

Evolutionary Psychopathology and Recurrent Pathways to Depression

Bryon Cunningham

California School of Professional Psychology at
Alliant International University, Los Angeles

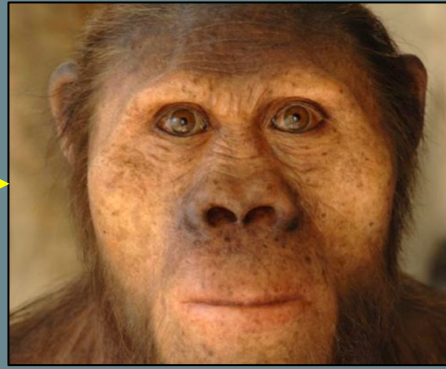
Contact : bcunningham1@alliant.edu

Abstract

In this poster, I outline four recurrent pathways to depression suggested by recent research in evolutionary psychopathology, namely:

- (a) **failure** to achieve adaptive goals
- (b) **helplessness** in aversive environments
- (c) **defeat** in competitions for social rank, and
- (d) **loneliness** due to social isolation.

Understanding these recurrent pathways to depression from an evolutionary perspective can help inform the conceptualization, diagnosis, and treatment of depressive disorders. It can also help clinicians make more informed judgments about the adaptive significance of the depressive symptoms of people in treatment. And it helps demonstrate the value of evolutionary theory to clinical science and clinical practice.



Evolutionary Psychopathology (EPP)

The application of evolutionary theory to the conceptualization, investigation, and treatment of mental disorders.

Researchers working within EPP have applied evolutionary theory to a wide range of mental disorders, including **anxiety disorders** (e.g., Price, 2003), **depressive disorders** (e.g., Gilbert, 2006), **bipolar disorder** (e.g., Gilbert et al., 2007), **obsessive-compulsive disorder** (e.g., Brüne, 2006), **attention-deficit/hyperactivity disorder** (e.g., Baird et al., 2000), **autism spectrum disorder** (e.g., Ploeger & Galis, 2011), **eating disorders** (e.g., Guisinger, 2003), and **substance use disorders** (e.g., Nesse, 2002).

1

Biological Evolution

Biological evolution is any process of (a) *variation*, (b) *selection*, and (c) *transmission* of organisms' **biological** traits or behaviors.

Biological Adaptation: A biological trait or behavior that:

- (i) was produced by *selection processes* in **ancestral** environments;
- (ii) produces *beneficial effects* in **the** context of one or more environments.

Camouflage



National Geographic

2

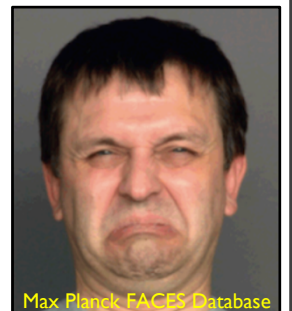
Psychological Evolution

Psychological evolution is any process of (a) *variation*, (b) *selection*, and (c) *transmission* of organisms' **psychological** traits or behaviors.

Psychological Adaptation: A psychological trait or behavior that:

- (i) was produced by *selection processes* in **ancestral** or **childhood** environments;
- (ii) produces *beneficial effects* in the context of one or more environments.

Disgust



Max Planck FACES Database

1

The Principle of Adaptive Action

Basic mental processes evolved to control adaptive actions.

“Basic” mental processes: species-typical; superordinate; e.g., perception, cognition, emotion, motivation.

Adaptive actions: Goal-directed behaviors that produce beneficial effects in the context of particular environments.

2

Mental Disorders

Mental disorders are disturbances to the basic mental processes that control adaptive actions, resulting in adaptive deficits in perception, cognition, emotion, motivation, action, and/or physiological regulation.

3

Depression

Depression is a disturbance to the basic mental processes that control adaptive actions, resulting in pessimism (cognition), dysphoria (emotion), depletion (motivation), inhibition (action), and dysregulation (physiology).

1

Pathways to Depression – Widely Recognized

Genetic traits (Dunn et al., 2016), **epigenetic traits** (Vialou et al., 2013), **neurotransmitter hypoactivity** (Werner & Coveñas, 2010), **grey matter volume reduction** (Arnone et al., 2013), **hormone dysregulation** (Schiller et al., 2015), **adverse childhood experiences** like neglect (De Venter et al., 2012), **traumatic events** (Mandelli et al., 2015), **chronic stress** (Hammen, 2005), **bereavements** (Karam et al., 2009), **high levels of neuroticism or low levels of extraversion** (Jylhä & Isometsä, 2006), some **personality disorders** (Newton-Howes et al., 2014). Also **seasonal depression**, **substance-induced depression**, **disease-induced depression**, **inflammation-induced depression**, and **starvation-induced depression** (for a survey, see Rantala et al., 2017).

2

Pathways to Depression – Supported by Evolutionary Psychopathology

1. **Failure** to achieve adaptive goals.
2. **Helplessness** in aversive environments.
3. **Defeat** in competitions for social rank.
4. **Loneliness** due to social isolation.

	Psychological Level	Social Level
Local	Failure	Defeat
Global	Helplessness	Loneliness

Failure to Achieve Adaptive Goals

1 Optimal Foraging Theory (Winterhalder & Smith, 2000)

1. All animals have **limited resources** (i.e. time, energy, raw materials).
2. Foraging behaviors (i.e. action/environment selection) vary in terms of:
 - (a) **productivity**, i.e. the yield of consumable plants/animals;
 - (b) **expenditure**, i.e. the amount of resource depletion.
3. Animals that forage in a way that *increases the ratio* of (a) productivity to (b) expenditure have **higher biological fitness**.



2 Resource Allocation Hypothesis of Depression

(Nesse, 2000, 2019)

4. For humans and perhaps other primates, the valence of emotions (**positive/negative**) and moods (**high/low**) helps optimize:
 - (a) **foraging behaviors**; subsequently generalized to
 - (b) **any behaviors** with productivity/expenditure tradeoff.
5. **Negative** emotions and **low** moods associated with depression may be the result of an evolved system to **protect humans from wasted efforts**.

3 BAS/BIS (Gray, 1990)

- i. Behavioral **Activation** System
- ii. Behavioral **Inhibition** System

4 Goal Disengagement

(Wrosch et al., 2013)

Disengagement from unattainable goals protects from depression.

Helplessness in Aversive Environments

1

Helplessness (Overmier, 2002; Seligman & Maier, 1967)

1. Animals exposed to *inescapable* shocks subsequently fail to attempt to escape from *escapable* shocks. In other words, they respond with *helplessness*.
2. **Helplessness**: passivity in response to prolonged aversive stimuli.
3. Features of helplessness in animals overlap with symptoms of depression, including **motivational depletion** and **behavioral inhibition**.
4. Helplessness is **highly evolutionarily conserved** across species.



2

Hopelessness (Abramson et al., 1995)

5. **Hopelessness**: (a) expectation of a negative future, (b) belief that no actions can alter the future, (c) dysphoria.
6. Features of hopelessness in humans overlap with symptoms of depression, including **cognitive pessimism** and **emotional dysphoria**.
7. Helplessness/hopelessness may be an evolved system to **conserve energy** and **minimize damage** from uncontrollable aversive environments.



Defeat in Competitions for Social Rank

1

Social Hierarchies (Sloman & Gilbert, 2000)

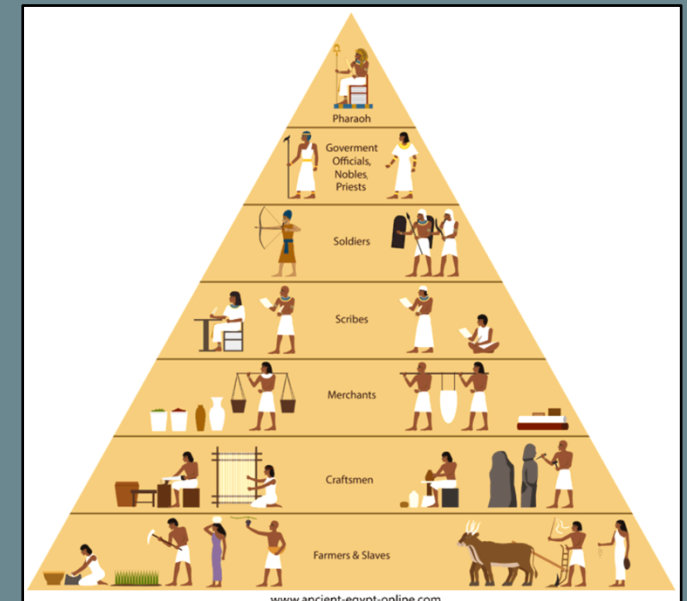
1. Many groups of social animals form **social hierarchies**, i.e. patterns of *social rank* within a group.
2. **Social rank**: Relative dominance or subordination of animals within the same social group. Social rank is mediated by *agonistic behaviors*.
3. **Agonistic behaviors**: Behaviors related to conflict between animals, including ritualized threat displays, physical aggression, and submission.



2

Involuntary Defeat Strategy (Sloman, 2000, Stevens & Price, 2015)

4. Social animals who lose a dominance dispute often exhibit a collection of behaviors known as the *Involuntary Defeat Strategy* (IDS).
5. IDS in **non-human animals** includes submissive behaviors, reduced motivation, behavioral inhibition. IDS in **humans** also includes dysphoria, lack of energy, and diminished self-esteem.
6. IDS may be an evolved system for adjusting to the **loss of social rank** while still remaining a member of a group.



Loneliness Due to Social Isolation

1 Social Integration (Kappeler & van Schaik, 2002)

1. **Social integration:** consistent engagement with a stable group of conspecifics through actions like proximity maintenance, reciprocal altruism, mutualistic hunting and foraging, acquiring allies, courting mates, and caring for offspring.
2. Social integration **promotes biological fitness**, i.e. the probability of survival and reproduction. Social integration improves predator detection, dilutes risk of predation, improves foraging yields, provides opportunities for mating, and improves conservation of heat, water, and energy.



2 Social Isolation (Cacioppo et al., 2015)

3. **Objective social isolation:** scarcity of social relationships and/or paucity of time spent in social activities.
4. **Subjective social isolation:** feelings of loneliness caused by too few or poor quality relationships. Subjective, but not objective, social isolation is depressogenic.
5. **Loneliness** may be an evolved system that motivates animals to avoid social isolation and engage in social integration, thereby enhancing biological fitness.



1

Treatment Goals for Specific Pathways to Depression

Pathways to Depression	Therapeutic Goals
Failure to achieve adaptive goals	Success in achieving adaptive goals
Helplessness in aversive environments	Self-efficacy in adaptive environments
Defeat in competitions for social rank	Social recognition from valued groups
Loneliness due to social isolation	Social integration within valued groups

2

Treatment Modalities for Specific Symptoms of Depression

Process	Depression	Some Currently Available Modalities
Cognition	pessimism	Cognitive Therapy, Positive Psychotherapy
Emotion	dysphoria	Emotion-Focused Therapy, Dialectical Behavior Therapy
Motivation	depletion	Motivational Interviewing, Acceptance and Commitment Therapy
Behavior	inhibition	Cognitive-Behavioral Therapy, Behavioral Activation
Physiology	dysregulation	Meditation, Mindfulness, Somatic Experiencing

References. 1. Abramson, L.Y., Alloy, L.B., & Metalsky, G.I. (1995). Hopelessness depression. In G.M. Buchanan & M.E. Seligman (Eds.), *Explanatory style* (pp. 113-134). Erlbaum. 2. Arnone, D., McKie, S., Elliott, R., Juhasz, G., Thomas, E.J., Downey, D., Williams, S., Deakin, J.F., & Anderson, I.M. (2013). State-dependent changes in hippocampal grey matter in depression. *Molecular Psychiatry*, 18, 1265-1272. 3. Baird, J., Stevenson, J.C., & Williams, D.C. (2000). The evolution of ADHD: A disorder of communication? *The Quarterly Review of Biology*, 75(1), 17-35. 4. Brüne, M., (2006). The evolutionary psychology of obsessive-compulsive disorder: The role of cognitive metarepresentation. *Perspectives in Biology and Medicine*, 49(3), 317-329. 5. Cacioppo, J.T., Cacioppo, S., Cole, S.W., Capitanio, J.P., Goossens, L., & Boomsma, D.I. (2015). Loneliness across phylogeny and a call for comparative studies and animal models. *Perspectives on Psychological Science*, 10(2), 202-212. 6. De Venter, M., Demyttenaere, K., & Bruffaerts, R. (2012). The relationship between adverse childhood experiences and mental health in adulthood: A systematic literature review. 7. Dunn, E.C., Brown, R.C., Dai, Y., Rosand, J., Nugent, N.R., Amstadter, A.B., & Smoller, J.W. (2015). Genetic determinants of depression: recent findings and future directions. *Harvard Review of Psychiatry*, 23(1), 1-18. 8. Gilbert, P. (2006). Evolution and depression: Issues and implications. *Psychological Medicine*, 36, 287-297. 9. Gilbert, P., McEwan, K., Hay, J., Irons, C., & Cheung, M. (2007). Social rank and attachment in people with bipolar disorder. *Clinical Psychology and Psychotherapy*, 14(1), 48-53. 10. Guisinger, S. (2003). Adapted to flee famine: Adding an evolutionary perspective to anorexia nervosa. *Psychological Review*, 110(4), 745-761. 11. Gray, J.A. (1990). Brain systems that mediate both emotion and cognition. *Cognition and Emotion*, 4(3), 269-288. 12. Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology*, 1, 293-319. 13. Jylhä, P., & Isometsä, E. (2006). The relationship of neuroticism and extraversion to symptoms of anxiety and depression in the general population. *Depression and Anxiety*, 23(5), 281-289. 14. Karam, E.G., Tabet, G.C., Alam, D., Shamseddeen, W., Chatila, Y., Mneimneh, Z., Salamoun, M.M., & Hamalian, M. (2009). Bereavement related and non-bereavement related depressions: A comparative field study. *Journal of Affective Disorders*, 112, 102-110. 15. Mandelli, L., Petrelli, C., & Serretti, A. (2015). The role of specific early trauma in adult depression: A meta-analysis of published literature. *European Psychiatry*, 30(6), 665-680. 16. Nesse, R.M. (2000). Is depression an adaptation? *Archives of General Psychiatry*, 57, 14-20. 17. Nesse, R.M. (2002). Evolution and addiction. *Addiction*, 97, 470-474. 18. Nesse, R.M. (2019). *Good reasons for bad feelings: Insights from the frontier of evolutionary psychiatry*. Penguin Random House. 19. Newton-Howes, G., Tyrer, P., Johnson, T., Mulder, R., Kool, S., Dekker, J. & Schoevers, R. (2014). Influence of personality on the outcome of treatment in depression: Systematic review and meta-analysis. *Journal of Personality Disorders*, 28(4), 577-593. 20. Ploeger, A., & Galis, F. (2011). Evolutionary approaches to autism – an overview and integration. *McGill Journal of Medicine*, 13(2), 38-43. 21. Overmier, J.B. (2002). On learned helplessness. *Integrative Physiological and Behavioral Science*, 37, 4-8. 22. Price, J.S. (2003). Evolutionary aspects of anxiety disorders. *Dialogues in Clinical Neuroscience*, 5(3), 223-236. 23. Rantala, M.J., Luoto, S., Krams, I., & Karlsson, H. (2018). Depression subtyping based on evolutionary psychiatry: Proximate mechanisms and ultimate functions. *Brain, Behavior, and Immunity*, 69, 603-617. 24. Schiller, C.E., Meltzer-Brody, S., & Rubinow, D.R. (2015). The role of reproductive hormones in postpartum depression. *CNS Spectrums*, 20(1), 48-59. 25. Seligman M.E., & Maier S.F. (1967). Failure to escape traumatic shock. *Journal of Experimental Psychology*, 74,1–9. 26. Sloman, L. & Gilbert, P. (Eds.) (2000). *Subordination and defeat: An evolutionary approach to mood disorders and their therapy*. Erlbaum. 27. Vialou, V., Feng, J., Robison, A.J., & Nestler, E.J. (2013). Epigenetic mechanisms of depression and antidepressant action. *Annual Review of Pharmacology and Toxicology*, 53, 59-87. 28. Werner, F.M., Coveñas, R. (2010). Classical neurotransmitters and neuropeptides involved in major depression: A review. *International Journal of Neuroscience*, 120(7), 455-470. 29. Winterhalder, B. & Smith, E.A. (2000). Analyzing adaptive strategies: Human behavioral ecology at twenty five. *Evolutionary Anthropology*, 9(2), 51-72. 30. Wrosch, C., Scheier, M.F., Miller, G.E. (2013). Goal adjustment capacities, subjective well-being, and physical health. *Social and Personality Psychology Compass*, 7(12), 847-860.