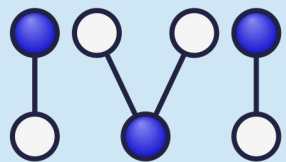


Using iPlant's Discovery Environment to model emotional interaction

Andrew Predoehl, 7 November 2014



**Interdisciplinary
Visual Intelligence
Laboratory**



“Who is iPlant? What's the Discovery Environment?”

- **iPlant** – NSF-funded “cyberinfrastructure for life sciences research”
- Goal: “democratize access to U.S. supercomputing capabilities.”
- Founded 2008 for plant scientists
- Now supports a variety of research
- Free (please cite!) – sign up at iplantc.org.
- <http://www.youtube.com/watch?v=If6MsFoze3I>

“Who is iPlant? What's the Discovery Environment?”

- ***Data Store***, cloud storage to keep and share your files
- ***Discovery Environment***, a platform for web-accessible high-performance computing
- and much more!



“Who is iPlant? What's the Discovery Environment?”

The screenshot displays a desktop environment with a blue mountain wallpaper. A Chromium Web Browser window is open, showing the iPlant Discovery Environment interface. The browser address bar displays <https://de.iplantcollaborative.org/de/>. The interface includes a navigation sidebar on the left with icons for Data, Apps, and Analyses. The main content area is divided into three panels: 'Data: tes_data', 'Apps', and 'Analyses'. The 'Analyses' panel is active, showing a table of analysis jobs.

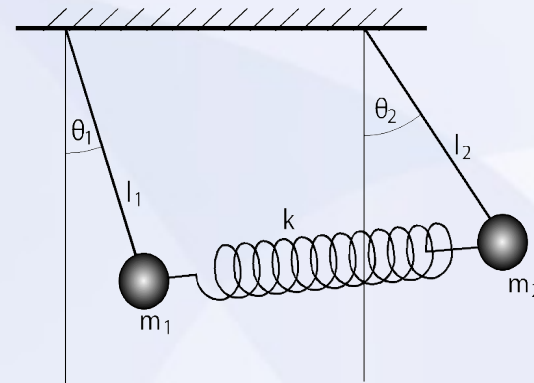
| Name | App | Start Date | End Date | Status |
|--------------------------------|----------------------|----------------------|----------------------|-----------|
| TIES baseline 1 - average... | TIES baseline 1 ... | 2014 Oct 27 22:28:50 | 2014 Oct 27 22:32:56 | Completed |
| TIES baseline 1 - average... | TIES baseline 1 ... | 2014 Oct 27 22:28:20 | 2014 Oct 27 22:32:56 | Completed |
| TIES baseline 1 - average... | TIES baseline 1 ... | 2014 Oct 27 22:27:39 | 2014 Oct 27 22:31:33 | Completed |
| TIES step 1 - pa... | TIES step 1 - pa... | 2014 Oct 27 20:25:30 | 2014 Oct 27 20:26:59 | Completed |
| TIES step 1 - pa... | TIES step 1 - pa... | 2014 Oct 27 20:08:41 | 2014 Oct 27 20:10:47 | Completed |
| TIES step 1 - pa... | TIES step 1 - pa... | 2014 Oct 27 20:07:50 | 2014 Oct 27 20:09:54 | Completed |
| TIES step 1 - pa... | TIES step 1 - pa... | 2014 Oct 27 20:07:00 | 2014 Oct 27 20:09:00 | Completed |
| TIES step 1 - parse input C... | TIES step 1 - pa... | 2014 Oct 27 15:43:55 | 2014 Oct 27 15:45:33 | Completed |
| TIES step 1 - parse input C... | TIES step 1 - pa... | 2014 Oct 27 15:42:31 | 2014 Oct 27 15:43:17 | Failed |
| tes cross-validation help a... | tes cross-validat... | 2014 Oct 23 20:09:19 | 2014 Oct 23 20:11:52 | Completed |

TIES Modeling: Couples

- Temporal Interpersonal Emotion Systems
- Data: time-varying, observed from m&f couples (two people in a relationship)
- Model it with a “coupled oscillator.”



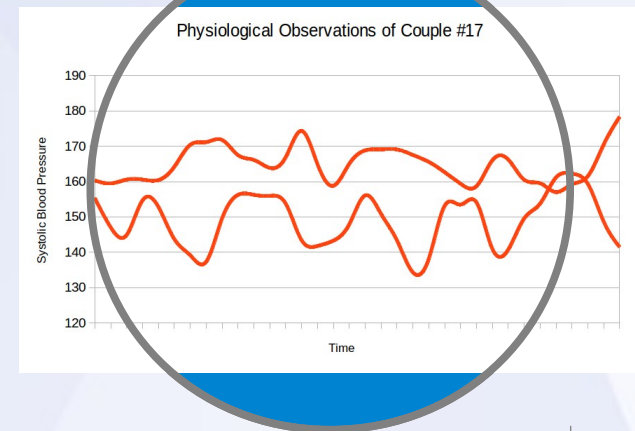
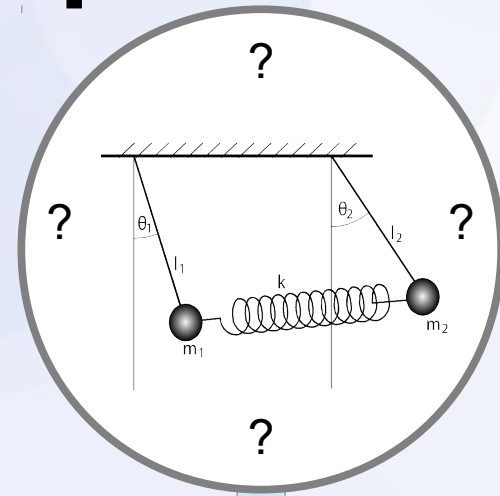
≈



Reed, Butler, and Barnard, *Emotion* (in press) 5

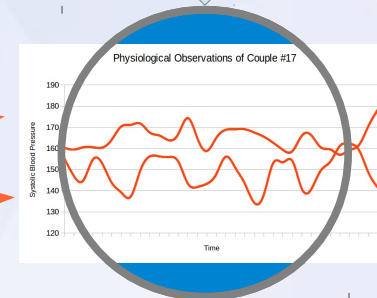
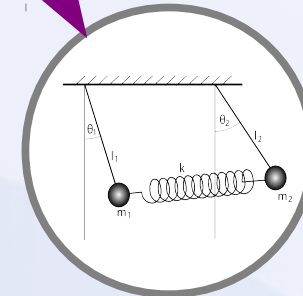
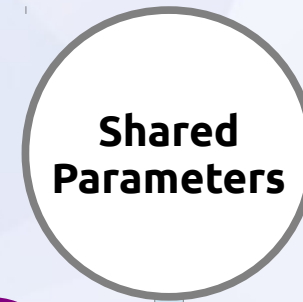
TIES Modeling: Couples

- Data: time-varying, observed from two people in a relationship
- Model with a latent “coupled oscillator.”
- Overfitting



TIES Modeling: Couples

- Shared parameters
- May also consider static *moderators*
- They “generate” the coupled oscillator parameters
- ... that “generate” the time-varying observable data



Modeling Decisions:

- **Observables** – what empirical, time-varying data should our model explain?
- *Examples: respiration rate, blood pressure*

Observables, observables, observables, observables, observables!

- **Moderators** – what constant factors should influence the model?
- *Examples: Body-mass index, age*
- and many more!

Formatting Your Input

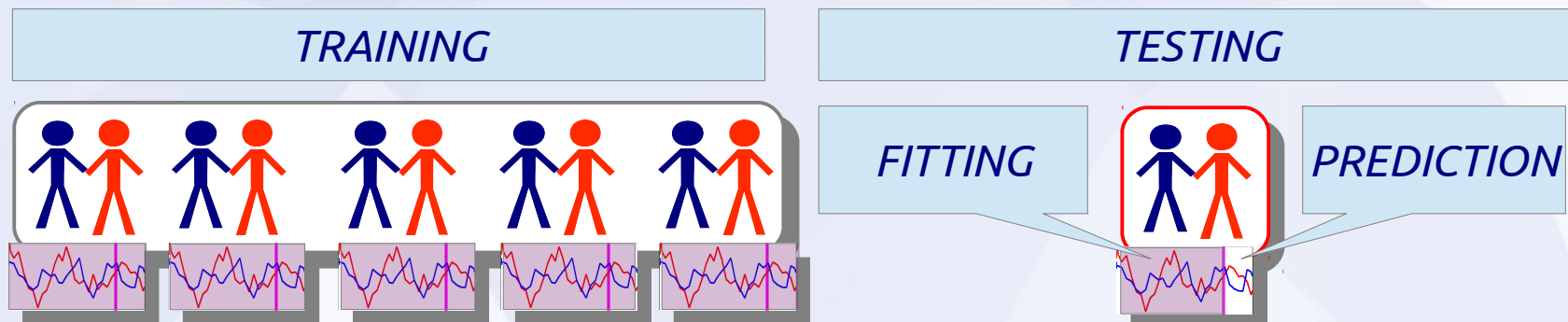
- Use CSV format
- First row contains text column labels. Rows below are all numbers.
- Required column names: Dyad and time
- Other required columns: each named moderator and observable, and a “distinguisher” 0-1 category
- Holes in your data? OK. (Blank or NA)
- In case of failure, see logs/condor-stderr-0

TIES Basic Complete Run

- DE app, fits full coupled oscillator model.
- One optional moderator allowed.
- One observable variable (required).
- Other modeling decisions: pre-set.
- Training and testing with cross-validation.
- Three baseline models for comparison.
- A work in progress. (Plots coming soon.)

TIES Basic Complete Run

- Each model (full C.O. and baselines) has
 - *errors/err_couples.txt*, RMS fit errors per dyad
 - *errors/err_summary.txt*, mean RMS fit errors
- Folder of full model: *shared-param-CLO* ★
- Baselines: *average_OBS*, *line_OBS*, *individual-CLO*.
- Recall the double partition:



Advanced TIES

- Future work
- More flexibility than the Basic app:
 - multiple moderators, observables
 - more control over details (ask at poster)
- Train on all of today's data, test with tomorrow's.
- When using moderators, provide simulated output for hypothetical 1st, 3rd quartile participants.

Roll Your Own App

- For the advanced user: you can share your computational modeling software via DE.
- DE Apps are based on DE Tools.
- Easy and quick to create a new App.
- Creating a new Tool takes more effort.
- R, Matlab, Perl, Python, Bash, C, C++
- DE Workflow: linear chain of Apps

Summary

- iPlant: computing resources for science, both data-storage and computation
- TIES: modeling dyadic emotional interaction, using a coupled oscillator “generated” by shared parameters.
<http://www.compties.org/>
- Discovery Environment: a platform for scientific computation, running the TIES oscillator model. You can use it too!
<http://de.iplantc.org/>

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- iPlant: *Nirav Merchant, Martha Narro.*

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URL: www.iplantcollaborative.org