

NEURAL NOTES FOR THE VIDEO WORKER

"The Unique value of consciousness is that it carries a residue of neural activity one instant to the next, giving a semblance of continuity to what, in actual fact, may be extremely brief and isolated neural events. In this sense, it may be likened to a television tube that glows for a fraction of a second after it has been electrically excited and thus affords a continuous rather than a flickering image. Consciousness is not and never has been essential for the functioning of the nervous system. Rather, it is a supplement to the operations of the spinal cord, the brain stem, and the autonomic nervous system—all of which can and do function without it."

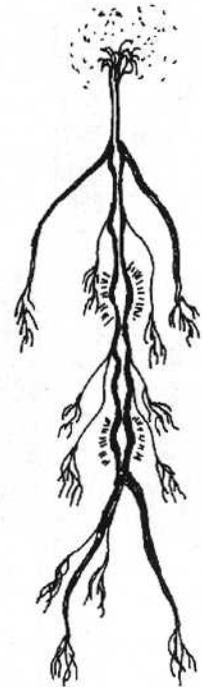
Human Design by William S. Beck
Harcourt, Brace, Javanovich Textbook

It is of great value to have some concept of the workings of the electrochemical meat by which we perceive and experience all events. For a worker in the world of video, it is significant that the television images succeed each other at a rate of 30 times a second, whereas the human brain can perceive nowhere near that amount of input. No human being has ever exceeded 100 bits of information per second. If you consider that the American standard has 525 horizontal rows, each of which is capable of effervescing at 8 discrete levels of brightness from black to white, at 30 frames per second, television is emitting 8 billion bits of information per second, for display on the screen.

The principle of scansion is of immense importance to the functioning of the television camera and screen, and is likewise essential to the three neural systems of the Auditory, Optical and Cerebral Cortex. The principle of scansion is actually the exchange for one dimension in time for one in space, or vice versa.

In television, the role of scansion is as follows: first, in the camera, the field of view is scanned by a small electron gun, affording the covering of a larger area than if there was no scanning motion. The sacrifice of misrepresentation because of the slight amount of time spent in the glance at a single point, is compensated for by the ability of the phosphorescent screen to glow for a sufficient time that the image seems continuous. Therefore, there is a slight delay in the actual perception of a significant new change in the picture which amounts to less than 1/30th of a second. More space is covered by the camera by its scanning motion, even though there is a slight corruption of the information through the scansion. The phosphorescent screen works just the exact opposite way from the camera. The signal is retranslated back into the wide display of information from the camera's scanned information.

The three instances in the brain are more like the television camera's scanning than the tube, in that there is a succinct signal of significant information abstracted from the wide display of information. In the Auditory Cortex, octaves occupy equal areas of cortex. Within the range, all frequencies are fed into the cortex, but the cortex abstracts the universal of the interval between notes, or a certain chord, regardless of what the actual notes are. That is why the quality of a fifth is constant, whether played in the high notes, or low notes.



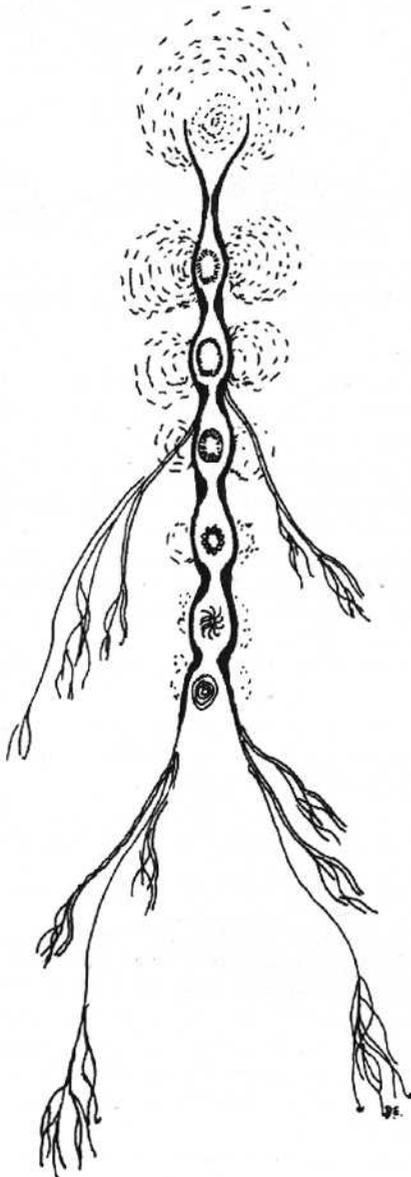
by Dimitri Devyatkin

In the Optical Cortex, there is a reflex type mechanism which directs the eyes to immediately turn towards whatever enters the field of vision. There is a scansion of the entire field, but if an incoming impulse collides with the sweep, the corresponding eye muscle is activated by its motor neuron. There is the slight delay of response, due to, among other causes, the time consumed before a given point is scanned. This is in contrast to the eyes of insects, etc., for their eyes, though multiple in number, each look at a separate scene, and never can there be more eyepower brought to bear on the viewing of a given point than the single primitive eye.

In the Cerebral Cortex, there is a constant undulating change in the level of electrical activity. The entire brain consists of about 10 billion nerve cells, all interconnected by very complex switching systems. An initial firing of a single neuron can cause a long sequence of echoing impulses, all producing a constant electrical activity. That this electricity should read out on graphs in classic, regular waveforms, is to be attributed to the high level of internal organization. These waveforms are known as the alpha wave, which is normal adults, over the age of 17, is usually of the order of 8 to 12 cycles per second. The voltages are of the order of 0 to 300 micro-volts v. There are also Beta waves, which are faster, usually 18 to 32 cps, normally thought to be associated with alertness, problem solving and the like. And then there are also Delta waves, much slower at 8 cps.

The Cerebral Cortex is believed to function as the clearing house in which all inputs and outputs, receptors and motor effectors respectively, are monitored. As an incoming sensory impulse enters the grid or field of scansion, it is directed towards its proper afferent, causing the movement of the corresponding motor neuron. The sacrifice is again in time—of a slight delay in the immediacy of response until the proper input is monitored, and the gain is in number of possible inputs.

The human brain is unique in the quality that it can draw an abstraction from a mass of data. Even our nearest Simmian progenitors are incapable of the simple association between stimuli received through different mode channels of the same object. Experiments have shown that a monkey cannot choose the shape of an orange held out of sight, upon being shown the visual representation. Therefore, neurophysiologists believe that it is in the human brain alone that there are "Cross-Modal Connections."



In the three instances of scansion in the human brain described above, the abstraction is a derivative of the total inputs. In the Optical Cortex, the eye is caused to respond to slight changes of an over-all sameness, like a fly flying in front of a white wall; it is the new, significant information to which the eye is drawn. In the Auditory Cortex, significant relationships between notes and chords are gleaned from the mass of sounds produced, explaining man's propensity to the 12-tone scale.

In the cerebral cortex, the abstraction made is the constant dichotomies to which man must be well adapted. To choose to do one thing is to choose not to do another. The human brain presents itself with reports as to the action of its inputs indicating reports from every receptor in the body. Certain stimuli have priority over others, but there is still a balance reached. For example, it seems likely that sudden pain is channeled through an express lane of the spinal cord, but that continuous pain can be modulated by diversion, emotions, and memories of prior experience. However, every receptor sends its signal whether activated or non-activated . . . There is a constant unchanging background. This constant scanned report from the receptors is called the generator current, and like the white wall behind the fly, it is the wall upon which significant new information is to be seen against.

We live in a world to which we are capable of transducing certain stimuli into electrical signals, and thereby we define our universe. For example, there is no known response of the human body to radio waves, although the list of stimuli to which we are receptive grows continuously: i.e. gyroscopic deflections, wind, infrared radiation, and ultra violet light. In the Renaissance, early experimenters with bats were given no support, and were even considered crazy when they said that they believed there to be sounds which the human ear was incapable of hearing. A telephone is a simple transducer. The charcoal granules colliding in the mouthpiece from the vibrations caused by your voice change the audible sound into an electrical signal, and then the earpiece translates the electrical signal back into sound. A transducer is a device which changes one form of energy into another, an essential component of any communicating or control system. Our receptor neurons act as transducers in that they indicate intensity of the stimulus through the frequency of the all-or-nothing impulse. The stimulus is changed from whatever form it arrived into an electrical signal. The myth that there are only five senses should be stricken. There are different receptors for the following stimuli: touch/pressure, gravity/motion, light, sound, blood pressure, blood oxygen level, and chemical substances, both gas (smell) and in solution (taste). Why is oxygen an odourless, tasteless, invisible, silent, weightless substance. Because we lack the capabilities to perceive it except for the carotid body in the circulatory system, which triggers response from the respiratory system to change the oxygen level in the blood. Imagine if we were differently constructed, or imagine the people occupying the distant galaxies. It is entirely explainable through survival of the fittest that these sensory devices are actually best adapted to the local environment, but imagine life on a planet with a much larger sun, causing entirely different ratios of all energies. Imagine the video these people would have!