

### *Brain Complexity*

What is the most amazing structure in nature? There could be many answers, but you would be hard-pressed to come up with something more amazing than the human brain. Consisting largely of two types of cells – neurons, which are specialized cells that can rapidly send and receive signals to each other, and glial cells, which primarily support the structure and function of those neurons – your brain automatically regulates the bodily processes that keep you alive, preserves your memories, and enables you to be conscious.

While you were still in the womb, your brain was furiously assembling itself, adding up to a quarter million neurons each second. It needs to grow at this rate if it is ever going to reach the astronomical total of 100 billion neurons that constitute an adult brain. Each of these neurons is connected to hundreds or thousands of others by microscopic gaps called synapses. It is across these synapses – your brain is estimated to have 100 trillion of them - that neurons communicate with each other via chemicals known as neurotransmitters.

One-hundred trillion is a lot of synapses – that number is 1000 times the number of stars in the Milky Way - so it might surprise you to know that you had even more synapses when you were younger. From maximum connectivity around the age of six, your brain steadily loses connections until approximately fourteen years of age, which indicates that the brain is refined not simply by making new connections, but largely by pruning the connections that aren't needed. Nevertheless, it is also true that we continue to make new connections, and strengthen existing connections, throughout our lives.

Finally, consider this sobering thought: In the short time you have been listening to me tell you about your brain, approximately 135 of your brain's neurons have died off, never to be replaced. But don't blame me – whether you had been listening to my voice or to something else, you and every other healthy adult is in the process of losing about 85,000 neurons every day.

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