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RESEARCH ARTICLE

Multi-scale Inference of Interaction Rules in Animal Groups Using Bayesian Model Selection

Richard P. Mann, Andrea Perna, Daniel Strömbom, Roman Garnett, James E. Herbert-Read, David J. T. Sumpter, Ashley J. W. Ward

Published: January 5, 2012 • https://doi.org/10.1371/journal.pcbi.1002308

Retraction

The authors are retracting this paper. The first author explains the reasons below: A bug was found in the Matlab code used in this study, which resulted in only a small proportion of the full data set being analysed. Where each of 102 experiments should have been down-sampled to half the original size for computational efficiency, instead the number of experiments in the data set was repeatedly halved 102 times, until only one remained. As a consequence of this, our results and conclusions were based on only one experimental study, rather than the 102 reported in the paper. After correcting the bug and reanalyzing the full data set we found that our results had changed significantly, and some of our conclusions were no longer valid. The empirically observed phase transition and collective behaviour remain, as does the observation that

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Retraction: Multi-scale Inference of Interaction Rules in Animal Groups Using

Michael: hey rich

11:45

Michael: it's going ok, I hope
hey are you ready for some news

11:46 **me**: bring it

Michael: dave reckons you only used 1/100th of the data in the .m files you sent us rather than 1/2 as it seems you intended
basically just data from a single trial

me: ...
.....
um, ok

11:47 what leads you/him to this conclusion?

Michael: well, looking at the code
our evidences approximately match yours on the 1/100th dataset

11:48 it's actually good news for us, because running on the whole dataset is crazy slow
which allows us to make the argument that choosing samples is important

me: ok, but how did i manage to only pull out 1/100th?

11:49 is it just 1:100:end?
or are you only goijg on the evidences?

11:50 **Michael**: David: so there is something weird about the scripts we got

it seems like there is a bug that means that only 1/100th of the data is used
14:32
instead of 1/2 like they meant

me: ha

David: lines 12-15 of

logP_mc_...
14:33
so prawn_MC_results_script just hands it these cell arrays

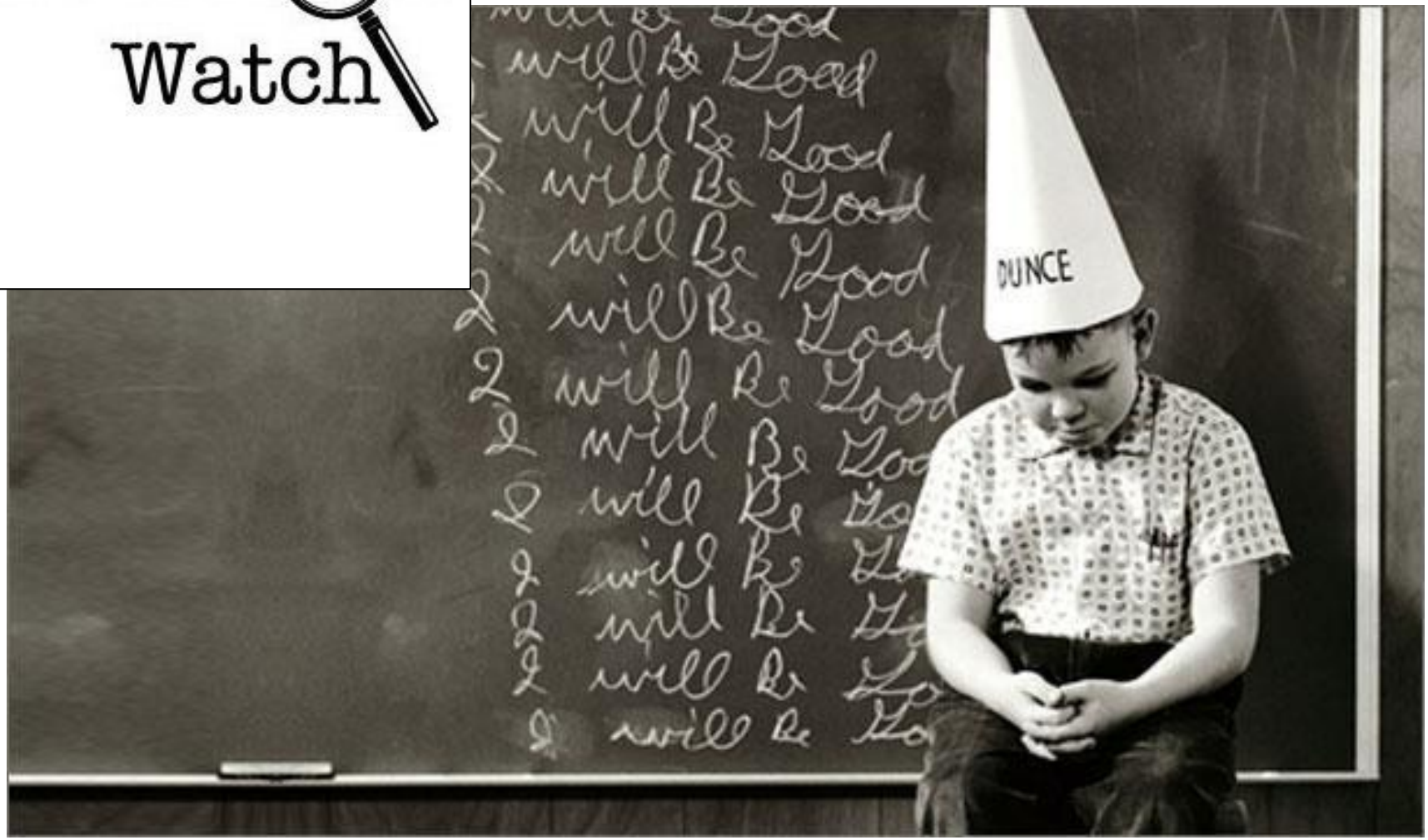
and then it divides them in half 100 times

I think the code is supposed to just take every second row

but it takes every second cell, and does this over and over

Retraction Watch

Expectation



Reality

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Published: March 21, 2013 • https://doi.org/10.1371/journal.pcbi.1002961

Abstract

Inference of interaction rules of animals moving in groups usually relies on an analysis of large scale system behaviour. Models are tuned through repeated simulation until they match the observed behaviour. More recent work has used the fine scale motions of animals to validate and fit the rules of interaction of animals in groups. Here, we use a Bayesian methodology to compare a variety of models to the collective motion of glass prawns (*Paratya australiensis*). We show that these exhibit a stereotypical 'phase transition', whereby an increase in density leads to the onset of collective motion in one direction. We fit models to this data, which range