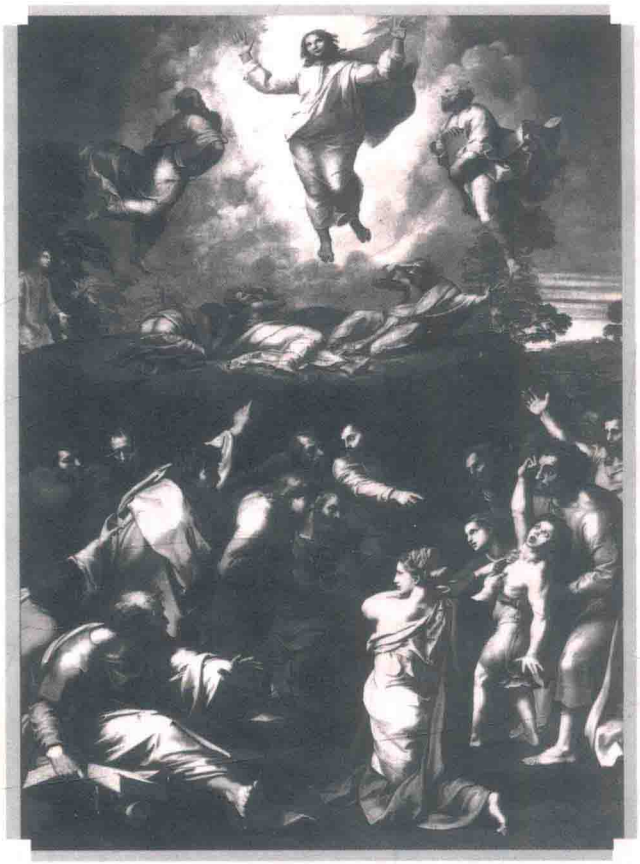
Neurology of the Arts

Painting • Music • Literature



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Imperial College Press

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Preface

The Medical Society of London — the oldest medical society in the world, being founded in 1773 — was left a bequest in the early 1970s by Mrs Florence Alice Mansell. Her husband had been a Fellow of the Society and died in his fifth decade of motor neurone disease. The bequest specifically stated that it should be used to further neurological studies, and the Council of the Society agreed to invest the capital and use the accrued interest to fund symposia related to neurological topics. These meetings were to be restricted to the participants and Fellows of the Society, but the proceedings were to be published.

The first symposium, held in 1976, understandably on motor neurone disease, lasted only one day. Since then, the meetings have been held every two to three years, lasting two days, with 12 speakers each day. On average, 6 speakers would come from North America, 6 from the Continent and elsewhere, and the rest from the UK. The subjects chosen were those not readily accepted by commercial publishers; for example, the proceedings of the motor neurone disease symposium contituted the first book on the subject for 25 years. Other topics have been the first of their kind, such as clinical neuroimmunology and clinical neuroepidemiology (see following table). The present volume, the proceedings of "Neurology of the Arts", is again the first in this field.

The medicine of art has been a hobby of mine since I became a medical student. My preclinical-education school (King's College, London) and medical school (Westminster Hospital) were both a few minutes' walk from several of Britain's most famous art galleries, so these were easy to visit. Looking at pictures has never been a hardship with me, and it is difficult to understand why there are some who do not find it pleasurable. From walking the wards to walking the galleries, it was not unnatural to take note of those paintings which carried some significance for medical studies, possibly because of guilt feelings over the latter being neglected. During the ensuing decades, on frequent lecture tours abroad, I followed this bent whilst visiting art galleries in foreign cities.[1] That this is not an original idea has been pointed out by a famous medical historian: "Whenever a doctor goes on a vacation trip to Europe, accompanied by his wife, who insists on seeing the galleries, he

1. F.C. Rose, The medicine of art: presidential address, *Trans. Med. Soc. London* (1985).

spends his time hunting for pathological subjects, sure to make a 'discovery' and to write a paper about it."[2]

It seemed appropriate to add music and literature (in their broadest sense) in equal measures to painting so as to provide an overview of an area which is extremely large, as indicated by the table of contents, and of wide interest.

2. H.E. Sigerist, The historical aspects of art and medicine, *Bull. Inst. Hist. Med.* **II**, 271–97 (1936).

THE MANSELL BEQUEST SYMPOSIA
OF THE MEDICAL SOCIETY OF LONDON
(Editor: F. Clifford Rose)

Year	Title	Publisher
1977	Motor Neurone Disease	Pitman Medical
1979	Clinical Neuro-immunology	Blackwell Science
1980	Clinical Neuro-epidemiology	Pitman Medical
1981	Metabolic Disorders of the Nervous System	Pitman Medical
1982	Advances in Stroke Therapy	Raven Press
1984	Advances in Aphasiology	Raven Press
1985	Advances in Neuro-oncology (*with W.S. Fields*)	Karger, Basle
1988	Physiological Aspects of Clinical Neuro-ophthalmology (*with C. Kennard*)	Chapman & Hall Medical
1989	The Control of the Hypothalamo-pituitary-adrenocortical Axis	International Universities Press, Chicago
1993	Advances in Neuropharmacology	Smith Gordon
1995	Recent Advances in Tropical Neurology	Elsevier Science
1997	Towards Migraine 2000	Elsevier Science
1999	A Short History of Neurology: The British Contribution 1660–1910	Butterworth-Heinemann
2001	Twentieth Century Neurology: The British Contribution	Imperial College Press

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Contents

Chapter 1

The Cerebral Localization of Creativity

George K. York

This chapter examines the cerebral localization of creative processes from the point of view of the practical neurologist. The appreciation of visual, musical or verbal artistry leads the clinical neurophysiologist to ask whether creativity arises in a discrete part of the nervous system. Modern clinical neurophysiology localizes sensorimotor functions, not mental ones. For a creative induction to be localized, it must be exclusively sensorimotor, yet the artistic process is intrinsically mental. For neurologists, mental processes occur concomitant to physical events leading to doubt that artistry emerges from one or another part of the nervous system. Aesthetic assessment of the creative output of a patient does not help in localizing a lesion—a distressing conclusion for the sensitive neurologist. He or she may take comfort, though, in the realization that neurological diagnosis tests the creative mind of the examiner, if not the patient.

Introduction

Works of art fill the viewer or listener with many feelings, not least of which is a sense of wonder at the source of the artist's achievement. Neurologists compound this amazement by asking the classic neurological question: Where in the brain does the picture, or the symphony, or the poem come from? Most people accept that the creative process arises in the brain, and scientific neurology is based on the premise that different parts of the nervous system have different functions. Thus the neurologist in the art gallery might consider the question where in the brain creative ideas arise. Science has produced conflicting observations on the cerebral localization of artistic processes, and this chapter aims to examine some of these observations from the point of view of a practical clinical neurologist.

In considering this topic, the words and works of John Hughlings Jackson articulate the point of view of a practicing neurologist, which can be summarized as the conviction that it is possible to test the function of the nervous system by bedside examination. Stimulation or destruction of different parts of the nervous system leads to different signs and symptoms. Clinical neurophysiology, the conceptual framework of diagnostic neurology, rests on the principle that stimulating or ablating a part of the brain illuminates that area's function.

The Jacksonian neurologist's point of view is little known in wider circles because scientific medicine strives to be rational and skeptical—characteristics that do not necessarily promote the sensitive appraisal of artistry. However, physicians are privileged to examine people in whom nature has contrived to damage or destroy a part of the nervous system and who are willing to undergo a full range of diagnostic maneuvers in the hope of better health. Therefore, the neurologist is put in the unique position of being able to study neurobiology and human nature simultaneously. In this way the inquiring neurologist may offer a different and enlightening way to look at painting, music, literature and science.

Scientific Cerebral Localization

Clinical neurophysiology begins with the following question: What, precisely, do neurologists localize when they examine a patient? Hughlings Jackson, as a practicing neurologist, declared that neurologists localize symptoms rather than elemental neurological functions.[1] More importantly, he asserted that symptoms are exclusively sensory and motor.[2] At the bedside, to say nothing of the gallery or the symphony hall, the Jacksonian neurologist regards the nervous system as an exclusively sensory–motor machine that works by integrating afferent and efferent electrochemical impulses. Scientific neurology demands rigorous adherence to such matters as thermodynamics and the laws of conservation of energy and mass. As a result, a bedside test may be critically important to the patient even when the sign itself is of dubious scientific significance. It would be disingenuous to say that these signs and symptoms have nothing whatever to do with the presence or absence of elemental neurological functions. For example, hemiparesis seems strongly related to voluntary movement, which is an arguably circumscribed neurological function. Even so, focal signs do not necessarily define a basic neurophysiological function.

Practical clinical neurology relies on the principles of evolutionary neurophysiology, a discipline that has been called the most successful application of evolutionary theory to medicine.[3] Evolutionary neurophysiology considers the nervous system an aggregate of discrete organs, each with a single physiological function.[4] This fundamental neurophysiological idea can be traced to the phrenological movement.[5,6] In developing this phrenological assumption, Hughlings Jackson thought that each neurological organ is organized as a hierarchy of three evolutionary levels. The lowest of these levels comprises a number of nodes or centers, each representing a small part of the body, such as the face, the arm or the leg. At the middle and highest evolutionary levels, each center contains a complete representation of the next lower level, but each is also weighted for a different body part. This weighting is dynamic, so that reweighting after focal brain necrosis results in recovery of function. Superior levels suppress or inhibit the function of subordinate levels. This hierarchical organization means that symptoms of neurological disease are dual in nature, negative symptoms resulting from the loss of higher level function and positive ones from the appearance of function of previously inhibited lower levels. Neurological disease may be focal or diffuse, meaning that it may affect one, many or all centers at one, two or all three levels.[7]

In everyday practice, the principle of weighted ordinal representation allows neurologists to predict the presence and location of pathology with tolerable accuracy.[8–10] Physicians use this diagnostic process to distinguish between focal and diffuse disease of the nervous system, an endeavor which would be absurd if there were no localization of function. They examine patients for negative symptoms due to the loss of higher levels, such as hemiplegia. They also look for the emergence of positive signs due to disinhibition of lower levels, for example pathological hyperreflexia or Babinski's sign. The diagnostic system inherent in Jacksonian neurophysiology becomes second nature to experienced neurologists, who regard it as "thinking neurologically".

Of course, all work and no play makes for a dull neurologist. A visit to the Tate Modern or St. Martin's-in-the-Fields, not to mention a midnight walk in the West End, makes thoughtful neurologists vividly aware of the reality of the mind in health and disease. As medical men and women, they know well the importance of the mind in everyday life, and as cultivated citizens of the world they realize that painting, music, literature and drama emerge from creative minds rather than sensorimotor machines. But there's the rub, because long years of practicing neurology also tell them that mental functions, however precisely defined, do not arise in one lobe or hemisphere. The mind, if it has

any physical existence at all, must obey the conservation laws that say that an immaterial agent cannot energize a material system. In the strict medical sense, mental processes can be said to arise anywhere, or everywhere, in the cortex. Mental processes, including creativity, are sensorimotor processes, or they are nothing at all.[11]

It follows that bedside mental tests do not lead to localization of a pathological lesion in the same way that sensorimotor tests do. How, then, are the brain and the creative mind related? A Jacksonian solution to this problem, though perhaps philosophically uninformed, remains a useful clinical approach. In Hughlings Jackson's doctrine of concomitance, there is no causal connection between the brain and the mind at all, that they exist concomitantly.[7] This parallelism has two practical effects. First, it allows neurologists to practice a diagnostically useful form of medicine based on sensorimotor physiology without having to consider the localization of mental symptoms. Second, it suggests an evolutionary structure for the mind analogous to that of the nervous system. Given the undeniable success of evolutionary neurophysiology as a bedside tool, neurologists have regarded the mind as a three-level hierarchy governed by a process of weighted ordinality. Such a structure allows neurologists to characterize mental states and processes, and imposes certain constraints on the products of the mind.[7,11–13]

In hierarchical terms, the mental aspect of art making can be regarded as an inductive process that elevates concepts to conscious awareness. This inductive process appears when a superior and controlling mental state, namely consciousness, stops working temporarily. Paul Klee, an inspired commentator as well as a one-man art movement, wrote that art does not reproduce the visible; rather, it makes the invisible visible.[14] This stands as one of the most profound statements of where art comes from, but a discerning neurologist would hesitate to say where in Klee's nervous system his words, much less his paintings or drawings, arose. Visual artists or musicians may not have the verbal skills to describe precisely what they do, and we ought to be skeptical of reports by artists about the process of their own creativity. Nevertheless, first-person reports provide a primary source, a direct insight into the mind of the artist. Creative people often observe that their own art making requires a certain alteration of consciousness, an exalted state of mind conducive to the creative process. Those with particular insight tell us of a type of hallucination that envelops them when they are doing something artistic. The use of alcohol or other mind-altering substances to artificially produce or prolong this state

has been common since the very beginning of art—an experience also well known to many neurologists.

The idea that the creative process brings some ill-defined visual, auditory or verbal image from a subconscious level to conscious awareness implies that the creative state is lower, in evolutionary terms, than a state of conscious awareness. The products of creativity, the paintings and novels and songs, have their origin at a lower evolutionary level, which suggests that everyone possesses this creative ability, and has interesting consequences in regard to the artistic output of other animals. Alternatively, the altered awareness that enhances creative induction might involve a reweighting of conscious elements analogous to the reweighting of sensorimotor elements that occurs in recovery from stroke. This implies that creative states and processes arise at the highest evolutionary levels rather than at a lower, or subconscious, level. However, it might be difficult in practice to distinguish these possibilities.

The Localization of Creativity

The view that art emerges when the mind is in a disinhibited state has been examined scientifically. In a number of well-studied cases, patients show the preservation, or even the appearance, of artistic output in the face of neurological disease. For example, artists with widespread cortical disease may retain their artistic drive. Some continue to paint, draw, or play the trombone despite severe and progressive Alzheimer's disease.[15,16] The abstract painter Willem de Kooning developed Alzheimer's disease, yet he dramatically increased his productivity after being treated for alcoholism, malnutrition and depression. Art critics say that his paintings improved artistically as well.[17]

Patients with frontotemporal dementia were able to continue to paint, draw, or make photographs, which has been interpreted as the emergence of creativity or talent despite frontal and temporal lobe atrophy and substantial cognitive impairment. Investigators characterized their demented patients' artistry as improved or enhanced after the onset of their illnesses, possibly due to a more intense appreciation of visual images. The authors further observed that preservation of the frontal and parietal lobes allowed planning and execution of the work. They concluded that the patients' art arises from the undamaged parietal and occipital lobes when freed from the inhibition of the anterior temporal lobes.[18,19]