

VOLUME 19
NUMBER 3
SEPTEMBER 1996

An International Journal of Current Research
and Theory with Open Peer Commentary

Behavioral and Brain Sciences

28-FEB-1997 BLDSC BOSTON SPA
LS23 7BQ
BEHAVIORAL AND BRAIN SCIENCES



1877.293000 VOL 19 PART 3

2/2

PB

Controversies in Neuroscience IV: Motor Learning and Synaptic Plasticity in the Cerebellum

edited by Curtis Bell, Paul Cordo, and Stevan Harnad

- Cerebellar long-term depression as investigated in a cell culture preparation** David J. Linden
Cellular mechanisms of long-term depression in the cerebellum F. Crepél, N. ... art, D. Jaillard &
H. Daniel
**Long-lasting potentiation of GABAergic inhibitory synaptic transmission in cerebellar Purkinje
cells: Its properties and possible mechanisms** Masanobu Kano
Nitric oxide and synaptic plasticity: NO news from the cerebellum Steven ... Vincent
Models of the cerebellum and motor learning James C. Houk, Jay T. Buckingham & Andrew Barto
On climbing fiber signals and their consequence(s) J.I. Simpson, D.R. Wylie & C.I. De Zeeuw
**Does the cerebellum learn strategies for the optimal time-varying control of joint
stiffness?** Allan M. Smith
**On the specific role of the cerebellum in motor learning and adaptation: Clues from PET
activation and lesion studies in man** W.T. Thach

Also, Continuing Commentary on
"Précis of *Relevance: Communication and Cognition*" (Sperber & Wilson) "The reliability
of peer review for manuscript and grant submissions: A cross-disciplinary
investigation" (Cicchetti) "Is human information processing conscious?" (Velmans)
"Précis of *Deduction*" (Johnson-Laird & Byrne) "Coevolution of neocortical size,
group size and language in humans" (Dunbar) "Mathematical principles of
reinforcement" (Killeen) "A theory of visual stability across saccadic eye movements"
dgeman, Van der Heijden & Velichkovsky) "Characteristics of dissociable human
learning systems" (Shanks & St. John) "Toward a theory of human memory: Data
structures and access processes" (Humphreys, Wiles & Dennis)

CAMBRIDGE

ISSN 0140-525X

Contents Volume 19:3 September 1996

Bell, C., Cordo, P., and Harnad, S. Controversies in Neuroscience IV: Motor learning and synaptic plasticity in the cerebellum: Introduction	v
Linden, D. J. Cerebellar long-term depression as investigated in a cell culture preparation	339
Crépel, F., Hemart, N., Jaillard, D., & Daniel, H. Cellular mechanisms of long-term depression in the cerebellum	347
Kano, M. Long-lasting potentiation of GABAergic inhibitory synaptic transmission in cerebellar Purkinje cells: Its properties and possible mechanisms	354
Vincent, S. R. Nitric oxide and synaptic plasticity: NO news from the cerebellum	362
Houk, J. C., Buckingham, J. T., & Barto, A. G. Models of the cerebellum and motor learning	368
Simpson, J. I., Wylie, D. R., & De Zeeuw, C. I. On climbing fiber signals and their consequence(s)	384
Smith, A. M. Does the cerebellum learn strategies for the optimal time-varying control of joint stiffness?	399
Thach, W. T. On the specific role of the cerebellum in motor learning and cognition: Clues from PET activation and lesion studies in man	411
 Open Peer Commentary	
Arbib, M. A. Spanning the levels in cerebellar function	434
Baudry, M. Similarities and contrasts between cerebellar LTD and hippocampal LTP	435
Bekkering, H., Heck, D., & Sultan, F. What has to be learned in motor learning?	436
Bindman, L. J. How and where does nitric oxide affect cerebellar synaptic plasticity? New methods for investigating its action	437
Bower, J. M. Perhaps it's time to completely rethink cerebellar function	438
Calabresi, P., Pisani, A., & Bernardi, G. Long-term changes of synaptic transmission: A topic of long-term interest	439
De Schutter, E. One cannot build theories of cerebellar function on shaky foundations: Induction properties of long-term depression have to be taken into account	440
Dean, P. Saccades and the adjustable pattern generator	441
Dufossé, M. How can the cerebellum match "error signal" and "error correction"?	442
Feldman, A. G. & Levin, M. F. Grasping cerebellar function depends on our understanding the principles of sensorimotor integration: The frame of reference hypothesis	442
Fiala, J. C. & Bullock, D. Timing implications of metabotropic mechanisms for cerebellar learning	445
Flament, D. & Ebner, T. J. The cerebellum as comparator: Increases in cerebellar activity during motor learning may reflect its role as part of an error detection/correction mechanism	447
Gielen, C. Cerebellum does more than recalibration of movements after perturbations	448
Gilbert, P. F. C. How and what does the cerebellum learn?	449
Gomi, H. Is stiffness a byproduct or a target?	450
Haggard, P. What can and what cannot be adjusted in the movement pattern of cerebellar patients?	451
Hallett, M. The role of the cerebellum in motor learning is limited	453
Hartell, N. A. Two separate pathways for cerebellar LTD: NO-dependent and NO-independent	453
Hepp, K. Programming the cerebellum	455
Hesslow, G. Positive cerebellar feedback loops	455
Hirano, T. Molecules involved in cerebellar long-term depression (LTD) and mutant mice defective in it	456
Hore, J. Cerebellar arm ataxia: Theories still have a lot to explain	457
Houk, J. C. & Alford, S. Computational significance of the cellular mechanisms for synaptic plasticity in Purkinje cells	457
Jaeger, D. Constructing a theory of cerebellar function in limb movement control is premature	461

Kano, M. New players for cerebellar long-term depression	462	Timmann, D. & Diener, H. C. Limitations of PET and lesion studies in defining the role of the human cerebellum in motor learning	477
Kawato, M. The common inverse-dynamics motor-command coordinates for complex and simple spikes	462	van Donkelaar, P. Sensorimotor learning in structures "upstream" from the cerebellum	477
Kiedrowski, L. Which cerebellar cells contribute to extracellular cGMP?	464	Van Galen, G. P., Hendriks, A. W., & De Jong, W. P. What behavioral benefit does stiffness control have? An elaboration of Smith's proposal	478
Latash, L. P. & Latash, M. L. The notions of joint stiffness and synaptic plasticity in motor memory	465	Weiss, C. & Disterhoft, J. F. Eyeblink conditioning, motor control, and the analysis of limbic-cerebellar interactions	479
Miall, R. C., Malkmus, M., & Robertson, E. M. Sensory prediction as a role for the cerebellum	466	Wessel, K. Plasticity of cerebro-cerebellar interactions in patients with cerebellar dysfunction	481
Mori-Okamoto, J. & Okamoto, K. Further evidence for the involvement of nitric oxide in trans-ACPD-induced suppression of AMPA responses in cultured chick Purkinje neurons	467		
Okada, D. Nitric oxide is involved in cerebellar long-term depression	468	Authors' Responses	
O'Mara, S. M. The cerebellum and cerebral cortex: Contrasting and converging contributions to spatial navigation and memory	469	Linden, D. J. A cerebellar long-term depression update	482
Paulin, M. G. Cerebellar theory out of control	470	Crépel, F. Cellular mechanisms of long-term depression: From consensus to open questions	488
Roberts, P. D., McCollum, G., & Holly, J. E. Cerebellar rhythms: Exploring another metaphor	471	Kano, M. A bridge between cerebellar long-term depression and discrete motor learning: Studies on gene knockout mice	488
Schmahmann, J. D. Dysmetria of thought: Correlations and conundrums in the relationship between the cerebellum, learning, and cognitive processing	472	Vincent, S. R. NO more news from the cerebellum	490
Sultan, F., Heck, D., & Bekkering, H. How to link the specificity of cerebellar anatomy to motor learning?	474	Houk, J. C. & Barto, A. More models of the cerebellum	492
Swinnen, S. P., Walter, C. B., & Dounskaia, N. We know a lot about the cerebellum, but do we know what motor learning is?	474	Simpson, J. I., Wylie, D. R. W., & De Zeeuw, C. I. More on climbing fiber signals and their consequence(s)	496
Thompson, R. F. Motor learning and synaptic plasticity in the cerebellum	475	Smith, A. J. Resilient cerebellar theory complies with stiff opposition	499
		Thach, W. T. Q: Is the cerebellum an adaptive combiner of motor and mental/motor activities? A: Yes, maybe, certainly not, who can say?	501

Continuing Commentary

On Sperber, D. & Wilson, D. (1987) <i>Précis of Relevance: Communication and Cognition</i>. BBS 10:697–754.			529
Chiappe, D. L. & Kukla, A. Context-selection and the frame problem	529	Authors' Response	
		Sperber, D. & Wilson, D. Fodor's frame problem and relevance theory	530
On Cicchetti, D. V. (1991) The reliability of peer review for manuscript and grant submissions: A cross-disciplinary investigation BBS 14:119–134.			533
Somit, A. & Peterson, S. A. Journal response time: A case for multiple submission	533		
Editorial Commentary	534	Author's Response	
Cicchetti, D. V. The peer review process for manuscripts submitted to an international chemistry journal: Evidence for more agreement on acceptance than on rejection	534	Cicchetti, D. V. Peer review: Agreement and disagreement	536
On Velmans, M. (1991) Is human information processing conscious? BBS 14:651–726.			537
Rakover, S. S. The place of consciousness in the information processing approach: The mental-pool thought experiment	537	Author's Response	
		Velmans, M. Consciousness and the "causal paradox"	539

<i>On</i> Johnson-Laird, P. N. & Byrne, R. M. J. (1993) Précis of <i>Deduction</i> . BBS 16:323–380.			542
Hardman, D. Mental models: The revised theory brings new problems	542	Authors' Response Johnson-Laird, P. N. & Byrne, R. M. J. Mental models and syllogisms	543
<i>On</i> Dunbar, R. I. M. (1993) Coevolution of neocortical size, group size and language in humans. BBS 16:681–735.			546
Kemmerer, D. What about the increasing adaptive value of manipulative language use?	546	Author's Response Dunbar, R. I. M. Deception as cause or consequence of language?	548
<i>On</i> Killeen, P. R. (1994) Mathematical principles of reinforcement. BBS 17:105–172.			549
Zeiler, M. D. What behaviors do	549	Author's Response Killeen, P. R. Secure footing	550
<i>On</i> Bridgeman, B., Van der Heijden, A. H. C. & Velichkovsky, B. M. (1994) A theory of visual stability across saccadic eye movements. BBS 17:247–292.			551
Burr, D. C. Suppression of motion during saccades	551	Authors' Response	
Hershberger, W. A. & Jordan, J. S. The phantom array	552	Bridgeman, B., Van der Heijden, A. H. C. & Velichkovsky, B. M. Relationship of saccadic suppression to space constancy	553
<i>On</i> Shanks, D. R. & St. John, M. F. (1994) Characteristics of dissociable human learning systems. BBS 17:367–447.			555
Furedy, J. J. & Kristjansson, M. Human Pavlovian autonomic conditioning and its relation to awareness of the CS/US contingency: Focus on the phenomenon and some forgotten facts	555	Authors' Response Shanks, D. R. & St. John, M. F. Implicit learning: What does it all mean?	557
Kugel, P. Implicit learning from a computer-science perspective	556		
<i>On</i> Humphreys, M. S., Wiles, J. & Dennis, S. (1994) Toward a theory of human memory: Data structures and access processes BBS 17:655–692.			559
Colonius, H. Set theoretic foundations for a theory of human memory	559	Authors' Response Dennis, S., Humphreys, M. S., & Wiles, J. Mathematical constraints on a theory of human memory	559

Intriguing New Books from Cambridge

Essential Psychopharmacology

Neuroscientific Basis and Practical Applications

Stephen M. Stahl

Covering both the neurobiology of drug action, and the range of psychiatric disorders and their treatments, this book will be an essential text for students, scientists, psychiatrists, and other mental health professionals. Aided by ample, colorful illustrations, it provides an easily readable introduction to psychopharmacology.

1996	c.400 pp.	
56011-X	Hardback	\$120.00
42620-0	Paperback	\$49.95
55438-1	Slides	\$275.00

Psychotherapy, Psychological Treatments and the Addictions

Griffith Edwards and Christopher Dare, Editors

This timely review of psychological treatments in the addictions field provides a rare combination of expertise from addiction specialists as well as those who use psychotherapeutic approaches to solve a wide range of personal problems. It forms a valuable reference for all concerned with alcohol and drug abuse.

1996	284 pp.	
55357-1	Hardback	\$95.00
55675-9	Paperback	\$34.95

Hyperactivity Disorders of Childhood

Seija Sandberg, Editor

Drawing upon international expertise, this volume provides balanced and in-depth reviews of basic research and practical treatment as well as novel perspectives in contributions on sex differences, cross-national studies and developmental outlook.

Cambridge Monographs on Child and Adolescent Psychiatry 2

1996	540 pp.	
43250-2	Hardback	\$95.00

Adults with Autism

A Guide to Theory and Practice

Hugh Morgan, Editor

As many health care professionals will attest, there is a scarcity of literature that specifically addresses autism in adults. This volume sets out to fill this gap by providing practical help and guidance specifically for those caring for the growing recognized population of autistic adults.

1996	312 pp.	
45070-5	Hardback	\$85.00
45683-5	Paperback	\$32.95

Psychopathology

The Evolving Science of Mental Disorder

Steven Matthysse, Francine Benes, Deborah Levy, and Jerome Kagan, Editors

From psychopathology's beginnings at a descriptive level—cataloging signs and symptoms—it has become a vigorous, mature, experimental field, making strides in both biological and psychological understanding. In this important volume, scholars review new data and provide recommendations for future research. This book covers neuro-anatomical, developmental, cognitive and genetic research and theory as they relate to schizophrenia and other psychoses.

1996	647 pp.	
44469-1	Hardback	\$69.95

The History of Mental Symptoms

Descriptive Psychopathology since the Nineteenth Century

German E. Berrios

Tracing the evolution of memory, consciousness, will and personality, and of symptoms ranging from catalepsy and aboulia to anxiety and self-harm, this book provides fascinating insights into the subjective nature of mental illness, as well as the ideas of those who have clarified and defined it.

1996	581 pp.	
43135-2	Hardback	\$165.00
43736-9	Paperback	\$59.95

Incentive Relativity

Charles F. Flaherty

Disappointment and recovery occur frequently in life; as does irritation regarding ones financial or economic state compared to others. The book shows that animals also respond on the basis of the relative value of rewards and that these relativity effects are stressful, but that they may also be adaptive. The book demonstrates that animal research may lead to an understanding of individual differences in discernment and susceptibility to disappointment, and to their adaptive advantages, or disadvantages.

Problems in the Behavioral Sciences 15

1996	c.250 pp.	
38118-5	Hardback	\$69.95

Language, Learning, and Behavior Disorders

Developmental, Biological, and Clinical Perspectives

Joseph H. Beitchman, Nancy J. Cohen, M. Mary Konstantareas, and Rosemary Tannock, Editors

Language as a connecting bridge between learning disability and psychiatric disorder is the unifying theme of this wide-ranging book. Particular prominence is given to attention deficit hyperactivity disorder, dyslexia, and autistic disorder. Explanations for the comorbidity of psychiatric and language disorder are sought in developmental, cognitive and biological fields, and implications for etiology, treatment and rehabilitation are explored.

1996	c.616 pp.	
47229-6	Hardback	\$120.00

Melancholia: A Disorder of Movement and Mood

A Phenomenological and Neurobiological Review

Gordon Parker and Dusan Hadzi-Pavlovic, Editors

This book describes the development of a behavioral approach to the diagnosis of depression, the CORE system, and demonstrates its superiority to previous symptom-based diagnostic systems. The authors suggest that the psychomotor signs elicited may indicate the likely pathogenesis of melancholic depression. The CORE measure itself is incorporated as an appendix.

1996	350 pp.	
47275-X	Hardback	\$69.95

Language in Cognitive Development

The Emergence of the Mediated Mind

Katherine Nelson

The book addresses issues in cognitive development in early childhood, stressing the central role that development of language plays in taking the child to new levels of cognitive operations in memory, forming concepts and categories, in using concepts of time, processing narratives, and understanding other people's intentions. It advances a theory of collaborative construction of knowledge systems that integrates the contributions of biological evolution, individual development, and the social-cultural world.

1996	c.416 pp.	
55123-4	Hardback	\$44.95

Available in bookstores or from

CAMBRIDGE UNIVERSITY PRESS

40 West 20th St., N.Y., NY 10011-4211

Call toll-free 800-872-7423.

Web site: <http://www.cup.org>

MasterCard/VISA accepted.

Prices subject to change.