



Editorial

The Current Crisis of Neuroscience

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The term neuroscience was coined by Francis O. Schmitt in 1963, to introduce a new research discipline focused on the functions and properties that made brains the special organs that we all suspect they are. The discipline was born and started to grow at the time after the Second World War when psychologists abandoned the biological brain, in apparent recognition of the failure, on theoretical as well practical grounds, of understanding what brains do and how they do it, using tools that mostly consisted in interviews of clients. While this recognition happened in despair, it did afford the emergence of a new kind of researcher, the so-called neuroscientist, who worked to test hypotheses of brain function from recording the activity and molecular biology of mammalian brain tissue under different but specific circumstances, by means of methods of imaging, biochemistry, electrophysiology, and pathology. The neuroscientists came from many walks of science, with backgrounds of familiarity with

these methods, and they saw themselves suddenly elevated to the status of magicians, capable of deducing the inner workings of mammalian brains that the psychologists had failed or refused to uncover, and doing so simply by observing the events taking place in brain tissue itself.

Now, 60-70 years later, the party is over for the neuroscientists, and we sit back, forced to acknowledge our inability to test hypotheses of brain function that would allow us to explain how brains do what they evidently evolved to do. Not that we lack detailed information on the activity of single nerve cells and networks of neurons, but we remain unable to put the details together into a whole that would explain consciousness, subjectivity, and theory of mind, and the specific disruptions of these functions that occur in mental disorders. Along with this failure came the inability of neuroscientists to help pharmacologists devise treatments and drugs that invariably would correct the mysterious deficiencies associated with the mental disorders. Pharmaceutical companies en masse have now abandoned the brain, and psychologists and psychiatrists increasingly are being recalled to the congregations of neuroscience by cries of help with novel forms of non-neurobiological treatments such as psychotherapy and alternative and complementary interventions, albeit with little success.

The failures of current neuroscience in the medical field fall into two general categories, one theoretical and one practical. In the theoretical area, it is still impossible to even imagine how the mechanisms, if any, underlying consciousness, subjectivity, and theory of mind, the purported ability of people and some animals to “read” the minds of other individuals, can be explained or understood by means of the findings and accomplishments of current neuroscience. The dilemma reminds us of the issue of what the world would be like if humans or other potential observers were not here to interpret the signals. The question itself of what it would be “like” would be meaningless if no one were present to interpret the signals. This may happen in the future but has not happened yet. The dilemma proves to current

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neuroscientists that the world as it appears to us is a construction of the brain, generated in unison with the act of observing. Here, even the word “act” points to a phenomenon arising in the brain and not outside the brain; however we wish to interpret it [1].

In the practical area, attempts on one hand to understand and treat the specific abnormalities of psychiatric disorders largely have been unsuccessful, even to the extent that it is unclear whether psychiatric disorders may rightly be called diseases, and attempts on the other hand to treat the dementias that so haunt the advanced ages of humans, with Alzheimer’s disease the most frequent of this group of afflictions. The incidence of Alzheimer’s disease is greater in patients with type 2 diabetes mellitus, for reasons that are still unknown. Also, type 2 diabetes mellitus is another condition of more or less advanced aging of humans that shares the features of unknown etiology and uncertain therapy with the psychiatric disorders. Thus, altogether, neuroscientists are faced with three of the most common and devastating conditions of adult humans, including depression, type 2 diabetes of the brain, and dementia, with little to offer in terms of prevention or treatment, with no clear picture of how these conditions arise. The failures have been good reasons for pharmaceutical companies to give up the search for new drugs, keeping in mind that many of the more popular medications of the past started out with accidental discoveries of off-label effects of molecules originally formulated for other conditions, often infections [2,3].

So what can neuroscientists do now, realizing that they don’t understand major features of the human mind, and they can’t help prevent or treat major disorders of the human brain? That is the great question that we must answer before humanity descends into the quagmires of dissolution and disillusion. For example, is it possible that the advent of the internet and the subsequent introduction of social media, along with the loss of written books and printed papers, have contributed to the plunge of humanity into an artificial world that exists only in people’s heads and in the computers where the digitized instructions reside with little similarity to or affinity with the world that they mimic? If this plunge is at the core of some of the ailments of the brain discussed here, what should neuroscientists look at or do to reverse this process?

First, one endeavor that may raise the prospect of neuroscientific advances in the future is an intensified study of healthy brains over time as they age normally. This pursuit would not require pharmaceutical interventions and would make it easier to pinpoint the times at which, and the situations in which, healthy brain aging undergoes a more or less extended transition to unhealthy brain aging. In other words, to understand how the brain fails, it is necessary to know how it works when it works well.

Second, what is also needed to prevent further decline of the applicability of the results of neuroscience is a concerted and intensified effort to discover the mechanisms that control the reactions of the brain to stimuli that challenge the functions of the brain. Much work has been wasted testing the effects of drugs and compounds, with no firm basis in any understanding of the relevant actions of these molecules on brain cells and networks. Neuroscientists need to know the specific changes associated

with disease to design interventions that are likely to reverse the pathology rather than to introduce a factor that will trigger additional changes, as in the case of antidepressive medications to which the patients become addicted. A positive case in point is the modern treatment of Parkinson’s disease based on the insights from the 1960’s that the patients had lost the capacity to produce sufficient dopamine. This development to some extent mimicked the discovery in the early part of the 20th century of the reduced ability of patients with type 1 diabetes to make insulin. No firm knowledge of this kind exists for any of the major disorders of the brain that underlie the current crisis of neuroscience.

The short message of the long argument presented above is that we simply don’t know enough of how the brain works to devise the correct interventions when the brain fails to work properly. Two major efforts in principle can reverse the crisis, one focused on the work of the normal brain, and one focused on the discovery of the specific mechanisms that fail in fellow humans with abnormalities of the brain, in order to specifically design the interventions that correct the failed mechanisms.

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