from sleep to attention – lecture 7 – April 16, 2012

the function of sleep II - development

“you should have never told me horses sleep standing up...it gave me a mental block” – Mister Ed
phylogeny: amount of REM sleep during development and adulthood is related to position along a precocial-altricial axis.

ontogeny: timing and amount of different types of sleep changes across the lifespan
even slow-waves fizzle in old age
brain maturation patterns somewhat parallel changes in sleep
sleep enhances changes in degree of ocular dominance in primary visual cortex induced by monocular deprivation

Following 6 hrs of monocular deprivation (MD6), a bias develops wherein more neurons respond more vigorously to input from the non-deprived eye (●) than to the deprived eye ( ). Undisturbed sleep (MDS) in the dark for six hours after deprivation enhances this effect to the same extent as a full 12 hours of deprivation (MD12), but sleep-deprivation over the same six hours (MDSD) suppresses it.

Frank et al., Neuron, 2001
a newer, and certainly unproven, idea concerning the function of REM sleep as it relates to development

genetic reprogramming

here, activation of cortex by PGO waves is thought to strengthen connections in the brain that are genetically determined and which determine core attributes of the individual’s personality, habits and perspectives

connections strengthened, during waking, as a result of interaction with the environment would be depressed during REM sleep

as a result, REM sleep would function to maintain differences among individuals despite extensive similarity in their environmental experience