

**Inequality and Justice**  
**Questions and Answers**

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# **Overview**

- **Basic Building Blocks**
- **Questions and Answers**
  1. **Inequality**
  2. **Justice**
  3. **Inequality and Justice**

# Overview

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# **J.1. Is the Sense of Justice Universal?**

- Some say No. And point to its putative absence in women.**
  - Schopenhauer: “The fundamental fault of the female character is that it has *no sense of justice.*”**
  - Freud: “Women have but little sense of justice.”**
- Some say Yes. And sometimes point to children.**
  - Rawls: Everyone “develops a sense of justice”**
  - Scalia: If you treat siblings differently “you will feel the fury of the fundamental sense of justice”**
  - Babbitt, Zolotow, and numerous children’s books authors: “It’s not fair!”**

**[E]ach person beyond a certain age and possessed of the requisite intellectual capacity develops a sense of justice under normal social circumstances. We acquire a skill in judging things to be just and unjust, and in supporting these judgments by reason.**

**-- Rawls, 1971**

**Parents know that children will accept quite readily all sorts of substantive dispositions – no television in the afternoon, or no television in the evening, or even no television at all. But try to let one brother or sister watch television when the others do not, and you will feel the fury of **the fundamental sense of justice** unleashed.**

**-- Scalia, 1989  
Justice, U.S. Supreme Court**

**We are all somehow born with a  
strong sense of justice. Why else  
say so often, “It's not fair!”**

**-- Babbitt, 2004  
Children's Book Author**

## **J.2. How Does the Sense of Justice Work?**

- **Justice – for self, for others, for all**
- **Three fundamental actors**
  - **observer**
  - **rewardee**
  - **allocator**
- **Four fundamental processes**
  - **just reward process**
  - **actual reward process**
  - **justice evaluation process**
  - **justice consequences process**



# Persons and Actors

- **In a justice situation, a person can be**
  - **Observer only**
  - **Allocator only**
  - **Rewardee only**
  - **Observer and Allocator**
  - **Observer and Rewardee**
  - **Allocator and Rewardee**
  - **Observer, Allocator, and Rewardee**

# Actors and Processes in Justice Theory

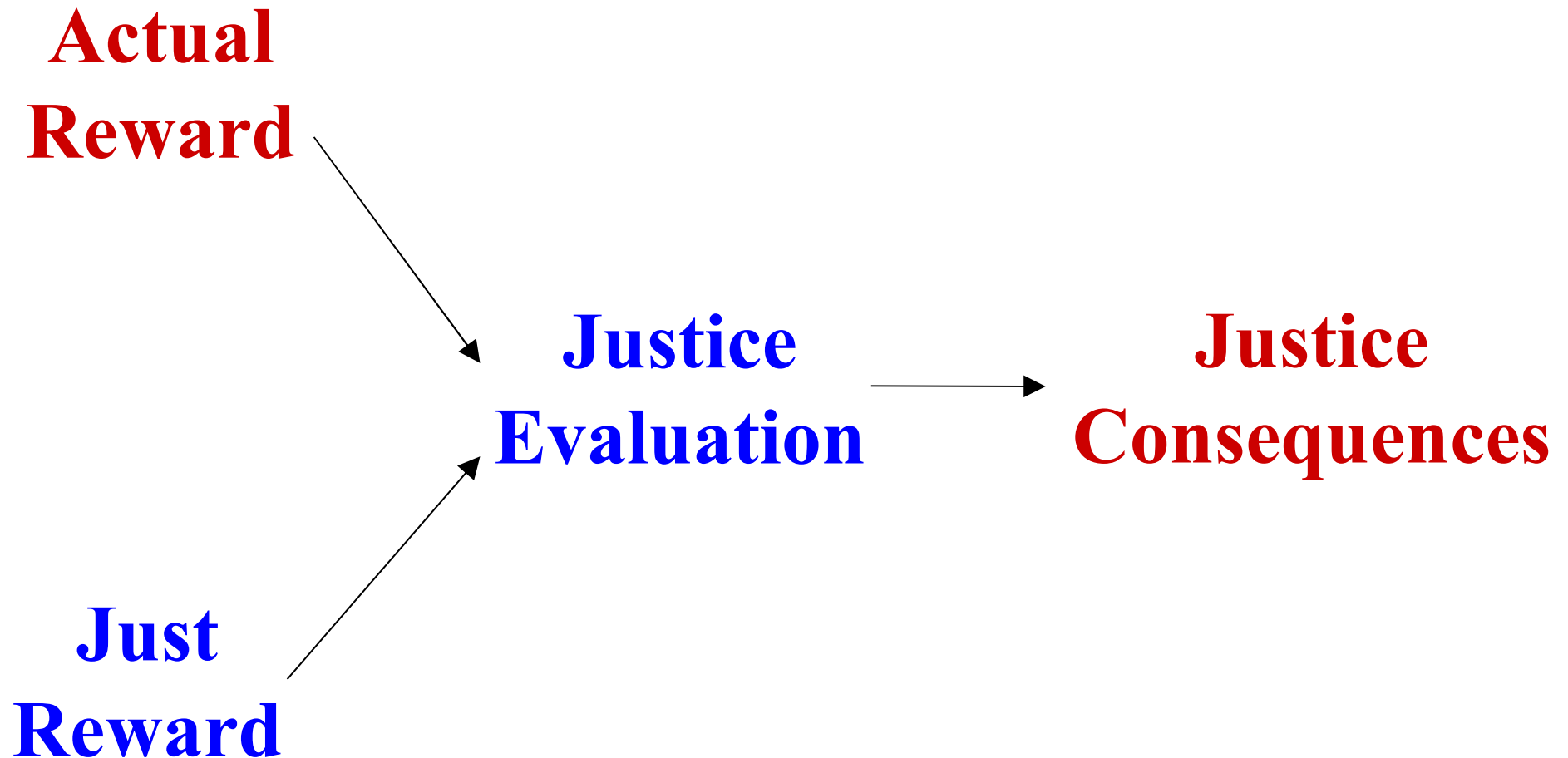
- **just reward process**
  - Observer forms idea of just reward
- **actual reward process**
  - Allocator sets actual reward
- **justice evaluation process**
  - Observer judges justice of actual reward
- **justice consequences process**
  - Observer & Allocator react to chain of events

# Thinking, Saying, Doing

## in the World of Distributive Justice

	Thinking	Saying	Doing
Just Reward	True Just Reward	Disclosed Just Reward	---
Actual Reward	---	---	✓
Justice Evaluation	Experienced Justice Eval	Expressed Justice Eval	---
Justice Consequences	✓	✓	✓

# Fig 1. The World of Distributive Justice



## **J.3. How Does the Justice Evaluation Vary with the Actual Reward and the Just Reward?**

- **General function (in the case of a good)**
  - increases with the actual reward
  - decreases with the just reward
- **Specific function**
  - varies as the log of the ratio of the actual reward to the just reward

# Justice Evaluation Function

$$J = \theta \ln \left( \frac{A}{C} \right)$$

# Justice Evaluation Function

- where  $\theta$  is the Signature Constant
  - whose sign indicates observer framing
    - positive for goods
    - negative for bads
  - whose absolute magnitude indicates observer expressiveness

# Properties of the Justice Evaluation Function

- **Original four noticed (*AJS* 1978)**
  - Mapping onto justice evaluation scale
  - Justice evaluation it yields is in justice units
  - Integrates rival ratio-difference views
  - Deficiency is felt more keenly than comparable excess
- **Theorem and proof (*SM* 1990)**
  - Scale-invariance (homogeneity of degree zero)
  - Additivity (zero second-order mixed partial derivative)
- **Two more properties (*SMR* 1996)**
  - Symmetry
  - Limiting form of difference between two power functions
- **Links loss aversion and the Golden Number (2006, 2015)**



# Loss Aversion & the Golden Number: Based on $J = \ln(A/C)$

- **Loss is felt twice as keenly as gain when:**

$$k = A_0 \left( \frac{\sqrt{5}}{2} - \frac{1}{2} \right) \approx .618 A_0$$

# Loss Aversion -- Summary

- **Justice evaluation function predicts both that**
  - **Deficiency is felt more keenly than excess**
  - **Loss is felt more keenly than gain**
- **Justice evaluation function predicts the exact magnitudes by which deficiency(loss) is felt more keenly than excess(gain)**
- **Justice evaluation function predicts that deficiency (loss) is felt twice as keenly as excess (gain) when the actual reward equals the just reward (prev A) plus and minus the just reward (prev A) multiplied by the Golden Number**

## **J.4. What Does the Justice Evaluation Function Do **Theoretically**?**

- **As the first postulate in a hypothetico-deductive theory, the justice evaluation function**
  - **yields a large and growing number of testable implications**
    - **reaching out to multiple disparate domains**
    - **some of them novel predictions**
  - **provides interpretation for rare or non-recurring phenomena and events**
  - **yields some possibly fundamental constants**

# **Some Predictions of Justice Theory -- 1**

- Gain from theft greater when stealing from a fellow group member rather than an outsider; this premium is greater in poor groups.**
- Parents will spend more of their toy budget at an annual giftgiving occasion than at birthdays.**
- Veterans of wars fought away from home are more vulnerable to posttraumatic stress than veterans of wars fought on home soil.**
- Gifts are more valuable in the giver's presence.**
- The blind are less susceptible to eating disorders.**

# **Some Predictions of Justice Theory -- 2**

- The parent who dies first is mourned more. In epochs of war, fathers are mourned more than mothers, but in epochs of death in childbirth, mothers mourned more than fathers.**
- Newcomers are more likely to be welcomed by groups that value cardinal goods than by groups that value ordinal goods, and more likely to be welcomed by groups that play games of chance than by groups that play games of skill.**
- Society loses when rich steal from poor.**

# **Some Predictions on Conversation**

- **Topics raised signal valued goods**
  - **Ex. hereditary monarch discussing horse bloodlines**
- **Number of interruptions in a group depends on**
  - **Number of potential valued goods**
  - **Inequality in the distribution of cardinal goods**
  - **Intercorrelations among valued goods**
- **Homogeneous groups have fewer interruptions**
- **Interruptions are group-specific; a given actor may interrupt repeatedly in one group, never in another**
- **Courtesy is lower in heterogeneous groups, and thus in urban settings**

# **A Thing's Value Changes**

- A gift is more valuable to the receiver when the giver is present.**
- A thief's gain from theft is greater when stealing from a fellow group member.**
- The gain or loss from having a gift stolen depends on whether the giver and the thief are from inside or outside the group.**
- In an experiment, if a thing is given by the experimenter and lost to a fellow participant, the loss from theft exceeds the gain from the gift.**

# Some **Predictions** About **Grief**

- **Inheritance tempers grief.**
- **The death of an offspring is mourned more than the death of a parent.**
- **When wives predecease their husbands, mothers are mourned more than fathers, but when husbands predecease their wives, fathers are mourned more than mothers.**
- **Losing a beloved spouse to death is less painful than losing a beloved spouse to divorce.**



# **Emergence of Norms:**

## **Testable Implications**

- **Never steal from someone poorer than yourself**
- **When stealing from someone richer, never leave him/her poorer than you were before the theft**
- **If the victim is poorer than the thief, punish the thief more severely, the larger the amount stolen**
- **In all societies, guardians will propose the norm, “Thou shalt not steal,” but norm will meet with opposition and may have to be imposed from above**

# **Interpretation of Non-Recurring or Rare Events**

- **invention of mendicant institutions in 12<sup>th</sup> century was a response to switch from valuing attributes (birth, nobility, rank) to valuing possessions (wealth)**
- **invention of mystery novel in 19<sup>th</sup> century the same**

# Some Predictions for Fundamental Constants

- Critical inequality level occurs when Atkinson inequality equals  $1-(2/e)$ , or approx **.264**
  - about when Gini inequality equals .42
  - switches between cardinal and ordinal goods
- Societal mainstream lies in the region between  $J = -1$  and  $J = +1$ 
  - relative ratios/ranks between  $1/e$  and  $e$ , or approx between .368 and 2.72
  - ordinal-good societies have no “top”
  - cardinal-good societies can have neither “top” nor “bottom”

## **J.5. What Does the Justice Evaluation Function Do **Empirically**?**

- **Suggests questions to study**
- **Identifies factors producing outcomes**
- **Provides new ways to measure variables**
- **Guides choice of statistical procedures**
- **Guides interpretation of results**

# Hypothesis Tests

- **one-tailed**
  - **prior theoretical reasoning, AND**
  - **effects predicted by all theories are in the same direction**
- **two-tailed**
  - **no prior theoretical reasoning, OR**
  - **prior theoretical reasoning AND opposite effects predicted**

## **J.6. Do People Agree on Their Ideas of What Is Just?**

- **No**
- **In fact, a fundamental principle, owed independently to Elaine Hatfield and Milton Friedman, is that justice is in the eye of the beholder**
- **It is thus critical to study the range of ideas of justice**
- **And amazing when general results emerge**

# **Independence of Mind**

## **Hatfield-Friedman Principle**

- **“Equity is in the eye of the beholder”**
  - **Elaine Hatfield, 1973**
- **“Fairness is . . . in the eye of the beholder”**
  - **Milton Friedman, 1977**

## **J.7. What Is the Relation between Justice and Fairness and Impartiality?**

- Justice, fairness, and impartiality are three words in a larger set of related words that also includes equity and appropriateness**
- It is known that some words do not occur in all languages – for example, impartiality**
- The theoretical challenge is to find in justice theory opportunities for each of these words**
- The empirical challenge is to study how real people use these words, across languages and countries**



# Opportunities for Impartiality Among the Actors and Processes of Justice Theory

Processes	Observer	Allocator
<b>Just Reward Process</b>	✓	---
<b>Actual Reward Process</b>	---	✓
<b>Justice Evaluation Process</b>		
<b>Framing</b>	✓	---
<b>Expressiveness</b>	✓	---
<b>Justice Consequences Process</b>	✓	✓

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# I&J.1. Is Inequality Good or Bad?

- Theorem (Inequality **Goodness** and **Badness**)
- If an observer regards a cardinal thing as a **good**, then that observer implicitly regards inequality in the distribution of that thing as a **bad**; and if an observer regards a cardinal thing as a **bad**, then that observer implicitly regards inequality in the distribution of that thing as a **good**.

# Framing Theorem

## Goodness or Badness of Cardinal Things and Their Distribution

### Thing's Distribution

Thing

Mean

Inequality

Good

Good

Bad

Bad

Bad

Good

Good	Good	Bad
Bad	Bad	Good

## **I&J.2. What Is the Exact Relation between Inequality, Poverty, and Justice?**

- The justice index JI1 – the arithmetic mean of  $J$  – yields a decomposition of overall injustice into injustice due to poverty and injustice due to inequality.**

$$\ln \left[ \frac{\text{actual mean}}{\text{just mean}} \right] - \ln \left[ \frac{f(\text{actual inequality})}{f(\text{just inequality})} \right]$$

# Justice Index JI1

$$\ln \left[ \frac{[E(A)][1 - I(A)]}{[E(C)][1 - I(C)]} \right]$$

## **I&J.3. What Is the Exact Relation between Inequality and Justice?**

- **There is no general necessary relation between inequality and justice**
  - the relation can be nonexistent
  - or it can be positive
  - or it can be negative
- **Classically, justice is regarded as the first line of defense against self-interest and inequality. But absent a clear link, the sense of justice would not awaken to exert its moral suasion, no matter how great the inequality or how fast its increase**

## **I&J.4. What Is the Just Inequality?**

- **The question is incomplete; it lacks the requisite phrase, “in the eyes of . . . .”**
- **Hatfield-Friedman Principle: Justice is in the eye of the beholder.**
- **Some examples:**
  - **Socrates: just inequality is zero inequality**
  - **Athenian Stranger: just inequality is anything up to a maximum-to-minimum ratio of 4**
  - **Ben and Jerry: just inequality is anything up to a maximum-to-minimum ratio of 7. [The firm’s policy ended in 1994.]**



# **I&J.5. How Fast Does Inequality Grow to Unjust Levels?**

- **Inequality in ordinal variables does not grow**
- **For cardinal variables, no firm theoretical or empirical evidence**
- ***Leviticus 25* implies that the answer is 50 years.**  
**For every fiftieth year**
  - **all land returned to original owners or their heirs**
  - **all debts forgiven**
  - **all indentured servants and slaves freed**

## **I&J.6. What Are Some Predictions of Justice Theory about Inequality?**

- In a society with two warring subgroups, the greater the overall economic inequality, the greater the intensity of the conflict**
- Preference for salary secrecy is influenced by overall salary inequality in distribution-specific ways**
- In societies where husbands earns more than their wives, divorce rates decrease when husbands' wage inequality increases and increase when wives' wage inequality increases**

# I&J.7. What Is the Exact Relation Between Inequality and the Just Society?

- Combining the Inequality Theorem and the voting model yields:
- The **just society** has a **mixed** government
  - Distribution of **benefits** is by **the many**
  - Distribution of **burdens** is by **the few**

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# **Basic Building Blocks**

- **Personal Characteristics**
- **Inputs and Outcomes**
- **Probability Distributions**



# Quantitative Characteristics

- **Cardinal**
  - **wealth**
  - **land**
  - **animals**
- **Ordinal**
  - **beauty**
  - **intelligence**
  - **skills of all kinds**

# Qualitative Characteristics

- **Sex**
- **Race**
- **Ethnicity**
- **Language**
- **Nativity**
- **Religion**

# Quantitative Characteristics

## Goods and Bads

- In the eyes of an observer,  
a thing is a **good**  
if **more is preferred to less.**
- In the eyes of an observer,  
a thing is a **bad**  
if **less is preferred to more.**

# Inputs and Outcomes

- **Basic scientific relation**
  - outcome is generated by
  - one, two, or many inputs
- **Basic tool**
  - mathematical function

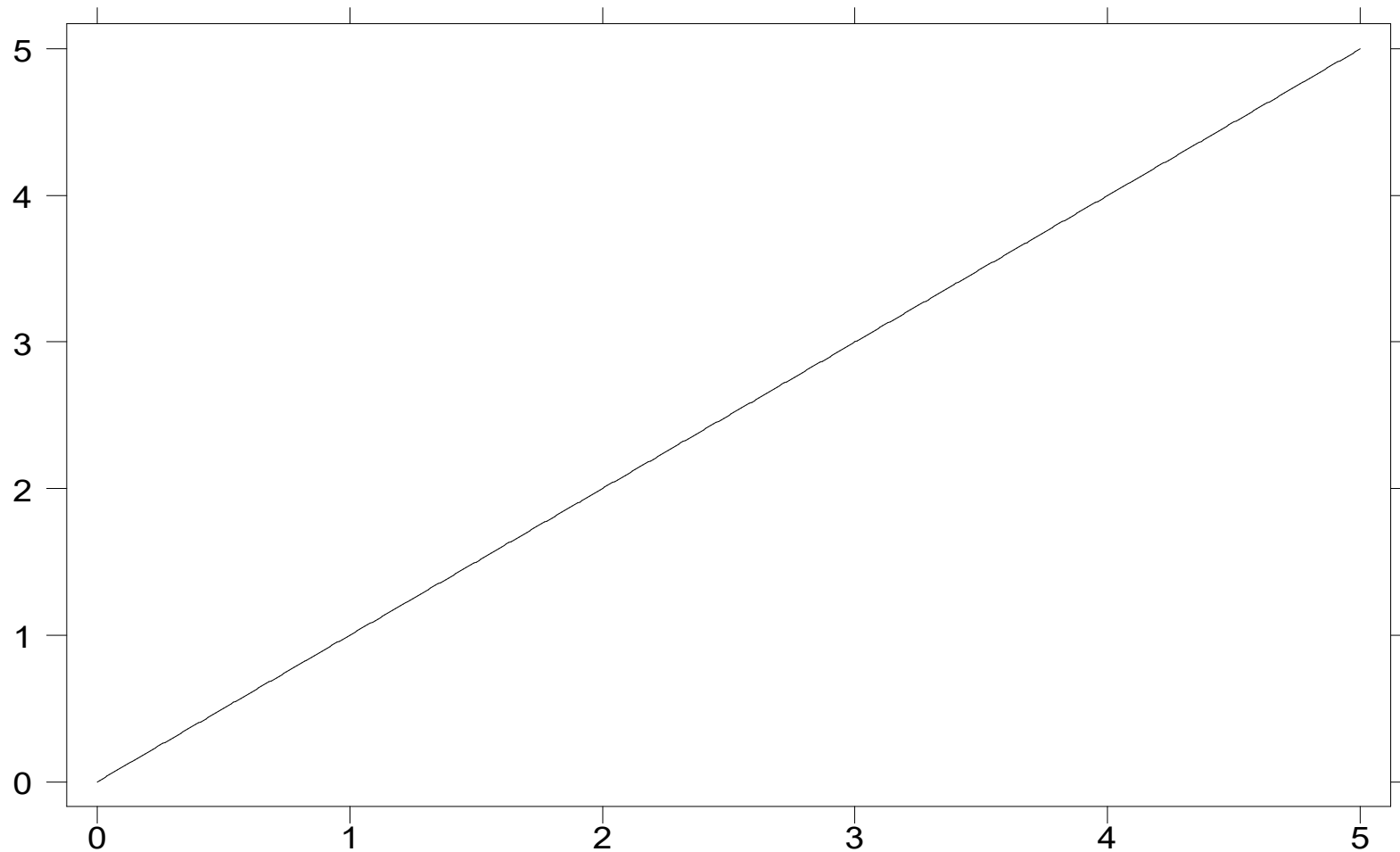
# Generic Notation

- **input  $X$**
- **outcome  $Y$**
- **relation  $X \rightarrow Y$**
- **Example**
  - **as  $X$  increases,  $Y$  increases**

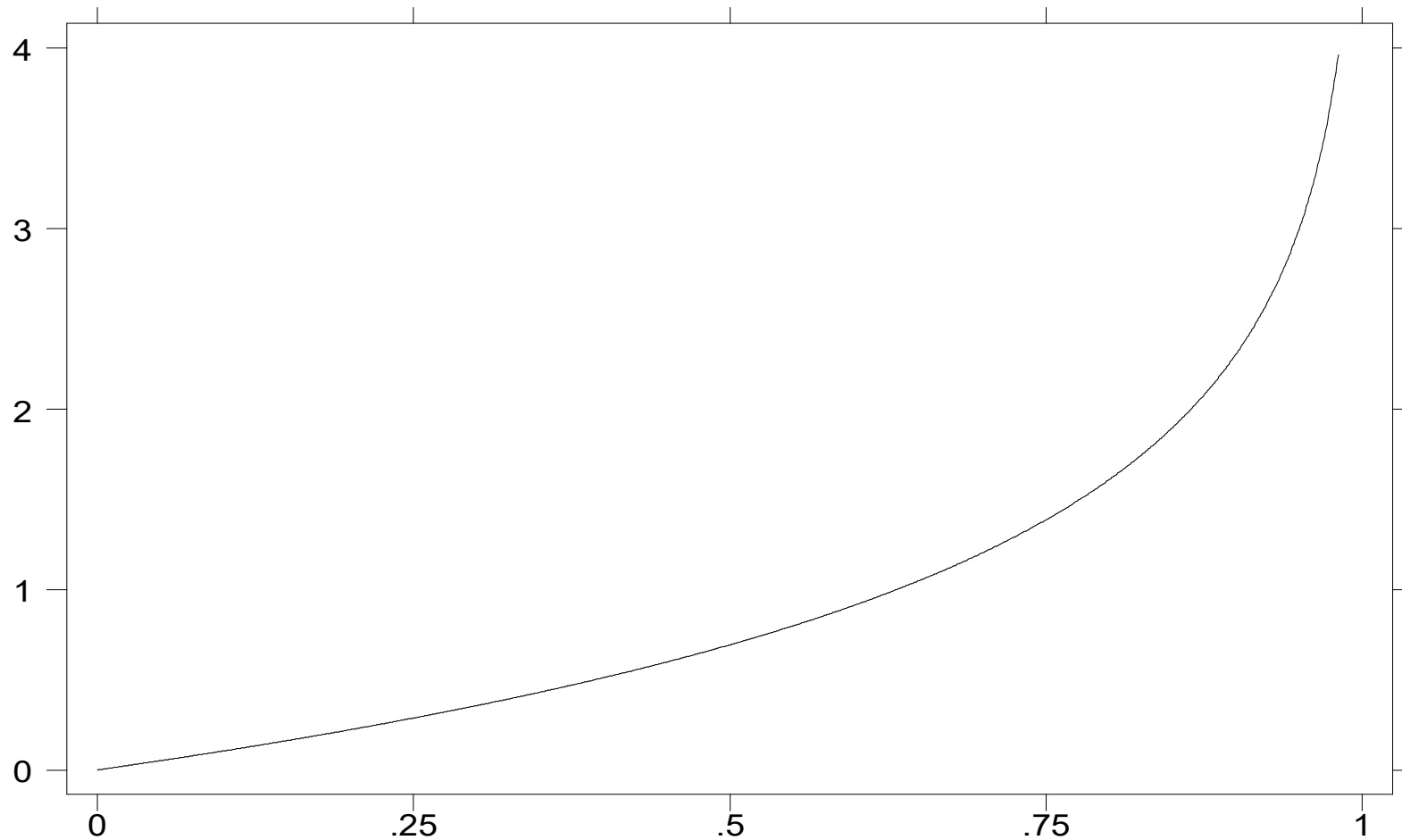
# **MathStat Tools – Mathematical Functions**

- **Focus on increasing functions,  
classified by their rate of change**
  - **increasing at a constant rate**
  - **increasing at an increasing rate**
  - **increasing at a decreasing rate**

# ***Y* Increases at a Constant Rate**

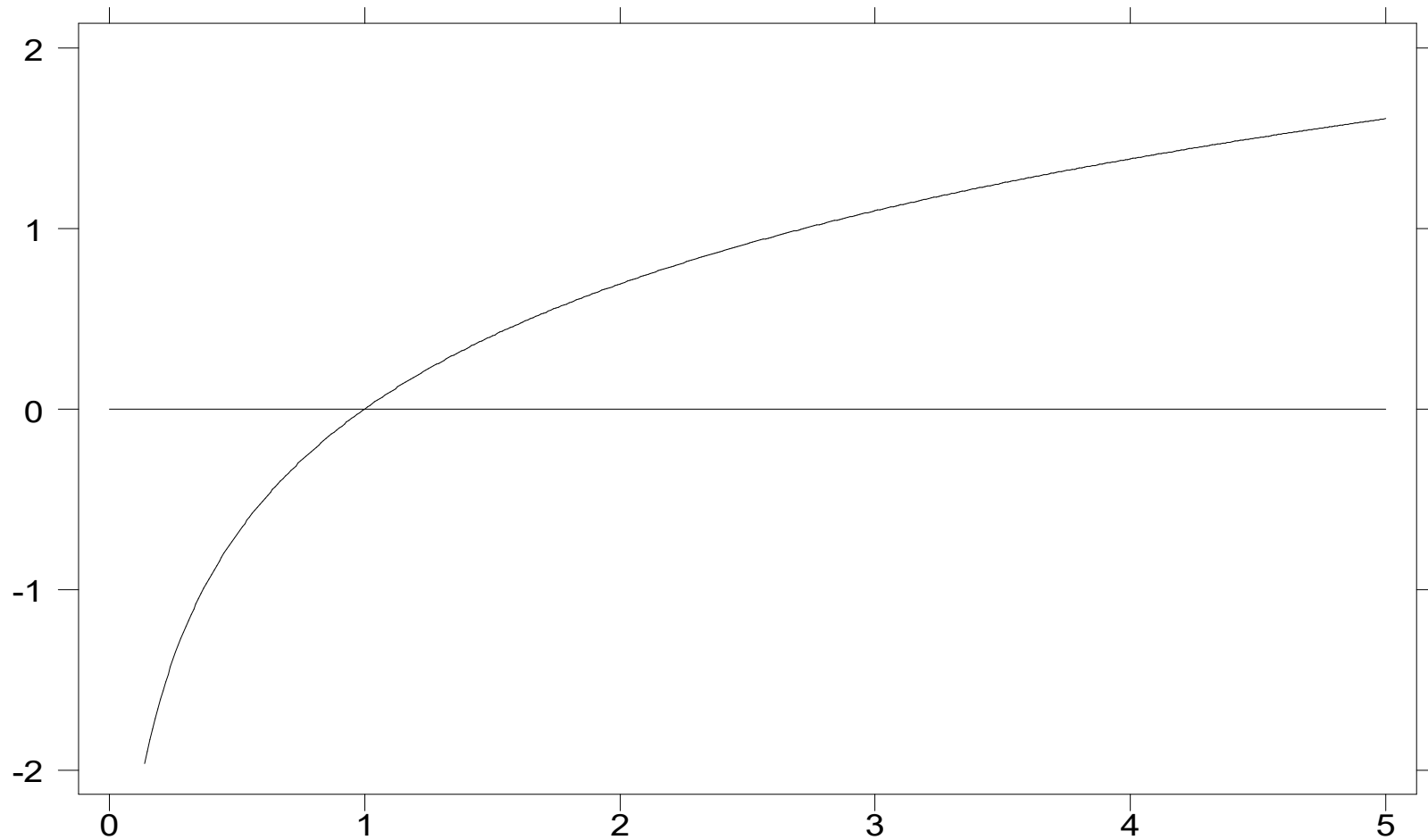


# ***Y* Increases at an Increasing Rate**





# ***Y* Increases at a Decreasing Rate**



# Distribution of the Input $X$

- **when input  $X$  is ordinal**
  - $X$  is rectangular
- **when input  $X$  is cardinal**
  - choose modeling distribution

# **Choose Modeling Distributions for Cardinal Input $X$**

- **Work with mathematically-specified, continuous univariate two-parameter distributions**
  - **location parameter**
  - **second parameter  $c$ , which has been proposed as a general inequality parameter (Jasso and Kotz, *Sociological Methods and Research*, 2008)**

# Prototypical Distributions of Income

Has supremum

No supremum

**Infimum  $> 0$**

quadratic

Pareto

shifted exponential

**Infimum  $= 0$**

power-function

lognormal

	Has supremum	No supremum
<b>Infimum <math>&gt; 0</math></b>	quadratic	Pareto shifted exponential
<b>Infimum <math>= 0</math></b>	power-function	lognormal

# Three Special Distributions

- **Three distributions widely used to model size distributions in the social sciences**
  - **lognormal**
  - **Pareto**
  - **power-function**

**Table 1**  
**Three Continuous Univariate Distributions**  
**and Associated Functional Characteristics**

Variate	Cumulative Distribution Function	Probability Density Function	Quantile Function
Lognormal $x > 0, c > 0$	$F_N \left\{ \left[ \frac{\ln(\frac{x}{\mu}) + \frac{c^2}{2}}{c} \right] \right\}$	$\frac{1}{xc\sqrt{2\pi}} \exp \left\{ -\frac{[\ln(\frac{x}{\mu}) + \frac{c^2}{2}]^2}{2c^2} \right\}$	$\mu \exp \left[ c Q_N(\alpha) - \frac{c^2}{2} \right]$
Pareto $x > \frac{\mu(c-1)}{c}, c > 1$	$1 - \left[ \frac{\mu(c-1)}{cx} \right]^c$	$\left[ \frac{\mu(c-1)}{c} \right]^c cx^{-c-1}$	$\frac{\mu(c-1)}{c(1-\alpha)^{1/c}}$
Power function $0 < x < \frac{\mu(c+1)}{c}, c > 0$	$\left[ \frac{xc}{\mu(c+1)} \right]^c$	$\left[ \frac{c}{\mu(c+1)} \right]^c cx^{c-1}$	$\frac{\mu(c+1)\alpha^{1/c}}{c}$

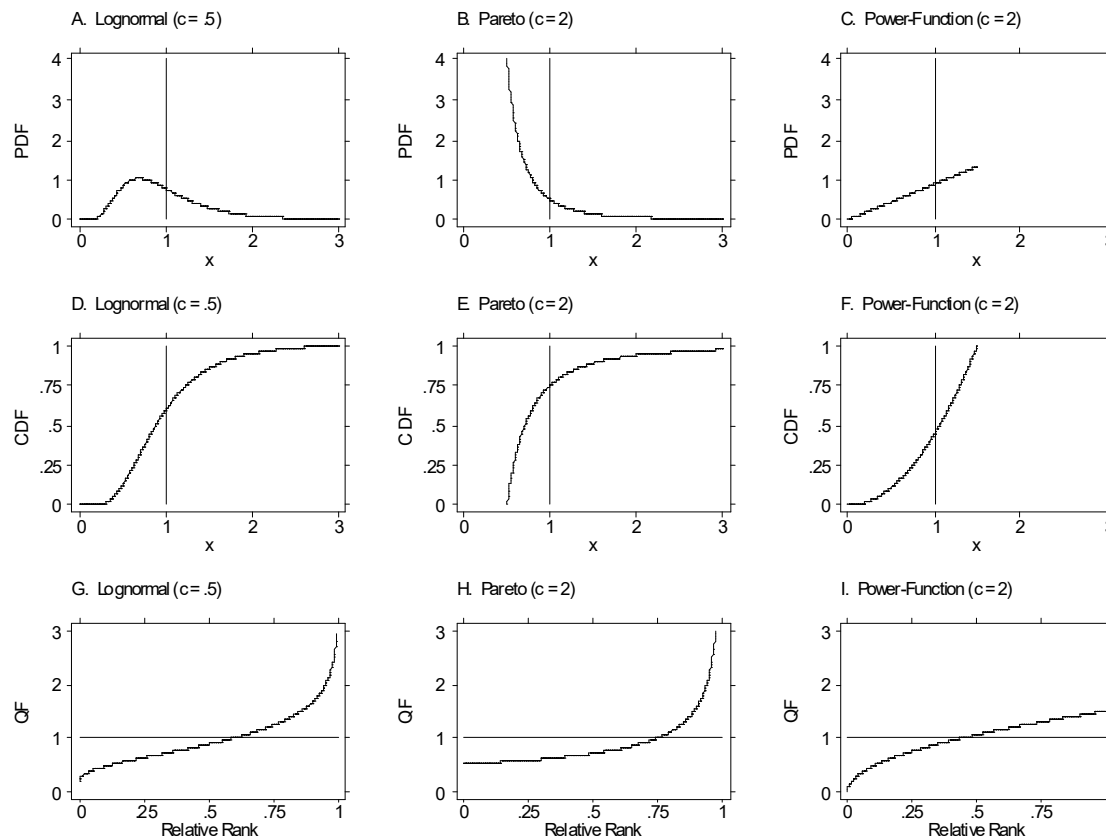
Note: For all variates,  $x > 0$ ; other restrictions are as indicated. The expressions  $F_N(\cdot)$  and  $Q_N(\cdot)$  denote the cumulative distribution function and the quantile function, respectively, of the standard normal variate:

$$F_N(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^x e^{-\frac{t^2}{2}} dt,$$

$$Q_N(\alpha) = \sqrt{2} \operatorname{erf}^{-1}(2\alpha - 1),$$

where erf denotes the error function. Inequality is a decreasing function of  $c$  for the Pareto and power-function variates and an increasing function of  $c$  for the lognormal distribution.

# Figure 1. PDF, CDF, and QF in the Lognormal, Pareto, and Power-Function



# **Six Ideal Types of Combinations of Inputs**

- **formed by crossclassifying**
  - **whether the input distributions are identical or different**
  - **whether the input distributions are perfectly positively associated, independent, or negatively associated (perfectly negatively associated in the case of two inputs)**



# Combining 2 Input Distributions

<b>Input Dists.</b>	<b>Association between Inputs</b>		
	<b>Perfect Positive</b>	<b>Independent</b>	<b>Perfect Negative</b>
Identical			
Different			

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# **Inequality: Basic Template**

- **A population of persons**
- **With a quantitative characteristic  $X$  which generates outcome  $Y$**
- **With subgroups formed by qualitative characteristics**
- **Assess inequality in  $X$  and  $Y$** 
  - **between persons**
  - **between subgroups**

# Four Forms of Inequality: e.g., Wage, Race, Well-Being

**X Inequality**

**Y Inequality**

Personal  
Inequality

wage inequality

well-being  
inequality

Subgroup  
Inequality

race wage gap

race status gap

## **I.1.1. How Is Inequality between Persons Defined and Measured?**

- **Plato's Ratio (348 BCE)**
- **Coefficient of variation (1896)**
- **Gini coefficient (1914)**
- **Theil index (1967)**
- **Theil MLD (1967)**
- **Atkinson inequality (1970)**
- **Pen's Parade (1971)**

## **I.1.2. How Is Inequality between Subgroups Defined and Measured?**

- **Two subgroups, defined by**
  - **categorical variable (race, ethnicity, etc.)**
  - **top and bottom proportions**
- **Absolute gap**
  - **difference between subgroup averages**
- **Relative gap**
  - **ratio between subgroup averages**
- **Contrast between two subdistributions**
  - **quantile function (Pen's Parade for each)**

## **I.2. Is It Possible To Link Inequality between Persons and Inequality between Subgroups?**

- **Yes**
- **In continuous univariate two-parameter distributions, both are governed by the general inequality parameter  $c$**
- **As overall inequality increases, so does subgroup inequality**
- **Jasso and Kotz (2008)**

## **I.3. How Much Inequality Is There in an Ordinal Variable?**

- **Inequality constant**
  - **Gini** =  $1/3 \approx .333$
  - **Absolute gap** =  $.5$
- **Inequality constant or approaches a constant**
  - **CV** =  $1 - \sqrt{3} \approx .577$
  - **Theil MLD** =  $1 - \ln(2) \approx .309$
  - **Atkinson** =  $1 - (2/e) \approx .264$
- **Relative gap (ratio of averages) varies with proportion in bottom subgroup**



## **I.4. Is Inequality Greater in Cardinal Variable or Ordinal Variable?**

- Inequality can be larger or smaller in cardinal variable**
- Inequality in ordinal variable may be thought of as the Natural Inequality**
- Reducing economic inequality can pierce through the Natural Inequality Floor**
- If each inequality measure governs a distinct sociobehavioral domain, then a family of Natural Inequality Floors**

**I've been such a fool, Vassili. Man will always be a man. There is no new man. We tried so hard to create a society that was equal, where there'd be nothing to envy your neighbour. But there's always something to envy. A smile, a friendship, something you don't have and want to appropriate. In this world, even a Soviet one, there will always be rich and poor. Rich in gifts, poor in gifts. Rich in love, poor in love.**

**Danilov to Vassili**

***Enemy at the Gates, 2001***

## **I.5.1. How Does Economic Inequality Increase and Decrease?**

- **Principles of measurement, for example:**
  - principle of transfers
  - principle of equal additions
- **Behavioral models, for example:**
  - assortative mating
  - wage a function of multiple rewarded characteristics
  - wage-setters recommend wage distributions

## **I.5.2. How Does Sociobehavioral Inequality Increase and Decrease?**

- constant if input inequality is constant**
- constant if  $Y$  notices only  $X$  ranks**
- increases or decreases with number of inputs and their association**

# Mathematical Structure

- As the **covariances among the inputs  $X_i$**  (where the  $X_i$  have finite variances) move from positive to zero to negative, the variance in the outcome distribution  $Y$  declines
- As the **number of inputs** (not perfectly positively associated) increases, the variance in the outcome distribution  $Y$  declines

## **I.6. Which Is Greater, Input Inequality or Sociobehavioral Inequality?**

- **Depends on**
  - **Sociobehavioral function**
  - **Type(s) of input(s), cardinal or ordinal**
  - **Distributional form and inequality in cardinal input(s)**
  - **Number of and associations among the inputs**
- **In general**
  - **Input inequality and sociobehavioral inequality can be the same or different**
  - **If different, either one can be larger than the other**

## **I.7. Are Top Shares a Good Measure of Inequality?**

- **Yes**
- **Anything Lorenz curves can do, top shares can do**
- **Specifically, top shares are a measure of subgroup inequality**

# Gini Coefficient in the Pareto

$$\frac{1}{2c - 1}$$



# Top Share in the Pareto

$$(1 - p)^{\frac{c-1}{c}}$$

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