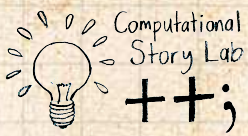
Voting, Success, and Superstars

Principles of Complex Systems | @pocsvox
CSYS/MATH 300, Fall, 2016 | #FallPoCS2016

Winning: it's not for everyone
Superstars
Musiclab
References

Prof. Peter Dodds | @peterdodds

Dept. of Mathematics & Statistics | Vermont Complex Systems Center
Vermont Advanced Computing Core | University of Vermont



PoCS
Principles of
Complex Systems
@pocsvox
What's the Story?

Licensed under the *Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License*.

These slides are brought to you by:

Winning: it's not for everyone
Superstars
Musiclab
References

Outline

Winning: it's not for everyone
Superstars
Musiclab
References

Winning: it's not for everyone

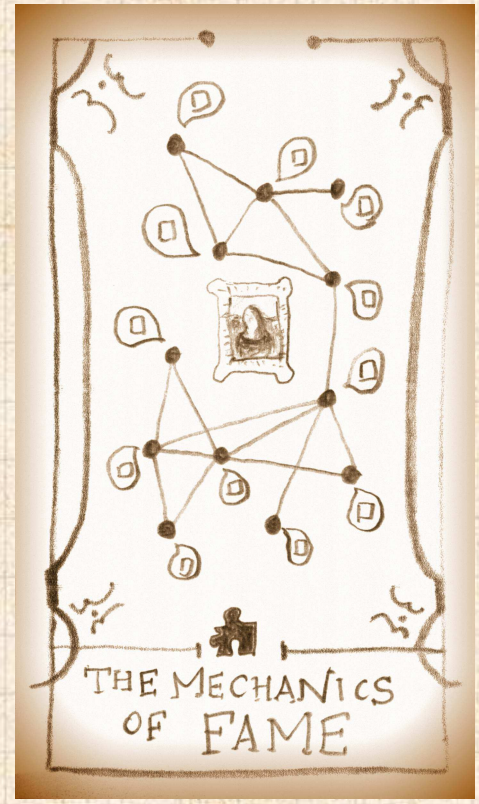
- Superstars
- Musiclab

References

Voting, Success, and Superstars

Winning: it's not for everyone
Superstars
Musiclab

References



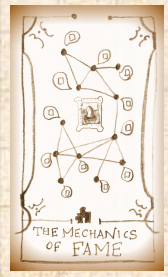
Outline

Winning: it's not for everyone
Superstars
Musiclab
References

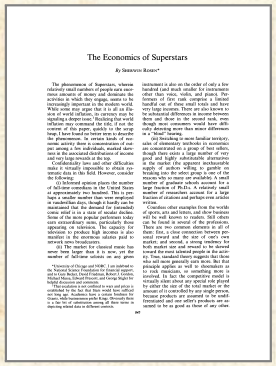
Winning: it's not for everyone

- Superstars
- Musiclab

References



Where do superstars come from?


The Economics of Superstars

By SHERWIN ROSEN*

The phenomenon of Superstars, wherein relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world. Although I have found no better term to describe some activity does a concentration of output among a few individuals, marked skewness in the distribution of earned income and very large rewards at the top.

Confidentiality laws and other difficulties prevent systematic statistical evidence to document many facts in this field. However, consider the following:

(i) The Hollywood system places the number of full-time comedians in the United States at approximately two hundred. This is perhaps a smaller number than were employed on vaudeville days, though it hardly can be considered small. Yet the income and public status of the comic relief is a matter of secular decline. Some of the most popular performers today are employed in a single medium, television, appearing on television. The capacity for television to produce high incomes is also illustrated by the occasional athletic paid to network news broadcasters.

(ii) The market for classical music has grown enormously in recent years. The number of full-time soloists in any given instrument is also on the order of only a few hundred (and much smaller for instruments other than voice, violin, and piano). Performers of this rank comprise a limited handful out of those small in size and have been for many decades. There appears to be substantial differences in income between them and those in the second rank, even though the latter are extremely able. The former enjoy drawing more than minor differences in a "blind" hearing.

(iii) In the overwhelmingly more familiar territory of elementary textbooks in economics are concentrated on a group of best sellers, which dominate the market. Entry of new, good and highly substitutable alternatives in the market (the apparent inexhaustible demand for a "new" book) has not succeeded in breaking into the select group. A sort of explanation why so many are available. A small number of well-established authors, such as the late Lord Keynes of Ph.D.s, is currently handed a number of researchers assisted for a large fraction of citations and perhaps even articles written.

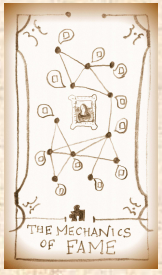
These examples cited examples from the worlds of sports, arts and letters, and show business will be well known to readers. Still others will be found in the fields of science and law. There are two common elements in all of them: first, a close connection between personal talent (broadly defined) and income earned, and second, a strong tendency for both market size and reward to be skewed toward the most successful performers in each field. Two standard theses suggests that those who sell more generally earn more. But that is not enough. To be sure, scarcity rents due to rank exploitation, or something more is involved. In fact the competitive model is virtually silent about any special role played by either the size of the total market or the unusual concentration of rewards at the top because products are assumed to be readily substituted and one seller's products are assumed to be as good as those of any other.

"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

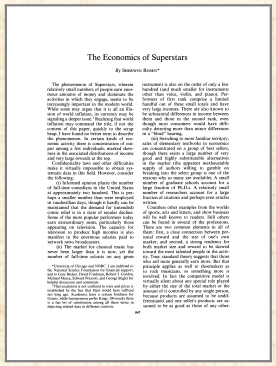
Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

Winning: it's not for everyone
Superstars
Musiclab
References



Where do superstars come from?


The Economics of Superstars

By SHERWIN ROSEN*

The phenomenon of superstars, wherein relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world. Although it is not entirely new, due to the size of world markets, its currency may be signaling a deeper issue.[1] Realizing that world markets are important is one thing, but the economic of this paper, quickly to the savage bang. I have found no better term to describe the extreme income variation we observe in economic activity than a concentration of output among a few individuals, marked skewness in the distribution of rewards in relation to talent, and very large rewards at the top.

Confidentiality laws and other difficulties in obtaining data are severe impediments to research in this field. However, consider the following:

(i) The Informed opinion places the number of full-time comedians in the United States at approximately two hundred. This is perhaps a smaller number than were employed on vaudeville days, though it hardly can be considered small. Yet the income of successful comics relative to the mean of income declines. Some of the most popular performers today command annual salaries of several million dollars appearing on television. The capacity for television to produce high incomes is also illustrated by the astronomical salaries paid to network news broadcasters.

(ii) The market for classical music has grown enormously in recent years. The number of full-time soloists we may guess

*University of Chicago and NORC. I am indebted to the National Science Foundation for financial support and to Gary Becker, Dennis Friedman, Robert J. Gordon, Zvi Griliches, Jacob Mincer, and George Stigler for helpful discussion and comments.

[1] Although the focus here is on "high" income and not on "low" income, the two are linked in many ways and policy is often concerned with both. Thus, the "negative income tax" experiments under Economic Opportunity Act of 1964 are a case in point. Another example is the list of substitutes among all those items in reporting related data in different contexts.

instrument is also on the order of only a few hundred (and much smaller for instruments other than voice, violin, and piano). Performers of this rank comprise a limited handful out of many tens of mils and have been in existence for centuries. There are no substantial differences in income between them and those in the second rank, even though the latter are scarcely known. The only detecting more than minor differences in a "blind" hearing.

(iii) Many professions require familiar notoriety, echo of elementary textbooks to economics are concentrated on a group of best sellers, while the majority of titles sell relatively few copies and highly substitutable alternatives in the market (the apparent inelasticity of demand for the "best" books is evidence of breaking into the select group is one of the reasons why so many are available). A small number of Ph.D.s, a relatively small number of researchers account for a large fraction of citations and perhaps even articles written.

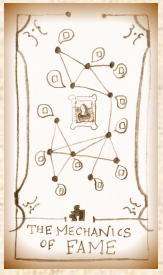
(iv) Examples other examples from the worlds of sports, arts and letters, and show business will be well known to readers. Still others will be found in the study of labor markets. There are two common elements in all of them: first, a clear connection between performance and reward in terms of both market size and reward to be skewed toward the best performers relative to others; second, a strong tendency for both market size and reward to be skewed toward the best performers relative to others. Two standard theory suggests that those who sell more generally earn more. But that is not enough. To be a superstar requires that its rank conclusion, or something more is involved. In fact the competitive model is virtually silent about any special role played by either the size of the total market or the reward of superstars. Part of the explanation is because products are assumed to be readily substituted and one seller's products are assumed to be as good as those of any other

"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

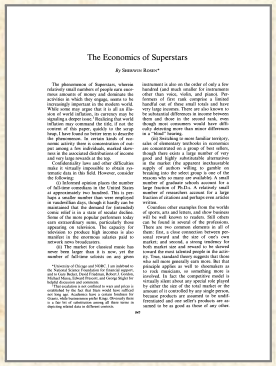
Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

Winning: it's not for everyone
Superstars
Musiclab
References



Where do superstars come from?


The Economics of Superstars

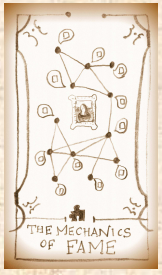
By Sherwin Rosen*

"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

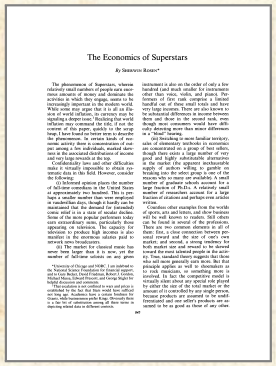
Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

Winning: it's not for everyone
Superstars
Musiclab
References



Where do superstars come from?


The Economics of Superstars

By SHERWIN ROSEN*

The phenomenon of superstars, whereby relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world. Although it is common to refer to this as a consequence of world inflation, its currency may be signaling a deeper issue.[1] Realizing that world inflation is a complex matter, I shall, for the moment of this paper, quickly to the assumption I have found no better term to describe the economics of superstars than to refer to economic activity done in concentration of output among a few individuals, marked skewness in the distribution of large rewards to talent, and very large rewards at the top.

Confidentiality laws and other difficulties in collecting data make it hard to document economic facts in this field. However, consider the following:

(i) The Hollywood system places the number of full-time comedians in the United States at approximately two hundred. This is perhaps a smaller number than were employed on vaudeville days, though it hardly can be considered small. The supply of performers of comic relief is in a state of secular decline. Some of the more popular performers today are employed in other media, particularly in appearing on television. The capacity for television to produce high incomes is also limited by the number of available paid to network news broadcasters.

(ii) The market for classical music has been declining for years. Even though the number of full-time soloists we may guess

*University of Chicago and NORC. I am indebted to the National Science Foundation for financial support to Gary Becker, David Friedman, Robert J. Gordon, Jacob Mincer, Kevin M. Murphy, and George Stigler for helpful discussion and comments.

[1] Although the term is used in many and precise contexts, the term is used here in a very broad sense. For a more technical discussion, see Rosen. Examples from the world of sports are used throughout this paper because it is the lot of economists among all those terms in rejecting related data in different contexts.

instrument is also on the order of only a few hundred (and much smaller for instruments other than voice, violin, and piano). Performers of this rank comprise a limited handful out of those small in size and have little in common with the vast majority who are substantial differences in income between them and those in the second rank, even though differences in talent may be small, can easily amount more than source differences in a "blind" hearing.

(iii) In the relatively more familiar territory, sales of elementary textbooks in economics are concentrated on a group of best sellers, while the vast majority of titles sold are good and highly substitutable alternatives in the market (the apparent inexhaustible demand for a new title by a new author breaking into the select group is one of the reasons why so many are available). A small number of authors receive royalties in the high six figures or 50 plus, while a relatively small number of researchers account for a large fraction of citations and perhaps even articles written.

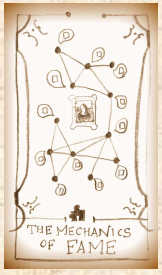
Countless other examples from the worlds of sports, arts and letters, and show business will be well known to readers. Still others will be found in the nature of organization. There are two common elements in all of them: first, a close connection between personal talent (broadly defined) and the market, and second, a strong tendency for both market size and reward to be skewed toward the most successful performers in each. Even standard theory suggests that those who sell more generally earn more. But that is not the end of the matter. Relatively small differences in talent, or something more is involved. In fact the competitive model is virtually silent about any special role played by either the size of the total market or the reward of superstars. Yet both are crucial, because products are assumed to be readily substituted and one seller's products are assumed to be as good as those of any other

"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

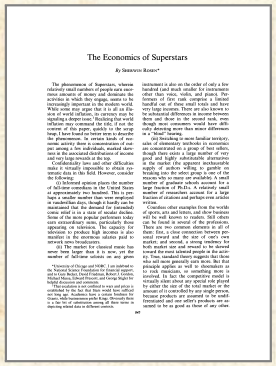
Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

Winning: it's not for everyone
Superstars
Musiclab
References



Where do superstars come from?


The Economics of Superstars

By SHERWIN ROSEN*

The phenomenon of superstars, whereby relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world. Although it is common to refer to this as a consequence of world inflation, its currency may be signaling a deeper issue.[1] Realizing that world inflation is a complex matter, I shall, for the moment of this paper, quickly to the assumption I have found no better term to describe the economics of superstars than to refer to economic activity done in concentration of output among a few individuals, marked skewness in the distribution of large rewards to talent, and very large rewards at the top.

Confidentiality laws and other difficulties in collecting data make it hard to document economic facts in this field. However, consider the following:

(i) The Hollywood system places the number of full-time comedians in the United States at approximately two hundred. This is perhaps a smaller number than were employed on vaudeville days, though it hardly can be considered small. The supply of performers of comic relief is in a state of secular decline. Some of the more popular performers today are employed in other media, particularly in appearing on television. The capacity for television to produce high incomes is also limited by the number of available paid to network news broadcasters.

(ii) The market for classical music has been declining for years. Even though the number of full-time soloists we may guess

*University of Chicago and NORC. I am indebted to the National Science Foundation for financial support to Gary Becker, David Friedman, Robert J. Gordon, Jacob Mincer, Kevin M. Murphy, and George Stigler for helpful discussion and comments.

[1] Although the term is used in many and precise contexts, the term is used here in a very broad sense. For a more technical discussion, see Rosen. Examples from the world of sports are used throughout this paper because it is the lot of economists among all those terms in rejecting related data in different contexts.

instrument is also on the order of only a few hundred (and much smaller for instruments other than voice, violin, and piano). Performers of this rank comprise a limited handful out of those small in size and have little in common with the vast majority who are substantial differences in income between them and those in the second rank, even though differences in talent may be small, can easily amount more than source differences in a "blind" hearing.

(iii) In the relatively more familiar territory, sales of elementary textbooks in economics are concentrated on a group of best sellers, while the vast majority of titles sold are good and highly substitutable alternatives in the market (the apparent inexhaustible demand for a new title by a new author breaking into the select group is one of the reasons why so many are available). A small number of authors receive royalties in the high six figures or 50 plus, while a relatively small number of researchers account for a large fraction of citations and perhaps even articles written.

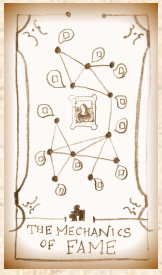
Countless other examples from the worlds of sports, arts and letters, and show business will be well known to readers. Still others will be found in the nature of organization. There are two common elements in all of them: first, a close connection between personal talent (broadly defined) and the market, and second, a strong tendency for both market size and reward to be skewed toward the most successful performers in each. Even standard theory suggests that those who sell more generally earn more. But that is not the end of the matter. Relatively small differences in talent, or something more is involved. In fact the competitive model is virtually silent about any special role played by either the size of the total market or the reward of superstars. Yet both are crucial, because products are assumed to be readily substituted and one seller's products are assumed to be as good as those of any other

"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

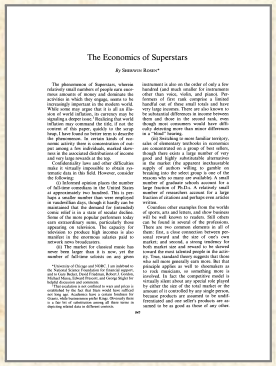
Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

Winning: it's not for everyone
Superstars
Musiclab
References



Where do superstars come from?


The Economics of Superstars

By SHERWIN ROSEN*

The phenomenon of superstars, wherein relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world. Although it is common to refer to this as a consequence of world influence, its currency may be signaling a deeper issue.[1] Realizing that world influence is a consequence and not a cause of the economic activity there is concentration of output among a few individuals, marked skewness in the distribution of rewards to talent, and very large rewards at the top.

Confidentiality laws and other difficulties prevent direct statistical evidence on the phenomenon to this field. However, consider the following:

(i) The Informed opinion places the number of full-time comedians in the United States at approximately two hundred. This is perhaps a smaller number than were employed as vaudevillians days, though it hardly can be considered a trivial number. Moreover, their status relative to the rest of society declines. Some of the most popular performers today are employed in this activity, especially those appearing on television. The capacity for television to produce high incomes is also evident from the astronomical salaries paid to network news broadcasters.

(ii) The market for classical music has undergone vast changes in the past few decades. Even standard bearers suggests that there are now many more symphony orchestras and many more concerts than ever before. Moreover, the number of full-time soloists in classical music has increased enormously. Formerly, most soloists were part-time performers who supplemented their incomes by teaching. Now there are many full-time soloists making high incomes. Furthermore, the number of recordings available is a far cry from the days of 78 rpm records. Recordings of the same piece of music by many different artists are available, and the number of different recordings of the same piece by the same artist is also enormous. Finally, the number of outlets for recordings has increased enormously.

(iii) The market for economics textbooks is also very large. Moreover, the number of authors who sell more than a million books is not small. Many economics textbooks are translated into foreign languages and sold throughout the world.

(iv) The market for classical music has undergone vast changes in the past few decades. Even standard bearers suggests that there are now many more symphony orchestras and many more concerts than ever before. Moreover, the number of full-time soloists in classical music has increased enormously. Formerly, most soloists were part-time performers who supplemented their incomes by teaching. Now there are many full-time soloists making high incomes. Furthermore, the number of recordings available is a far cry from the days of 78 rpm records. Recordings of the same piece of music by many different artists are available, and the number of different recordings of the same piece by the same artist is also enormous. Finally, the number of outlets for recordings has increased enormously.

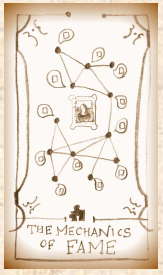
"The economics of superstars"
S. Rosen,
Am. Econ. Rev., **71**, 845–858, 1981. [5]

Examples:

- Full-time Comedians (≈ 200)
- Soloists in Classical Music
- Economic Textbooks (the usual myopic example)

- Highly skewed distributions again...

Winning: it's not for everyone
Superstars
Musiclab
References

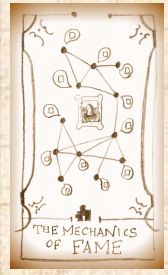


Superstars

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution
  2. Technology
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

Winning: it's not for everyone
Superstars
Musiclab
References

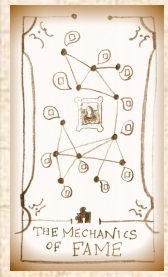


Superstars

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution
  2. Technology
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

Winning: it's not for everyone
Superstars
Musiclab
References

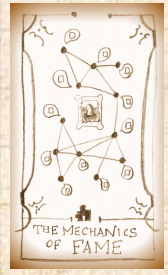


Superstars

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
  2. Technology:
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

Winning: it's not for everyone
Superstars
Musiclab
References



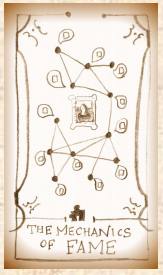
Superstars

Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
  2. Technology:

- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.



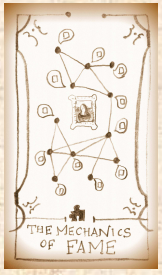
Superstars

Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
     A very good surgeon is worth many mediocre ones
  2. Technology:

- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.



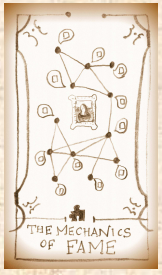
Superstars

Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
     A very good surgeon is worth many mediocre ones
  2. Technology:

- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

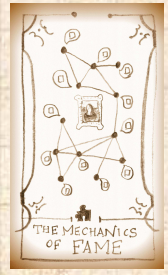


Superstars

Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
     A very good surgeon is worth many mediocre ones
  2. Technology:
     Media spreads & technology reduces cost of reproduction of books, songs, etc.
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

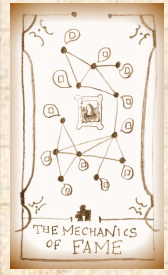


Superstars

Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
     A very good surgeon is worth many mediocre ones
  2. Technology:
     Media spreads & technology reduces cost of reproduction of books, songs, etc.
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.

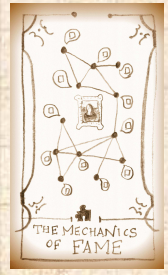


Superstars

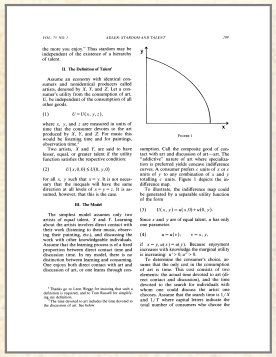
Winning: it's not for everyone
Superstars
Musiclab
References

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($\mathrm{d}^2 R/\mathrm{d}q^2 > 0$).
- Two reasons:
  1. Imperfect substitution:
     A very good surgeon is worth many mediocre ones
  2. Technology:
     Media spreads & technology reduces cost of reproduction of books, songs, etc.
- Joint consumption versus public good.
- No social element—success follows 'inherent quality'.



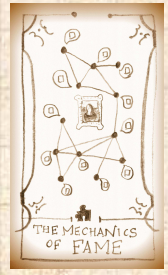
Superstars



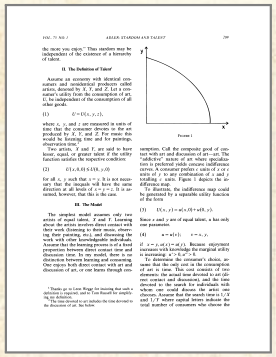
"Stardom and Talent"
Moshe Adler,
American Economic Review, **75**, 208–212, 1985. [1]

- "Consumption capital": "Appreciation [of music] increases with knowledge. But how does one know about music? By listening to it, *and discussing it with other persons who know about it.*"
- Assumes extreme case of equal 'inherent quality'
- Argues desire for coordination in knowledge and culture leads to differential success
- Success can be purely a social construction
- (How can we measure 'inherent quality'?)

Winning: it's not for everyone
Superstars
Musiclab
References



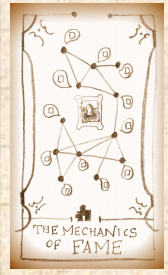
Superstars



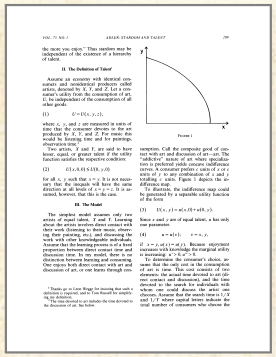
"Stardom and Talent"
Moshe Adler,
American Economic Review, **75**, 208–212, 1985. [1]

- "Consumption capital": "Appreciation [of music] increases with knowledge. But how does one know about music? By listening to it, *and discussing it with other persons who know about it.*"
- Assumes extreme case of equal 'inherent quality'
- Argues desire for coordination in knowledge and culture leads to differential success
- Success can be purely a social construction
- (How can we measure 'inherent quality'?)

Winning: it's not for everyone
Superstars
Musiclab
References



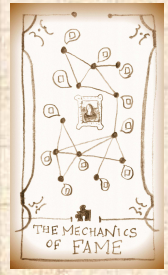
Superstars



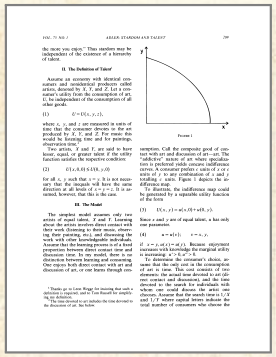
"Stardom and Talent"
Moshe Adler,
American Economic Review, **75**, 208–212, 1985. [1]

- "Consumption capital": "Appreciation [of music] increases with knowledge. But how does one know about music? By listening to it, *and discussing it with other persons who know about it.*"
- Assumes extreme case of equal 'inherent quality'
- Argues desire for coordination in knowledge and culture leads to differential success
- Success can be purely a social construction
- (How can we measure 'inherent quality'?)

Winning: it's not for everyone
Superstars
Musiclab
References



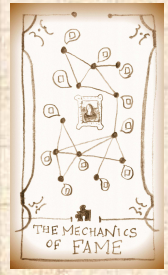
Superstars



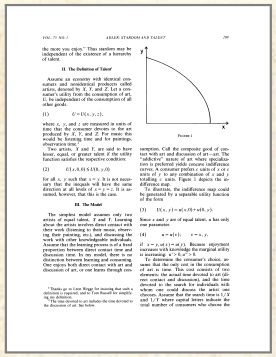
"Stardom and Talent"
Moshe Adler,
American Economic Review, **75**, 208–212, 1985. [1]

- "Consumption capital": "Appreciation [of music] increases with knowledge. But how does one know about music? By listening to it, *and discussing it with other persons who know about it.*"
- Assumes extreme case of equal 'inherent quality'
- Argues desire for coordination in knowledge and culture leads to differential success
- Success can be purely a social construction
- (How can we measure 'inherent quality'?)

Winning: it's not for everyone
Superstars
Musiclab
References



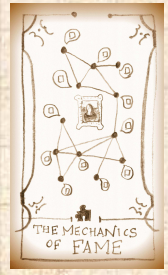
Superstars



"Stardom and Talent"
Moshe Adler,
American Economic Review, **75**, 208–212, 1985. [1]

- "Consumption capital": "Appreciation [of music] increases with knowledge. But how does one know about music? By listening to it, *and discussing it with other persons who know about it.*"
- Assumes extreme case of equal 'inherent quality'
- Argues desire for coordination in knowledge and culture leads to differential success
- Success can be purely a social construction
- (How can we measure 'inherent quality'?)

Winning: it's not for everyone
Superstars
Musiclab
References



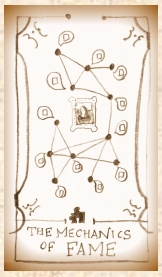
Voting

Winning: it's not for everyone
Superstars
Musiclab
References

Evidence from the web suggestions (Huberman et al.)

1. Easy decisions (yes/no) lead to bandwagoning
   - e.g. jyte.com
2. More costly evaluations lead to oppositional votes
   - e.g. amazon.com

- Self-selection: Costly voting may lower incentives for those who agree with the current assessment and increase incentives for those who disagree.



Voting

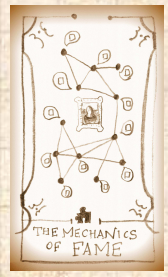
Winning: it's not for everyone
Superstars
Musiclab
References

Score-based voting versus rank-based voting:

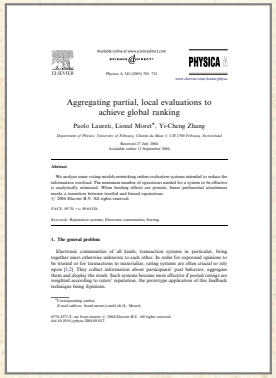
A theory of measuring, electing, and ranking

"A theory of measuring, electing, and ranking"

Balinski and Laraki,
Proc. Natl. Acad. Sci., **104**, 8720–8725, 2007. [2]



Voting



"Aggregating partial, local evaluations to achieve global ranking"

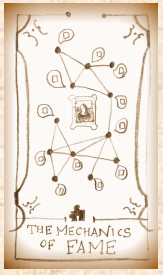
Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

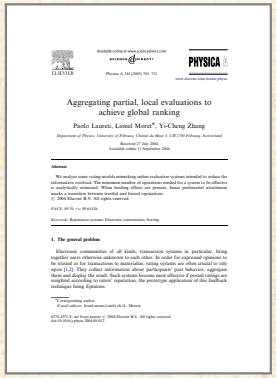
$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach

Winning: it's not for everyone
Superstars
Musiclab
References



Voting



Aggregating partial, local evaluations to achieve global ranking

Paolo Laureti, Lionel Moret*, Yi-Cheng Zhang

"Aggregating partial, local evaluations to achieve global ranking"

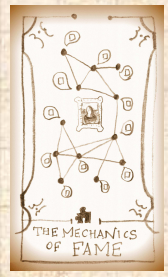
Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

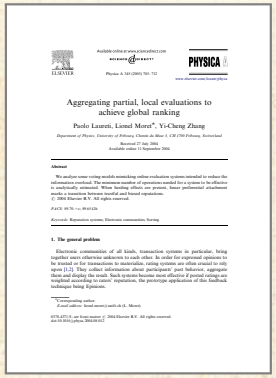
$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach

Winning: it's not for everyone
Superstars
Musiclab
References



Voting



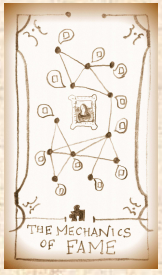
"Aggregating partial, local evaluations to achieve global ranking"

Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

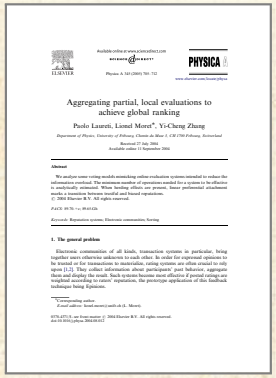
- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach



Voting


Aggregating partial, local evaluations to achieve global ranking

Paolo Laureti, Lionel Moret*, Yi-Cheng Zhang

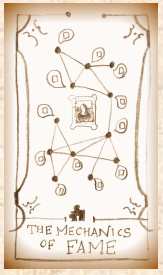
"Aggregating partial, local evaluations to achieve global ranking"

Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

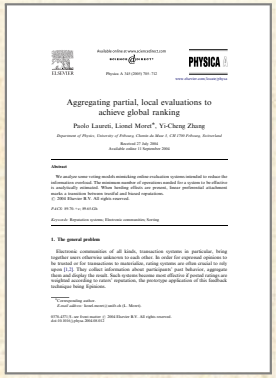
- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach



Voting


Aggregating partial, local evaluations to achieve global ranking

Paolo Laureti, Lionel Moret*, Yi-Cheng Zhang

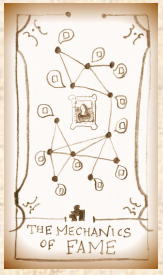
"Aggregating partial, local evaluations to achieve global ranking"

Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

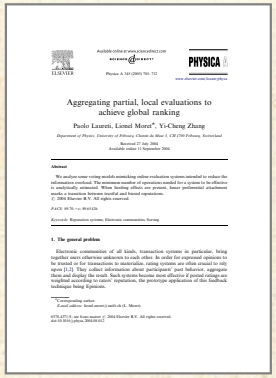
- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach



Voting


Aggregating partial, local evaluations to achieve global ranking

Paolo Laureti, Lionel Moret*, Yi-Cheng Zhang

"Aggregating partial, local evaluations to achieve global ranking"

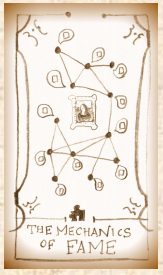
Laureti, Moret, and Zhang, Physica A, **345**, 705–712, 2004. [4]

- Model: participants rank n objects based on underlying quality q
- Assume evaluation of object i is a random variable with mean q_i
- Choose objects based on votes:

$$p_i(t) \propto v_i(t)^\alpha \text{ or } p_i(t) \propto q_i v_i(t)^\alpha.$$

- If $\alpha < 1$, correct quality ordering is uncovered
- If $\alpha > 1$, some objects are never evaluated and mistakes are made...
- Related to Adler's approach

Winning: it's not for everyone
Superstars
Musiclab
References



Dominance hierarchies

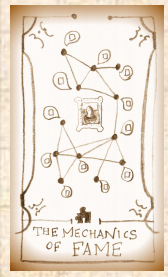
Individual differences versus social dynamics in the formation of animal dominance hierarchies

"Individual differences versus social dynamics in the formation of animal dominance hierarchies"

Chase et al.,
Proc. Natl. Acad. Sci., **99**, 5744-5749, 2002. [3]

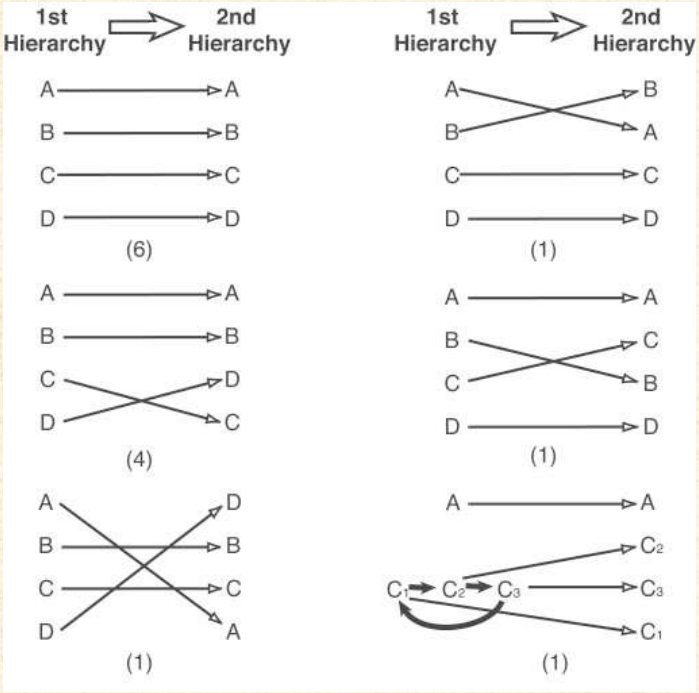
- The aggressive female Metriaclima zebra:

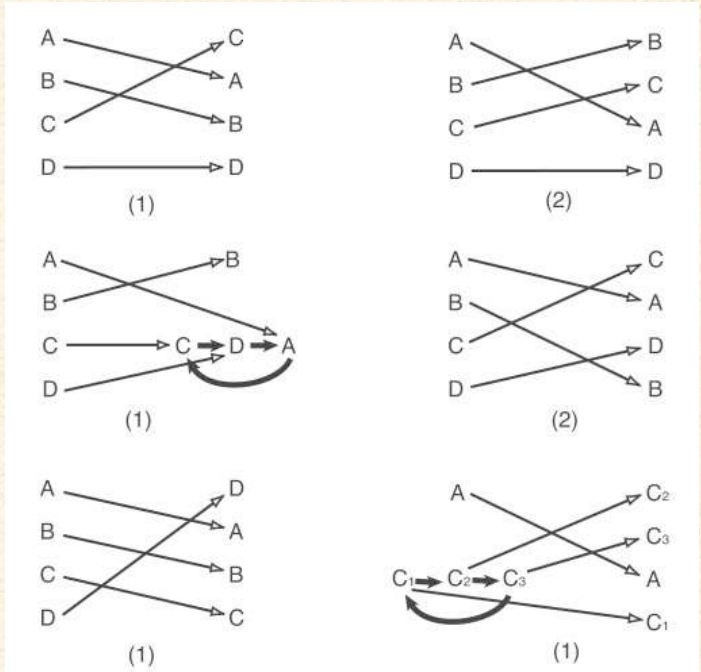
Winning: it's not for everyone
Superstars
Musiclab
References



Dominance hierarchies

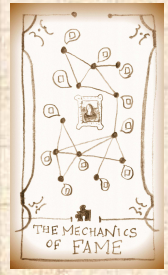
Fish forget—changing of dominance hierarchies:





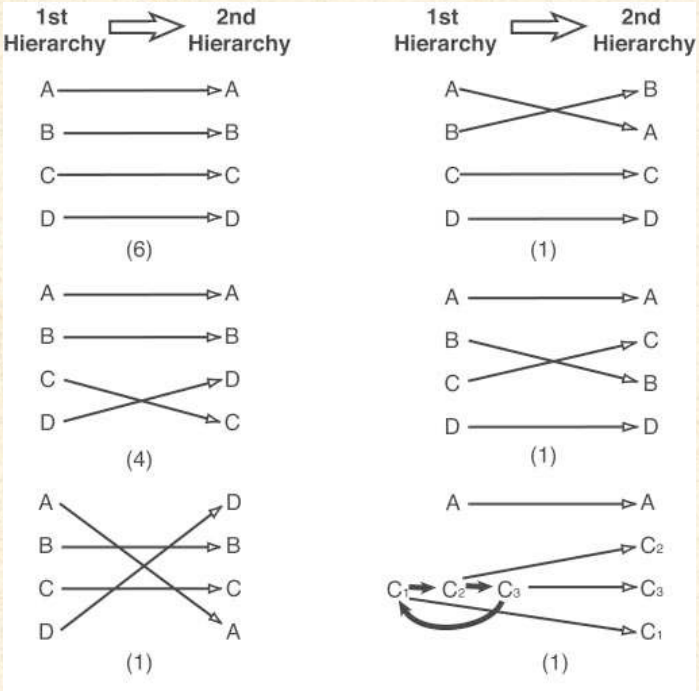
- 22 observations: about 3/4 of the time, hierarchy changed

Winning: it's not for everyone
Superstars
Musiclab
References



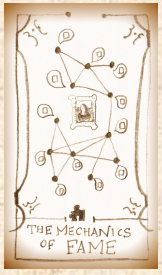
Dominance hierarchies

Fish forget—changing of dominance hierarchies:



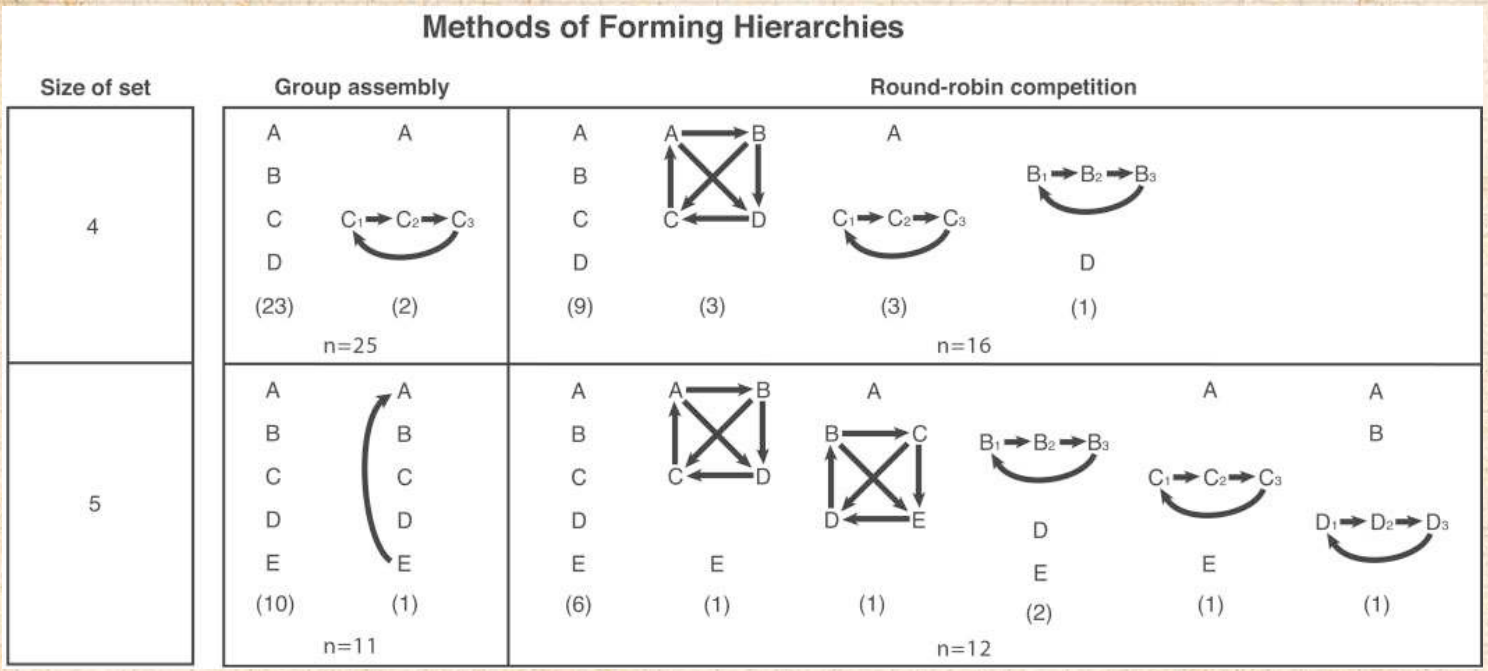
- 22 observations: about 3/4 of the time, hierarchy changed

Winning: it's not for everyone
Superstars
Musiclab
References

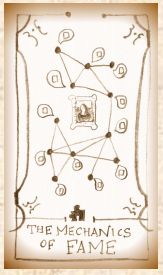


Dominance hierarchies

Winning: it's not for everyone
Superstars
Musiclab
References



- Group versus isolated interactions produce different hierarchies



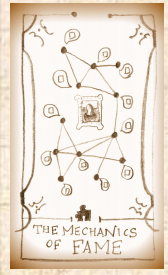
Outline

Winning: it's not for everyone
Superstars
Musiclab
References

Winning: it's not for everyone

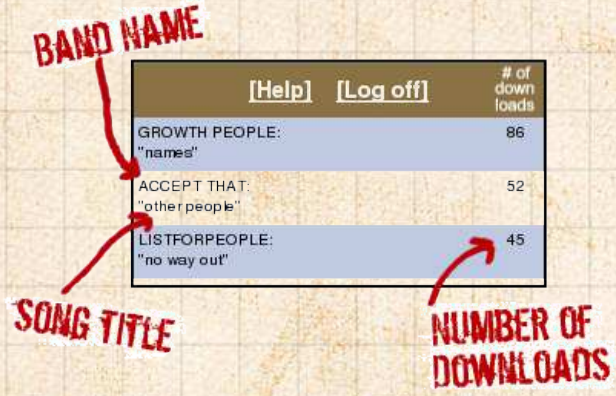
- Superstars
- Musiclab

References



Music Lab Experiment

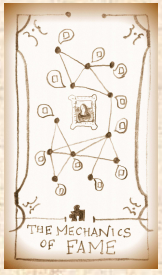
Winning: it's not for everyone
Superstars
Musiclab
References



48 songs
30,000 participants

multiple 'worlds'
Inter-world variability

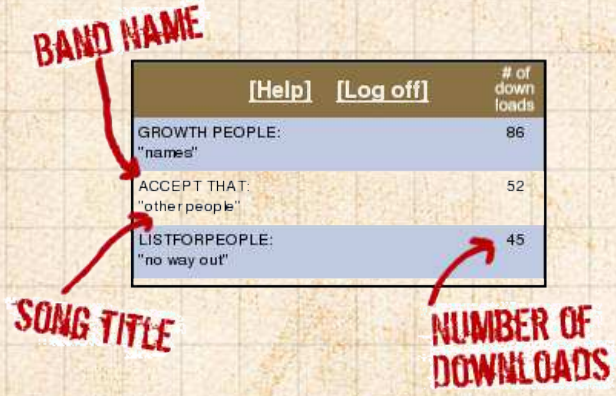
- How probable is the world?
- Can we estimate variability?
- Superstars dominate but are unpredictable. Why?



The University of Vermont

Music Lab Experiment

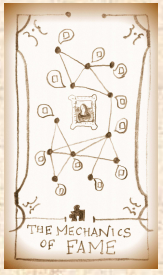
Winning: it's not for everyone
Superstars
Musiclab
References



48 songs
30,000 participants

multiple 'worlds'
Inter-world variability

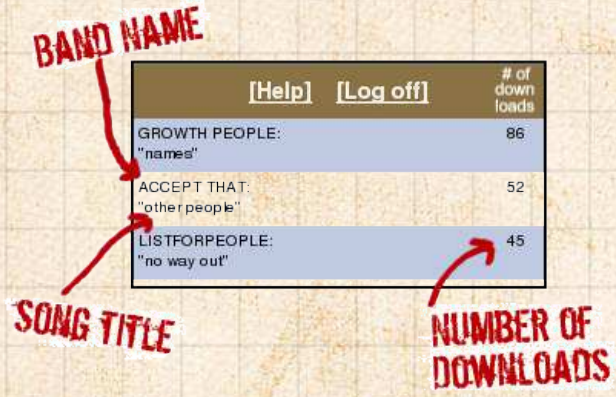
- How probable is the world?
- Can we estimate variability?
- Superstars dominate but are unpredictable. Why?



The University of Vermont

Music Lab Experiment

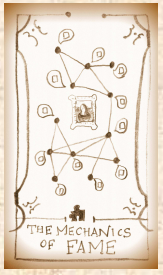
Winning: it's not for everyone
Superstars
Musiclab
References



48 songs
30,000 participants

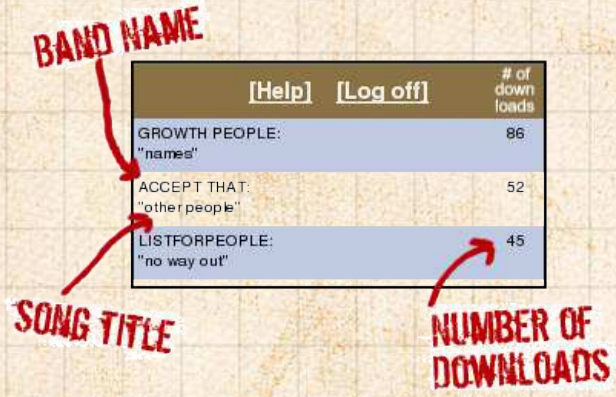
multiple 'worlds'
Inter-world variability

- How probable is the world?
- Can we estimate variability?
- Superstars dominate but are unpredictable. Why?



Music Lab Experiment

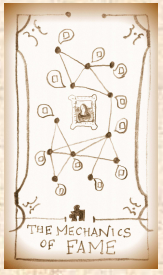
Winning: it's not for everyone
Superstars
Musiclab
References



48 songs
30,000 participants

multiple 'worlds'
Inter-world variability

- How probable is the world?
- Can we estimate variability?
- Superstars dominate but are unpredictable. Why?



The University of Vermont

Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Music Lab – Song Selection - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.musiclab.columbia.edu/me/songs

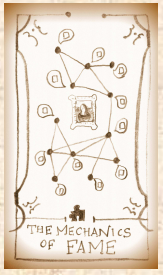
[Help] [Log off]

	# of down loads		# of down loads		# of down loads
HARTSFIELD: "enough is enough"	20	GO MOREDCAI: "it does what its told"	12	UNDO: "while the world passes"	24
DEEP ENOUGH TO DIE: "for the sky"	17	PARKER THEORY: "she said"	47	UP FOR NOTHING: "in sight of"	13
THE THRIFT SYNDICATE: "2003 a tragedy"	20	MISS OCTOBER: "pink agression"	27	SILVERFOX: "gnaw"	17
THE BROKEN PROMISE: "the end in friend"	19	POST BREAK TRAGEDY: "florence"	14	STRANGER: "one drop"	10
THIS NEW DAWN: "the belief above the answer"	12	FORTHFADING: "fear"	24	FAR FROM KNOWN: "route 9"	18
NOONER AT NINE: "walk away"	6	THE CALEFACTION: "trapped in an orange peel"	20	STUNT MONKEY: "inside out"	46
MORAL HAZARD: "waste of my life"	8	52METRO: "lockdown"	17	DANTE: "lifes mystery"	14
NOT FOR SCHOLARS: "as seasons change"	27	SIMPLY WAITING: "went with the count"	16	FADING THROUGH: "wish me luck"	10
SECRETARY: "keep your eyes on the ballistics"	5	STAR CLIMBER: "tell me"	38	UNKNOWN CITIZENS: "falling over"	34
ART OF KANLY: "seductive intro, melodic breakdown"	10	THE FASTLANE: "til death do us part (i dont)"	31	BY NOVEMBER: "if i could take you"	20
HYDRAULIC SANDWICH: "separation anxiety"	20	A BLINDING SILENCE: "miseries and miracles"	17	DRAWN IN THE SKY: "tap the ride"	12
EMBER SKY: "this upcoming winter"	25	SUM RANA: "the bolshevik boogie"	15	SELSIUS: "stars of the city"	22
SALUTE THE DAWN: "i am error"	13	CAPE RENEWAL: "baseball warlock v1"	12	SIBRIAN: "eye patch"	14
RYAN ESSMAKER: "detour_(be still)"	14	UP FALLS DOWN: "a brighter burning star"	11	EVAN GOLD: "robert downey jr"	10
BEERBONG: "father to son"	12	SUMMERSWASTED: "a plan behind destruction"	17	BENEFIT OF A DOUBT: "run away"	38
HALL OF FAME: "best mistakes"	19	SILENT FILM: "all i have to say"	61	SHIPWRECK UNION: "out of the woods"	16

Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market

"An experimental study of inequality and unpredictability in an artificial cultural market"

Salganik, Dodds, and Watts, Science, **311**, 854–856, 2006. [6]



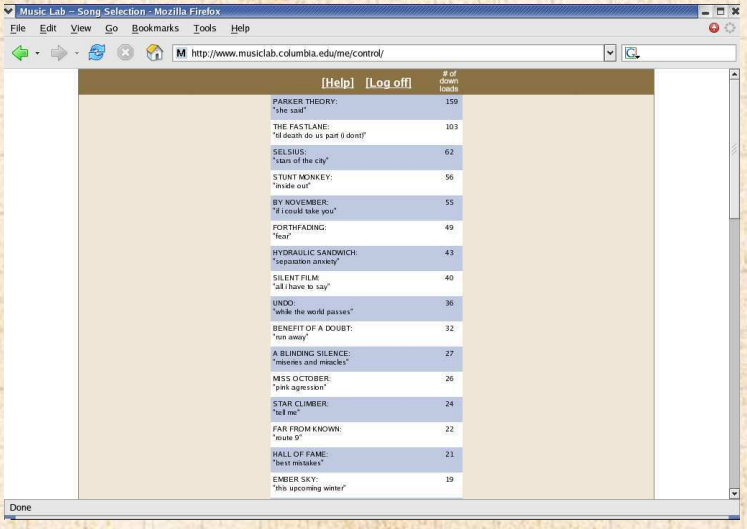
The University of Vermont

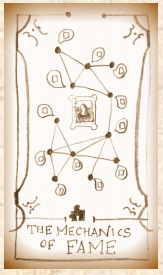
Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Experiment 1

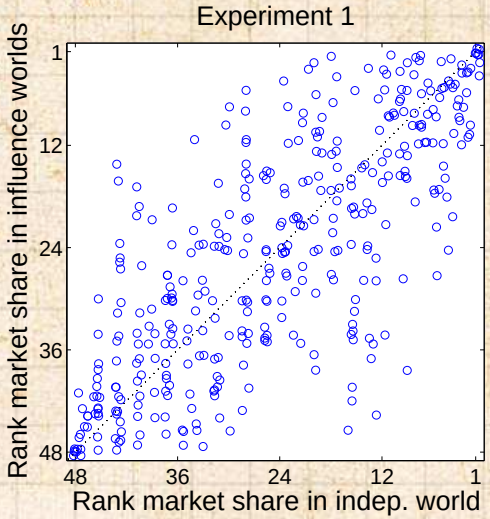
Experiments 2–4

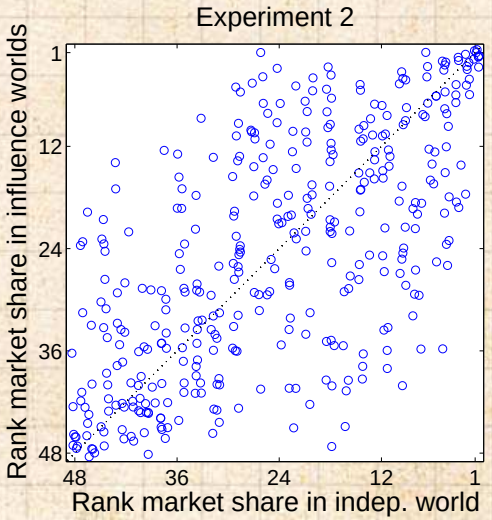




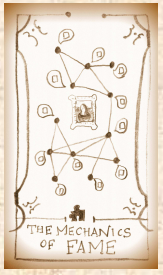
Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References



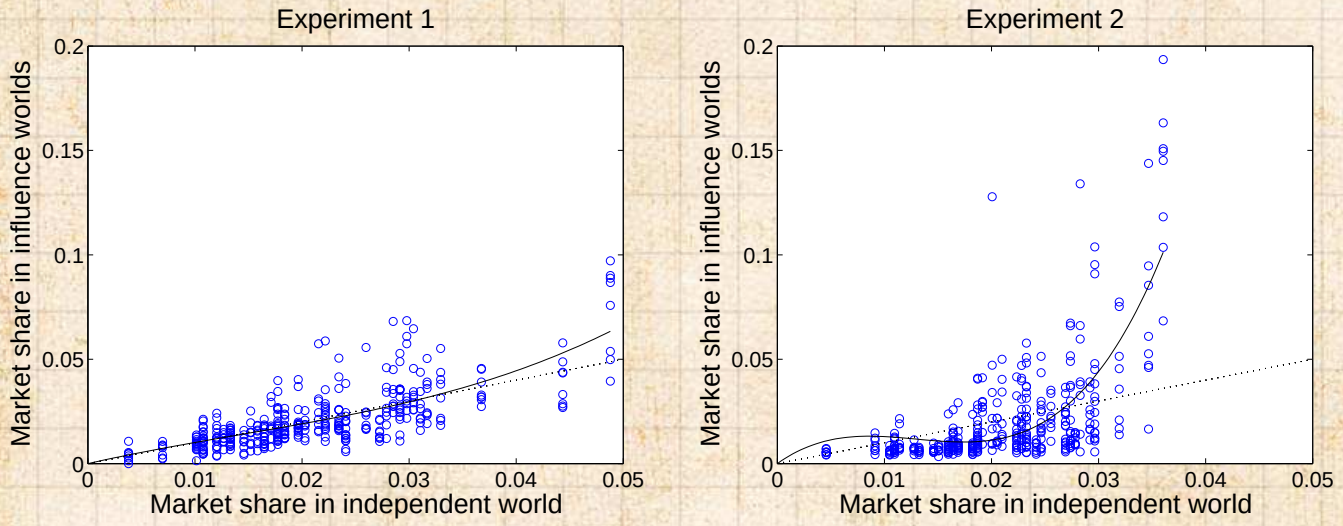


- Variability in final rank.

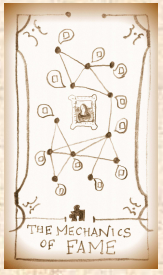


Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

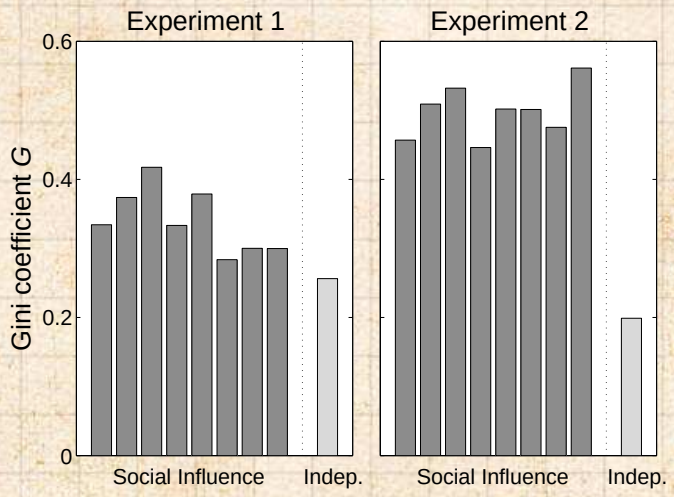


- Variability in final number of downloads.



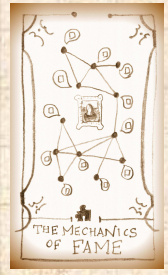
Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References



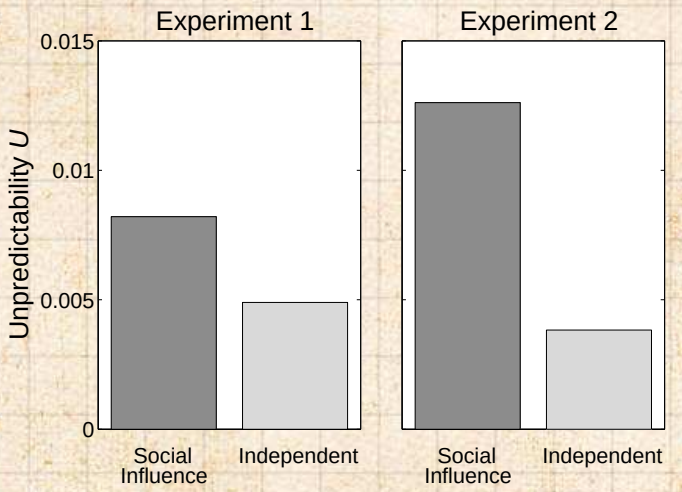
- Inequality as measured by Gini coefficient:

$$G = \frac{1}{(2N_s - 1)} \sum_{i=1}^{N_s} \sum_{j=1}^{N_s} |m_i - m_j|$$



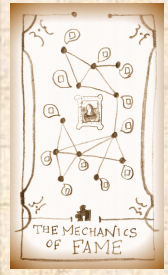
Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References



Unpredictability

$$U = \frac{1}{N_s \binom{N_w}{2}} \sum_{i=1}^{N_s} \sum_{j=1}^{N_w} \sum_{k=j+1}^{N_w} |m_{i,j} - m_{i,k}|$$



Music Lab Experiment

Sensible result:

- Stronger social signal leads to greater following and greater inequality.

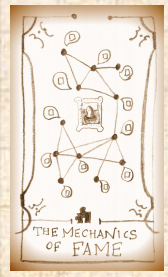
Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.

Winning: it's not for everyone
Superstars
Musiclab
References



Music Lab Experiment

Sensible result:

- Stronger social signal leads to greater following and greater inequality.

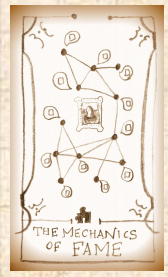
Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.

Winning: it's not for everyone
Superstars
Musiclab
References



Music Lab Experiment

Sensible result:

- Stronger social signal leads to greater following and greater inequality.

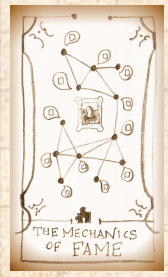
Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.

Winning: it's not for everyone
Superstars
Musiclab
References



Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Sensible result:

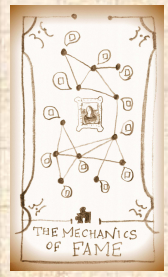
- Stronger social signal leads to greater following and greater inequality.

Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.



Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Sensible result:

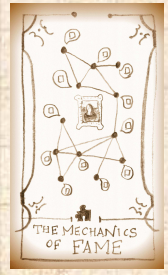
- Stronger social signal leads to greater following and greater inequality.

Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.



Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Sensible result:

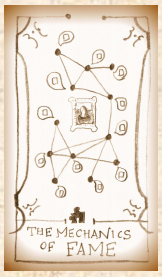
- Stronger social signal leads to greater following and greater inequality.

Peculiar result:

- Stronger social signal leads to greater unpredictability.

Very peculiar observation:

- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following.



Music Lab Experiment

Winning: it's not for everyone
Superstars
Musiclab
References

Sensible result:

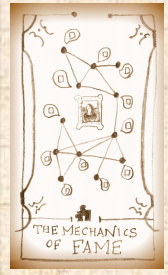
- Stronger social signal leads to greater following and greater inequality.

Peculiar result:

- Stronger social signal leads to greater unpredictability.

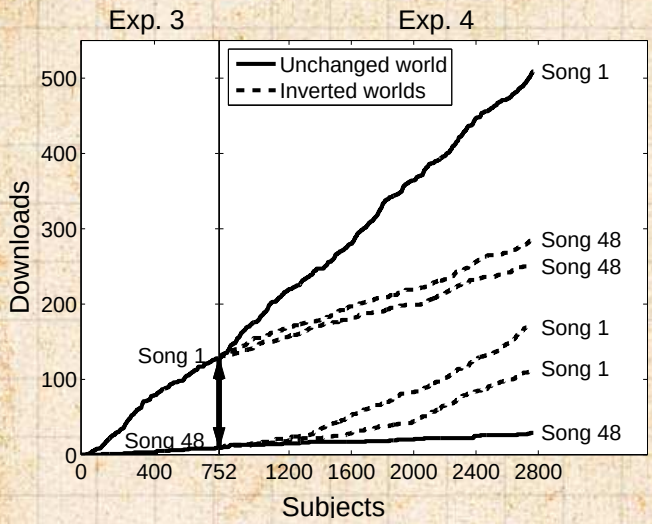
Very peculiar observation:

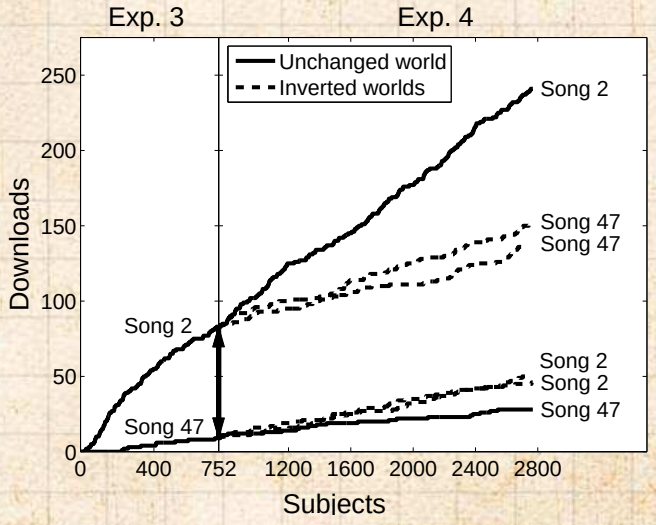
- The most unequal distributions would suggest the greatest variation in underlying 'quality.'
- But success may be due to social construction through following. (so let's tell a story... [8, 9])



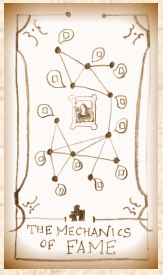
Music Lab Experiment—Sneakiness [7]

Winning: it's not for everyone
Superstars
Musiclab
References



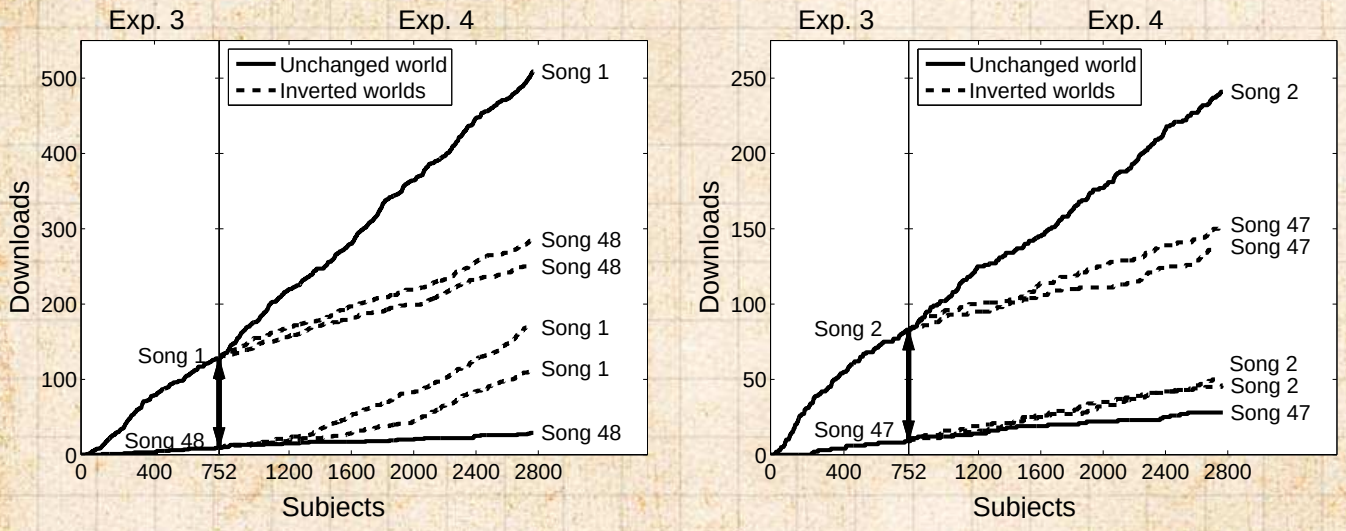


- Inversion of download count
- The pretend rich get richer ...
- ... but at a slower rate

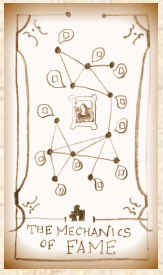


Music Lab Experiment—Sneakiness [7]

Winning: it's not for everyone
Superstars
Musiclab
References

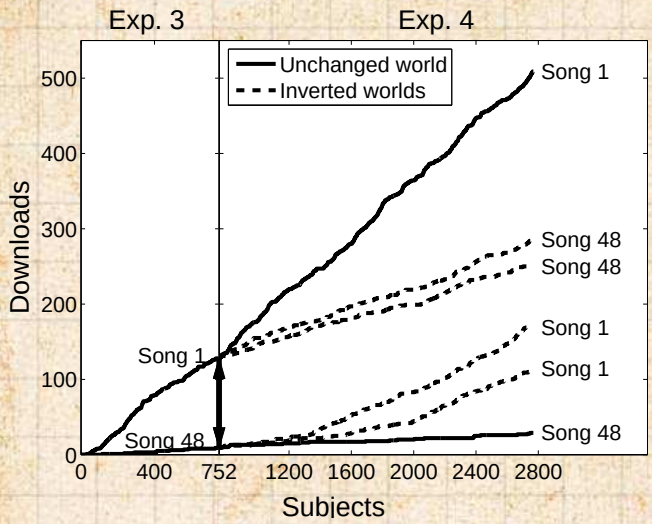


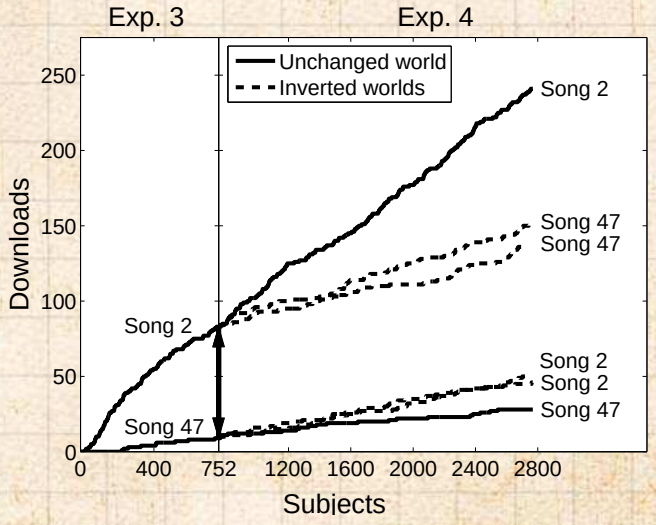
- Inversion of download count
- The pretend rich get richer …
- … but at a slower rate



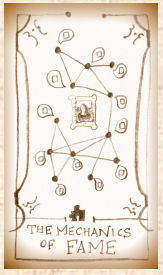
Music Lab Experiment—Sneakiness [7]

Winning: it's not for everyone
Superstars
Musiclab
References





- Inversion of download count
- The pretend rich get richer …
- … but at a slower rate

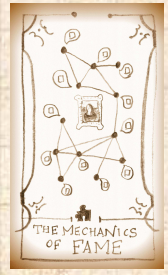


References I

[1] M. Adler.
Stardom and talent.
American Economic Review, pages 208–212, 1985.
pdf

[2] M. Balinski and R. Laraki.
A theory of measuring, electing, and ranking.
Proc. Natl. Acad. Sci., 104(21):8720–8725, 2007.
pdf

[3] I. D. Chase, C. Tovey, D. Spangler-Martin, and M. Manfredonia.
Individual differences versus social dynamics in the formation of animal dominance hierarchies.
Proc. Natl. Acad. Sci., 99(8):5744–5749, 2002. pdf

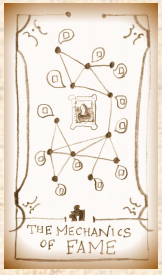


References II

[4] P. Laureti, L. Moret, and Y.-C. Zhang.
Aggregating partial, local evaluations to achieve global ranking.
Physica A, 345(3–4):705–712, 2004. pdf

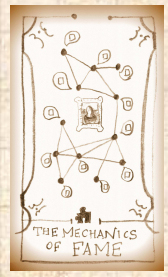
[5] S. Rosen.
The economics of superstars.
Am. Econ. Rev., 71:845–858, 1981. pdf

[6] M. J. Salganik, P. S. Dodds, and D. J. Watts.
An experimental study of inequality and unpredictability in an artificial cultural market.
Science, 311:854–856, 2006. pdf



References III

[7] M. J. Salganik and D. J. Watts.
Leading the herd astray: An experimental study of self-fulfilling prophecies in an artificial cultural market.
Social Psychology Quarterl, 71:338–355, 2008.
pdf

[8] C. R. Sunstein.
Infotopia: How many minds produce knowledge.
Oxford University Press, New York, 2006.

[9] N. N. Taleb.
The Black Swan.
Random House, New York, 2007.