

# Voting, Success, and Superstars

Principles of Complex Systems | @pocsvox  
CSYS/MATH 300, Fall, 2015 | #FallPoCS2015

Winning: it's not  
for everyone

Superstars  
Musiclub

References

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Sealie & Lambie  
Productions

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# Outline

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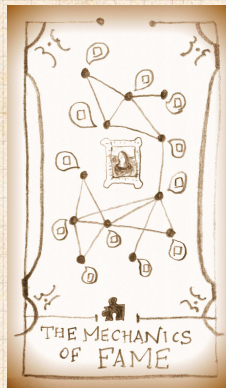
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# Where do superstars come from?



"The economics of superstars" 

S. Rosen,

Am. Econ. Rev., **71**, 845–858, 1981. [5]

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## Examples:

- ▶ Full-time Comedians ( $\approx 200$ )
- ▶ Soloists in Classical Music
- ▶ Economic Textbooks (the usual myopic example)
  
- ▶ Highly skewed distributions again...



## 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'.

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## "Stardom and Talent"

Moshe Adler,  
*American Economic Review*, **75**, 208–212,  
1985. <sup>[1]</sup>

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- ▶ "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]





“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

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# 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]

“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*:



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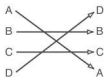
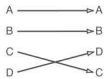
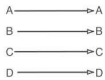
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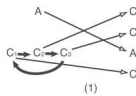
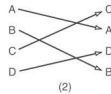
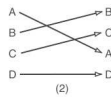
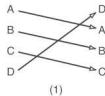
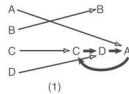
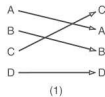
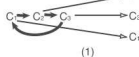
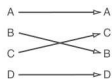
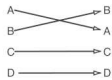
# Dominance hierarchies

## Fish forget—changing of dominance hierarchies:

1st Hierarchy  $\rightleftharpoons$  2nd Hierarchy



1st Hierarchy  $\rightleftharpoons$  2nd Hierarchy



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- 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																					
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- ▶ Group versus isolated interactions produce different hierarchies



# Music Lab Experiment

PoCS | @pocsvox

Voting, Success,  
and Superstars



BAND NAME

[Help]	[Log off]	# of down loads
GROWTH PEOPLE:	"I'm not"	86
ACCEPT THAT:	"to the people"	52
LISTFORPEOPLE:	"no way out"	45

SONG TITLE

NUMBER OF DOWNLOADS

Winning: it's not  
for everyone

Superstars

Musiclab

References

48 songs

30,000 participants

multiple 'worlds'

Inter-world variability

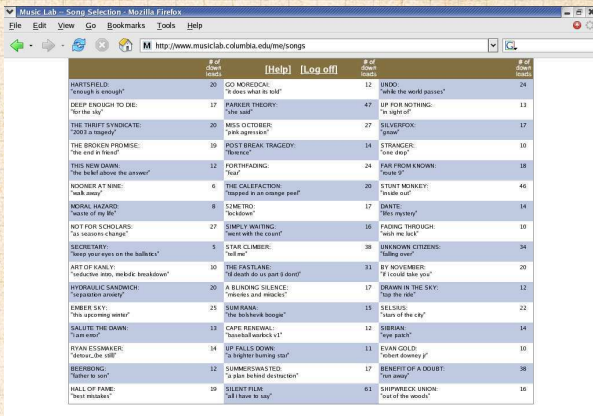
- ▶ How probable is the world?
- ▶ Can we estimate variability?
- ▶ Superstars dominate but are unpredictable. Why?



# Music Lab Experiment

PoCS | @pocsvox

Voting, Success,  
and Superstars



	# of down loads	[Help] [Log off]	# of down loads	# of down loads	
HARTSFIELD: "enough is enough"	20	GO MORFOCAL: "Is 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	MESS OCTOBER: "pink aggression"	27	SILVERFOX: "glow"	17
THE BROKEN PROMISE: "the end in hand"	19	POST BREAK TRAGEDY: "silence"	14	STRANGER: "love deep"	10
THIS NEW DAWN: "the heli above the answer"	12	FORTHFADING: "leaf"	24	FAR FROM KNOWN: "out of"	18
HOOMER 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	SIMETRO: "lockdown"	17	DANTE: "Bles mystery"	14
NOT FOR SCHOLARS: "as seasons change"	27	SIMPLY WAITING: "meet with the count"	16	FADING THROUGH: "wish me luck"	10
SECRETARY: "three parties on the hallway"	5	STAR CLIMBER: "hell no"	38	UNKNOWN CITIZENS: "falling over"	34
ART OF FAMILY: "redneck step, moshic breakdown"	10	THE FACTLANE: "if death do us part 9 don't"	31	BY NOVEMBER: "I could take you"	20
HYDRAULIC SANDWICH: "separation anxiety"	20	A BLINDING SILENCE: "pieces and meeces"	17	DRAWN IN THE SKY: "top the ride"	12
EMBER SKY: "the upcoming winter"	25	SUMRAMA: "the bobbevik boogie"	15	SELSAUS: "stars of the city"	22
SALUTE THE DAWN: "I am emor"	13	CAPE RENEWAL: "baseball workck v1"	12	SIBRIAN: "eye patch"	14
RYAN ESMARKER: "demon, the still"	14	UP FALLS DOWN: "a bright burning star"	11	EVAN GOLD: "what doneya j"	10
BEESBING: "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 UNKN: "out of the woods"	16

Winning: it's not  
for everyone

Superstars

Musicalab

References



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

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







# Music Lab Experiment

PoCS | @pocsvox

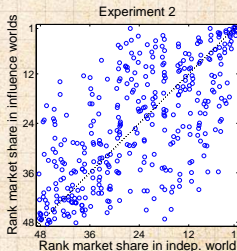
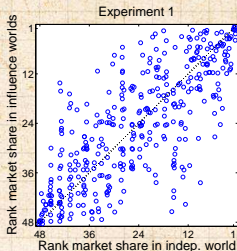
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References



- Variability in final rank.



# Music Lab Experiment

PoCS | @pocsvox

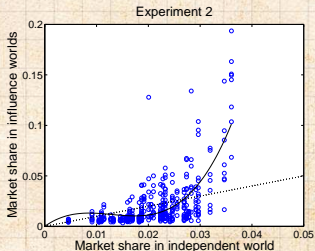
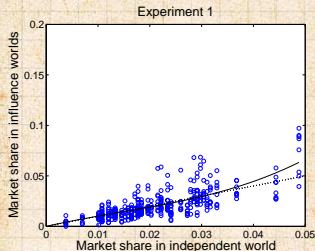
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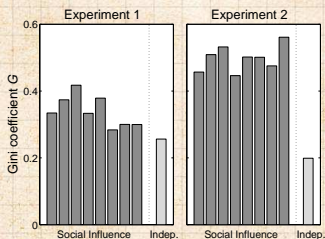
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References



- ▶ Variability in final number of downloads.





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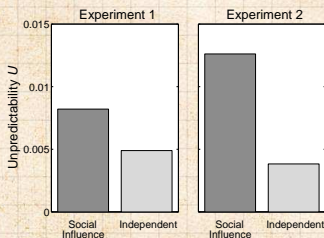
Musiclab

References

- Inequality as measured by Gini coefficient:

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





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References

## ► Unpredictability

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



## Sensible result:

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

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References

## 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]

PoCS | @pocsvox

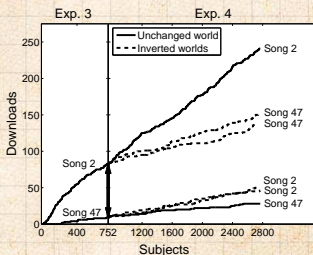
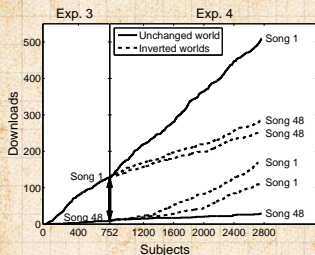
Voting, Success,  
and Superstars

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References



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



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market.

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