

Anne G. E. Collins

CONTACT INFORMATION	3210 Tolman Hall Department of Psychology, University of California, Berkeley Berkeley, CA 94720	annecollins@berkeley.edu (510) 664-7146
PROFESSIONAL ACTIVITIES	Assistant professor Department of Psychology, University of California, Berkeley	2016-present
	Research assistant professor Department of Cognitive, Linguistic and Psychological Sciences, Brown University	2015
	Post-doctoral research associate Laboratory for Neural Computation and Cognition, Brown University, RI. Advisor: Dr M.J. Frank. <i>Computational modeling</i> (Bayesian inference, reinforcement learning, neural network models) in the domains of learning and cognitive control. <i>Development and implementation</i> of computerized experimental paradigms for probing model mechanisms in reinforcement learning, cognitive control and structured learning. <i>Electro-encephalography</i> experiments and data analysis, including machine learning methods for decoding latent brain states. <i>Genetic and patient studies</i> probing relevant variants impacting above processes.	2010-2015
	Project coordinator Coordination of a neural decoding competition as part of the new initiative for computation in brain and mind at Brown.	2013-2014
	Consultant Consulting for Roche. Experimental design, data analysis and computational modeling for drug effect testing.	2013-2016
EDUCATION	École Normale Supérieure , Paris, France Université Pierre et Marie Curie , Paris, France <i>PhD candidate, Computational and cognitive neuroscience</i> Advisor: Dr. E. Koechlin, Laboratoire de neurosciences cognitives, INSERM U742. Behavioral experiments with healthy adult subjects in areas of reinforcement learning and cognitive control. Computational modeling (reinforcement learning, Bayesian inference).	2006 – 2010
	ENS, EHESS , Paris, France <i>Master's degree in Cognitive Science</i> Advisor: Dr. E. Koechlin	2005 – 2006
	Ecole Polytechnique , Palaiseau, France <i>Engineering diploma. Equivalent to a Master's in engineering.</i> <i>Bachelors of science, major in theoretical mathematics.</i> Research rotation (one semester) in algebraic topology at the Centre de Mathématiques	2002-2006 2006 2005

Laurent Schwartz, supervision Dr H. Abbaspour.

PUBLICATIONS

The cost of structure learning. Collins, AGE. *Journal of Cognitive Neuroscience*, in press.

Role of Prefrontal Cortex in Learning and Generalizing Hierarchical Rules in 8-Month-Old Infants. Werchan, DM; Collins, AGE; Frank, MJ; Amso, D. *Journal of Neuroscience*, 2016.

Neural signature of hierarchically structured expectations predicts clustering and transfer of rule sets in reinforcement learning. Collins, AGE; Frank, MJ. *Cognition*, 2016.

Probabilistic reinforcement learning in schizophrenia: Relationships to anhedonia and avolition. Dowd, EC, Frank, MJ., Collins, AGE, Gold, JM, Barch, DM *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 2016.

Motor demands constrain cognitive rule structures. Collins, AGE; Frank, MJ. *Plos Computational Biology*, 2016.

Surprise! Dopamine signals mix action, value and error. Collins, AGE, and Frank, MJ. *Nature neuroscience News and Views* 2016.

Eight-Month-Old Infants Spontaneously Learn and Generalize Hierarchical Rules. Werchan, DM; Collins, AGE; Frank, MJ; Amso, D. *Psychological Science*. 2015.

Working memory contributions to reinforcement learning impairments in Schizophrenia. Collins, AGE; Brown, J; Gold, J; Waltz, J; Frank, MJ. *Journal of Neuroscience*. 2014.

A Reinforcement Learning Mechanism Responsible for the Valuation of Free Choice. Cockburn, J, Collins, AGE, Frank, MJ. *Neuron*. 2014.

Human EEG uncovers latent generalizable rule structure during learning. Collins, AGE, Cavanagh, JF, Frank, MJ. *Journal of Neuroscience*. 2014.

Opponent Actor Learning (OpAL): Modeling interactive effect of striatal dopamine on reinforcement learning and choice incentive. Collins, AGE, Frank, MJ. *Psychological Review*. 2014.

Foundations of human reasoning in the prefrontal cortex. Donoso, M, Collins, AGE, Koechlin, E; *Science*, 2014 .

Cognitive control over learning: Creating, clustering and Generalizing task-set structure. Collins, AGE, Frank, MJ. *Psychological Review*. 2013.

Negative Symptoms and the Failure to Represent the Expected Reward Value of Actions: Behavioral and Computational Modeling Evidence. Gold JM; Waltz JA; Matveeva TM, Kasanova, Z; Strauss, GP; Herbener, EH; Collins, AGE; Frank, MJ. *Arch Gen Psychiatry*. 2012.

Reasoning, Learning and Creativity: Frontal lobe functions and human decision-making. Collins, AGE, Koechlin, E; *PLoS Biology*, 2012.

How much of reinforcement Learning is working Memory, not reinforcement Learning? Collins, AGE, Frank, MJ; *European Journal of Neuroscience*, 2012.

A computational theory of prefrontal executive function. Collins, AGE, Koechlin, E; *Proceedings of the 2009 COSYNE conference, Frontiers in Neuroscience*, 2009.

SUBMITTED, IN
PREPARATION
ARTICLES

Cross-task contributions of fronto-basal ganglia circuitry in response inhibition and conflict-induced slowing. Jahfari, S; Ridderinkhof, KR; Collins, AGE; Knapen, T; Frank, MJ. *Submitted*.

Stimulus discriminability may bias value-based probabilistic learning. Schutte, I; Slagter, HA; Collins, AGE; Frank, MJ; Kenemans, JL. *Submitted*.

Interactions between working memory, reinforcement learning and effort in value-based choice: a new paradigm and selective deficits in schizophrenia. Collins, AGE; Albrecht, MA; Waltz, JA; Gold, JM; Frank, MJ. *Submitted*.

Working memory load strengthens reward prediction errors. Collins, AGE; Ciullo, B; Frank, MJ; Badre, D. *Submitted*.

EEG markers of interactions between reinforcement learning and working memory. Collins, AGE; Frank, MJ. *In Prep*.

TEACHING

Teaching assistant . 2006 – 2009
Universite Pierre et Marie Curie, Paris, France. 192 hours teaching mathematics for undergraduate biology students (statistics, linear algebra, dynamical systems).

Guest lecturer. 2009 – 2010
Master in Cognitive Science, École Normale Supérieure, Paris. Computational models for cognitive control.

INVITED
PRESENTATIONS

Hierarchical Structure within Corticostriatal Gating Circuits Supports Flexible Generalization and Transfer of Task-Sets. 2017/11
San Diego, Control Processes.

Reinforcement learning: bringing together computation, behavior and neural coding. 2016/05
San Francisco, OpenAI.

Reinforcement learning: bringing together computation, behavior and neural coding. 2016/04
Berkeley, Abbeel Lab.

Priors and constraints in human structure learning. 2016/04
CalTech.

EEG markers of structure learning, clustering and transfer 2016/04
Cognitive Neuroscience Society meeting.

Extracting the principal components of human learning 2016/04
Cognitive Neuroscience Society meeting.

Reinforcement learning and Working memory: Contributions to learning in healthy controls and schizophrenia 2016/03
Cosyne Workshops.

The hidden players in reinforcement learning: The case of Structure learning
2016/02/04
UCL Affective Brain Lab .

Constraints and priors in human structure learning. 2015/10
Society for Neuroscience, Chicago, IL

Disentangling multiple contributions to human learning. 2015/10
Harvard McLean Hospital, Belmont, MA.

Working memory contribution to learning impairments in schizophrenia. 2015/09
ECSR conference, Berlin.

Creating structure and generalizing in learning. 2015/05
ESCONS conference, San Francisco.

The hidden players in reinforcement learning. 2015/01-02
Lyon; Boston University; Stanford; University of Michigan; Columbia; Berkeley.

Prefrontal contributions to reinforcement learning. 2014/09
NYU, NY.

Computational models of structure learning in humans. 2014/07
Neuromorphic workshop, Telluride, CO.

Generalization and transfer in structure learning. 2014/05
Symposium for the Biology of Decision Making, Paris, France.

Explorations of structure learning 2014/02
Princeton, NJ.

Many actors in reinforcement learning 2014/02
Rochester, NY.

Many actors in reinforcement learning 2014/01
Irvine, CA.

Creating and generalizing task-set structure in corticostriatal circuits. 2013/03
COSYNE workshops.

Two levels of rule generalization in reinforcement learning with latent structure.
2012/12
MBI computational neuroscience workshop, Columbus (OH).

Structured learning and task-set transfer during reinforcement learning. 2012/05
Princeton, NJ.

Learning and cognitive control: neurobiologically explicit models fro inferring hidden structure. 2012/01
ICARUS workshop, Boston.

Working memory contributions to reinforcement learning. 2012/01
LNC, ENS, Paris.

Learning hidden structure for cognitive control. 2011/07
Mathematical Psychology annual meeting.

POSTERS

Working memory contributions to reinforcement learning: an fMRI study. Collins, AGE; Ciullo, B; Frank, MJ; Badre, D. *SfN*, Chicago, 2015.

Antipsychotic medications induce sustained alterations in approach/avoidance learning. Vierling-Claassen, NE; Collins, AGE; Burke, D; Warwick, H; Rego, B; Hill, M; Bath, K; Frank, MJ; Moore, CI. *SfN*, Chicago, 2015.

Feature-based attention during sequential tasks. Desrochers, TM; Collins, AGE; Badre, D. *SfN*, Chicago, 2015.

Interaction between reinforcement learning and Working memory. Collins, AGE; Frank, MJ. *SBDM*, Paris, 2015.

Prefrontal cortex and uncertainty during sequential tasks. Desrochers, TM; Collins, AGE; Badre, D. *CNS*, San Francisco, 2015.

Neural signature of latent structure during learning predicts hierarchical clustering and transfer of rule sets. Collins, AGE; Frank, MJ. *CNS*, San Francisco, 2015.

Working memory contributions to reinforcement learning impairments in schizophrenia. Collins, AGE; Gold, J; Waltz, J; Frank, MJ. *COSYNE*, Salt Lake City, 2014.

Why do we structure knowledge? Two levels of rule generalization in reinforcement learning. Collins, AGE, Frank, MJ. *SfN*, 2013.

Motor patterns impose priors on abstract rule structure representations. Collins, AGE, Frank, MJ. *RLDM*, Princeton, NJ, october, 2013.

Interactive effects of learning and choice incentive in the striatal dopamine system: Computational model. Collins, AGE, Frank, MJ. *COSYNE*, Salt Lake City, 2013.

EEG predictors of structured learning and task-set transfer during reinforcement learning. Collins, AGE, Cavanagh, JF, Frank, MJ. *SfN*, New Orleans, 2012.

Why (and how much) do we value the freedom to choose? Decision enhances spatial credit assignment in reinforcement learning. Cockburn, J, Collins, AGE, Frank, MJ. *SfN*, New Orleans, 2012.

Welcome to the machine: Pattern classifiers reveal latent cognitive states. Cavanagh, JF, Collins, AGE, Frank, MJ. *SPR*, 2012.

Incidental structured learning and abstraction in cognitive reinforcement learning. Collins, AGE, Frank, MJ. *COSYNE*, Salt Lake City, 2012.

Working memory contributions to reinforcement learning: Computational and genetic analysis. Collins, AGE, Frank, MJ. *SfN*, 2011.

A bias to apply hierarchical structure in learning: a computational and behavioral study. Collins, AGE, Frank, MJ. *CNS*, 2011.

A computational theory of prefrontal executive function. Collins, AGE, Koechlin, E. *COSYNE*, 2009.

SERVICE	<p>Ad-hoc reviewer for More than 15 journals, including <i>Nature Neuroscience</i>, <i>Neuron</i>, <i>eLife</i>, <i>Nature Communications</i>, <i>Neural Computation</i>, <i>Psych Science</i>, <i>Neuropsychologia</i>, <i>Cerebral Cortex</i>, <i>Journal of Experimental Psychology General</i>, <i>Journal of Cognitive Neuroscience</i>, <i>Plos Biology</i>, <i>Plos Computational Biology</i>, <i>Biological Psychiatry</i>, <i>Cognitive, Affective Behavioral Neuroscience</i>.</p> <p>Member. Cognitive Neuroscience Society, Society for Neuroscience.</p>
GRANTS AND FELLOWSHIPS	<p>How prefrontal cortex augments reinforcement learning. 2015-2018 NSF CompCog award 1460604 to Michael J Frank and Anne GE Collins.</p> <p>Allocation Monitorat Polytechnicien (AMX). 2006 – 2009 Graduate studies and teaching assistant grant.</p> <p>Undergraduate studies full grant. 2002– 2006 Indemnité d’élève officier polytechnicien.</p>
SKILLS	<p>Computer skills Advanced: Matlab (including statistics toolbox and psychtoolbox), SPSS, LaTeX. Intermediate: Python, R, Linux. Basic: java.</p> <p>Languages French(native), English (fluent), German (fluent), Japanese (intermediate), Russian (intermediate).</p>
HOBBIES	<p>Music Proficient cello player, classical singer. Chamber music, choir.</p> <p>Outdoors Hiking, biking, swimming, sailing.</p>