

Pitch to publication

Moving Forwards by Tweaks and Bounds

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Elena spoke to Cultured Scene about the first paper from her PhD, which is currently under review.

The paper

Cultured Scene: Tell us about your paper – what are the key findings?

Elena Miu: This is the first paper that came out of my PhD, which has been 4 years in the making, and it just recently came back from review (it's not published yet). My PhD was mainly concerned with cumulative cultural evolution, and in this paper we studied its dynamics using a large-scale dataset from online collaborative programming competitions organised by MATLAB. Each contest consisted of participants trying to solve computer science problems while having full access to each other's solutions. Within each contest population performance increased over time through many 'tweaks' of the current best entry and rare innovative 'leaps', which were associated with either big improvements or large failures.

We show that this process of cumulative culture reduced technological diversity over time, as individuals focused on refining high-performing solutions, and that while individual entries borrow from few sources, repeated copying drives populations to integrate ideas from many sources, showing a type of collective intelligence. This work has obvious implications for the field of cultural evolution and trying to understand the question of human uniqueness, but also speaks about collective improvement and technological progress.

The process

CS: How did this paper get made? Where did the original idea for the study come from, and were there any challenges along the way?

EM: This paper, rather unconventionally, started with a dataset. Cumulative culture is a long-term, complex process, and, understandably, much of the experimental work addressing this question used simple tasks in the lab. Our dataset, though, was a lucky find that perfectly encapsulates realistic, large-scale microcosms of cumulative culture. Much of the challenge, then, was not data collection, but trying to organise and make sense of what we were looking at. More data is a great thing, but you quickly tend to forget that when you're trying to decide which of the 10 really cool hypotheses you came up with you should test in the time you have left until your PhD stipend runs out (or when you're trying a load all that data in R!). We ended up extracting some really interesting points though, and it's been a good exercise in patience and discipline (much of that honed through learning Bayesian statistics over the internet). That being said, I've had a lot of fun getting to know my participants retrospectively through online forum discussions, and I've learned much more than I thought I would about data visualisation techniques (colour palettes are important!).

Publishing

CS: The writing and publishing process can be notoriously difficult - how did you find it?

EM: I've always thought that the writing stage, when your results are all spelled out, you've put them in perspective, and everything comes together, is my favourite step of a study. And it still is, but in our case it took a bit longer than I expected because we kept discovering neat analyses we wanted to do, and kept changing our minds about which journal would be a better fit. You learn very quickly that different journals have very different formatting requirements, but that wasn't really an

issue (remember colour palettes?). The best consequence of this long refinement process was that the reviews were not painful to read at all!

What's next?

CS: Will you be following up on this research? How will what you learnt in the process inform your future work? And what big questions do you see on the horizon for cultural evolution as a field?

EM: My current work follows closely from my PhD – I study innovation and cumulative improvement through theoretical and large-scale experimental approaches – so you'll hopefully be seeing more specific, controlled studies from me, complimenting this observational approach. This has definitely been a topsy-turvy ride, but I don't think

I'd change anything about it. I might have a stack of folders full of unproductive analyses, but I've learned from all of the uncertainty, and that's what PhDs are all about.

Looking forward, I'm not going to try to predict where the field is going, but I'm very excited to read Celia Heyes' new book, 'Cognitive Gadgets: The Cultural Evolution of Thinking'. □



Elena Miu studied Linguistics and Artificial Intelligence at the University of Edinburgh, and recently finished a Biology PhD with Luke Rendell at University of St Andrews. She is currently working as a post-doc with

Tom Morgan in the School of Human Evolution and Social Change at Arizona State University.

Wisdom of the Crowd

Our resident Agony Aunt offers guidance on the crucial questions bothering early-career researchers, with additional advice crowd-sourced from Twitter. In this issue:

How to make the most of your first academic conference?

Conferences! Some people love them, some hate them. They can be stressful, exhausting, and expensive. But conferences are also fantastic networking opportunities, provide a chance to present your work to the (potentially) small number of people in the world who are genuinely interested in it, and they can be a lot of fun – especially if you follow this advice!

Making the most of the conference is important – after all, you may well have paid a lot of money to attend, and the conference might only come around every couple of years. My first piece of advice, though, is not to put too much pressure on yourself. It's likely that you won't make it to every talk you want to hear, or that you won't have a chance to talk to every senior academic you're

