

respond by way of motor neurons.<sup>17</sup> The great intermediate net can be considered *command central*, having instantaneous access to the brain's complete information network.

Once the information is processed, the great intermediate net initiates action by sending messages on to appropriate motor neurons that originate in the brain. Motor neurons carry the messages away from the CNS to muscles and glands to activate their function. Every action requires motor neuron activation. For gross motor movements, as in swinging your right arm back and forth, a single motor neuron may stimulate or cause the simultaneous contraction of 150 to 2,000 muscle fibers. For more precise movements, fewer than ten muscle fibers are stimulated by one neuron. This more focused distribution enables more exact control for the muscular actions of high level skills like those of concert pianists or brain surgeons.<sup>18</sup>

Bundles of neurons form nerves, like the sciatic nerve that is a conduit of millions of both sensory and motor neurons, supplying innervation to and from the leg and foot.

All of the structures in a neuron are involved in guiding and programming an organism's behavior.<sup>19</sup> The cell bodies contain the nucleus and other important organelles of the cell. The cell bodies are usually housed in the bony protection of the spinal column and skull because they contain the genetic and regenerative hardware for the whole cell.

Dendrites are the highly branched, thick extensions of the cell body that gather information and conduct impulses toward the cell body. The axon is usually a long, thin fiber that conducts nerve impulses away from the cell body to another neuron, a muscle or a gland. As neurons are used, over and over, they lay down over the axon a multilayered, white, phospholipid (fatty), segmented covering called myelin. Myelin increases the speed of nerve impulse transmission, and insulates, protects and assists axon regeneration if the nerve is damaged.

When we first learn something, it is slow going, like beating a path through untraveled terrain. But as the neurons are activated repeatedly, more myelin is laid down. The more myelin built up, the faster the transmission. In highly myelinated neurons, impulses travel at 100 meters per second. Therefore, the more practice, the more myelin, and the faster the processing — until it becomes easy and familiar, like driving fast on a superhighway. Researchers have discovered that thicker myelin coats translate into brains that are larger and better able to coordinate rapid perceptual decisions. Thicker myelin coating is associated with greater intelligence.<sup>20</sup> Myelin is responsible for the color

of the white matter in the brain, spinal cord and nerves throughout the body. Unmyelinated nerve fibers look grey and, along with cell bodies, constitute the gray matter in the brain and spinal cord.

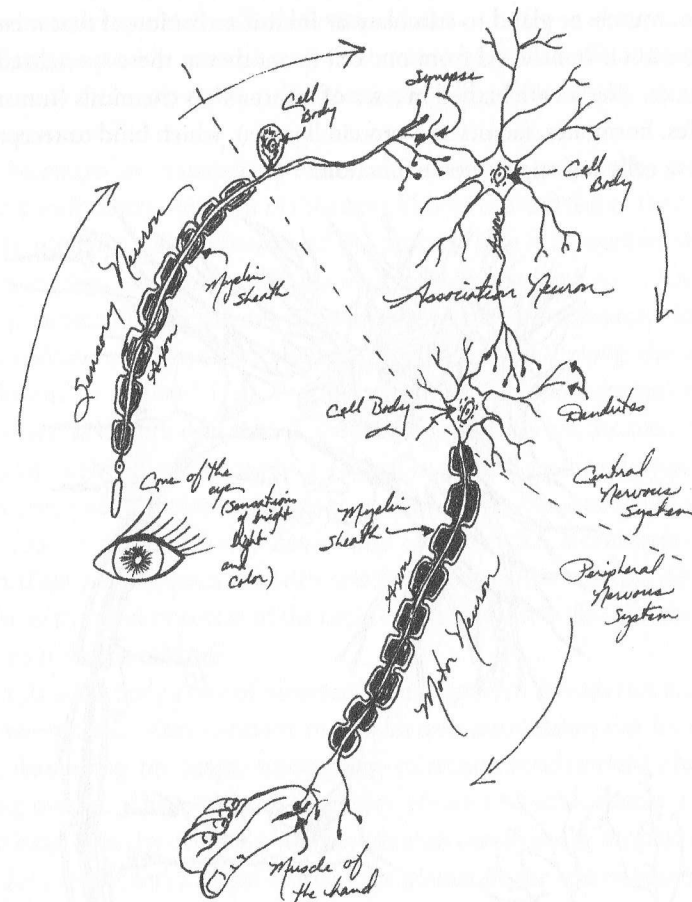


Figure 2.1: Types of Neurons

Multiple sclerosis and Tay-Sachs disease are related to destruction of myelin sheaths.<sup>21</sup> The movie *Lorenzo's Oil*, based on a true story, dealt with a rare disease that destroyed myelin on the neurons. Two dedicated parents, determined not to believe in the terminal diagnosis of this disease, studied myelin's composition and were able to arrest the disease. Then, with the use of specific fatty acids (oils), were able to assist the reformation of the lost myelin. This again, is an example of the remarkable healability of the nervous system.