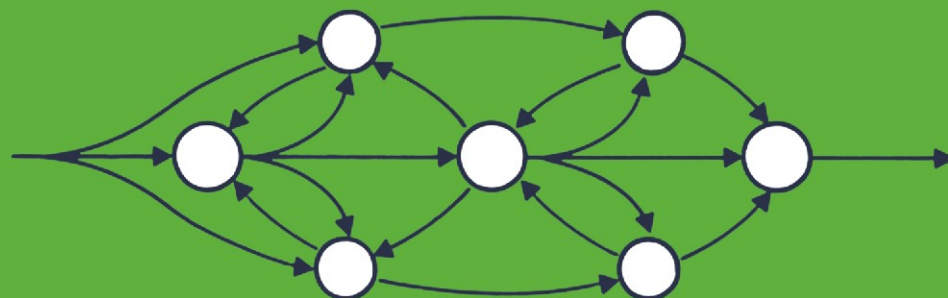
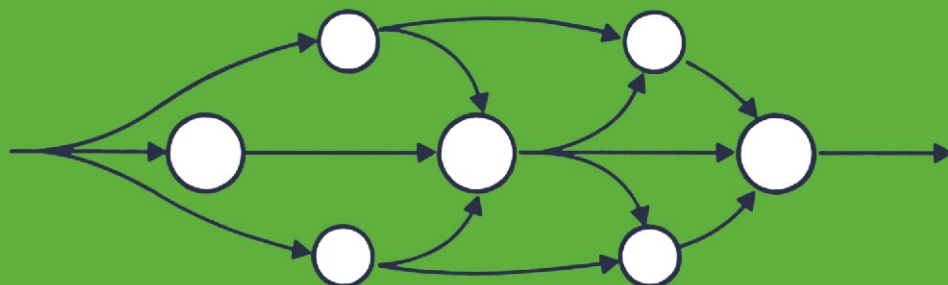


Brain Theory

Edited by
Günther Palm and Ad Aertsen





Brain Theory

Proceedings of the First Trieste Meeting
on Brain Theory, October 1–4, 1984

Edited by
Günther Palm and Ad Aertsen

With 75 Figures

Springer-Verlag
Berlin Heidelberg New York Tokyo

Dr. GÜNTHER PALM
Dr. AD AERTSEN

Max-Planck-Institut für
Biologische Kybernetik
Spemannstraße 38
7400 Tübingen, FRG

Cover illustration:

Reactive and creative system differing in absence or presence of closed loops. From P. Johannesma, this Volume, page 34, Figure 6.

ISBN-13: 978-3-642-70913-5
DOI: 10.1007/978-3-642-70911-1

e-ISBN-13: 978-3-642-70911-1

Library of Congress Cataloging in Publication Data. Trieste Meeting on Brain Theory (1st : 1984) Brain theory. 1. Brain–Congresses. 2. Intellect–Congresses. 3. Neurology–Philosophy–Congresses. I. Palm, Günther, 1949– . II. Aertsen, Adrianus, 1948– III. Title. IV. Title: Brain theory. QP376.T73 1984 153 85-27664

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machine or similar means, and storage in data banks. Under § 54 of the German Copyright Law where copies are made for other than private use a fee is payable to 'Verwertungsgesellschaft Wort', Munich.

© by Springer-Verlag Berlin Heidelberg 1986

Softcover reprint of the hardcover 1st edition 1986

The use of registered names, trademarks etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Offsetprinting: Beltz Offsetdruck, Hemsbach/Bergstraße.

2131/3130-543210

Contents

Report of the First Meeting on Brain Theory V. BRAITENBERG and G. PALM	1
Introduction G. PALM and A. AERTSEN	5
From Neuron to Assembly: Neuronal Organization and Stimulus Representation A. AERTSEN, G. GERSTEIN, and P. JOHANNESMA (With 7 Figures)	7
From Synchrony to Harmony: Ideas on the Function of Neural Assemblies and on the Interpretation of Neural Synchrony P. JOHANNESMA, A. AERTSEN, H. VAN DEN BOOGAARD, J. EGGERMONT, and W. EPPING (With 9 Figures)	25
On Information Processing in the Cat's Visual Cortex W. VON SEELEN, H.A. MALLOT, G. KRONE, and H. DINSE (With 23 Figures)	49
Two Views of the Cerebral Cortex V. BRAITENBERG (With 5 Figures)	81
EEG Spatial Pattern Differences with Discriminated Odors Manifest Chaotic and Limit Cycle Attractors in Olfactory Bulb of Rabbits W.J. FREEMAN and G. VIANA DI PRISCO (With 12 Figures)	97
Tensor Network Theory of the Central Nervous System and Sensorimotor Modeling A.J. PELLIONISZ (With 7 Figures)	121

Neuronic Equations Revisited and Completely Solved E.R. CAIANIELLO	147
Am I Thinking Assemblies? C. VON DER MALSBERG (With 2 Figures)	161
Trion Model of Cortical Organization: Toward a Theory of Information Processing and Memory G.L. SHAW, D.J. SILVERMAN, and J.C. PEARSON (With 3 Figures)	177
Associative Processing in Brain Theory and Artificial Intelligence A. LANSNER (With 4 Figures)	193
Associative Networks and Cell Assemblies G. PALM (With 2 Figures)	211
 Reviews of Historical Papers	
Warren McCulloch and Walter Pitts: A Logical Calculus of the Ideas Immanent in Nervous Activity G. PALM	229
Donald Hebb: The Organization of Behavior G.L. SHAW	231
Alan Turing: The Chemical Basis of Morphogenesis W.J. FREEMAN	235
W.G. Walter: The Living Brain W.J. FREEMAN	237
John von Neumann: The Computer and the Brain W.J. FREEMAN	239
Eduardo Caianiello: Thought Processes and Thinking Machines P. JOHANNESMA	241
Frank Rosenblatt: Principles of Neurodynamics: Perceptrons and the Theory of Brain Mechanisms C. VON DER MALSBERG	245

Wilfrid Rall: Electrophysiology of a Dendritic Neuron Model	
A. LANSNER	249
David Marr: A Theory of the Cerebellar Cortex	
A.J. PELLIONISZ	253
David Marr: A Theory for Cerebral Neocortex	
W. VON SEELEN	259