Predators and Other Dangers: Fears, Phobias, & Memories

Function of Fear (Isaac Marks '87):
1. Avoid threat
2. Activate physiology for a response
3. Concentration: Maximize Performance

Phobias:
1. Fear out of proportion to threat (unrealistic)
2. Involuntary
3. Leads to avoidance

Adaptive Properties of Fear & Anxiety

1. Freezing:
   - Vigilance
   - Concealment
   - Inhibition of futile aggression – Juvenile ✠ Conduct Disorder
2. Escape & Avoidance
   Negative Reinforcement maintains pathological phobias
   Tx: Confrontation:
   1. Systematic Desensitization
   2. Flooding (Implosive Therapy)
3. Aggressive Defense
   Different Brain Area than Predatory Aggression
4. Submission or Appeasement – Intra-Species

Evolved Physiological Consequences of Fear

Release of Epinephrine:
- Facilitation of blood clotting
- Liberation of Glucose from Liver
- Elevation in Heart Rate
- Diversion of Blood from Stomach to Muscles
- Enhancement of Breathing/Oxygenation

Release of Cortisol:
1. Anti-Inflamatory/Promotes Healing
2. Inhibits Non-Essential Metabolic Processes
3. Positive Feedback to Fear Centers in Brain

Evolutionary Preparedness of Fear

Darwin:
- Fears of Children Independent of Experience
- Reflect Real Dangers (**of past more than present**)
- A window into past problems of survival

Developmental (Ontogeny per POPE)
- Universality – Cross-Cultural
- Emergence of Fear Coincides with onset of **Adaptive Problem**
    - 6mo.: Heights and Strangers – at initiation of Crawling
        Death by Stranger common to Human and
            Non-Human Primates
    - Visual Cliff -- $\uparrow$ in % of Children as Crawling commences

Ontogeny Reflects Onset of Adaptive Problem

Adaptive Mechanisms do not have to be present at birth to reflect
  An evolved process – E.G. Puberty

•Separation Anxiety: Peaks at 9-13mo across cultures

•Animal Fears: Age 2, with greater exploration

•Agoraphobia: When young leave home

Common Fears and Adaptation

Snakes
Spiders
Heights
Panic -- Imminent Attack
Agoraphobia – Exposure, Inescapability
Small Animals
Hypochondriasis -- Disease
Separation Anxiety
Stranger Anxiety – Especially male
Blood from Injury

Why Would Pathology Reflect Evolutionary Processes?

Data: Anxiety (1) Over-generalizes & (2) Exaggerates threat
Increases with Time

Interpretation: Differential Impact of Error
•Potential Cost of Underestimating threat greater than
Cost of Overestimation

•Example of **Sub-Optimal Adaptation**

•Can result in Positive-Feedback – Pathology
Example of why Negative Inheritance does not disappear
Across generations

Pathology cont.

Manipulation:
•Threatening and Non-threatening Slides
•Each stimulus type followed by
•Shock   33%
•Tone   33%
•Nothing   33%

Data:
•Women consistently Overestimated frequency of shock
following slide of snake (42-52%)
•Greater if fear of snakes high
•Example of Over-Generalization/Exaggeration

Critique

McNally '87:
- If we are evolutionarily predisposed (**Prepared**) towards Certain phobias, then they should be hard to treat (extinguished)

- Phobias of animals and heights among the easiest to treat

Counter Argument:
Phobias are by definition exaggerated, inappropriate, Inefficient, and non-adaptive

The Allergy Hypothesis

Profet, *Quarterly Review of Biology*, '91:
Purpose is to avoid and extrude toxins
Extrusion: Sneezing, coughing, vomiting, eye watering
Avoidance: Pregnancy Illness – Teratogenesis

Anaphylactic Shock: Example of Sub-Optimal Adaptation
Increase in Allergies:
- Harder to identify in modern society
- Cannot avoid what cannot be identified
   Hence, more adaptive in previous times
- Reduction in breast-feeding (endogenous antibodies)
   May lead to exaggerated response

Response to Disease

1. **<u>Fever:</u>** <u>Kills bacteria and viruses</u>

   - Cold-blooded lizards seek heat – failure results in death

   - Anti-pyretic Tx in rabbits increases frequency of death

   - Syphilis rare in areas with malaria
     - Usually 99% fatal
     - Malarial Tx: 30% survival

   - Anti-pyretic Tx in Humans
     - Recovery from Chickenpox 1 day longer
     - Increased symptoms & Slower recovery from cold

Response to Disease cont.

2. **<u>Iron:</u>** <u>Nutrient for bacteria</u>

   - Leukocyte Endogenous Mediator – Reduces serum Iron
   - Spontaneous Aphagia to Iron-rich foods
   - Reduced Absorption
   - Iron supplements increase amoebic infection in Masai
     - 88% of Treatment Group
     - 10% of Controls
     - Example of True Experiment

   - Somali nomads:
     - Low levels of Iron in diet
     - Supplementation increased infection 30%

Apoptosis: Programmed Death

Senescence: Deterioration of all bodily mechanisms

Senescence Theory: Process of Natural Selection decreases with age
>   Less impact on transmission of genes

Pleiotropic Theory of Senescence:
>   Multiple effects of single gene
>>   Early positive effects outweigh late negative effects

>>   E.G.: High Testosterone **Selected**
>>>   Facilitates competition early
>>>   Promotes prostate cancer later

>>   E.G.: Alpha ram dies earlier than competitors

Pleiotrophic Theory cont.

Explains why organs wear out at roughly same time

Explains why men die 7 yrs earlier
>   Greater expression of Selection on men
>>   Due to greater reproductive variance
>>>   •Most fertile women reproduce – Upper limit ≈12
>>>   •Male reproduction varies 0 to +1,000
>>>>   Predicts greater propensity for pleiotropic genes
>>>>   and organs wearing out at same time

Suicide?

De Catanzaro '95:

Increasing propensity with dramatic decline in ability to contribute to **Inclusive Fitness**

Indicators:
- Expectations of poor health
- Chronic Infirmity
- Disgrace or Failure
- Poor prospects for Heterosexual mating
- Perception of being a burden to Genetic Kin

All Indicators suggest better chance of **genetic replication** in **absence** of Subject

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De Catanzaro cont.

Suicidal Ideation:

- Ever considered
- Recently Considered
- Intended within one year
- Intended ever
- Previously engaged in suicidal behavior

De Catanzaro cont.

Sum of suicidal ideation (♂, Age 18-30) correlated strongest with:

- Perceived Burden to family r = 0.56

- Lack of Heterosexual success
    - Amount of sex in last month, r = -0.67
    - Success in heterosexual relations, r = -0.49
    - Sex ever, r = -0.45
    - Stability of heterosexual relations, r = -0.45
    - Amount of sex in last year, r = -0.40

- Number of Children, r = -0.36

De Catanzaro cont.

Sum of suicidal ideation (♀, Age 18-30) correlated strongest with:

- Perceived Burden to family r = 0.44

- Sex ever, r = -0.37

- Contribution to family, r = -0.36

De Catanzaro cont.

Sum of suicidal ideation (✠ >50yrs) correlated strongest with:

- •Health, r = -0.48

- •Future financial problems, r = 0.46

- •Perceived Burden to family r = 0.38

- •Homosexuality, r = 0.38

- •Number of friends, r = -0.36

De Catanzaro cont.

Sum of suicidal ideation (☝ >50yrs) correlated strongest with:

- •Loneliness, r = 0.62
- •Perceived Burden to family r = 0.47
- •Future financial problems, r = 0.45
- •Health, r = -0.42

Similar results (**Converging Data**) for **all four groups** in samples of:
- •General Public (large sample)
- •Mental hospital patients
- •Maximum security inmate
- •Elderly

Brown, et al., In Press

175 American University Students:

High correlation of:
1. Low perceived attractiveness to Opposite Sex
2. High Burdensomeness to Kin

With:
1. Suicidal ideation
2. Depression
3. Hopelessness

Potential Confounds require a **prospective** study :
   Depression → Suicidal Ideation → Opposite Sex avoids Subject