Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab

References

Voting, Success, and Superstars

Principles of Complex Systems
CSYS/MATH 300, Spring, 2013 | #SpringPoCS2013

Prof. Peter Dodds
@peterdodds

Department of Mathematics & Statistics | Center for Complex Systems |
Vermont Advanced Computing Center | University of Vermont

These slides brought to you by:

Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab

References

Outline

Winning: it's not for everyone
Superstars
Musiclab

References

**Voting, Success,
and Superstars**

Winning: it's not for
everyone
  Superstars
  Musiclab

References

Where do superstars come from?

Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab

References

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...

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:
     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

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'?)

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

Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab

References

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)

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

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...

Dominance hierarchies

Fish forget—changing of dominance hierarchies:
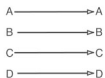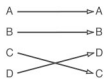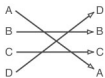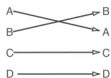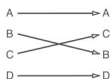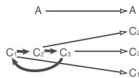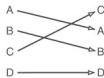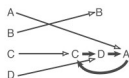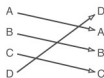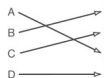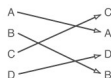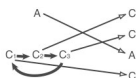
- 22 observations: about 3/4 of the time, hierarchy changed

Dominance hierarchies

Methods of Forming Hierarchies

- Group versus isolated interactions produce different hierarchies

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?

Music Lab Experiment

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

Music Lab Experiment

Experiment 1

Experiments 2–4

Music Lab Experiment

Experiment 1 — Rank market share in influence worlds vs. Rank market share in indep. world

Experiment 2 — Rank market share in influence worlds vs. Rank market share in indep. world

- Variability in final rank.

Music Lab Experiment

Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab
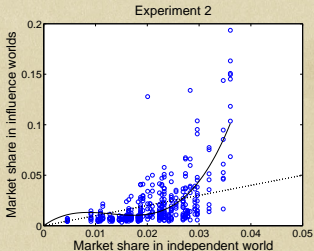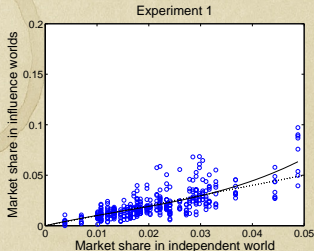
References

- Variability in final number of downloads.

Music Lab Experiment
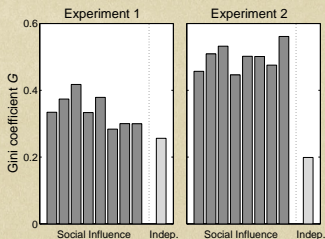
- Inequality as measured by Gini coefficient:

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

Music Lab Experiment
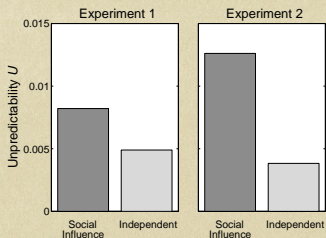
- Unpredictability

$$U = \frac{1}{N_{\mathrm{s}} \binom{N_{\mathrm{w}}}{2}} \sum_{i=1}^{N_{\mathrm{s}}} \sum_{j=1}^{N_{\mathrm{w}}} \sum_{k=j+1}^{N_{\mathrm{w}}} |m_{i,j} - m_{i,k}|$$

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...[7, 8])

Music Lab Experiment—Sneakiness

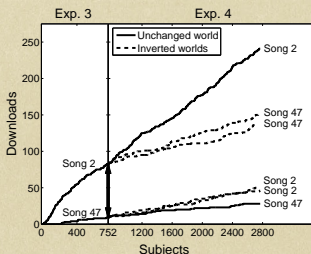Voting, Success,
and Superstars

Winning: it's not for
everyone
Superstars
Musiclab
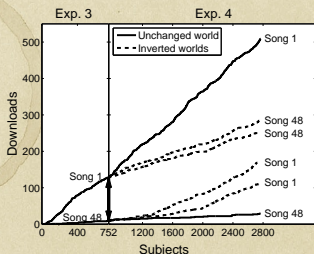
References

- 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 (⊞)

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

References III

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