# ANTIFRAGILE

## THINGS THAT GAIN FROM DISORDER

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Supplemental Graphics

# Contents

GRAPHIC 1. • THE CENTRAL TRIAD: THREE TYPES OF EXPOSURE

| | FRAGILE | ROBUST | ANTIFRAGILE |
|---|---|---|---|
| Mythology— Greek | Sword of Damocles Rock of Tantalus | Phoenix | Hydra |
| Mythology— New York and Brooklyn | Dr. John | Nero Tulip | Fat Tony, Yevgenia Krasnova* |
| Black Swan | Exposed to negative Black Swans | | Exposed to positive Black Swans |
| Businesses | New York: Banking system | | Silicon Valley: "Fail fast," "Be foolish." |
| Biological & Economic Systems | Efficiency, optimized | Redundancy | Degeneracy (functional redundancy) |
| Errors | Hates mistakes | Mistakes are just information | Loves mistakes (since they are small) |
| Errors | Irreversible, large (but rare) errors, blowups | | Produces reversible, small errors |
| Science/ Technology | Directed Research | Opportunistic research | Stochastic Tinkering (antifragile tinkering or bricolage) |
| Dichotomy event-exposure | Studying events, measuring their risks, statistical properties of events | Studying exposure to events, statistical properties of exposures | Modifying exposure to events |
| Science | Theory | Phenomenology | Heuristics, practical tricks |
| Human Body | Mollification, atrophy, "aging", sarcopenia | Mithridatization Recovery | Hormesis, Hypertrophy |

\* Dr John, Nero Tulip, Fat Tony, and Yevgenia Krasnova are characters in *The Black Swan*. Nero Tulip is also a character in *Fooled by Randomness*.

|  | *FRAGILE* | *ROBUST* | *ANTIFRAGILE* |
| --- | --- | --- | --- |
| *Ways of Thinking* | Modernity | Medieval Europe | Ancient Mediterranean |
| *Human relationships* | Friendship | Kinship | Attraction |
| *Ancient Culture (Nietzsche)* | Apollonian | Dionysian | Balanced mixture of Apollonian and Dionysian |
| *Ethics* | The weak | The magnificent | The strong |
| *Ethics* | System without skin in the game | System with skin in the game | System with soul in the game |
| *Regulation* | Rules | Principles | Virtue |
| *Systems* | Concentrated sources of randomness | | Distributed sources of randomness |
| *Mathematics (functional)* | Nonlinear-Concave, or Concave-convex | Linear, or Convex-Concave | Nonlinear-Convex |
| *Mathematics (probability)* | Left-Skewed (or negative skewed) | Low volatility | Right-Skewed (or positive skewed) |
| *Option Trading* | Short Volatility, gamma, vega | Flat Volatility | Long volatility, "gamma", "vega" |
| *Knowledge* | Explicit | Tacit | Tacit with convexity |
| *Epistemology* | True-False | | Sucker-Nonsucker |
| *Life and Thinking* | Tourist Personal and intellectual | | Flâneur with a large private library |
| *Financial dependence* | Corporate employment, Tantalized class | Dentist, dermatologist, niche worker, minimum wage earner | taxi driver, artisan, prostitute, F*** you money |
| *Learning* | Classroom | Real life, pathemata mathemata | Real life and library |
| *Political Systems* | Nation-State; Centralized | | Collection of City-States; Decentralized |

|  | *FRAGILE* | *ROBUST* | *ANTIFRAGILE* |
|---|---|---|---|
| *Social System* | Ideology | | Mythology |
| | Post-agricultural Modern Settlements | | Nomadic and hunter-gatherer tribes |
| *Knowledge* | Academia | Expertise | Erudition |
| *Science* | Theory | Phenomenology | Evidence-based phenomenology |
| *Psychological Well-Being* | Post traumatic syndrome | | Post traumatic growth |
| *Decision Making* | Model-based probabilistic decision making | Heuristic-based decision making | Convex heuristics |
| *Thinkers* | Plato, Aristotle, Averroes | Early Stoics, Menodotus of Nicomedia, Popper, Burke, Wittgenstein, John Gray | Roman Stoics, Nietzsche, Nietzsche perhaps Hegel (sublation), Jaspers |
| *Economic Life* | Econophasters Cults | Anthropologists | Religion |
| *Economic Life (effect on economic life)* | Bureaucrats | | Entrepreneurs |
| *Reputation (profession)* | Academic, corporate executive, Pope, Bishop, Politician | Postal employee, truck driver, train conductor | Artist, Writer |
| *Reputation (class)* | Middle Class | Minimum wage persons | Bohemian, aristocracy, old money |
| *Medicine* | *Via positiva* Additive treatment (give medication) | | *Via negativa* Subtractive treatment (remove items from consumption, say cigarettes, carbs, etc.) |
| *Philosophy/ Science* | Rationalism | Empiricism | Skeptical, subtractive empiricism |
| | Separable | | Holistic |

|  | FRAGILE | ROBUST | ANTIFRAGILE |
|---|---|---|---|
| Economic Life |  | Owner operated |  |
| Finance | Short Option |  | Long Option |
| Knowledge | Positive Science | Negative Science | Art |
| Stress | Chronic stressors |  | Acute stressors, with recovery |
| Decision Making | Acts of commission |  | Acts of omission ("missed opportunity") |
| Literature | E-Reader | Book | Oral Tradition |
| Business | Industry | Small Business | Artisan |
| Food | Food Companies |  | Restaurants |
| Finance | Debt | Equity | Venture capital |
| Finance | Public Debt | Private debt with no bailout | Convertible |
| General | Large | Small but specialized | Small but not specialized |
| General | Monomodal |  | Barbell |
| Risk taking | Markowitz | Kelly criterion | Kelly criterion using finite bets |
| Legal System | Statutory law, Legal Code |  | Common Law, equity |
| Regulation | Code of regulations |  | Heuristic regulations |
| Finance | Banks, Hedge funds managed by econophasters. | Hedge funds (some) | Hedge funds (some) |
| Business | Agency Problem |  | Principal operated |
| Noise-Signal | Signal only |  | Stochastic resonance, simulated annealing |
| Model Error | Concave to errors |  | Convex to errors |
| Education | Soccer mom | Street life | Barbell: parental library, street fights |

|  | FRAGILE | ROBUST | ANTIFRAGILE |
|---|---|---|---|
| Physical Training | Organized sports. gym machines |  | Street fights |
| Urbanism | Robert Moses, Le Corbusier |  | Jane Jacobs |

Process

Process

Time

Time
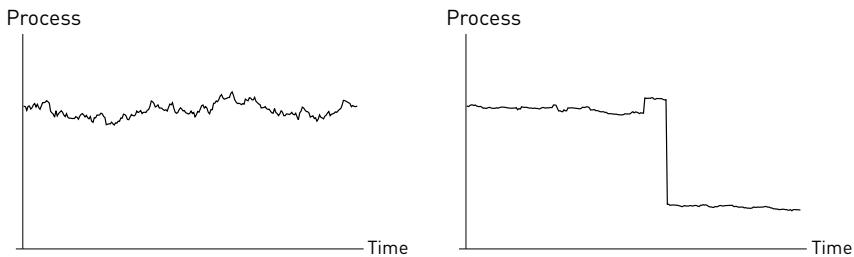
GRAPHIC 2. Municipal noise, distributed variations in the souks (first) compared to that of cen-
tralized or human-managed systems (second)—or, equivalently, the income of a taxi drive[r]
(first) and that of an employee (second). The second graph shows moves taking place from
cascade to cascade, or Black Swan to Black Swan. Human overintervention to smooth o[r]
control processes causes a switch from one kind of system, Mediocristan, into another, Ex-
tremistan. This effect applies to all manner of systems with constrained volatility—health[,]
politics, economics, even someone's mood with and without Prozac. Or the difference be-
tween the entrepreneur-driven Silicon Valley (first) and the banking system (second).

GRAPHIC 3. • FRAGILIZING INTERVENTIONISM AND ITS EFFECTS
                ACROSS DISCIPLINES

| FIELD | EXAMPLE OF INTERVENTIONISM | IATROGENICS/ COSTS |
|---|---|---|
| *Medicine, Health* | Overtreatment<br><br>Steady feedings, thermal stability, etc.—denying the human body randomness<br><br>Pharmaceutical addition, not subtraction | Fragility<br><br>Medical error<br><br>Sicker (but longer-living) humans, richer pharma, antibiotic-resistant bacteria |
| *Ecology* | Micromanaging forest fires | Worsening total risks— larger "big ones" |
| *Politics* | Central planning<br><br>U.S. supporting rotten regimes "for the sake of stability" | Informational opacity<br><br>Chaos after a revolution |
| *Economics* | "No More Boom and Bust" (Greenspan (US), Labor (UK)), Great Moderation (Bernanke)<br><br>State interventionism<br><br>Optimization<br><br>Illusion of pricing rare events, value-at-risk methodologies, illusion of economies of scale, ignorance of second-order effects | Fragility<br><br>Deeper crises when they happen<br><br>Support for established, state-friendly corporations; stifling of entrepreneurs<br><br>Vulnerability, pseudo-efficiency<br><br>Big-time blowups |
| *Business* | Positive advice (charlatans), focus on return not risk (what to avoid) | Richer charlatans, bankrupt businesses |
| *Urbanism* | City planning | Urban blight, inner cities, depressions, crime |
| *Forecasting* | Forecasting in Black Swan Domain (Fourth Quadrant) in spite of the horrible track record | Hidden risks (People take more risks when supplied with a forecast) |
| *Literature* | Copy editors trying to change your text | Blander, more *New York Times*–style commoditized writing |

7

| FIELD | EXAMPLE OF INTERVENTIONISM | IATROGENICS/ COSTS |
|---|---|---|
| *Parenting* | Soccer mom (or pop): removing every random element from children's lives | Touristification of children's minds |
| *Education* | The entire concept is grounded in interventionism | Ludification—transformation of children's brain |
| *Technology* | Neomania | Fragility, alienation, nerdification |
| *Media* | High-frequency sterile information | Disruption of the noise/ signal filtering mechanism<br><br>Interventionism |

Profits in Stater (Thekel)
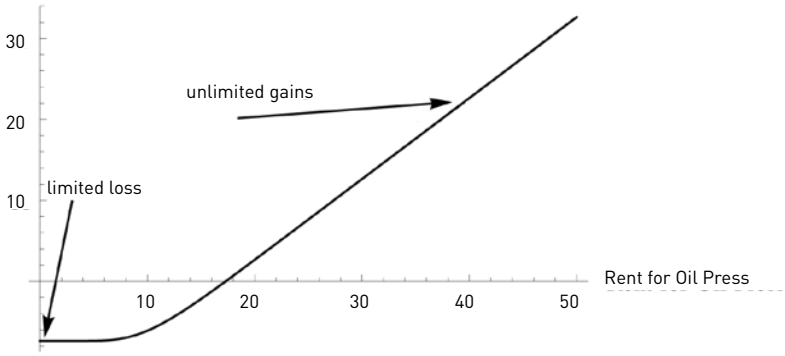


**GRAPHIC 4.** Thales' antifragility. He pays little to get a huge potential. We can see the asymmetry between upside and downside.
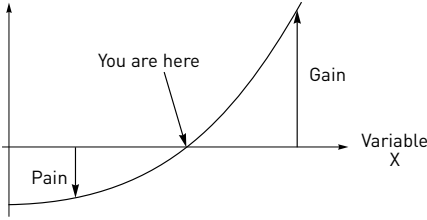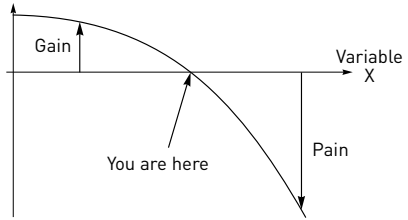


**GRAPHIC 5.** Pain More than Gain, or Gain More than Pain. Assume you start from the "You Are Here" spot. In the first case, should the variable *x* increase, i.e., move to the right on the horizontal axis, the gains (vertical axis) are larger than the losses encountered by moving left, i.e., an equivalent decrease in the variable *x*. The graph illustrates how positive asymmetry (first graph) turns into convex (inward) curving and negative asymmetry (second graph) turns into concave (outward) curving. To repeat, for a set deviation in a variable, in equivalent amounts in both directions, the convex gains more than it loses, and the reverse for the concave.
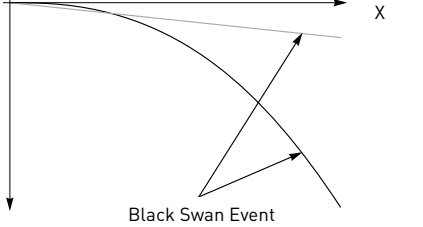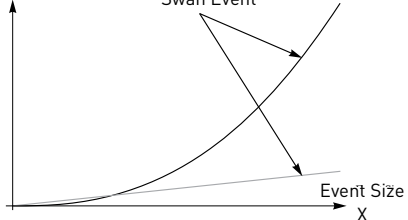


**GRAPHIC 6. .** Two exposures, one linear, one nonlinear, with negative convexity—that is, concavity—in the first graph, positive convexity in the second. An unexpected event affects the nonlinear disproportionately more. The larger the event, the larger the difference.

9

GRAPHIC 7. • ETHICS AND THE FOUNDATIONAL ASYMMETRY

| NO SKIN IN THE GAME | SKIN IN THE GAME | SKIN IN THE GAME FOR THE SAKE OF OTHERS, OR SOUL IN THE GAME |
|---|---|---|
| (Keeps upside, transfers downside to others, owns a hidden option at someone else's expense) | (Keeps his own downside, takes his own risk) | (Takes the downside on behalf of others, or universal values) |
| Bureaucrats | Citizens | Saints, Knights, Warriors, Soldiers |
| Cheap talk ("tawk" in Fat Tony's lingo) | Actions, no tawk | Expensive talk |
| Consultants, sophists | Merchants, Businessmen | Prophets, Philosophers (in the pre-modern sense) |
| Businesses | Artisans | Artists, Some artisans |
| Corporate Executives (with suit) | Entrepreneurs | Entrepreneurs/Innovators |
| Theoreticians, data miners, observational studies | Laboratory and field experimenters | Maverick scientists |
| Centralized government | Government of city states | Municipal government |
| Editors | Writers | Great writers |
| Journalists who "analyze" and predict | Speculators | Journalists who take risks and *expose* frauds (powerful regimes, corporations) |
| Politicians | Activists | Rebels, Dissidents, Revolutionaries |
| Bankers | Traders | (They would not engage in vulgar commerce) |
| Fragilista Prof. Dr. Joseph Stiglitz | Fat Tony | Nero Tulip |
| Risk Vendors | | Taxpayers (not quite voluntarily soul in the game, but they are victims) |