborators extended the public goods game to model Hyena behaviors.

not have been developed without the ongoing feedback provided by Strauss’ observations. Mirmomeni and Adami credited the interdisciplinary interaction for the group’s ability to develop models that mimic nature so closely.

“A lot of computer science models are based on what the programmers think will happen, but they are often wrong,” says Adami. “We can call the people watching the behaviors and verify the results we get.”

BEACON provides its members an unique ability to interact between fields, and this team of researchers have done an excellent job of proving just how rewarding the practice can be!

BEACON CONGRESS ‘14: LOTS TO SEE & DO

This year’s Congress will take place August 17-19, with a special students & postdocs only day on August 16. The program will feature contributed talks and posters in many areas, including Selection & Speciation; Molecular Evolution; Communication, Cooperation, & Intelligence; Teaching Evolution; and Synthetic Biology & Evolution.

We will also offer several “Sandbox Sessions” designed to brainstorm Grand Challenges in our fields and ways to tackle them, including Evolutionary Computation Beyond Academia, Major Transitions in Evolution, Evolution of Intelligence, Priorities in Evolution Education, and more.

We’ve also got tutorials and workshops on topics ranging



from social media to responsible conduct of research to ways to increase your broader impacts. See you there!

CONGRATULATIONS, BEACONITES!

Celebrating recent efforts around BEACON

Awards:

Emily Dolson was awarded a National Science Foundation Graduate Research Fellowship.

Publications:

Erik Fredericks, et al. published “Towards Runtime Adaptation of Test Cases for Self-Adaptive Systems in the Face of Uncertainty” in *Symposium on Software Engineering for Adaptive and Self-Managing Systems*.

Brian Goldman, et al. won best paper in Genetic Algorithms Track at GECCO ‘14 with “Parameterless Population Pyramid.”

“Evolving Multimodal Behavior With Modular Neural Networks in Ms. Pac-Man,” by Jacob

Schrum took home best paper in the Digital Entertainment and Arts Track at GECCO ‘14.

Terence Soule, et al. was accepted into GECCO ‘14 for the paper “Evolution of Communication and Cooperation.”

Sam Chapman published “The bustle of bioinformatics: Cloudy with a Chance for Big Data” in *International Workshop on Big Data Analytics for Predictive Organization and Big Transformations*.

Conference Talks:

Zachary David Blount, Kiyana Weatherspoon, Maia Rowles, Erik Quandt, Richard Lenski, SMBE 2014, San Juan, Puerto Rico, Ecological Specialization and Incipient Speciation in an Experimental Population of E. coli.

AROUND EVOLUTION ‘14 WITH BEACON



Left: Amy Lark teaches a fellow attendee Avida-ED during down time at the Evolution Conference. *Above:* The BEACON booth attracted many visitors during the festivities.

CURIOS ABOUT SUBMITTING CONTENT?



New to BEACON? Veteran BEACONite? Here's how to submit possible content to the newsletter:

1. Do what you're already doing: Log into the BEACON Intranet (accessible through the BEACON site: <http://beacon-center.org>, at the “For Current Members” tab.) Then go to the “Outputs and Activities” tab at the top banner, and fill in information

about your papers published, grants received, etc. New entries will be flagged automatically.

2. Tweet about it. Tweet about what you'd like to cover as it happens to @BEACON_Center with the hashtag #news. We'll see it, and so will others!
3. Email content directly. Please email leighs@msu.edu if you've got content you'd like to highlight that doesn't fit into the website categories.