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."

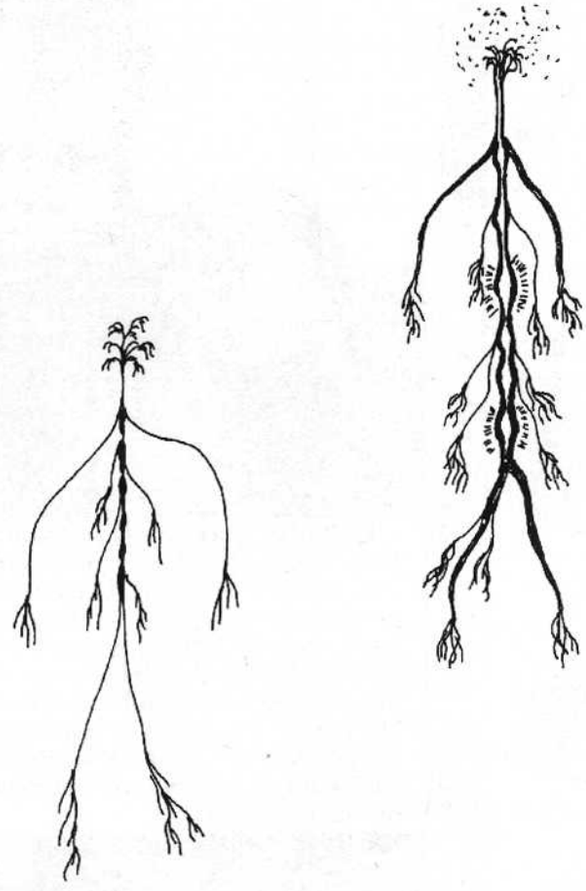
Human Design by William S. Beck
Harcourt, Brace, Javanovich Textbook

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 phospherescent 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.