



Chapter 1

Précis

Impressionism, one of the most dominant developments in French painting in the 19th century, was a reaction against academic tradition, romanticism, and the startling influences of the technological invention of the camera. No longer were careful realistic painters the only ones who could render precise reflections of reality. The camera provided true-to-life portraits, landscapes, and documentation of events with efficiency and economy of effort. The term *impressionism* was derived from a painting by Claude Monet—*Impression: Sunrise* (1872, Musée Marmottan, Paris; Figure 1–1), a view of the port of Le Havre in the mist—and was coined for this group of artists by the less than friendly critic Louis Leroy. Monet probably intended his title for the remarkable Le Havre sunrise to refer to the sketchy, unfinished look of the work, similar to receiving an impression of something on the basis of an exposure that is partially obscured and incomplete in its detail. The term, however, was quickly taken up by compassionate critics, who used it in an alternative sense to mean the impression stamped on the senses by a visual experience that is rapid and transitory, associated with a particular moment in time, not unlike the fleeting, immediate sensory memory we get from our filtered and rapid perceptions of the world. Monet, Renoir, Pissarro, and Sisley were incredibly talented artists who perfected this sense impression style of art. Beginning in the later 1860s and culminating in 1872 to 1875,



Figure 1-1. Claude Monet, *Impression: Sunrise* (1872), Musee Marmottan, Paris. A view of the port of Le Havre in the mist.

they chose to paint outdoors (*en plein air*), recording the rapidly changing conditions of light and atmosphere as well as their individual sensations of nature. They used brilliant colors and a variety of brushstrokes, which allowed them to be responsive both to the material character and texture of the object in nature and to the impact of light on its surfaces (Rosenblum, 1989).

Other French brains were beginning to make their mark as well. Not on art, but on the then mystical world of neuroscience; and the enchanted universe of human language and the communication of ideas. It would be generations before this science evolved and benefited from the remarkable camera technology that allowed the actions and functions of the brain to be recorded in realtime, noninvasive ways. But other French brains were at work, questioning, observing, and developing early empirical observation techniques that allowed us to better understand ourselves. One of these remarkable scientists, who curiously labored during the same general 19th century

time frame as the impressionist painters, was Pierre Paul Broca, a child prodigy who fulfilled his promise by becoming a brilliant neurologist, surgeon, anthropologist, and more. He was surrounded temporally and in proximity by a number of other philosophers, thinkers, and scientists who would handle, examine, and interpret brains from their patients. The artists and scientists of this era had another shared characteristic. The context in which they labored was tumultuous. Political and social unrest was rife in France for most of the 19th century. Many historians have noted these difficult times and it is remarkable how much was accomplished in the arts and in science against the backdrop of this grueling turbulence. This bewildering era was characterized by seesaw-like periods of stability, uprisings, monarchies, empires, republics, abject poverty of the masses, and opulent wealth by the nobles and the aristocracy. Despite these troubled waters, French brains managed to fashion useful sailcloth. Those who steered and pulled the oars of the ferryboats of progress coped well and persevered. Magnificent headway was cataloged in French culture and in intellectual development. The intellectual fleet of French brains was prolific in the middle and late 1800s, and art and science would never be the same.

My personal visits to the museums of Paris in the summer of 2011 have crystalized my admiration of these French brains. The startling impressions of Monet's lilies in the *Musée d'Orsay* and the delicate convolutions, floating still in formalin, of Leborgne's brain in the *Musée Dupuytren* at the University of Paris School of Medicine have created this synapse of French thought and art, both of which would have profound influences on everything thereafter.

This convergence of developments in impressionistic art and the science of the brain was shared and discussed with my colleague and good friend in the Program in Neuroscience and College of Medicine at Florida State University in this summer of 2011. Dr. Charles Ouimet, a noted researcher on brain function, has an abiding interest in the history of neuroscience as well. His laboratory, amid the azaleas and cardinals of the new medical school in Tallahassee, conducts research on recovery of function after brain damage from Alzheimer's disease, stroke, or trauma. His lab works on growing dendritic spines, small protrusions from dendritic shafts on which synaptic contacts are made

with other neurons. This work has important implications for issues of neuroplasticity and changes in neural architecture and connectivity as a result of experience or treatment. We relished some shared time, along with our Francophile wives, Janice and Corinne, at the Musée Dupuytren, the Musée d'Orsay, and Bouillon Racine art nouveau restaurant this summer in Paris and enjoyed our discussions of the historic overlap of developments and radical departures on the topic of brain and water lilies. Ouimet (2011) commented as follows:

It is interesting that the development of both Monet's (et al.) and Broca's work required a sharp break with tradition. And it also fascinates me that both Monet and Broca spoke to us about brain function. To me, Broca's larger contribution (broader than the discovery that a specific lump of brain was needed for the production of speech) was the very discovery of functional neuroanatomy. Monet's insight was that the visual brain was capable of constructing (startlingly beautiful) images, seemingly concrete and whole, from daubs of paint on canvass that when viewed up close were meaningless.

This stands as a metaphor for the brain's amazing ability to make mass synaptic activity sensible in the face of the meaninglessness of the individual daubs of electrical activity bursting at each synaptic connection.

Broca fulfilled his promise and his potential was pollinated and nurtured by others. Broca and his work were conducted and vetted during a firestorm of intellectual and scientific debates on the relationship between head size, brain weight, and intelligence; and on the whereabouts of human reasoning, thought, and higher cerebral functions in the brain. Perhaps, Broca's most lasting contribution to neuroscience was his proposal that the third frontal convolution of the left cerebral hemisphere of the brain is the seat of that most human attribute, the production of articulate speech and language. This notion was advanced by detailing the autopsy findings, with quite evident lesions, in the brains of his two now famous cases, M. Leborgne (known as "Tan," for that is all he could say) and M. Lelong. These case presentations were made at the Society of Anthropology in Paris in 1861 amid the milieu of enduring fuming debate on cerebral localization of functions versus a more holistic approach to the

brain. As Broca (1861) wrote of his patient Leborgne, the poor, aphasic laborer who had been hospitalized for over 20 years and was to become the *sine qua non* in this clash of ideas:

He could no longer produce but a single syllable, which he usually repeated twice in succession; regardless of the question asked him, he always responded: *tan, tan*, combined with varied expressive gestures. This is why, throughout the hospital, he is known only by the name *Tan* . . . [at autopsy it was found that] most of the other frontal convolutions were entirely destroyed. The result of this destruction of the cerebral substance was a large cavity, capable of holding a chicken egg, and filled with serous fluid. (Broca, 1861a, p. 335)

Broca's presentations were milestones in the history of the neuroscience of language and the brain, but they were only more defined echoes of ideas that had preceded him. Faint impressions of localization of functions in the brain were in the wind for a long time preceding Broca, just as in the French art world vague evocative impressionism stirred debate, outright revolt, and further experimentation. French brains were in a state of mutability and flux and echoes of the enlightenment were felt in philosophy, the arts and science. Franz Josef Gall, residing in Paris, advanced ideas on specific brain areas associated with "faculties" or character traits and passed his hands over skulls to interpret head bumps. The French physicians Jean-Baptiste Bouillaud and his son-in-law Ernest Aubertin had previously advanced notions of the primacy of the anterior lobe of the cerebral hemisphere and its role in human speech. In fact, Broca's curiosity was piqued by an earlier presentation by Aubertin to the Society of Anthropology that described the cessation of speech in a conscious patient whose brain was exposed. Aubertin repeatedly placed and removed a medical instrument not unlike a tiny spatula and observed that his patient's speech was interrupted. This primitive spatula experiment set the stage for Broca who listened to Aubertin's presentation at the Society meeting.

Who are these French scientists and pioneers who contributed so much to what we know about the brain's considerable role in speech and language? Broca's significant being has been rhapsodized in biography and historical articles, but what else

captivated his interest? What were his views as a member of the French Senate and did they coincide with his life as a scientist? What of Broca, the man, aside from his prodigious published offerings? What other avenues of interest did Broca pursue and what led him to the exploration of second and third frontal convolutions of the left cerebral hemisphere that would subsequently be named “Broca’s area?” Who were Bouillaud and his son-in-law Aubertin? How did they intersect and relate to Broca? How did the quasiscience and eventual fad of phrenology contribute to our understanding of localization of functions in the brain? Were there other French “brains” who have been historically neglected in our understanding of these milestone developments? What of M. Leborgne and M. Lelong, whose brains now reside preserved in formalin in the Dupuytren Museum in Paris? Who were they and what were the circumstances that brought them to become encased in preservative, as everlasting testaments to brain and disrupted language?

These are the questions I would like to pursue and formulate into a cohesive history of the “French Brains” that created these pioneering neuroscience impressions. The events in Paris in the 1860s and before form a backdrop of a roiling and tumultuous political canvas and constituted a turning point in the history of ideas regarding brain function. Some of the controversies that peaked during that era are unresolved today, but they surely advanced our thinking about them. Many of them gave convergence and exactitude to brilliant advances that would strengthen our understanding of mind, brain, and the incredibly human attributes of thought, language, and communication. Human communication is one of those precious gifts that is taken for granted until it is unavailable or lost. I have had more than one person with aphasia relate to me with varying degrees of fractured language, “I didn’t realize. I took it for granted. I never missed the water till the words went dry.”

Communication is the bedrock of all learning, living, and loving and its loss compromises each of these all-encompassing aspects of life. Without language and communication life is a void, a vacuum, a living death. With it, in all its creativity, grandeur, and even tedium, life is marvelous and vivid. Language is life. Language is identity.

This book portrays some of the influential early understanding on human communication and its loss and how the events of early tragedies are rooted to an extraordinary epoch. French brains in both a metaphoric and literal sense played an important role in contemporary neuroscience and in our understanding of the vagaries and tragedy of aphasia and language loss. This work returns to that era with its people, ideas, debates, discoveries, and brains suspended even today in bottles of preservative. France and particularly Paris in the 19th century were at a rendezvous of intellectual discovery and reflection, even while they struggled with social and political puberty. Wars, revolution, uprisings, emergence of republican ideas, anarchy, and periods of relative restiveness and prosperity would color the milieu. The medical arts would be introduced to clinical-pathological methods of empirical research and the rewards of defining the functions of the most mysterious of all organs. Witchcraft, superstition, and black magic were fading into the deep recesses of dubious medical intervention. The brain would begin to emerge from its historic conception of an amorphous mass of undifferentiated gruel, with convolutions that were more analogous to intestines than the seat of human creativity and reasoning. Speech, language, memory, and the vast array of higher cortical human functions would become targets of consternation and analysis. This era would influence the development of research approaches and techniques and would propel the future of all clinical neuroscience. Return with us now to the thrilling days of yesteryear.

