

Voting, Success, and Superstars


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Principles of Complex Systems, Vols. 1, 2, & 3D
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Winning: it's not for
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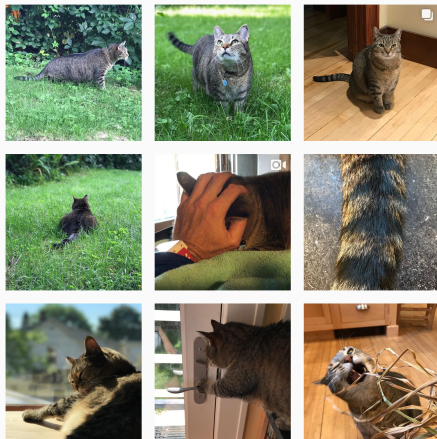
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Outline

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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.



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]








“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



Dominance hierarchies

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“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

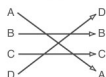
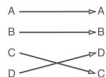
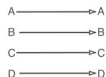
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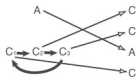
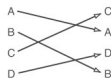
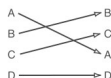
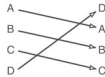
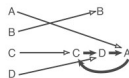
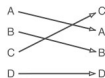
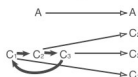
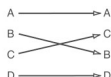
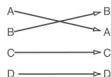
References

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

Methods of Forming Hierarchies			
Size of set	Group assembly	Round-robin competition	
4	<p>(23) (2) n=25</p>	<p>(9) (3)</p>	<p>(3) (1) n=16</p>
5	<p>(10) (1) n=11</p>	<p>(6) (1)</p>	<p>(1) (1) (1) (1) n=12</p>



Group versus isolated interactions produce different hierarchies



Music Lab Experiment

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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 the band names)


SONG TITLE (red arrow pointing to the song titles)


NUMBER OF DOWNLOADS (red arrow pointing to the download counts)

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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Music Lab - Song Selection - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

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

	# of down votes	[Help] [Log off]	# of down votes
HARTSFIELD: "enough is enough"	20	GO MOREDECA: "it does what it told"	24
DEEP ENOUGH TO DIE: "for the sky"	17	PARKER THEORY: "the sad"	13
THE THRIFT SYNDICATE: "2009 a tragedy"	20	MISS OCTOBER: "my expression"	17
THE BROKEN PROMISE: "the end is here"	19	POST BREAK TRAGEDY: "horror"	10
THIS NEW DAWN: "the belief above the answer"	12	FORTHFACING: "leaf"	18
NOONER AT NINE: "walk away"	6	THE CALEFACTION: "trapped in an orange peel"	46
MORAL HAZARD: "waste of my life"	8	SZMETRO: "lockdown"	14
NOT FOR SCHOLARS: "six seasons change"	27	SIMPLY WAITING: "smoke with the count"	10
SECRETARY: "keep your eyes on the ballistics"	5	STAR CLIMBER: "hell no"	34
ART OF KAMELY: "seductive into, melodic breakdown"	10	THE FASTLANE: "if death do us part i don't"	20
HYDRAULIC SANDWICH: "separation anxiety"	20	A BLINDING SILENCE: "riddles and riddles"	12
EMBER SKY: "the upcoming winter"	25	SUM RANA: "the bobbeik boogie"	22
SALUTE THE DAWN: "i am one"	13	CAPE RENEWAL: "hassled workday v1"	14
RYAN ESSMAKER: "detour, be still"	14	UP FALLS DOWN: "a brighter burning star"	10
BEERBORG: "father to son"	12	SUMMERSWASTED: "a plan behind destruction"	38
HALL OF FAME: "best mistakes"	19	SILENT FILM: "all i have to say"	16
		UNDO: "while the world passes"	
		UP FOR NOTHING: "in sight of"	
		SILVERFOX: "glide"	
		STRANGER: "some sleep"	
		FAR FROM KNOWN: "route 9"	
		STUNT MONKEY: "inside out"	
		DANTE: "the mystery"	
		FACING THROUGH: "with me left"	
		UNKNOWN CITIZENS: "talking over"	
		BY NOVEMBER: "if i could take you"	
		DRAWN IN THE SKY: "tap the ride"	
		SELSAUS: "stars of the city"	
		SIBIRIAN: "spin park"	
		EVAN GOLD: "robust downey j"	
		BENEFIT OF A DOUBT: "run away"	
		SHIPWRECK UNION: "out of the woods"	



"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	ANTHONY & DAVID	"I'm a Maniac!"	24
2	CHER	"I've Never Been So Happy!"	24
3	CHER	"I've Never Been So Happy!"	23
4	CHER	"I've Never Been So Happy!"	23
5	CHER	"I've Never Been So Happy!"	23
6	CHER	"I've Never Been So Happy!"	23
7	CHER	"I've Never Been So Happy!"	23
8	CHER	"I've Never Been So Happy!"	23
9	CHER	"I've Never Been So Happy!"	23
10	CHER	"I've Never Been So Happy!"	23
11	CHER	"I've Never Been So Happy!"	23
12	CHER	"I've Never Been So Happy!"	23
13	CHER	"I've Never Been So Happy!"	23
14	CHER	"I've Never Been So Happy!"	23
15	CHER	"I've Never Been So Happy!"	23
16	CHER	"I've Never Been So Happy!"	23
17	CHER	"I've Never Been So Happy!"	23
18	CHER	"I've Never Been So Happy!"	23
19	CHER	"I've Never Been So Happy!"	23
20	CHER	"I've Never Been So Happy!"	23

Experiments 2-4

Rank	Artist	Album	Score
1	ANTHONY & DAVID	"I'm a Maniac!"	24
2	CHER	"I've Never Been So Happy!"	24
3	CHER	"I've Never Been So Happy!"	23
4	CHER	"I've Never Been So Happy!"	23
5	CHER	"I've Never Been So Happy!"	23
6	CHER	"I've Never Been So Happy!"	23
7	CHER	"I've Never Been So Happy!"	23
8	CHER	"I've Never Been So Happy!"	23
9	CHER	"I've Never Been So Happy!"	23
10	CHER	"I've Never Been So Happy!"	23
11	CHER	"I've Never Been So Happy!"	23
12	CHER	"I've Never Been So Happy!"	23
13	CHER	"I've Never Been So Happy!"	23
14	CHER	"I've Never Been So Happy!"	23
15	CHER	"I've Never Been So Happy!"	23
16	CHER	"I've Never Been So Happy!"	23
17	CHER	"I've Never Been So Happy!"	23
18	CHER	"I've Never Been So Happy!"	23
19	CHER	"I've Never Been So Happy!"	23
20	CHER	"I've Never Been So Happy!"	23



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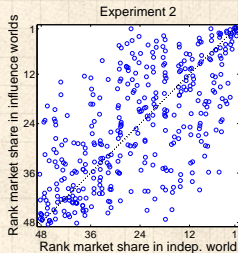
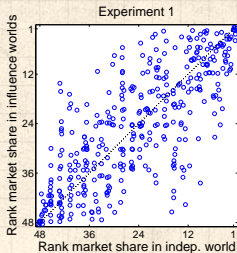
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Variability in final rank.



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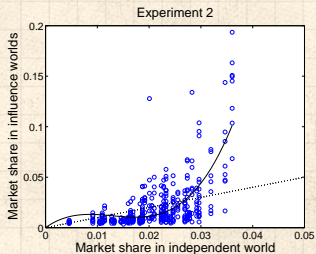
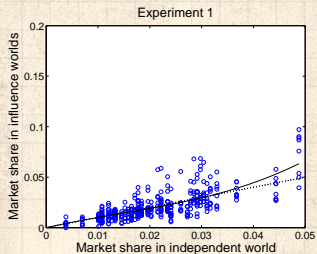
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Variability in final number of downloads.



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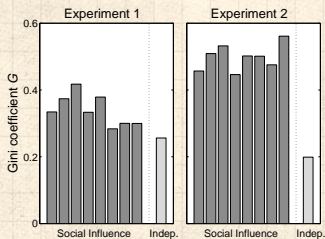
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Inequality as measured by Gini coefficient:

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



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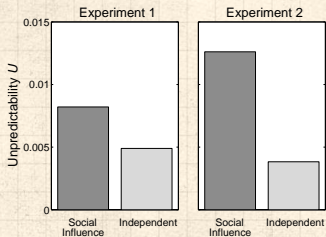
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Unpredictability

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



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]

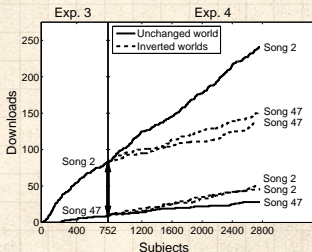
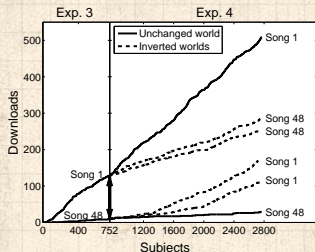
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🧱 Inversion of download count

🧱 The pretend rich get richer ...

🧱 ... but at a slower rate



References I

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