Science, Psychoanalysis, and the Brain

Science, Psychoanalysis, and the Brain is an invitation to a space for dialogue where reflections on neurophysiology are expressed with and guided by depth psychology in mind; a space where neurophysiology resumes its traditional humbled stance toward matters of the psyche, and where the intellectual autonomy of depth psychology is acknowledged. The author leads the reader through the terrain of methodological errors that have plagued recent reductive approaches, paving the way for a dialogue that is based on an alternative, relational approach. Neurophysiology is discussed at a high level of abstraction, enabling genuine analysis of the organization of the brain through its relational interactions with the world.

In this dialogue, where psychology provides a theoretical framework that contributes to physiology, both parties benefit. Neurophysiology gains important constraints and guidance in phrasing meaningful questions, psychology gains further motivation to crystallize its multifaceted concepts. Both disciplines enrich the spectrum of metaphors available to them within their own discourses.

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SPACE FOR DIALOGUE

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Technion – Israel Institute of Technology

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To Adi, *by way of a long letter.*

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

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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.

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

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

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.

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'Oeuver 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

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.

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