

Voting, Success, and Superstars


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Principles of Complex Systems, Vols. 1, 2, 3D, 4 Fourever, V for Vendetta

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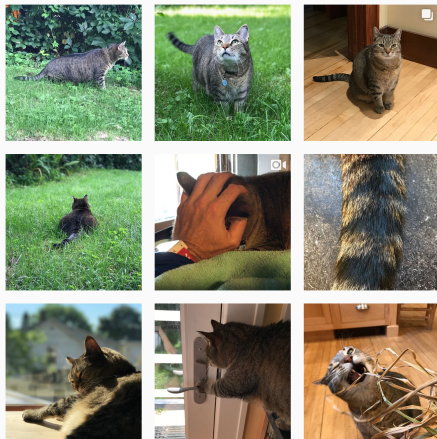
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Outline

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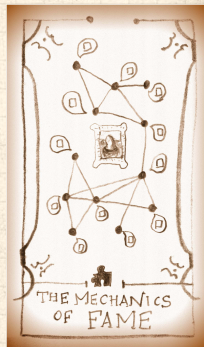
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Where do superstars come from?

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“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...



Superstars

Rosen's theory:

- Individual quality q maps to reward $R(q)$.
- $R(q)$ is 'convex' ($d^2 R/dq^2 > 0$).
- 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'.








“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’?)





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.




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Score-based voting versus rank-based voting:



“A theory of measuring, electing, and ranking” 

Balinski and Laraki,

Proc. Natl. Acad. Sci., **104**, 8720–8725, 2007. ^[2]




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References







“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
-  Tragic reality: Laureti et al.'s paper has 7 citations ($\alpha > 1$)



Dominance hierarchies


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References




“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 *Metriacrima* zebra:



 Pecking orders for fish...

Dominance hierarchies

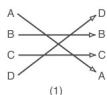
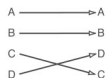
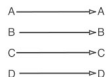
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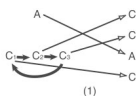
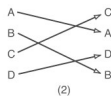
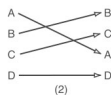
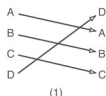
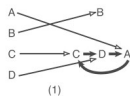
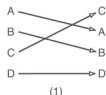
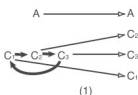
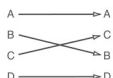
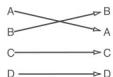
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Fish forget—changing of dominance hierarchies:

1st Hierarchy \Rightarrow 2nd Hierarchy



1st Hierarchy \Rightarrow 2nd Hierarchy



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



Dominance hierarchies

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Methods of Forming Hierarchies					
Size of set	Group assembly	Round-robin competition			
4	<p>A A</p> <p>B</p> <p>C $C_1 \rightarrow C_2 \rightarrow C_3$</p> <p>D</p> <p>(23) (2)</p> <p>n=25</p>	<p>A $A \rightarrow B$</p> <p>B $A \rightarrow B$</p> <p>C $C \rightarrow D$</p> <p>D $C \rightarrow D$</p> <p>(9) (3)</p>	<p>A</p> <p>$C_1 \rightarrow C_2 \rightarrow C_3$</p> <p>(3)</p> <p>n=16</p>	<p>$B_1 \rightarrow B_2 \rightarrow B_3$</p> <p>D</p> <p>(1)</p>	
5	<p>A</p> <p>B $A \rightarrow B$</p> <p>C $A \rightarrow B$</p> <p>D $A \rightarrow B$</p> <p>E $A \rightarrow B$</p> <p>(10) (1)</p> <p>n=11</p>	<p>A $A \rightarrow B$</p> <p>B $A \rightarrow B$</p> <p>C $C \rightarrow D$</p> <p>D $C \rightarrow D$</p> <p>E</p> <p>(6) (1)</p>	<p>A</p> <p>$B \rightarrow C$</p> <p>$B \rightarrow C$</p> <p>D $B \rightarrow C$</p> <p>E $B \rightarrow C$</p> <p>(1) (1)</p> <p>n=12</p>	<p>$B_1 \rightarrow B_2 \rightarrow B_3$</p> <p>D</p> <p>E</p> <p>(2)</p>	<p>A $C_1 \rightarrow C_2 \rightarrow C_3$</p> <p>B</p> <p>$D_1 \rightarrow D_2 \rightarrow D_3$</p> <p>E</p> <p>(1) (1)</p>



Group versus isolated interactions produce different hierarchies



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	[Help]	[Log off]	# of down loads
GROWTH PEOPLE: "names"			86
ACCEPT THAT "the r people"			52
LISTFORPEOPLE: "no way out"			45


BAND NAME (red arrow pointing to GROWTH PEOPLE)


SONG TITLE (red arrow pointing to "names")


NUMBER OF DOWNLOADS (red arrow pointing to 45)

48 songs

30,000 participants

 How probable is the world?

 Can we estimate variability?

 Superstars dominate but are unpredictable. Why?

multiple 'worlds'

Inter-world variability



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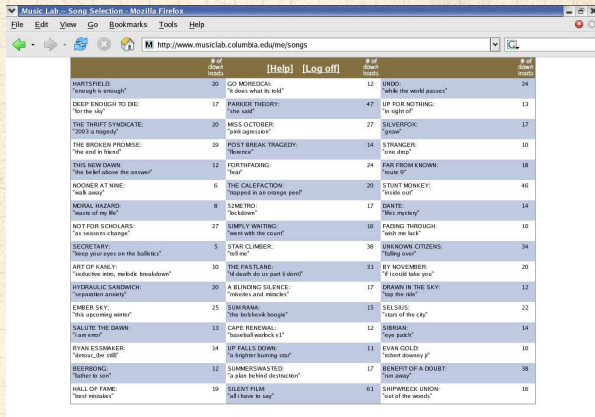
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	# of down loads	[Help] [Log off]	# of down loads		
HARTSFIELD: "enough is enough"	20	GO MOREDECA: "it does what it told"	12	UNDO: "while the world passes"	24
DEEP ENOUGH TO DIE: "for the sky"	17	PARKER THEORY: "the sad"	47	UP FOR NOTHING: "in sight of"	13
THE THRIFT SYNDICATE: "2009 a tragedy"	20	MISS OCTOBER: "my expression"	27	SILVERFOX: "glide"	17
THE BROKEN PROMISE: "the end is here"	19	POST BREAK TRAGEDY: "horror"	14	STRANGER: "one step"	10
THIS NEW DAWN: "the belief above the answer"	12	FORTHFACING: "leaf"	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	SZMETRO: "lockdown"	17	DANTE: "his mystery"	14
NOT FOR SCHOLARS: "six seasons change"	27	SIMPLY WAITING: "smoke with the count"	16	FACING THROUGH: "with me left"	10
SECRETARY: "keep your eyes on the ballistics"	5	STAR CLIMBER: "hell no"	38	UNKNOWN CITIZENS: "talking over"	34
ART OF KAMELY: "seductive into, mobile breakdown"	10	THE FASTLANE: "if death do us part i don't"	31	BY NOVEMBER: "if i could take you"	20
HYDRAULIC SANDWICH: "separation anxiety"	20	A BLINDING SILENCE: "riddles and riddles"	17	DRAWN IN THE SKY: "tap the ride"	12
EMBER SKY: "his upcoming winter"	25	SUM RANA: "the bobbeek boogie"	15	SELSAUS: "stars of the city"	22
SALUTE THE DAWN: "i am one"	13	CAPE RENEWAL: "hassled workday v1"	12	SIBIRIAN: "spin park"	14
RYAN ESSMAKER: "detour, be still"	14	UP FALLS DOWN: "a brighter burning star"	11	EVAN GOLD: "robert downey jr"	10
BEERBORG: "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



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

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



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Experiment 1

Rank	Artist	Album	Score
1	THE MONUMENTS MEN	"I know what she said"	24
2	THE MONUMENTS MEN	"I know what she said"	24
3	THE MONUMENTS MEN	"I know what she said"	24
4	THE MONUMENTS MEN	"I know what she said"	24
5	THE MONUMENTS MEN	"I know what she said"	24
6	THE MONUMENTS MEN	"I know what she said"	24
7	THE MONUMENTS MEN	"I know what she said"	24
8	THE MONUMENTS MEN	"I know what she said"	24
9	THE MONUMENTS MEN	"I know what she said"	24
10	THE MONUMENTS MEN	"I know what she said"	24
11	THE MONUMENTS MEN	"I know what she said"	24
12	THE MONUMENTS MEN	"I know what she said"	24
13	THE MONUMENTS MEN	"I know what she said"	24
14	THE MONUMENTS MEN	"I know what she said"	24
15	THE MONUMENTS MEN	"I know what she said"	24
16	THE MONUMENTS MEN	"I know what she said"	24
17	THE MONUMENTS MEN	"I know what she said"	24
18	THE MONUMENTS MEN	"I know what she said"	24
19	THE MONUMENTS MEN	"I know what she said"	24
20	THE MONUMENTS MEN	"I know what she said"	24

Experiments 2-4

Rank	Artist	Album	Score
1	THE MONUMENTS MEN	"I know what she said"	24
2	THE MONUMENTS MEN	"I know what she said"	24
3	THE MONUMENTS MEN	"I know what she said"	24
4	THE MONUMENTS MEN	"I know what she said"	24
5	THE MONUMENTS MEN	"I know what she said"	24
6	THE MONUMENTS MEN	"I know what she said"	24
7	THE MONUMENTS MEN	"I know what she said"	24
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10	THE MONUMENTS MEN	"I know what she said"	24
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16	THE MONUMENTS MEN	"I know what she said"	24
17	THE MONUMENTS MEN	"I know what she said"	24
18	THE MONUMENTS MEN	"I know what she said"	24
19	THE MONUMENTS MEN	"I know what she said"	24
20	THE MONUMENTS MEN	"I know what she said"	24



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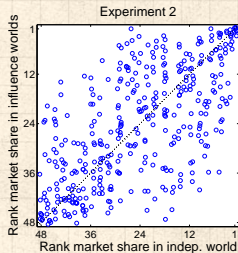
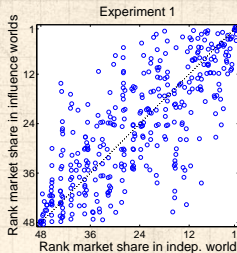
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Variability in final rank.



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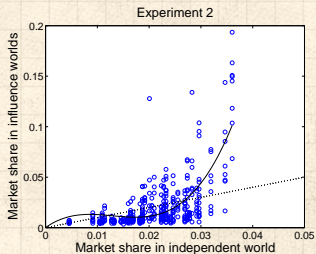
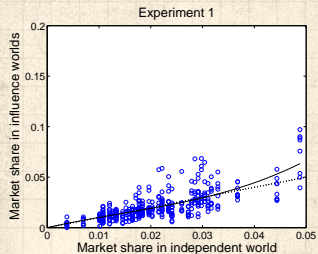
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Variability in final number of downloads.



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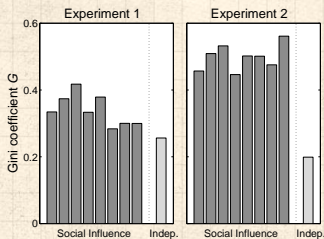
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Inequality as measured by Gini coefficient:

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



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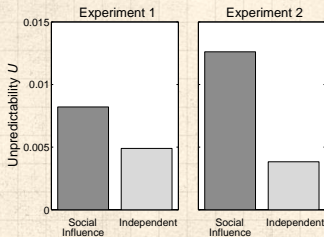
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Unpredictability

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



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**. (so let's tell a story... [8, 9])



Music Lab Experiment—Sneakiness [7]

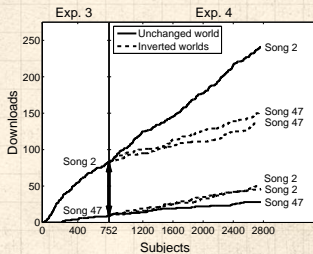
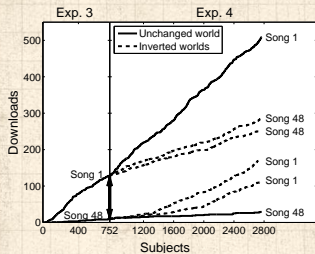
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🧱 Inversion of download count

🧱 The pretend rich get richer ...

🧱 ... but at a slower rate






References I

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A theory of measuring, electing, and ranking.
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