

# Protocol to replicate computational results indicating that wealth homophily facilitates cooperation by using wealth inequality as an information mechanism

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**SUBJECT AREAS**

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*cooperation, social behavior, altruism, computational models, evolutionary game theory*

## Abstract

This protocol presents replication materials for the article "Inequality as information: Wealth homophily facilitates the evolution of cooperation" (Scientific Reports, SREP-18-17837-T, 10.1038/s41598-018-30052-1, <http://www.nature.com/articles/s41598-018-30052-1>). The replication materials consist of computer code to replicate both the simulations and statistical analyses reported in the article, as well as data produced by the simulations reported in the article.

## Introduction

In our article, "Inequality as information: Wealth homophily facilitates the evolution of cooperation," we report findings from computer simulations that study an evolutionary game theory model across various parameter settings. The simulation was written in Python and we include that computer code with this protocol. Files containing Python code are named such that users can readily discern their relationship to results reported in the article. The simulation produced data that we analyzed using the statistical programming language R; the materials associated with this protocol include those data and the R code used to analyze them. In our R code, we provide excerpts from the main text of the article to indicate the relationship between sections of the computer code and results reported in the manuscript. Also, the names of data files imported and analyzed in the R code are consistent with the names of the data files associated with this protocol, thus allowing users to identify the data files that were used in each portion of the analyses. Together, these materials facilitate the replication of results reported in the article.

## Reagents

Not applicable.

## Equipment

-Python Programming Language

-R Programming Language

## Procedure

To replicate our work, the following general steps should be taken. These steps assume that researchers have Python and R programming environments downloaded and running on their systems. Furthermore, these steps assume that researchers have downloaded all attachments associated with this protocol (see attached zip files) and have extracted the files from those

attachments to a single local repository on their computer systems (e.g., a single file location).

I. To perform simulations:

1. Open Python computer code.
2. Replace file directories in Python code to local directories on your system.
3. Run Python code.

II. To replicate statistical analyses:

1. Download all data sets associated with this protocol.
2. Open R code.
3. Replace file directories in R code to the local directories in which data were downloaded in Step 1.
4. Run R code.

## Anticipated Results

Results from the simulation and its associated analyses can be found in:

“Inequality as information: Wealth homophily facilitates the evolution of cooperation” (SREP-18-17837-T)

DOI: 10.1038/s41598-018-30052-1

[www.nature.com/articles/s41598-018-30052-1](http://www.nature.com/articles/s41598-018-30052-1)

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_1.zip  
Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_2.zip  
Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_3.zip  
Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_4.zip  
Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_5.zip  
Johnson\_Smirnov\_2018\_Information\_as\_Inequality\_Replication\_Protocol\_6.zip

**Inequality as information: Wealth homophily facilitates the evolution of cooperation**

by Tim Johnson and Oleg Smirnov

Scientific Reports (01 August, 2018)

