

Voting, Success, and Superstars

Principles of Complex Systems
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Outline

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Where do superstars come from?

Rosen (1981): "The Economics of Superstars" [5]

Examples:

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

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Superstars

Rosen's theory:

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

Adler (1985): "Stardom and Talent"^[1]

- ▶ 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'?)

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Voting

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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Voting

Score-based voting versus rank-based voting:

- ▶ Balinski and Laraki^[2]
 "A theory of measuring, electing, and ranking"
 Proc. Natl. Acad. Sci., pp. 8720–8725 (2007)

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Voting

Laureti et al. (2004): "Aggregating partial, local evaluations to achieve global ranking"^[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

Chase et al. (2002): "Individual differences versus social dynamics in the formation of animal dominance hierarchies"^[3]

- ▶ The aggressive female Metriaclima zebra:



- ▶ Pecking orders for fish...

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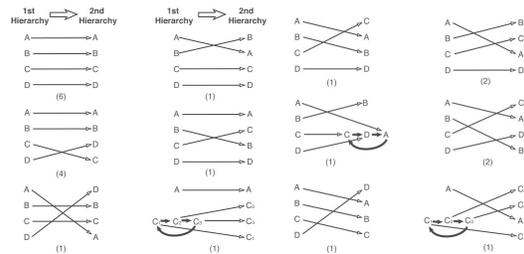
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Dominance hierarchies

Fish forget—changing of dominance hierarchies:



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

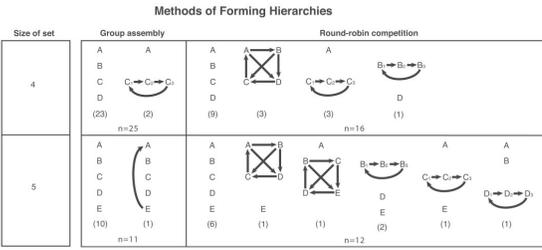
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Dominance hierarchies



▶ Group versus isolated interactions produce different hierarchies

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Music Lab Experiment



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?

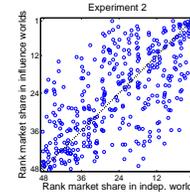
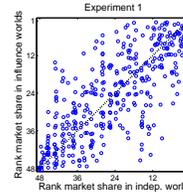
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▶ Variability in final rank.

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Rank	Song	# of votes	# of downloads	Rank	Song	# of votes	# of downloads
1	WANTRESS	26	12	12	WIND	12	24
2	DEEP ENOUGH TO BE	17	47	13	UP FOR NOTHING	11	13
3	THE THIRTY SYNDICATE	28	37	14	SILVERFOX	17	17
4	THE BODICAL PRINCESS	18	34	15	TRANCEUR	16	30
5	THIS NEW DOWN	12	38	16	PAW FROM KNOW	18	38
6	ROCKED AT NINE	6	20	17	START MONKEY	16	45
7	MORAL HAZARD	6	17	18	DATE	14	14
8	NOT FOR SCHOLARS	27	36	19	FADING THROUGH	16	30
9	SECRETARY	3	34	20	SHANGHAI OFFENSE	16	34
10	LET IT GO AWAY	18	20	21	BY YOUR SIDE	17	20
11	OFFERINGS	20	17	22	BY YOUR SIDE	17	17
12	THE BODICAL PRINCESS	18	15	23	THE CITY	21	21
13	SALUTE THE DOWN	11	14	24	BERNAL	14	14
14	RYAN ESCAMOTE	14	13	25	EVAN COLDS	10	10
15	REVEREND	12	38	26	SENSE OF A DOUBT	10	38
16	HALL OF FAME	18	61	27	SHAPWICK LANDS	10	35

Salganik et al. (2006) "An experimental study of inequality and unpredictability in an artificial cultural market" [6]

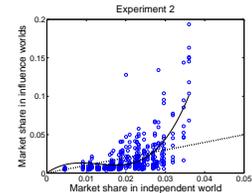
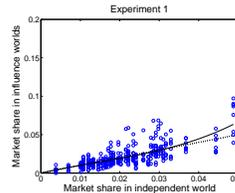
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▶ Variability in final number of downloads.

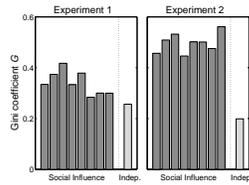
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- Inequality as measured by Gini coefficient:

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

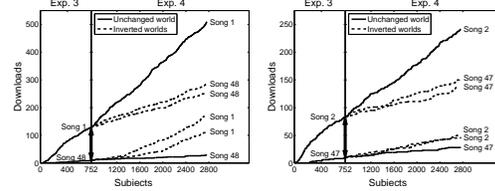
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Music Lab Experiment—Sneakiness



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

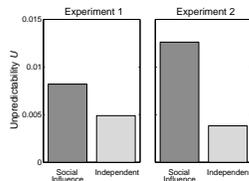
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- Unpredictability

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

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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... [7, 8])

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