Synaptic pruning

Jamie C. Kemper 12, September Bailey Portfolio Journals Synaptic Pruning It is an observable fact that babies have a higher tendency to learn new things, and develop their brains to learn varied and new skills faster than adults. This is because babies are born with more neurons than they have a few years into adolescence and adulthood. Also, they have a higher number of neural connections, called synapses, which transmit brain signals through to other cells (Feldman, 2010, p. 114).

The number of synapses decrease as a baby grows. This is because of a phenomenon termed as “ synaptic pruning”. As a baby starts experiencing the world around it, certain neurons and synapses become active in line with the experiences and others die away (Feldman, 2010, p. 114). Researches have shown that there is a direct relation of synaptic pruning with change in brain size. As the synapses get reduced, the size of the brain reduces by a small fraction (Paus et al., 2008). But that is not all of which occurs as a result of synaptic pruning. The neurons that get activated and the synapses that are utilized more and more start to grow and their myelination occurs. Myelin, a fatty substance, gets coated on the neural axons so that they are protected. This also increases their transmission speed (Feldman, 2010, p. 114). The growth of the neurons is much faster than the dying away of the unused neurons, which causes a large increase in brain size during the first 2 years after birth. This has been backed by MRI scans (Paus et al., 2008).

Synaptic pruning has been associated with the capacity of glucose metabolism as well as age related changes, but that is not the case (Paus et al., 2008). Rather, changes in the size of grey matter are affected by pruning and myelination of the white matter. T1-weighted images have been used to prove this trend (Paus et al., 2008).

It has been observed that the brain development in the initial stages can cover up for certain injuries to the brain because other areas can take over for the injured area. This is not so for adult brains, for which it is hard to recover from a mental injury (Feldman, 2010, p. 114).

Researches on non-humans have shown a strong relation between synaptic pruning and the plasticity of a human brain. Plasticity refers to the degree to which a brain is modifiable due to experience. For very young babies, the plasticity of the brain is at its peak. This means that they have a very high ability to learn new things. It also indicates that they have a higher tendency to be influenced by the environment around them. Studies are trying to identify this sensitive period more accurately, and determine how experiences can dictate brain development by selective stimulations to the brain. It is observed that if a baby has an enriched environmental experience, then it is possible for that baby to develop a better brain structure than one brought up in a restricted environment (Feldman, 2010, p. 114).

All this brings us to the conclusion that synaptic pruning is a very important part of the development of a child. We can make use of their sensitive period to enhance their abilities a lot greater than with adults. Also, it is necessary to not hamper the growth during such stages through either environmental restrictions or physical abuse. This field has a lot to offer, and it should be researched upon more extensively.

References

Feldman, R. (2010). Development across the life span. (6th Ed.) Upper Saddle River, New Jersey: Prentice Hall

Paus, T., Keshavan, M., & Giedd, J. (2008). Why do many psychiatric

disorders emerge during adolescence?. Nature Reviews Neuroscience, 9(12), 947-957. doi: 10. 1038/nrn2513.