

The Hour Between Dog And Wolf

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Introduction

- p.3 Financial risk taking can trigger similar biological and emotional responses to what we experience in life-or-death (fight-or-flight) situations
- p.8-10 Challenges that seem purely emotional can change our body (increased heart rate, changes in blood flow, etc.)
- p.10 Author discusses two major subjects: 1) description of how professional traders make and lose money, and 2) description of the physiology behind the behavior
- p.11 Physiology and neuroscience may help explain over-confidence and irrational exuberance that leads to recurrent cycles of euphoria, risk taking, and crash
- p.12 Author spent 12 years on Wall St.
Physiology described in book is not confined to Wall St. traders--it is the universal biology of risk taking

Biology Of A Market Bubble

- p.15 During 1990's author worked on Wall St. for Goldman Sachs, Merrill Lynch and Deutsche Bank
- p.17 Example of Kozmo.com, a NY based start-up promising free delivery in Manhattan within an hour, ended in bankruptcy, What on earth were investors thinking?
- p.18 Greed causes investors to "run" with their money for too long (bull market continually validates their beliefs)
- p.19 Hubris Syndrome (David Owen): recklessness, inattention to detail, overwhelming self-confidence and contempt for others leading to disastrous leadership and large scale damage
It is a disorder of the possession of power, particularly power associated with overwhelming success, held for several years with minimal constraint on the leader
- p.20 Traders that enjoy an extended winning streak experience a "narcotic-like" high. Traders on a roll are traders under the influence of a drug that can transform them into different people
"Overconfidence and hubris that traders experience during a bubble or a winning streak just does not feel as if it is driven by a rational assessment of opportunities nor by greed--it feels as if it is driven by a chemical."
- p.21 Observation: women were relatively immune to the frenzy surrounding Internet and high-tech stocks
- p.22 authors opinion that traders biology should be investigated on clinical level--risk taking displayed by traders during a bubble may be pathological
- p.23 search for a "bull market molecule" (may be a hormone)
- p.24 hormones don't cause behavior, like lobbyist the recommend or pressure us to do certain activities
- p.26 Hypothalamus helps ensure the body and brain are "in sync": triggers glands to produce hormones, hormones are released into blood and affect body tissue, hormones return to brain telling hypothalamus to shut down production (feedback loop)
Bruce McEwen discovered that feedback between glands and hypothalamus exists, but there are also other steroid receptors in the brain besides the hypothalamus
When steroids return to these other receptors it can impact how we think and behave
- p.27-28 "Winner Effect" (Testosterone Behavior Model)
 - 1. Anticipation of competition causes an increase in testosterone, causing an increase in confidence and appetite for risk

2. Success in competition triggers further testosterone production, confidence and encourages more risk taking (creating an upward spiral)

3. Ultimately spiral of victory and testosterone lead to excessive overconfidence, risk taking and ultimately reckless behavior

p.32-33 Assumptions of rational behavior in economic models

-Economists claim the irrationality we display should disappear when we deal with money. If we don't act rationally then we are driven to bankruptcy leaving the money in the hands of the truly rational

-Idea has come under scrutiny from social scientists that have documented irrational decisions made by investors

-Neoclassical economics focuses mainly on the mind (a "neck-up" exercise), and ignores the relationship between the mind and body

p.36 We have the worst of both worlds (nature and nurture): 1) unstable biology and 2) risk management practices that increase risk limits during bubbles and reduce them during a crash, plus bonus system that rewards high-variance trading

Thinking With Your Body

p.39 Brain and body evolved together, becoming more tightly knit over time.

Example of sea squirt called tunicate: ingests brain once it has found feeding grounds, idea is that if no movement is necessary then there is no reason for a brain

p.42 Human movement is far more complicated to understand compared to other scientific subjects such as quantum mechanics and the human genome (we evolved more complex brains to deal with the required complex motion needed for survival?)

p.43 Humans, unlike other animals, have the ability to learn new complex movements such as playing musical instruments, piloting planes, gymnastics, skiing, etc.

p.44-45 Neocortex is brain region that saw the greatest growth in humans (home to choice and planning)

Neocortex evolved with an expanded cortico-spinal tract (group of nerves that control the muscles of the body)

Cerebellum stores memories of how to do things and makes neural operations faster and more efficient (like extra RAM)

p.46-48 Brain controls and monitors a number of biological functions including: blood sugar, breathing, blood pressure, heart rate, blinking, body temperature, etc.

p.49 Mammals took on more control of their bodily functions (above) compare to other animals like reptiles.

This requires more brain circuitry and thus more energy with the need to acquire greater amounts of fuel

p.52 Human have nervous circuitry that facilitates interoception, or perception of our "inner world"

Brain has receptors to sense internal perceptions like temperature, chemical gradients, etc. Most of this is unconscious, but some, like hunger, we are aware of

The information coming from all regions of the body gives us the sense of "how we feel"

p.53 Bud Craig-University of Arizona-suggests that gut feelings, emotions, rationality and self-consciousness are more advanced tools that developed over the course of evolution to help regulate the body

The Speed Of Thought

p.66-69 Our conscious observations act too slow for us to interpret and respond to the world around us

p.70 Our brain has developed ways for us to anticipate what will happen rather than wait to respond

It takes us longer to interpret sights compared to sounds, but light travels faster than sound, so...

-Long distance observations: sight over sound (light travels faster than sound)

-Short distance observations: sound over sight (brain interprets sound faster than light)

-"Horizon of Simultaneity": About 10-15 meters from us, where observation and interpretation of sound and light are equal

p.72 When fast reactions are required consciousness is cut out and brain relies on reflexes or "preattentive processing"

p.77 At higher levels of the nervous system, more neurons exist (creating longer neural pathways) to process responses, thus responses are slower (typically when learning a new activity)
Once our reactions have been learned (slowly) they are passed to a lower level of the brain to improve and/or automate the response time (Tetris example)

p.80 Consciousness is merely a bystander observing our automatic responses
Why do we have consciousness: it may act as an override mechanism in certain instances

Gut Feelings

p.89 Gut feelings are strong convictions accompanied by physical symptoms
Brain receives information from our body (interoception from "Thinking With Your Body")
Notion of a gut feeling implies these feelings guide us in complex mental tasks

p.91 Two types of brain processing: automatic and controlled thoughts
Much of our thinking takes place automatically

p.92 Gut feelings are sometimes right and sometimes wrong. How do we know when to trust them?

p.93 Kahneman and Klein: intuition is recognition of patterns, but
Requires environment regular enough to produce repeating patterns and the brain must encounter these patterns frequently while receiving feedback (did I respond right or wrong) quickly
"Intuition cannot be trusted in the absence of stable regularities in the environment"
Do financial markets exhibit stable regularities? Unanimous opinion is no, EMH states that the market relies on news, and news cannot be predicted

p.94 Shiller argues that intelligence and training can improve the performance of traders (financial markets are not completely efficient)

p.95 Observation that the Sharpe ratio of traders increases over time (many years), they are able to make more profits and experience less volatility

p.96 Trading skill does appear to exist (based on above observation of Sharpe Ratio)
Which is more reliable: intuition or conscious reality? This question is a "red herring" as we inherently use both

p.97 Connection between preconscious decisions and body--a gut feeling allows us to rapidly assess whether a pattern and a considered choice will lead to a pleasant or nasty outcome
Use gut feelings and emotions to narrow our options (from a great number of options) when solving tricky problems

Neuroscientists Antonio Damasio and Antoine Bechara, worked with patients that had damage to brain region that integrates with body, patients had normal cognitive abilities, but made poor decisions

p.101 William James: feelings play a small role in an emotional event, they tag along as an observer after an event has already taken place

p.102 Why does brain send messages through our body instead of to another part of the brain (internalize the message)?

If the objective is to produce movement, then extra internal processing in the brain slows our response time

Emotions are really reflexes designed to help us behave and move quickly if necessary and at crucial moments

- p.107 Experiment by Robert Levenson and Paul Ekman found that people who made happy or sad faces wound up feeling happy or sad respectively-supporting James' theory
- p.115 Each of our emotions is tagged with a distinct pattern of nervous and hormonal activation
- p.120 The conscious brain has surprisingly little grasp of what makes us decide to do one thing or another
- p.123 Physiological monitoring of traders (heart rate, hormone levels, etc.) to assess their capability to trade profitably

The Thrill Of The Search

- p.129 Mild amounts of risk, stress, fear, effort and pain are good for us, but we need a recovery period
- p.132 Claude Shannon: found link between real information and uncertainty--the amount of information contained in a signal is proportional to the amount of uncertainty or noise
Real information should tell us something we do not already know, it should therefore be unpredictable or unexpected
- p.133 Our senses attend almost exclusively to pure information, we ignore things we expect to happen and instead hone in on new things that have changed
- p.134 Troxler fading: we gradually lose awareness of unchanging visual stimuli
- p.135 We produce noradrenaline in response to real information, which boosts the firing rate of neurons in the brain (our brain cells communicate and respond faster)
- p.137 Brain is able to distinguish significant information from trivial by searching our subconscious memory for patterns (a repeating cycle of recognition-assessment-alarm), thus preventing us from being fooled by unimportant information
- p.147 Dopamine drives our addiction to information and modulates our level of motivation
- p.148 Dopamine spikes at the expected arrival of pleasure or reward
- p.149 Dopamine depends not on the amount of reward, but on how unexpected it is
- p.151 Traders may experience a form of addiction to dopamine that is delivered when a trade works in their favor. This initiates a vicious cycle: they may habituate a certain level of risk, then have to take even larger risks to get the same dopamine hit
- p.152 Animals prefer to work for food as opposed to receiving it passively (a consequence of dopamine)--the expectation of reward
Dopamine encourages us to take risks independent of rational expectations of gain
- p.153 J.M. Keynes: "It is a characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation"
- p.154 Obesity epidemic, why do people today prefer inert consumption to effortful consumption? (This goes against the known affect of dopamine)

The Fuel Of Exuberance

- p.163 Bubbles drive excessive profits resulting in higher levels of dopamine for traders, and as profits rise so does testosterone
Evidence that testosterone amplifies the effect of dopamine (suggests steroids can be addictive)

Steroid hormones (testosterone) work on longer time scales (they are slower) compared to other chemicals like adrenaline

- p.180 "Winner Effect": Winning in one competition contributes to future wins. How?
Testosterone prepares males physically and mentally for competition
Winner of competition emerges with higher levels of testosterone, increasing chances of winning again
- p.182 Example and evidence of winner effect in tennis players
- p.185 In more competitive environments, such as societies based on free markets, the population may have a higher level of testosterone--this can last for years
- p.186 Two examples of winner effect in traders:
Testosterone levels of high frequency traders were higher on days they made an above average profit
When testosterone levels were high in the morning, traders went on to make larger profits in the afternoon
(graph of data to support this on p.187)
- p.188 2D:4D Ratio: a larger ring finger relative to index finger indicated more testosterone exposure during development in mother's womb
Implies that the high testosterone levels seen later in life are a consequence of testosterone exposure before birth
- p.189 Testosterone did not improve trader's sharpe ratios, but did increase the risks they took and profits they saw
- p.192 Eventually too much testosterone causes excessive risk taking and overconfidence leading to rash behavior
- p.193 High testosterone levels wear down bodies faster, leading to higher mortality rates
- p.194 Testosterone does not start a bull market (usually a technological breakthrough or new market does), but testosterone can turn a rally into a bubble (it amplifies what is already occurring)

The Stress Response On Wall Street

- p.204 Testosterone levels in animals fluctuate over the course of a year, in humans this level is highest in spring and lowest in the autumn. In other words markets outperform on sunny days and underperform during winter months (seasonal affective disorder?)
- p.206 Stress response is a rapid switch in our bodies and brains away from everyday functions into a state of emergency
Unfolds in several stages (the flight-or-fight response):
-Amygdala registers the danger and sends electrical signals to other parts of the brain
-Signals from Amygdala via the brain stem to visceral organs like the heart and lungs increase our heart rate, breathing and blood pressure
-Initial electrical responses require a lot of energy which is eventually supplied through hormonal responses like adrenaline production
If crisis lasts longer than fight-or-flight adrenal glands begin producing cortisol to sustain us in a longer term effort
Cortisol production has the following effects on us:
-Blocks the effects of testosterone and insulin
-Begins recruiting fat and muscle to be broken down into glucose as an energy supply
-Suppresses production of testosterone in men and estrogen in women
-Stands by as an anti-inflammatory aid along with opiate like endorphins to dull our sense of pain

- p.217 Three types of situation signal threats that drive physiological stress response
 1. Novelty (situations, environments or circumstances that are new)
 2. Uncertainty
 3. Uncontrollability
- p.219 Control or the appearance of control can mitigate our stress response (experiment with animals receiving electrical shocks)
Cortisol levels in traders increased with increases in market volatility (cortisol increases with uncertainty)
- p.221 Under heavy stress we scan our environment unable to concentrate, when presented with novelty we no longer know what to focus on
- p.224 Moderate levels of cortisol can have beneficial effects on cognitive and physical performance while high levels impair our performance
Chronic exposure acts like a poison, destroying our bodies cardiovascular and immune systems as well as impairing our ability to take risk (our bodies were not meant to deal with chronic levels of stress)
Cortisol can impair our memory
- p.226 Chronic levels of cortisol can also change the size and shape of different regions of the brain, possibly killing off neurons
- p.227 Under stress we imagine patterns in data that do not exist (example of WWI troops from "The Great War and Modern Memory" by Paul Fussell)
- p.228 CRH is an additional chemical produced during high stress events. It triggers "anticipatory angst", a general fear of the world leading to timid behavior
- p.230 A major condition affecting traders is known as "learned helplessness", a state in which a person loses all faith in his ability to control his own fate
- p.232 Stress response was designed for a muscular effort. The stress we now face is psychological and social
Real world consequences of chronic stress exposure discussed

Toughness

- p.237 Our conscious selves have very little control over cortisol and its effects
- p.238 We seldom have any conscious awareness of how stressed we are (can be measured through cortisol levels)-this demonstrates a disconnect between conscious and unconscious
- p.240 Mentally tough individuals embrace novelty as a challenge
- p.241 Chronic stress causes physical illness and learned helplessness. However, stress that is short lived and followed by rest can create a heartier physiology (example with rats)
- p.246 Experienced traders and athletes have the ability to call on their hormones (testosterone and cortisol) when needed, and return them to baseline levels when not needed
- p.249 Truly toughened individuals (i.e. world class athletes) have physiology that allows them to easily conquer grueling physical challenges
- p.250 Our responses to novelty can be looked at as offense vs. defense:
Offense: Energizing and leads to a state of flow (novelty seen as a challenge)
Defense: Draining, unpleasant and fear of the world (novelty seen as a threat)
- p.251 A great deal of our toughness comes from the genes we inherit
Some developmental influences exist
- p.252 Exercise is one stressor that can contribute to toughening in humans (examples of benefits)

- p.255 New model to explain fatigue: fatigue is a signal our body and brain use to tell us that the expected return of an activity has dropped below its metabolic cost
Cure for fatigue is not rest, it is a fresh tank, novelty may provide this
- p.256 When stress is high we should reduce the novelty in our lives as it can only cause more stress, we need familiarity

From Molecule To Market

- p.266 Why are market crises more prevalent today?
1. Financial deregulation
 2. Low margin requirements combined with high leverage
 3. Opening of new global markets in emerging economies (e.g. China)
 4. Shift in priorities from long-term to short-term
- p.267 Economist John Maynard Keynes described how "animal spirits" drive investment and market sentiment
Keynes was skeptical of public policy directed at rational choice, he was a believer in fiscal policy--where the state takes over the role of stabilizing the economy
- p.268 Potential cure for irrational exuberance is improved information and education?
Policies stemming from the rational choice theory have not been very successful at stabilizing markets
- p.270 Including more women and older men on trading floors may help reduce the effect of the testosterone feedback loop and potentially stabilize markets. This also helps improve the diversity of perspectives present in markets
- p.272 Brad Barber and Terrance Odean found among personal investors that single women outperform single men by 1.44% (women trade less than men?)
- p.273 Data indicate that women excel at long-term strategic thinking and risk taking
Women are more prevalent in asset management, which allows for longer periods of time to analyze and hold securities compared to trading floors
- p.280 Written on the Temple of Delphi was the maxim "Know Thyself!" This increasingly means understanding our own bio-chemistry