

# JEDy: A Julia package for Evolutionary Dynamics

Nikolas M. Skoufis  
Supervisor: Julia Garcia

September 10th, 2014

## Objectives

The objectives of this advanced project are to:

- Become familiar with standard methods for studying evolutionary dynamics computationally and analytically
- Become familiar with the Julia [1] language and its use in scientific computing
- Kickstart the development of an open-source package for studying evolutionary dynamics using Julia

## Progress

So far I have been familiarising myself with the Julia language by replicating part of the results of a paper [2] which studies the iterated prisoners dilemma. I have succeeded in reproducing the behavior of the stochastic model (the Moran process) employed in the paper using identical values of the parameters. The code that I have developed should be able to handle matrix games of arbitrary rank (ie. not just the Prisoner's Dilemma). In addition I have written code to determine the transition matrix of the game between various states, and hence the fixation probabilities and stationary distributions for arbitrary simple matrix games.

## Plans

The plan for the rest of the semester is to begin writing the package as soon as possible. This will begin with setting up and familiarising ourselves with a Github repository next week, and then beginning development of the package. Our first task will be to decide on the scope of the package for the remainder of the semester; what functionality we want to provide, what our method signatures are, and which external packages we will rely on.

## Achieving learning outcomes

This project is aiding me in achieving the learning outcomes of FIT1016 by providing me with a structured opportunity to learn the Julia language, the Git version control system, the mathematics of evolutionary dynamics, and the dynamics of working on open source software.

## References

- [1] Jeff Bezanson, Stefan Karpinski, Viral B. Shah, Alan Edelman, *Julia: A Fast Dynamic Language for Technical Computing*. eprint [arXiv:1209.5145](https://arxiv.org/abs/1209.5145), September 2012.
- [2] Lorens A. Imhof, Drew Fudenberg, Martin A. Nowak and Robert M. May, *Evolutionary Cycles of Cooperation and Defection*. PNAS, Vol. 102, No. 31, 2005.