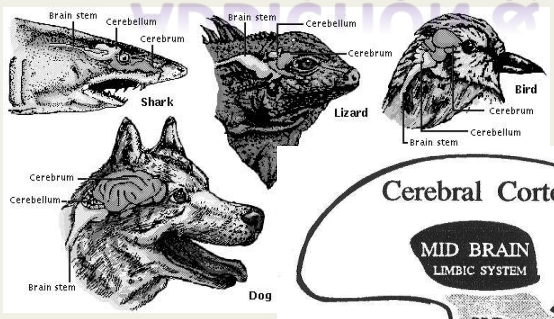
ADDICTION & The Triune Brain



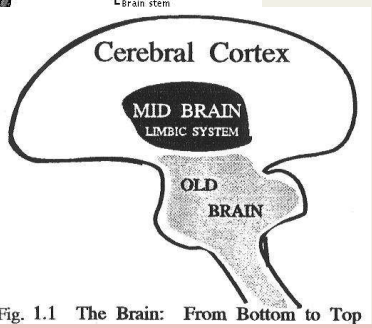


Fig. 1.1 The Brain: From Bottom to Top

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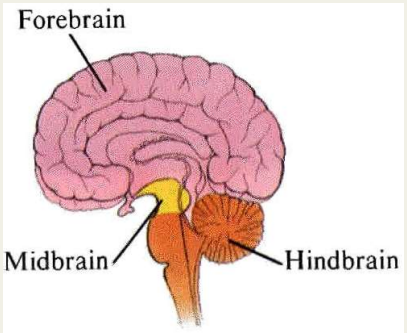
MacLean, P. D. (1985). *Evolutionary psychiatry and the triune brain.* Psychological Medicine, 15: 219-221.

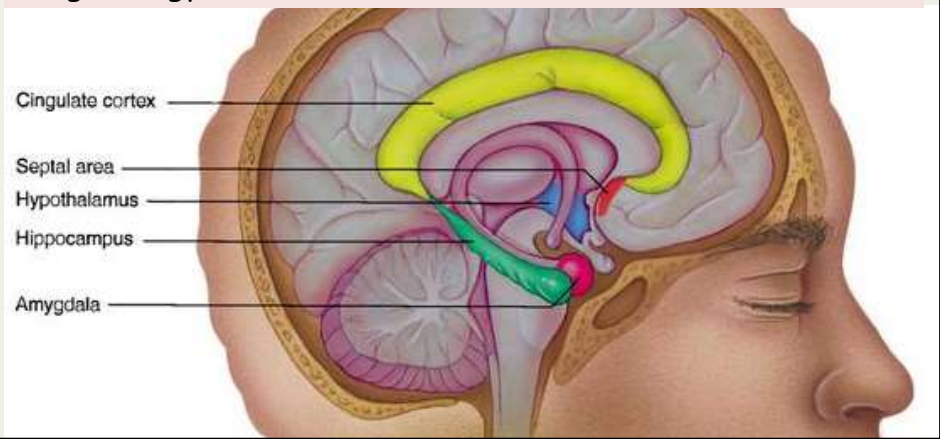
The human brain operates primarily from the bottom up. We are protected from emergencies by our reptilian brain's fight and flight responses – the affects of anger, rage and fear. And, we are held within the sphere of a human community with the affects of our mammalian brain – such as enjoyment and shame.

- Immediate threats that need instant action require automatic reflexing at the merest hint of environmental danger.
- This kind of reflexivity is the function of that ancient structure of our "old" brain known as the *brainstem*: the lower two thirds of the brain,
  - which includes the various functions of the *hindbrain*, such as arousal, balance, motor coordination, and sleep,
  - and that also extend into the functions of the *midbrain*, including pain management, vision and hearing.



Safety and security in mammals also requires brain-to-brain interaction - less automatic (reptilian) reflex actions to environmental cues individually, and more accommodation of information to coordinate future actions as a group. This requires more finely tuned ways to socially fit in with other brains.

With the evolution of mammals, this function required a more complex *forebrain*, starting with the *limbic system*: functions of memory formation (hippocampus), the activation of fear and aggression (amygdala), the regulation of basic drives such as hunger, thirst and sex (hypothalamus), and the perception of pain and emotions (cingulate gyrus).



This increased brain capacity came at a tremendous cost. Over the course of mammalian evolution, the ability to adapt to environmental changes resided less and less within individual body strengths and more and more in the social pooling of group strategies, requiring increases in brain capacity.

There was a corresponding loss of a hairy body covering, a reduction in the size and strength of jaws and teeth, a postponed sex life and a prolonged helplessness in infancy.

- What we eventually got in return was an internal life detached from the here and now functioning of less differentiated brains.
- We got the capacity to plan for different possibilities of behavioral responses,
- the ability to envision different approaches to environmental challenges,
- the ability to share knowledge through brain-to-brain interaction.

But there was a hidden cost as well - the mandate to deal with the internal, individual life of the brain, and the consequences of its newfound ability to contemplate itself. The paleontologist, Loren Eiseley found in this a fitting name for humans. He called them the "*dream animal*."

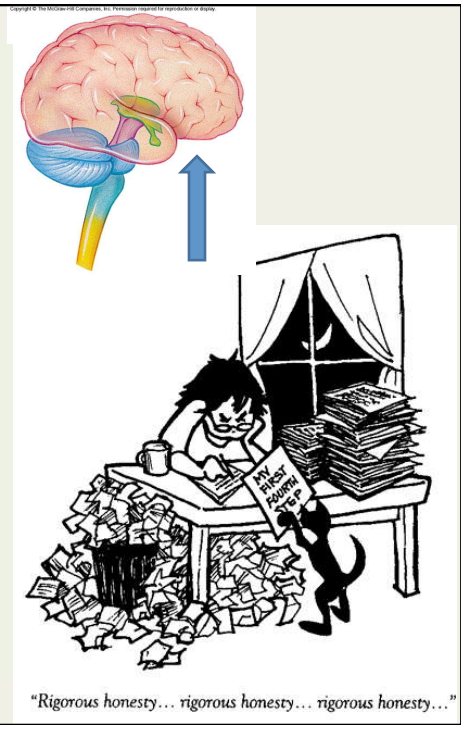
"for the first time in four billion years a living creature had contemplated itself and heard with a sudden, unaccountable loneliness, the whisper of the wind in the night reeds. Perhaps he knew, there in the grass by the chill waters, that he had before him an immense journey."

Eiseley, L. (1957). The immense journey. New York: Random House, Inc., p. 125-6.

So, the history of evolution placed a sequence into the functioning of the brain, from the brainstem to the cortex. The basic vital functions appeared first, followed eventually by the future oriented analytical functions. This evolutionary sequence is still with us in that the lower brainstem functions take precedence over the cortex.

For our affect system, survival in the here & now takes precedence over survival in the future. Our ability to plan strategies and coordinate future challenges is a secondary cognitive process that requires sufficient detachment from the process of our affective "old brain" overriding our cognitive "new Brain."

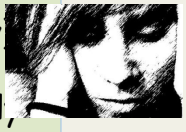
This is *bottom-up processing*, where the influence on the overall system is greatest at the lowest structure and least at the highest structure. When influenced by the environment or from our memories, we respond in tune with the lower, earlier forming, functions. This is not to say that the cortex can not utilize its analytical capabilities to override the emotional mandates of the limbic system.



"Rigorous honesty… rigorous honesty… rigorous honesty…"

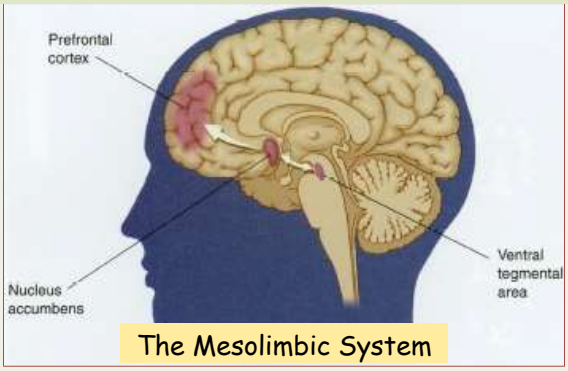
Why Do Humans Love Mood Altering Substances So Much?

The increasing complexity of our social environment makes the prospect of utilizing new technologies to enhance affective response more desirable. With the technology of ingesting an external substance to change affect we can dampen negative affects, those that respond to the environment with a mandate for change (anger, distress, shame), and we can enhance positive affects, those that respond to the environment with a mandate for stability and constancy (interest, enjoyment, joy). With this new technology, we've found a way to regulate our affective responses more efficientl, in situations that used to be problematic. We can withstand the embarrassing moments, endure the stressful times, sooth our losses, and prolong the pleasures.



the *dopaminergic* pathways

Not surprisingly, the brain process area for this technology starts in the upper area of the hindbrain, extends into the lower areas of the limbic system and on into contact area with the frontal lobe of the cerebral cortex. It operates within the process area of interaction between the reptilian, mammalian and the human brain – the *dopaminergic* pathways. The biological operation of mood altering substances (MAS) allows for the potential (or promised) regulation of affects in direct response to assessments of environmental conditions, assessments made through bottom-up processing.



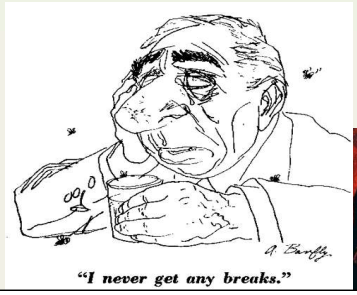
The Mesolimbic System

Given this, is there any question as to why humans have adapted the technology of ingesting mood altering chemicals that are external to the body?

With the potential to help regulate mood/emotion, why wouldn't the adoption of this technology be seen by the highly thinking brain as advantageous?

However, as with all technologies, their fit into the environment has its limits.

This is made even more problematic due to the fact that the environment in this case is both external and internal to the human brain itself.



What is Recovery?

It is learning to live life clean and sober – affect regulation without the use of addictive mood-altering substances. Changing our affect system, however, requires a interactive brain-to-brain effort with the use of communication and language over time.