

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

Science, Psychoanalysis, and the Brain

SPACE FOR DIALOGUE

Shimon Marom

Technion – Israel Institute of Technology



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

CAMBRIDGE
UNIVERSITY PRESS

32 Avenue of the Americas, New York, NY 10013-2473, USA

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781107101180

© Shimon Marom 2015

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2015

Printed in the United States of America

A catalog record for this publication is available from the British Library.

Library of Congress Cataloging in Publication Data

Marom, Shimon, 1958–

Science, psychoanalysis, and the brain : space for dialogue / Shimon Marom.

pages cm

Includes bibliographical references and index.

ISBN 978-1-107-10118-0 (hardback)

1. Psychoanalysis. 2. Psychoanalysis – Physiological aspects. 3. Psychobiology.

4. Psychophysiology. I. Title.

BF175.M28348 2015

150.19'5–dc23 2014043440

ISBN 978-1-107-10118-0 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party Internet Web sites referred to in this publication and does not guarantee that any content on such Web sites is, or will remain, accurate or appropriate.

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

To Adi, by way of a long letter.

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

For a hundred and fifty years past the progress of science has seemed to mean the enlargement of the material universe and the diminution of man's importance.... The romantic spontaneity and courage are gone, the vision is materialistic and depressing. Ideals appear as inert by-products of physiology; what is higher is explained by what is lower and treated forever as a case of "nothing but" – nothing but something else of a quite inferior sort.

William James, *Pragmatism*, 1907

Contents

<i>Preface and Acknowledgments</i>	<i>page ix</i>
1 A Lost Dialogue	1
2 Scales and Constraints	11
More Is Different	13
Less Is Not Simpler	23
Reverse Engineering	25
Why Reduce?	31
Consequences	35
Recapitulation	47
3 Language Relations	49
Syntax, Physiology, and Psychology	51
Semantics, Physiology, and Psychology	55
Congruent Interpretation–Projection Cycles	59
On Abstraction in Physiology and Psychology	64
4 Relational Objects in Psychology	69
Organization of Relational Objects	71
Primitives to Dialogue With	88
5 Reflections on Relational Physiology	90
Evolution of the Relational Brain	91
Localization, in the Gross	97
The Conceptual Nervous System	103
Neurophysiological Basics, a Digression	111
The Neuron Doctrine, Associationism, and the Network School	119
Symmetry and Self-Reflexive Inner Physiological Space	128

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

viii Contents

Symmetry Breaking, Programs, and Dynamics	138
The Emergence of Relational Objects	148
Relations Between Physiological Objects	159
Relations, Truth, and Pathology	163
Challenge for Relational Physiology	168
6 Sempiterna Temptatio	172
<i>Bibliography</i>	179
<i>Index</i>	191

Preface and Acknowledgments

This essay began as a letter to an experienced clinical psychologist, dynamically oriented by education, training, and practice. Out of a developing sense of unease with the nature of the present dialogue between brain science and psychology, she sought understanding, not so much of this or that recent biological finding, but of the roots that feed the stance of neurophysiology toward depth psychology.¹ While meandering in the chasm between physiology and psychology, contemplating the recent history of possible-impossible relations, the letter evolved into the essay offered here: an invitation, issued by a practicing physiologist, intended for dynamically oriented theory-sensitive psychologists and physiologists. It became an invitation to a space where reflections on neurophysiology are expressed and guided by depth psychology in mind; a space where neurophysiology resumes its traditional, humbled attitude toward matters of the psyche, and where the intellectual autonomy of depth psychology is acknowledged. The underlying assumption is that in the basic sense, as opposed to the applied science sense, the meaning

¹ Note on terminology: The terms “depth psychology,” “psychoanalysis,” “psychoanalytic,” “psychodynamics,” and “dynamic psychology” are used interchangeably to indicate the theory and concepts that have emerged from the various schools of the psychoanalytic movement. These terms are not used here to indicate the practical and technical aspects of the theory and its concepts in the context of therapy. The terms “physiology,” “neurophysiology,” “brain science,” and “neuroscience” are used here to designate any behaviorally relevant physiological system analysis in general, and neural systems in particular.

x Preface and Acknowledgments

of neurophysiological and neuroanatomical observables resides in their interpretation in light of psychological theories. A dialogue based on such terms, where psychology provides a theoretical framework that contributes to physiology, is beneficial to both parties: Neurophysiology gains something that is currently wanted – constraints and guidelines in phrasing meaningful questions. Psychology might gain further motivation to crystallize its multifaceted concepts. At all events, both camps might enrich the spectrum of metaphors available to them within their own disciplinary realms.

In Chapter 1 the stage is set with the 1909 Freud–James meeting in America as a soft, literary move that leads to a definition of the objectives of the essay. Chapters 2 and 3 are dedicated to explaining scientific constraints on the choices that may or should be made by a physiologist who contemplates borrowing observables and theoretical constructs from psychology in general, and from depth psychology in particular. Here space is taken to review the state of the art in my own field, neurophysiology, as well as critically to analyze naive mapping of depth psychology concepts to brain activity. To that end, lessons from well-studied relations between levels of organization in physics and in the life sciences are explained, demonstrated, and generalized (with limits) to the relation between psychology and neurophysiology. These analyses show that – contrary to the *zeitgeist* – the former constrains and guides the latter in phrasing meaningful questions. With the above foundations in place, Chapter 4 outlines the elements of depth psychology chosen to negotiate with: the organization of experience as a personal historical process, expressed in terms of relational psychological objects, their development, and their multiple relations with each other and with a dynamic environment populated by interacting others that house their own relational psychological objects. Psychological texts on relational dynamics of objects are read with a physiologist's eye, searching for primitives that transcend differences between psychoanalytical schools, presenting them in a manner that promotes interpretation into the realm of

Preface and Acknowledgments

xi

neurophysiology and neuroanatomy. While the choice of relational psychological objects to dialogue with reflects a personal preference, it does seem to have a natural appeal for the neurophysiologist. It resonates with the study of development and dynamics of neural representations, probably the most extensive research topic in neurophysiology, and a theme that has historical roots that are shared by both fields. But, more important from the point of view of neurophysiological research: what psychologists are telling us on the relational nature of objects has consequences on how we – neurophysiologists – should phrase and approach our research objectives, and how far we can take our interpretations of physiological observables that are (by definition) limited to processes that take place within the individual.

The longest chapter of the essay, Chapter 5, is an embodiment of the dialogue. It describes neuroanatomy and neurophysiology in light of the primitives of relational dynamics in psychology. It is an attempt to analyze different ways to approach neurophysiology given the facts of depth psychology. Physiology and neuroanatomy are presented at a rather abstract level, thus making space for a dialogue between the two languages. Effort is made to present things in a way that enables both the psychologically educated reader and the well-informed neurophysiologist to remain engaged. The somewhat old construct of a Conceptual Nervous System is reintroduced, and serves in the analysis of development and dynamics of physiological objects. Physiological concepts are offered and developed (internal space, discontent, symmetry breaking, inter-object interaction, and adaptation) that reflect aspects of the psychological theory. A need for a form of relational physiology is voiced, echoing the Rashevsky-Rosen school of relational biology, focusing on the organization of coupled systems beyond material realization. The chapter brings arguments from the fields of evolution, psychology, neurophysiology, and anatomy, making use of texts from the history shared by both fields. Reading these old texts was an exercise in modesty; each and every time the peregrinations in the chasm between psychology

xii Preface and Acknowledgments

and physiology seemed to bring me closer to an original idea – a small oasis of my own – I found it already colonized and cultivated by the founders of our disciplines. The chapter ends with pointing at the challenge entailed by a relational approach to neurophysiological research. Chapter 6 closes the essay with a touch of romanticism and politics of ideology.

A few more words might help in positioning this essay with reference to other points of view. The text is not an account of mind-brain philosophy, or philosophy of psychoanalysis or language in this context; these are available in many books published over the past century by eminent, more suitable, writers. A conscious decision was made to shy away from formal philosophical and metaphysical arenas. Instead, the focus is on how things look from the stance of a practicing scientist, reflecting a personal take; expressing appreciation of the need for a theoretical input from psychology, a position formed over years of physiological analysis of dynamics and function in large-scale neural networks. No claim is made that the approach and ideas expressed in this text represent the mainstream of practicing neurophysiologists, although they might represent many (albeit silent, public-relations-wise) of us.

The issue of reductionism, a loosely defined and often overloaded term, is central in discussions that concern relations between psychology and the sciences. The text is critical about naive mixing of scales in general, and about naive mapping of psychological concepts to this or that brain activity in particular. But it would be a mistake to read the essay as a critique on *any* attempt to map across constructs at different scales; the most beautiful intellectual insights are due to such mappings. Much may be gained by allowing for exchange of ideas between fields of knowledge – regardless of the scales involved – as long as the uniqueness of each field is respected. There are means to do this properly, and they usually involve abstractions of the kind offered in the present text.

Preface and Acknowledgments

xiii

The point of view presented in an essay of this particular kind inevitably reflects the idiosyncratic set of texts with which the writer is surrounded and consults. Several of the authors of these texts I feel particularly obliged to mention: Robert Rosen for *Life Itself* (1991), a tour in the basement floor of the sciences, where Nicolas Rashevsky's concept of relational biology is presented, as well as the treasure of humbled appreciation for the limits and consequences of our scientific abstractions and formalisms. Gerald M. Edelman, whose book *Neural Darwinism* (1987) exposes the making of neurophysiology in the wider context of the life sciences, rather than treating the brain as a substance different from all other living matter. Walter M. Elsasser who, in his *Reflections on a Theory of Organisms* (1987), offers a glimpse into the profound complexity of biology and points to a good enough way to handle it, scientifically. Henry Atlan, a biophysicist and philosopher whose book *Enlightenment to Enlightenment: Intercritique of Science and Myth (A tort et à raison)*, 1986 describes the possibility of establishing a dialogue between the sciences and the humanities. Marguerite Yourcenar for *The Abyss (L'Oeuvre au Noir)*, 1968, the story of Zeno of Bruges and the protracted delivery of modern human thought, told and analyzed in the most profound way imaginable. Richard C. Lewontin's essays on biology and genetics, particularly his *Biology as Ideology* (1991), which resonates with my personal biases and never fails to impress in their intellectual integrity and their sensitivity to the present state of biological art in the wider historical, social, and political contexts. Percy W. Bridgman's *The Logic of Modern Physics* (1927) for his analysis of our limitations in interpreting "objective" findings and the manners by which the method of measurement can be improved to handle these limitations, to an extent. Valentino Braitenberg, whom I had the honor of meeting, for his ability to abstract the complexity of the matters at hand. Braitenberg's *On the Texture of Brains* (1973) is a beautiful exposition of (using his words) "neuroanatomy as a kind of psychology." Philip

xiv Preface and Acknowledgments

W. Anderson for his two papers on the concept of *More Is Different* (1972 and 2001). And Denis Noble, whose work on the physiology of excitability is widely acknowledged, for *The Music of Life* (2006), a clear polemic exposition of the difficulties and challenges faced by the current structural, reductive approaches to the life sciences, and for his insistence on carrying with pride and dignity the ensigns of physiology. John Eccles for his *Evolution of the Brain: Creation of the Self* (1989), an analysis of the history of our kind, leading to the writings of Phillip V. Tobias and more recent scholars who study paleoanthropology. Jacques Barzun for the depth of *A Stroll with William James* (1983). Robert D. Richardson for his encyclopedic description of the life of *William James: In the Maelstrom of American Modernism* (2006). Saul Rosenzweig for *Freud, Jung and Hall the King-Maker* (1992), an emphatic, touching description of the settings that surrounded Freud's journey to America in 1909. John C. Flugel, whose book *A Hundred Years of Psychology* (1934) I encountered by chance in an old bookshop somewhere in Galilee, a panoramic view of the history of a discipline as conceived by a scholar in the beginning of the twentieth century. As for the visit to the terrain of psychological objects, I am infinitely obliged from afar to Thomas H. Ogden. His texts, in particular his paper on "The Concept of Internal Object Relations" (1983), the book that followed (*The Matrix of the Mind* [1986]), and his more recent *Creative Readings* (2012), opened for me a window to a whole world of Object Relations theorists and their writings. And, of course, the writings, and more so the images, of the two heroes, James and Freud, whom we secretly and humbly follow from behind, listening to a dialogue they have never had a chance to complete.

Acknowledgments. I thank my colleagues and students at Technion's Network Biology Laboratory, as well as the editors and reviewers at Cambridge University Press, for their candid and important comments on earlier versions of the text. I am especially grateful to Daniel Dagan, Erez Braun, Asaf Gal, Ron Meir, and Noam Ziv for encouragement and precious discussions throughout the writing

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Frontmatter

[More information](#)

Preface and Acknowledgments

xv

phase. Within the closer perimeter, I am beholden – first and foremost – to Adi for her love, inspiration, and teachings; to my son Nimrod for his support, invaluable advice, and delicate reviews throughout my negotiations with this subject matter; to my son Omer who patiently and emphatically stood beside me, enabling the space and time required. And to the memory of David Melamed, whom I never met, for the treasures he entrusted to me.

Cambridge University Press

978-1-107-10118-0 - Science, Psychoanalysis, and the Brain: Space for Dialogue

Shimon Marom

Excerpt

[More information](#)

1 A Lost Dialogue

A dialogue between two men took place early September 1909 in Worcester, New England. One of the two was William James, 67 years old, physiologist, medical doctor, psychologist, and philosopher. A portrait of James from around that time reveals a slender man with good posture, warm yet penetrating eyes, and a wild grayish beard. Being an empiricist in the most fundamental sense possible, James insisted on experiencing all, shying away from nothing, the simplest or the apparently bizarre, exploring for “irreducible and stubborn facts.”¹ Robert Richardson, the author of James’s extensive biography, says that “consistency, for James, was not in itself a virtue. Vacillation was ... a fixed habit. He was so open to almost any kind of experience that he was apt to change his mind repeatedly about any single piece of it, from a career plan to a recent book.”² James was the author of many psychology texts, the most celebrated of which is the 1890 *Principles of Psychology*; while not the first textbook of the discipline (textbooks by, for example, Bain and Spencer had been published earlier), James’s *Principles* remains the most relevant to date. It is a systematic analysis of a wide array of human behaviors, ranging from such basic concepts as Habits, Instincts, and Perception to complex phenomena such as Association, Thought, Consciousness of Self, Emotions, and Hypnotism. James’s contributions to philosophy

¹ Richardson (2007, pp. 5 and 297).

² *Ibid.*, p. 152.

2 Science, Psychoanalysis, and the Brain

are of utmost importance, largely due to their emphasis on the psychological machineries underlying key philosophical concepts. He was a firm believer in (and one of the founders of) *Pragmatism*, a conceptual framework much abused over the years, which to James was no less than the path towards knowing what is true by means of ongoing negotiations with the observed, tightly connected to relational dynamics and depth psychology, as will become evident in later chapters of this essay. “By their fruits ye shall know them, not by their roots”³ was one of James’s favorite aphorisms, variants of which appear in multiple places throughout his writings.

The other man was Sigmund Freud. In September 1909, as testified by several photographs taken in Worcester, Freud (at the age of 53) seems almost as old as James, having a somewhat embittered look, with an all-white, well-cultivated beard, slightly bent forward and holding a stylish walking stick. At that time Freud’s ideas, already known in the world of academic psychology, were much criticized but influential. He was called to Worcester by Stanley Hall, the president of Clark University, himself an eminent American psychologist and educator, an old friend, and often contender, of James. Stanley Hall invited Freud to present his theoretical framework to the Americans in a series of lectures as part of a conference in honor of the twentieth anniversary of the university. Freud had hesitated, but eventually accepted the invitation and sailed to Worcester from Europe, embarking from Bremen on board the *Norddeutscher Lloyd* ship *George Washington* on August 21.⁴ He travelled with two of his apostles – Carl Jung of Zurich (who had been invited independently of Freud)⁵ and Sandor Ferenczi of Budapest – a journey in which much is said to have happened

³ James (1902, p. 26); adapted from Matthew 7:20 (KJV) “Wherefore by their fruits ye shall know them.”

⁴ Jones (1955, p. 54).

⁵ While Jung said so, and likewise insisted in his biography, there is no indication to that effect in correspondence with Hall. See Rosenzweig (1992, footnote 2 in pp. 355–6).

A Lost Dialogue

3

between Freud and Jung, maybe the beginning of the collapse of their relationship. They arrived in New York City on August 30, spending several days there, and then took the train to Worcester.

The atmosphere in American academic psychology and its relation to the European (largely German) school around the time of Freud's arrival at Clark University, is described aptly by Flugel in his 1934 book on the history of psychology:

[T]he rapid rise of American psychology is beyond all doubt one of the most striking scientific events of the last two decades of the nineteenth century... But in taking over psychology, America distinctly modified the German attitude. From the very first the principal features of this modification were clearly apparent. They can be summarized very briefly under three heads: (1) a much greater interest in the genetic standpoint; (2) a distrust of introspection and (3) an emphasis on individual differences rather than on the general characteristics of the human mind.⁶

These are the seeds of biologism, behaviorism, and the dominance of quantitative mental tests in America throughout the twentieth century.

Freud and Jung stayed at President Hall's house during the one-week conference. William James arrived at Worcester toward the end of the conference, on the evening of Thursday, September 9, "in order to see what Freud was like."⁷ In itself, James's attendance was a valuable statement of an intention, by one of the most distinguished American intellectuals, to understand the principles underlying the psychoanalytical movement. He stayed the night in Hall's house, together with Freud and Jung, and planned to take the next day's (Friday) evening train back home to Boston.

It is reasonable to assume that Freud was eager to impress James; maybe this drove him to change the subject of his planned Friday

⁶ Flugel (1934, pp. 210–11).

⁷ A letter to Theodore Flournoy, September 28, 1909. In *The Letters of William James* (1920), vol. II.

4 Science, Psychoanalysis, and the Brain

lecture,⁸ practically repeating large portions of his previous day's lecture on dreams, slips of the tongue, and accidental behavior, conveying the message that interpretation of dreams and accidental acts are "the *Via Regia* to the knowledge of the unconscious."⁹ Freud asserted that his most regular observation thus made is that the symptoms of his patients are traceable back to impressions from their early sexual life. "In all cases," he said, a thorough explanation of present symptoms "finds its way back to the time of puberty and early childhood... [it] is the enduring, repressed wishes of childhood which provide the power for the formation of symptoms ... [T]hese powerful childhood wishes are almost invariably of a sexual nature."¹⁰ James was there, listening to Freud's message to an allegedly prudish American audience.¹¹

It was probably difficult for Freud and James to have time alone during the twenty-four hours of James's visit. Therefore, Freud, by invitation, joined James on Friday evening on his one-and-a-half mile walk from Hall's house to Worcester railway station, where they would go their separate ways, never to see each other again: James died in 1910. The failure of the genuine attempt made by these two great men to understand each other within the limited space and time (one-and-a-half miles, maybe one hour), was literally heart-breaking:¹² "He [James] stopped suddenly, handed me a bag he was carrying and asked me to walk on, saying that he would catch me up as soon as he had got through an attack of angina pectoris which was just coming on." James did see some possible merit in Freud's

⁸ Rosenzweig (1992, pp. 171–2).

⁹ *Ibid.*, p. 418.

¹⁰ *Ibid.*, p. 426.

¹¹ In a letter to Jung, while contemplating the option of accepting the invitation to come to America (McGuire, 1974, pp. 195–7), Freud expressed his concerns that "once they discover the sexual core of our psychological theories they will drop us. Their prudery and their material dependence on the public are too great."

¹² Freud (1925, p. 52).

A Lost Dialogue

5

idea; in a letter to one of his colleagues he expressed hopes that Freud and his disciples “will push their ideas to their utmost limits, so that we may learn what they are. They can’t fail to throw light on human nature; but I confess that he made on me personally the impression of a man obsessed with fixed ideas. I can make nothing in my own case with his dream theories, and obviously ‘symbolism’ is a most dangerous method.”¹³ In another letter he writes: “I strongly suspect Freud, with his dream-theory, of being a regular *halluciné*.”¹⁴ These are difficult words to read, even today, especially when streaming from a pen belonging to a man of such depth and openness as James. Strangely, Freud (an otherwise obsessive note keeper) never commented, at least not in writing – as far as I can tell – on what James had said (or did not say) to him in this walk to the station. It is strange, because no one single person throughout the American academic world was more strongly identified with the underpinnings of psychology than James at that time. All we know is that Freud came back to Europe with a feeling that “America is a mistake; a gigantic mistake, it is true, but none the less a mistake,”¹⁵ complaining of the traumatic impacts of the trip on his gastrointestinal system and – quite bizarrely – that his “handwriting has deteriorated so very much since the American trip.”¹⁶ Nothing on the intellectual interaction with James, whose scientific approbation Freud surely sought.

The failure to interact with each other, to initiate a genuine dialogue between the then budding Freudian theory that strived for scientific backing, and the age-old, systematic, seemingly solid thread from anatomy to physiology to psychology to mind and philosophy,

¹³ A letter to Theodore Flournoy, September 28, 1909. In *The Letters of William James*, vol. II.

¹⁴ A letter to Mary Calkins (September 19, 1909), in Rosenzweig (1992, p. 174).

¹⁵ Jones (1955, p. 60). The Jones account of Freud’s ambiguity towards the American experience is educative and humorous (pp. 53–60).

¹⁶ Letter from Sigmund Freud to Ernest Jones, January 27, 1910, in *The Complete Correspondence of Sigmund Freud and Ernest Jones 1908–39*, pp. 42–3.

6 Science, Psychoanalysis, and the Brain

a thread to which James devoted his intellectual life, should not have come as a surprise. It is James who wrote of scientists yielding “to the pleasure of taking for true what they happen so vividly to conceive as possible ... [representing] a mood of Faith, not Science.”¹⁷ It is James, rooted in physiology, who stated that “the ignoring of data is, in fact, the easiest and most popular mode of obtaining unity in one’s thought,”¹⁸ and that the “theorizing mind tends always towards the oversimplification of its materials.”¹⁹ While James rejected “the assertion ... that the only sound psychological science is that founded in physiology” and against “the most brutal materialism,”²⁰ he clearly articulated his faith that “the way to a deeper understanding of the order of our ideas lies in the direction of cerebral physiology. ... [I]t is only as incorporated in the brain that such schematism can represent anything *causal*.”²¹ The dialogue between James and Freud was a dialogue between one who was open to explore any direction, yet restrained by his insistence on “irreducible and stubborn facts,” and one who was significantly more relaxed regarding facts, but insisted on seeing things through his own prism – psychoanalysis, as he envisioned it.

Depth psychology and physiology went their separate ways. The psychoanalytic movement, arguably the only branch of psychology that dares to hypothesize on the dynamics of motives and conflicts underlying human psychic life, distanced itself from issues of matter, focusing on the development of a rich conceptual framework, addressing psychodynamics independently of the underlying physical machinery. This separation process stands in sharp contrast to the development of other branches of psychology that took less insecure paths, attending to aspects of human behavior to which the

¹⁷ Richardson (2007, p. 163).

¹⁸ *Ibid.*, p. 184.

¹⁹ James (1902, p. 32).

²⁰ Richardson (2007, p. 195).

²¹ James (1950[1890], volume 1, p. 593).

A Lost Dialogue

7

method of measurement might be applied. These other branches of scientific psychology (for instance, the study of perception, learning, memory, categorization, and decision making) position themselves at a more convenient place in their negotiations with the discipline of physiology. Moreover, they make every possible effort to distinguish themselves from the misty language of psychodynamics. At the same time, physiology had confined itself, until very recently, to matter, with marginal reference to the mind. A dialogue between physiology and psychology, where realized, was limited to the above-mentioned branches of scientific psychology that focus on measurable behavior. Only in one (critical) front – the borderline of medical practice – did clashes flare here and there between applied physiology and the psychoanalytic movement; most notable is the Osheroff versus Chestnut Lodge case.²² These clashes, however, were immediately extinguished, usually by psychoanalysts clearing the way and withdrawing from the field of conflict.

Over the past decade or two we have been witnessing a change in the relations between depth psychology and physiology. Technological advancements in manipulating and measuring brain activities around the transition from the twentieth into the twenty-first century, taken together with an atmosphere that rewards interdisciplinary approaches, have brought neurophysiology and psychoanalysis into contact again. Ernst Mach (1838–1916) referred to such often seen transient phenomena, where fields that have developed in parallel come into contact, hoping that relating them to each other might throw light on otherwise hidden important facts. On such occasions there is a natural tendency to think that one of the fields may be absorbed by the other. But, says Mach:

[T]he period of buoyant hope, the period of over-estimation of this relation which is supposed to explain everything, is quickly followed

²² Klerman (1990, 1991); Stone (1990).

8 Science, Psychoanalysis, and the Brain

by a period of disillusionment, when the two fields in question are once more separated, and each pursues its own aims, putting its own special questions and applying its own peculiar methods. But on both of them the temporary contact leaves abiding traces behind. . . . [T]he temporary relation between them brings about a transformation of our conceptions, clarifying them and permitting of their application over a wider field than that for which they were originally formed.²³

Regarding the matter in hand, whichever direction of abiding traces one seeks to identify – psychoanalysis to neurophysiology or vice versa – one must be aware of the danger of making the category errors that are entailed in the mixing of scales and levels of organization, inherent to wandering within the psycho-physiological chasm. Scientists tend to become less sensitive to such category errors – otherwise unacceptable within established scientific disciplines – when jumping scales across disciplines; more so when it comes to making statements about psychology, the “permitted” discipline.

With Ernst Mach’s perceptive comment in mind, a potentially important project – beyond the scope of the present essay – might be imagined, where psychologists attempt to identify abiding traces of transformations within psychoanalysis, brought about by modern approaches to complexity and organization in dynamical systems theory,²⁴ or by neurophysiological findings.²⁵

But this essay is about the complementary direction: identification of traces of those transformations that depth psychology imposes on neurophysiology, transformations that survive the disillusionment with relations that are supposed to explain everything. To this end, the century-old dialogue between physiology and depth psychology is presented in a manner that might help in defining what can and, more important, what cannot be exchanged between

²³ Mach (1914[1897], p. 83).

²⁴ See, for instance, Stolorow (1997).

²⁵ Kandel (1998, 1999).

A Lost Dialogue

9

the two disciplines. Acknowledging the inherent irreducibility of the depth psychology discourse, the dialogue – as presented here – departs from the aura of physiological chauvinism that dominates at the present time. It is important to do so in order to protect physiology from an ignominious materialism when it comes to issues of psychic processes. It is vital – for the benefit of neurophysiology – to secure the intellectual autonomy of depth psychology discourse from the impacts of a naive reductionism that aims to explain away psychic concepts by pointing at biological mechanisms and semantically empty causal relations.

While I subscribe to the belief that no direct mapping between the concepts that constitute psychoanalytic and neurophysiological discourses is available for us *in principle*, proper abstraction may expose domains within each of the disciplines, through which a meaningful dialogue may be reified. After all, both disciplines share a history of intellectual interest in relational, functional development and adaptation of representations over extended spatial and temporal scales; they share a history of intellectual interest in the ways representations (of admittedly very different kinds of objects) are formed, grow, interact, split, and merge; they share a history of confusion about what is pre-determined and what is open to evolve over the human life cycle; what is physical and tangible, and what is independent of structure. Taken together with the links between them, these and related issues constitute a space for dialogue; a floor where a genuine attempt may be made by both depth psychology and neurophysiology to understand each other and – importantly – to define the boundaries of their trades, their individuation. In this process, neurophysiology is a major donee by possible gain of meaning.

The present invitation to establish a deferential dialogue between depth psychology and physiology is mainly intended for the sake of physiology. It is in itself an unvoiced dialogue that might have taken place within the minds of physiologists that are interested in meaningful input from depth psychology, but are concerned by the

10 Science, Psychoanalysis, and the Brain

simplistic biologism that characterizes several of the recent trends. The dialogue is presented as a collection of thoughts, associations, and reflections that critically examine potential points of contact in an abstract space between the two disciplines. Concepts are phrased in terms that promote a dialogue, focusing on generic aspects of depth psychology and neurophysiology, primitives that are situated at the basis of these fields. In the analysis of neural structures and dynamics no specific brain anatomical loci are mentioned, nor cellular or genetic correlates of behavior. Not in order to spare the psychologists the agony of sinking into physiological technicalities do I refrain from localizing functions in the brain. Rather, it is because localization in its broader sense is the very thing that is detrimental to a dialogue between depth psychology and physiology.

We carry with us the symptoms and signs of the James-Freud 1909 symbolic failure to converse, sometimes paradoxically twisted, but clear to the eyes of those who seek them. Maybe it is time now to resume deferential tones dissolved too early, to dialogue in a more suitable space and definitely with no intentions in mind, nor in its matter, either to condescend or to ignore each other for one more century.

Index

- abstraction, 9, 47, 64, 108, 158
 and rigor in physiology and psychology, 64
 in experimentation, 37
 Rosen, R., 64
- adaptation, 9, 63, 88, 88n29, 121, 149, 150, 155
- adaptivity
 of physiological inner space, 139
 of psychological inner space, 138
- Adrian, E.D., 120
- Anderson, P.W., xiv, 13, 16
- Aristotle, 147
- Aron, L., 86n24, 87
- artificial intelligence, 29
 Garry Kasparov's criticism, 29
- association
 Freud and James, 124
- association by simultaneity, 54, 151, 160
 Bain, A., 121
 Freud, S., 123
 Hebb, D.O., 124
 James, W., 123
- associationism, 121
 and the neuron doctrine, 127
- Atlan, H.
A tort et à raison, xiii
 reductionism and mysticism, 34
- attachment theory, 85n21
- attractor, 161
- Atwood, G.E., 87
- Australopithecus*, 91
- availability bias, 114, 156
- axons, dendrites and synapse, 115
- Bain, A., 121
- Barzun, J., xiv, 65
- Bethe, H.A., 15
- Bion, W., 82
- bi-stable perception, 77, 79
- Borges, J.R., 57, 58
- Borgesian manifold, 66
- Boring, E.G.
 on mathematization as an escape, 105
- Bowlby, J., 84, 85, 135
- brain volume, 91, 94
- brain-machine interface, 98
- Braitenberg, V., xiii, 129
 on scales, 47
- Bridgman, P.W., xiii, 32
- British psychoanalysis, 86
- Brothers, L., 96
- Cajal, S.R., 119
- Calkins, M.W., 143
- Çatalhöyük*, 76
- category error, 8, 67
 the case of localization, 101

192 Index

- causation
 across scales, 35
 Aristotle, 147
 correlation and basic science,
 38, 41, 42
 downward *or* final *or* reversed *or*
 top-down *or* right-to-left, 25
 semantically empty, 38
 Tinbergen, 147
- complexity
 all the way down, 24, 25
 Havel, I.M., 33
 reflected in, 24
 scale horizon, 33
 superposing simple elements, 31
 temporal and spatial, 28
 unfathomable, 66
- conceptual nervous system
 scheme, 107
 Skinner, B.F., 103
- condensed matter (physics), 14
- congruent relations, 150, 156, 161,
 163, 167
- contact barrier, 110
- corporate science, 30n24
- corpus callosotomy, 97
- cortex
 anatomy and physiology, 129
 and primitive reflexes, 134
 and the white matter, 132
 as a “mixing machine,” 133
 asymmetry of layers, 130
 bi-laterality, 112
 dimensions, 112
 intrinsic dynamism, spontaneous
 activity, 131
 localization, 130
 relative to other brain structures, 113
 symmetry, 129
 the folded nature of, 133
 types and density of cells, 113
- coupled systems, 161
- Cybernetics, 149, 149n123
- cystic fibrosis, 39
- dendrites, axons and synapse, 115
- Dennett, D.C., 27n21
- Dewey, J., 63, 72, 145
- dialectic, 156, 172
- discontent, 77, 89, 138, 151, 156,
 157, 177
- drive reduction, 154
- drives, 151
- DSM – Diagnostic and Statistical
 Manual of Mental Disorders,
 30n25
- Dunbar, R.I.M., 94
- dynamical systems, 8, 46, 142, 161
- dynamical systems theory
 applied to psychology, 67
 potential impact on psychoanalytic
 theory, 46
- Eccles, J.C., xiv, 91n6, 120
- Edelman, G.M., 142
Neural Darwinism, xiii
- ego, as internal space, 82
- Elsasser, W.M.
*Reflections on a Theory of
 Organisms*, xiii
 unfathomable complexity, 66
- encephalization, 95, 97
- exorcism, 33
- exploration–exploitation
 tradeoff, 110
- Fairbairn, W.R.D., 73, 82
 internal split, 76, 77
 utopian, theoretically perfect
 world, 74
- Feynman, R.
 on More Is Different, 17n9

Index

193

- Flugel, J.C., xiv
 on American psychology, 3
 on associationism, 91
 on inhibition, 135
 on localization, 100
- Freud, S.
 biologism (against), 19
 biologism (in favor of), 21
 his neural network image, 125
 in Worcester, 2
 journey to Worcester, 2
 on America and Americans, 4n11, 5
 on brain localization, 99
 on More Is Different, 19
 on physiological constraints to
 psychological theory, 12
 on psychiatry, 20
 on splitting the inner space, 79
Project for Scientific Psychology, 12
- Friston, K., 46n45
- functional–dynamic, 142, 147, 150, 156,
 170, 174
- functionalism, 143, 144
- fundamental laws (physics), 15
- funnel view, 11, 13, 17, 23, 25, 31
- gastrulation, 140
- generative relations, 54, 57, 60, 63, 67,
 84, 107, 166
- Golgi, C., 119
- Hall, S., 2
- Havel, I.M.
 and reductionism, 33
 the concept of scale horizon, 27n20
- Hebb, D.O.
 association by simultaneity, 125
 neurologizing, 106
 on the conceptual nervous
 system, 106
- Hodgkin, A., 120
- Hominidae, 91
- Homo sapiens*, 91
- Huxley, A., 120
- indeterminacy, 27
- inferences in psychoanalysis and
 physiology, 52
 heterarchical topology, 54
- inner (or internal) space
 awareness, 136
 physiological, 131, 136
 psychological, 73, 75, 77, 79, 82, 88,
 89, 128, 137
- instinct, 71, 73
- intellectual autonomy, 17
- internal model theorem, 88
- internal object relations, 83, 85, 89
- interpretation–projection cycles, 165
- intersubjective, 71, 87, 93, 161, 172
- intersubjective psychology, 69,
 76, 86, 87
- intersubjectivity, 89
- Isaacs, S., 71, 75, 82
- Jackson, H., 135
- James, H., 176
- James, W.
 abstraction and details, 112
 and empiricism, 1, 6, 56
 in Worcester, 1
 on brain and psychology, 6
 on Freud, 3, 4
 on phrenology, 102
 pragmatic relations, 28, 61, 137, 147
Pragmatism, 2, 62
 pragmatism and active sensing,
 perception–action, predictive brain
 models, 62
 pragmatism and Dewey’s ideas, 63
Principles of Psychology, 1
 too much neuroanatomy, 112

194 Index

- Jerne, N., 157
- Jung, C.G.
 good and terrible mother, 77
 journey to Worcester, 2, 2n5
- Kahneman, D., 156
- Kandel, E.R., 43, 45
- Kasparov, G., 29–30
 on artificial intelligence, 29
- Katz, B., 120
- Kitten Carousel experiment, 146
- Klein, M., 71, 72, 77n9, 82
- Krippendorff, K., 149
- learning, 103n40, 110, 121, 149,
 149n123, 152n125
- Less Is Not Simpler, 23, 25, 27, 28, 29,
 31, 35, 38, 48, 152, 159
- Lewontin, R.C., xiii, 128, 173, 174
- localization
 as an explanation, 102
 Freud, S., 99
 in genetics, 100
 in the gross, but not in the fine, 103
 James, W., 102
 naive, 98
 phrenology, 98
 reorganization, following experience
 or damage, 101
 symptom versus function, 101
- Loewi, O., 119
- Mach, E., 7
- mechanism
 and reverse engineering, 27
 indeterminacy, 27
- membranes
 action potential, 115
 resting potential, 114
- microscopic–macroscopic relations,
 11, 18, 21
- in psychoanalysis, 39
 in physiology, 39
- Mitchell, S.A., 85, 87
- More Is Different*, xiv
- mother, 73, 74
 Çatalhöyük breast, 76
 good and bad, 76, 83
 Jung, C.G., 77
 My wife and my mother-in-law, 77
- movement
 assumed regularities, 56
 definition of behavior, 56
 generative relations, 57
- multiple selves, 85
- neural activity group, 121, 148, 152,
 155, 158
- neural network, 22, 33, 42, 121, 123,
 126, 129
- neuromodulation, 118
- neuropsychology, 43
 criticism, 44–5
- Noble, D., xiv, 36n34, 145n116
 on localization, 100n34
- object relations, 52, 77, 85, 163
- Ogden, T.H., xiv, 60n12, 85,
 158, 160
 internal object relations, 82, 83
 object internalization, 83
- Osheroff versus Chestnut Lodge, 7
- phantasy, 71, 72
 as prior hypothesis, 72
 frustration, 75
 higher-order, 75
 in adult, 75
 innate phylogenetic knowledge, 72
 noisy, 73
 primitive, 72, 75, 79
 validation, testing, 72, 73

Index

195

- phrenology, 98
 James, W., 102
 modern, 98
- physiological chauvinism, 9
- physiological objects, 134, 143, 148,
 151, 155, 158, 160, 166, 168
- plasticity, 46, 101, 109, 110n48, 125, 156
- Plato (*Meno*), 153
- pragmatic, 61, 137
- pragmatism, 147, 163, 165, 172
 and adaptation, 150
 and validation by congruence, 62
Pragmatism, 62
- production rules in psychoanalysis
 and physiology, 53
- projection, 61
- projective identification, 84
- Purkinje, J.E., 119
- reductionism
 aesthetics, 32
 and mysticism, 34
 exorcism, 33
 in intersubjective, relational
 context, 87
 mature, 35
 naive, 9, 28
 reasons to reduce, 32
 scale horizon, 33
- reflexes, infantile or primitive, 72, 88,
 89, 128, 134, 136, 139
- reflexive, 128, 132, 136, 137, 160
- reflexive inner (or internal) space
 physiological, 139
 psychological, 88, 128
- relational, 88
- relational brain, 93
- relational context, 93, 138, 169, 170
- relational dynamics, 86, 166, 168,
 170, 174
- relational objects, 69, 89
- relational psychology, 69, 76, 86, 87
- Remak, R., 126
- reverse engineering, 90n4, 156, 159
- Richardson, R.D., xiv, 1
- Rosen, R.
Life Itself, xiii
 model relations, 50
 on abstraction, 64
 the Natural Law, 57n9
- Rosenzweig, S., xiv
- scala naturae*, 94
- scale
 concept of, 36
 or lack thereof, 38
- scale horizon, 27, 27n20, 33, 35, 48, 67
- Schwann, T., 119
- scientific psychology, 7
 Freud on experimental
 psychology, 20
 the Wundtian vision, 18
- Segal, H., 72, 82
- self psychology, 69
- semantically empty causal relations,
 9, 38, 41
- Sherrington, C.S., 119, 125
- Simon, H., 144
- Skinner, B.F.
 conceptual nervous system, 103
- social brain hypothesis, 94
 emergence of language, 95
- social grooming, 95
- Socrates, 153
- solid state (physics), 14
- Solms, M., 142
- somatic drive, 73
- Spencer, H., 121
- spike-timing dependent
 plasticity, 125
- stability–plasticity tradeoff, 109
 Freud, S., 110

196 Index

- Stolorow, R.D., 9, 46n45, 71, 72, 77, 87, 96, 121
- structuralism, 143, 144, 172
- structural-programmatic, 140–2, 147, 151, 156, 169, 173, 174
- symmetry, 74
- breaking, 74, 75, 78, 89
 - Fairbairn, 74
 - inhibition and breaking, 135
 - primal, 88, 134, 139
- symmetry breaking, 77, 83, 85, 86, 89, 123, 134, 139, 150, 157, 166
- synapse, axons, and dendrites, 115
- systematic, structured languages
- aesthetics, 55
 - and formal languages, 50
 - and intellectual alienation, 51
 - dynamical system metaphor, 54
 - generative relations, 54
 - graph metaphor, 54
 - incompleteness, 55
 - inferences, 52
 - production rules, 53
 - psychoanalysis and physiology, 49
 - Rosen, R., 50
 - underlying assumptions, 51
 - validity of inferences, 52
- Szymborska, W.
- Utopia*, 31
- technological singularity, 30
- theory of everything, 15
- Tinbergen, N., 147
- Tobias, P.V., xiv
- Tomasello, M., 91n7, 96
- gaze direction in human infants, 95
- transference, 84
- tripartite relations, 65
- underlying assumptions in psychoanalysis and physiology, 51
- universal neural principles, 111
- validation by congruence, 85, 162, 166
- and pragmatism, 62
 - interpretation, 61
 - projection, 61
 - the analyst, 60
 - the physiologists, 60
 - tripartite relations, 65
 - wild interpretation, 63
 - wild projection, 63
 - wild psychoanalysis, 63
- Vygotsky, L.S., 73, 77, 90, 90n4, 91, 97, 120, 171, 172
- Weisskopf, V.F., 14
- Winnicott, D.W., 82
- Wolpert, L., 140
- Wundt, W., 18, 19
- Yourcenar, M., xiii, 174, 175n6
- Zeno of Bruges, xiii, 174, 175
- Φ neurons (or system), 109, 110, 152, 158
- Ψ neurons (or system), 109, 110, 152, 158