

# CURRICULUM VITAE

## Personal

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## Education

- 2002 – present      **Ph.D. candidate** in Neuroscience, Baylor College of Medicine, Houston, Texas, USA
- 2000 – 2002      **M.S.** in Ecology, with minor in Statistics, University of Tennessee at Knoxville, Tennessee, USA
- 1996 – 2000      **B.S.** in Biochemistry & Molecular Biology, Peking University, Beijing, China
- 1996 – 2000      The Honor Science Program, a counterpart of minor in Mathematics and Physics, Peking University, China
- 2000      The 5<sup>th</sup> course on Theoretical Ecology, International Center for Theoretical Physics, Trieste, Italy

## Skills

Experienced in fMRI experiment design and data analysis; MatLab and SPM (author of [xjView](#), a widely-used viewing program for SPM); C/C++ (author of BatCount, a program to analyze bat calls), PHP, MySQL and Perl (author of [xbrain.org](#), an online brain function database); Macromedia Flash; Scientific Notebook; LaTeX; JMP

Experienced in Windows, Linux and PBS cluster.

Good at mathematics and physics.

Also have experience in electrophysiology (intra- and extra-cellular recording), histochemistry, DNA electrophoresis, *in situ* hybridization.

## Publication

**Cui, X.**, Jeter, C.B., Yang, D., Montague, P.R., and Eagleman, D.M. (2007) Vividness of mental imagery: individual variability can be measured objectively. *Vision Research* 47, 474-478

Fisher, R.E., Harvey, A.H., Li, J., **Cui, X.**, McClure, S.M., and Montague, P.R. (2007) Comparing Pepsi and Picasso: Neural responses underlying preference and familiarity of diverse rewarding stimuli. In submission

Stetson, C., **Cui, X.\***, Montague, P.R., and Eagleman, D.M. (2006). Motor-sensory recalibration leads to an illusory reversal of action and sensation. *Neuron* 5, 651-659.

**\*parallel first author**

Li, D.H., Yang, X., **Cui, X.**, Cui, K.M., Li, Z.L., and Lee, C.L. (2002). Early development of pollen chamber in *Ginkgo biloba* ovule. *Acta Bot. Sin.* 7, 757-763.

**Cui, X.** (2002). M.S. thesis: Time series analysis of bat ultrasound signals

**Cui, X.** (2000). B.S. thesis: Cellular mechanism underlying the formation of pollen chamber in *ginkgo biloba*

### **Research Experience**

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|----------------|---|
| 2006           | Study the neural signal of waiting (to react) in a simple reaction task using fMRI.   |
| 2003 – present | Study temporal perception (especially temporal order judgment) of human using fMRI and psychophysics. We found an illusion where subjects perceive flash occurred before keypress while in reality it occurred after. Based on the neural signature of this illusion we concluded that there are multiple time representations in the brain. Collaborate with Chess Stetson and supervised under David Eagleman and P. Read Montague. |
| 2006           | Derive the mathematical formula of hyperbolic temporal discounting (e.g. human prefer \$10 now than \$10 a month later) from Weber's law of perception of value and time.   |
| 2005 – 2006    | Use reinforcement learning model (Q-learning) to explain the behavior of human subjects in the multi-round trust game. Supervised under P. Read Montague.   |
| 2006           | Study the relationship among imagery vividness, a color-naming behavior task, and the visual cortex activity using fMRI and psychophysics. Collaborate with Cameron Jeter and Dongni Yang and supervised under David Eagleman and P. Read Montague.   |
| 2005           | Participate in the “art” project to investigate the relationship between ventromedial prefrontal cortex activity and familiarity and liking using fMRI. Collaborate with Ann Harvey, Jian Li, Samuel McClure and supervised under Ronald Fisher and P. Read Montague.   |

- 2005 Study behaviorally how temporal uncertainty influence human's preference over a reward at a fixed delay and the same reward at a random delay. Supervised under P. Read Montague.
- 2004 – 2005 Study the relationship between quantum uncertainty and statistical mechanical entropy, the scaling invariance of quantum uncertainty, the relativistic invariance of entropy.
- 2004 Study quantitatively how spikes are transformed to dopamine release using a dopamine release model (implemented in C++).
- 2003 Study how the change of cleft calcium concentration can carry information from presynaptic neuron to postsynaptic neuron (simulation in MatLab)
- 2003 Study the relationship among the amplitude of action potentials, the information transmission rate, and the energy cost using a communication channel model. I concluded that amplitude of ~100mV maximizes the information per energy cost.
- 2002 Study the firing of locust DCMD neuron under motion threat using extracellular recording. Supervised under Fabrizio Gabbiani.
- 2001 – 2002 ([Master thesis](#)) Analyze the time series of bat ultrasound signals. I also wrote a computer program (BatCount) in C++ for automatic retrieving the statistics of call number from raw data file (WAVE format). Supervised under Louis Gross, Gary McCracken and James Drake.
- 2001 – 2002 Study the relationship between the probability distribution function and constraints under the maximal entropy principle. My work on simulation of broken-stick model appears in chapter 12 in the book *Composition Theory* authored by Xuewen Zhang.
- 2001 Study the dynamics of two-linked ecological populations using information theory. Computer simulation shows that moderate migration between the two populations maximizes the information between the two populations.
- 2000 – 2002 Study how complexity (chaos, bifurcation and fractal) emerges in a simple ecological system model (implemented in C++)
- 1999 – 2000 (B.S. thesis) Study Program Cell Death (or apoptosis) of the nucellus cells in *gingkgo biloba* using microscopy, *in situ* hybridization, DNA electrophoresis and TUNNEL reaction. Supervised under Xiong Yang.

1999 Study the movement of Al<sub>2</sub>O<sub>3</sub> particulate in water by computer simulation in C++.

### **Presentations**

2006 Economic Science Association (ESA) Asia-Pacific Regional meeting, Hong Kong, China. Oral presentation on “the value of temporal uncertainty”

2005 Annual meeting of the society for neuroeconomics, Kiawah Island, South Carolina. Poster presentation on “the value of temporal uncertainty”

2004 Annual meeting of society for neuroscience, San Diego, California. Poster presentation on “illusory reversal of temporal order and the anterior cingulate cortex”

2000 The 5<sup>th</sup> course on Theoretical Ecology, International Center for Theoretical Physics, Trieste, Italy. Oral presentation on “complementation of the dynamics of two linked population”

### **Software Development**

2004 xjView. A widely-used viewing program for SPM in brain imaging community, written in MatLab. <http://people.hnl.bcm.edu/cuixu/xjView/>

2004 xBrain. An online brain function database written in Perl and MySQL. <http://www.xbrain.org/>

2002 BatCount. A program to retrieve the statistics of bat calls, written in C++.

### **Awards**

2003 John J. Trenton Award (\$300) for Academic Excellence, Baylor College of Medicine, Houston

2000 Research fellowship (RMB ¥5000), Peking University, China

2000 Excellent graduate in "Honor Science Program", Peking University

1996 – 2000 "Mingde" Fellowship (RMB ¥4000 per year) for 4 years, Peking University

1995 First prize in the National Mathematics Contest, China

### **Activities**

2006 President of [Baylor College of Medicine Badminton Club](#). Organizer of [the 5<sup>th</sup> BCM Badminton Tournament](#)

2000 – 2002 Teaching Assistant, University of Tennessee at Knoxville

1999 English teacher, China College of software Management, Beijing

1998 Organizer, Summer English course for middle school students in Xinmi county, Zhengzhou, China

1997 Mathematics Tutor, Beijing, China

## **Hobby**

Badminton, Table tennis, Board game (Go)