

Daniel M. Drucker, Ph.D. <dmd@3e.org>
Unix, Python, ETL, human factors, neuroimaging, robots, data analysis.

<http://3e.org>
Boston.

EMPLOYMENT **Ab Initio Software** Lexington, MA 2016 –
Internal Consultant

- Support clients, including 46 of the Fortune 50, in their use of the Ab Initio ETL software and its underlying systems.
- Build software solutions on Linux, Solaris, and AIX ranging from low-level system utilities to high-performance data processing engines operating over data warehouse systems spanning tens of thousands of database tables and hundreds of petabytes of data.
- Implement systems to provide data lineage traceability and provide build systems that supply reproducible reporting to end users.
- Teach internal classes in the use of our technologies, and develop additional teaching materials to enhance existing classes.
- Started and manage a lecture series, “Brainfood”, wherein my coworkers present interesting scientific concepts, their thesis work, or anything else they find fascinating. There have been 14 lectures to date, including topics ranging from “General Anesthesia Makes No Sense” and “Nuclear Research Reactors” to “Universal Categories and Sign Theory” and “Galaxy Cluster Mergers”. Arrange professional film crew coverage of these events.
- Manage and help develop the internal proprietary Help system as well as its open source (nginx and Tomcat) components.
- Develop and maintain internal-facing dashboards, both web-based and using custom designed hardware based on the Raspberry Pi and Arduino platforms, which help teams visualize the current support workload and notify responsible parties of new work.

Harvard, McLean Hospital Belmont, MA 2015 –
Volunteer Visiting Scientist/Developer

- Occasionally assist researchers with data analysis and software toolchain development.
- Study researchers’ workflows and suggest and implement improvements.
- Help refactor and extend “Stabilitycalc”, a suite of Python tools used to monitor the stability of the McLean fMRI systems.
- Help researchers with programming against public APIs like that of FitBit.

Interactive Motion Technologies Watertown, MA 2012 – 2016
Scientist, Software Architect

- Developed software (Python, bash, Tcl/Tk, and C, on Linux) for FDA and CE certified robots that assist stroke and other patients with rehabilitation.
- Worked with clinical staff to design research-based treatment protocols and translate these into products.
- Made sure the robots followed Asimov’s First Law of Robotics by implementing multiple redundant safety systems including software and hardware based power-off systems triggering on logical, electrical, and mechanical faults, with hard real time (<1 ms) decision time requirements.
- Rewrote tens of thousands of lines of legacy Tcl/Tk code in (much less) Python
- Developed software in C for an Atmel microcontroller, replacing the PLC in a new product line
- Developed robot mechanical dynamics simulations in Jupyter/IPython Notebook
- Rewrote the central Xenomai-based real-time robot control loop to use a CANbus architecture
- Redesigned software deployment mechanism, which had been based mostly on manual instructions and loose collections of shell scripts, to use modern Debian packages and containerization
- Mentored junior programmers and interns

Design Science / Core HF Philadelphia, PA 2010 – 2012
Usability Specialist

- Focused on heuristic analysis, usability testing, statistics, data analysis, and background research in the service of medical device usability and safety, including human factors testing for regulatory approval.
- Specialized in applying principles of human psychology and cognitive performance to improving usability.

- I remain on staff as a consultant to Core HF.

AT&T Easylink, TransactPlus/JP Morgan, Bristol-Myers Squibb

1999 – 2002

Lead, Network Operations; Systems Analyst

At these three positions:

- Developed tools in Perl and shell to monitor Unix systems and networks.
- Supported Unix systems providing financial and other messaging services to 100,000+ customers in a high availability environment.
- Mentored other programmers.

Created formal documentation of procedures that had previously been passed down orally.

EDUCATION

University of Pennsylvania

M.A. 2006; Ph.D. 2009, Psychology (cognitive neuroscience).

Thesis: Neural Object Representation Spaces and their Metric Properties

Advisor: Geoffrey Aguirre, M.D., Ph.D.

I showed a new method of computationally modeling and analyzing functional neuroimaging data using multidimensional scaling-like methods, allowing researchers for the first time to detect certain very small-scale properties of neural populations using non-invasive techniques such as fMRI and EEG. Code (primarily Matlab) written for my dissertation is available at github.com/dmd/thesis. This work was published in the two first-author papers below.

- This work was supported by a NIMH predoctoral fellowship: “Training Program in Behavioral and Cognitive Neuroscience” (T. Abel, PI, T32-MH 017168).

I wrote tools in Python and Matlab to manage long-running computation jobs and the operation of the Penn Center for Functional Neuroimaging cluster, and created a calendaring system, still in use, to manage MRI reservations with complex business process requirements.

I additionally took coursework in the theory of human decision-making: the science of how and why people and organizations make mistakes, and how to overcome these mistakes and make rational decisions instead.

I am especially interested in how large quantities of information can be transformed in ways that allow people to quickly and accurately make decisions – whether that be by making computational tools to automate procedures so people can focus on higher-level concepts, or making simulations of large systems and datasets to help quantify how a particular experiment or change in behavior will turn out.

Rutgers University

B.A., 2002, Psychology; Certificate in Cognitive Science

RESEARCH

Drucker DM, Kerr WT, Aguirre GK. 2009. *Distinguishing conjoint and independent neural tuning for stimulus features with fMRI adaptation.* J Neurophysiology. DOI: 10.1152/jn.91306.2008

- This paper received a “must read” review from the Faculty of 1000 (Biology).

Drucker DM, Aguirre GK. 2009. *Different spatial scales of shape similarity representation in lateral and ventral LOC.* Cerebral Cortex. DOI: 10.1093/cercor/bhn244

Yee E, Drucker DM, Thompson-Schill SL. 2010. fMRI-adaptation evidence of overlapping neural representations for objects related in function or manipulation. Neuroimage. DOI: 10.1016/j.neuroimage.2009.12.036

I presented the above research at the following meetings:

- Cognitive Neuroscience Society
 - An fMRI-adaption investigation of semantic priming. 2006.
- Society for Neuroscience
 - Focal and distributed representation of two-dimensional object form. 2007.
 - Integral versus separable perceptual dimensional pairs are reflected in conjoint versus independent neural populations. 2008.
- Vision Sciences Society

- Cortical representation of texture and scale studied with fMRI. 2008.
- fMRI used to distinguish conjoint and independent representation of perceptual axes. 2008.
- Integral versus separable perceptual dimensional pairs are reflected in conjoint versus independent neural populations. 2009.
- Penn-Princeton Behavioral Neuroscience Retreat
 - Distinguishing conjoint and independent neural representation of stimulus features using fMRI. 2008.

Wilcox SB, Drucker DM. 2012. Implications of the new Food and Drug Administration draft guidance on human factors engineering for diabetes device manufacturers. Journal of diabetes science and technology. DOI: 10.1177/193229681200600203

*RESEARCH
ASSISTANT-
SHIPS*

- At Rutgers:
 - Summer 2000: I wrote code in Perl for the Stromswold lab at the RuCCS to process CHILDES data.
- At Penn:
 - 2003-2004: I was a research assistant in the Thompson-Schill lab at the Center for Cognitive Neuroscience. I mainly did independent research and readings in perception and categorization, which eventually led to my Masters' thesis.
 - 2004: I was a research assistant in the Kurzban Lab in the Department of Psychology, managing experiments and running subjects as well as maintaining the Lab's computers.

EXTRAS

I am a licensed pilot and fly small sport aircraft; I contribute to numerous open source projects, submitting patches and participating in mainline development; I contradance and participate in other folk music events.

I have managed my own mail and other network services on Linux at 3e.org for more than 20 years. I have been using, programming, and administering Unix since 1991.