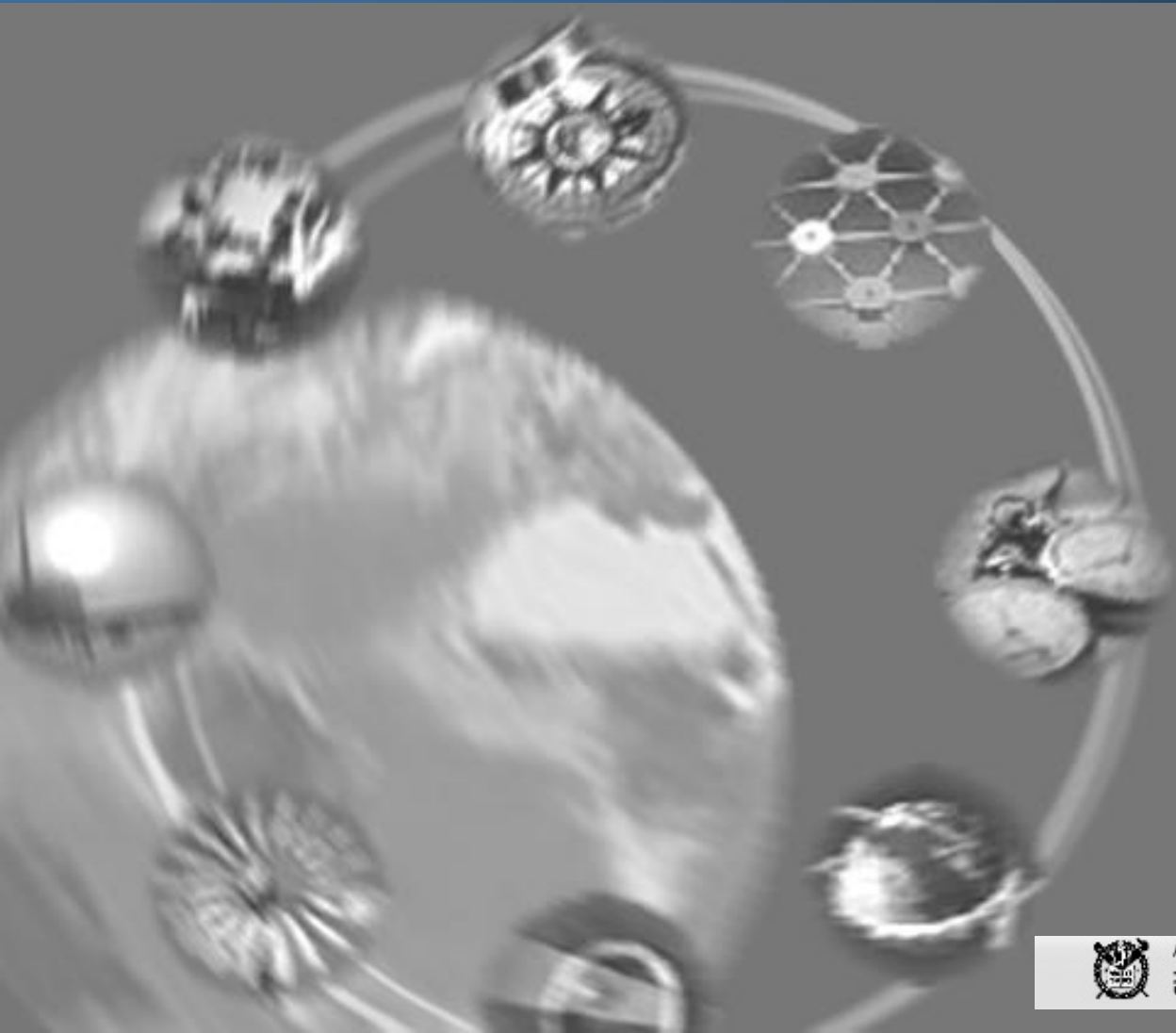# Decision Making
Modeling human behaviors/Bounded rationality/Drug War

401.661 Advanced Construction Technology

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Bounded Rationality

- Must capture decision making *as it is*, NOT as it should be.

- Rationality of human decision making is *bounded*.

- *Bounded rationality* results from limitations on our knowledge, cognitive capabilities, and time.

- Cognitive limitations: perception of information is not comprehensive but *selective*" (Hogarth 1987)
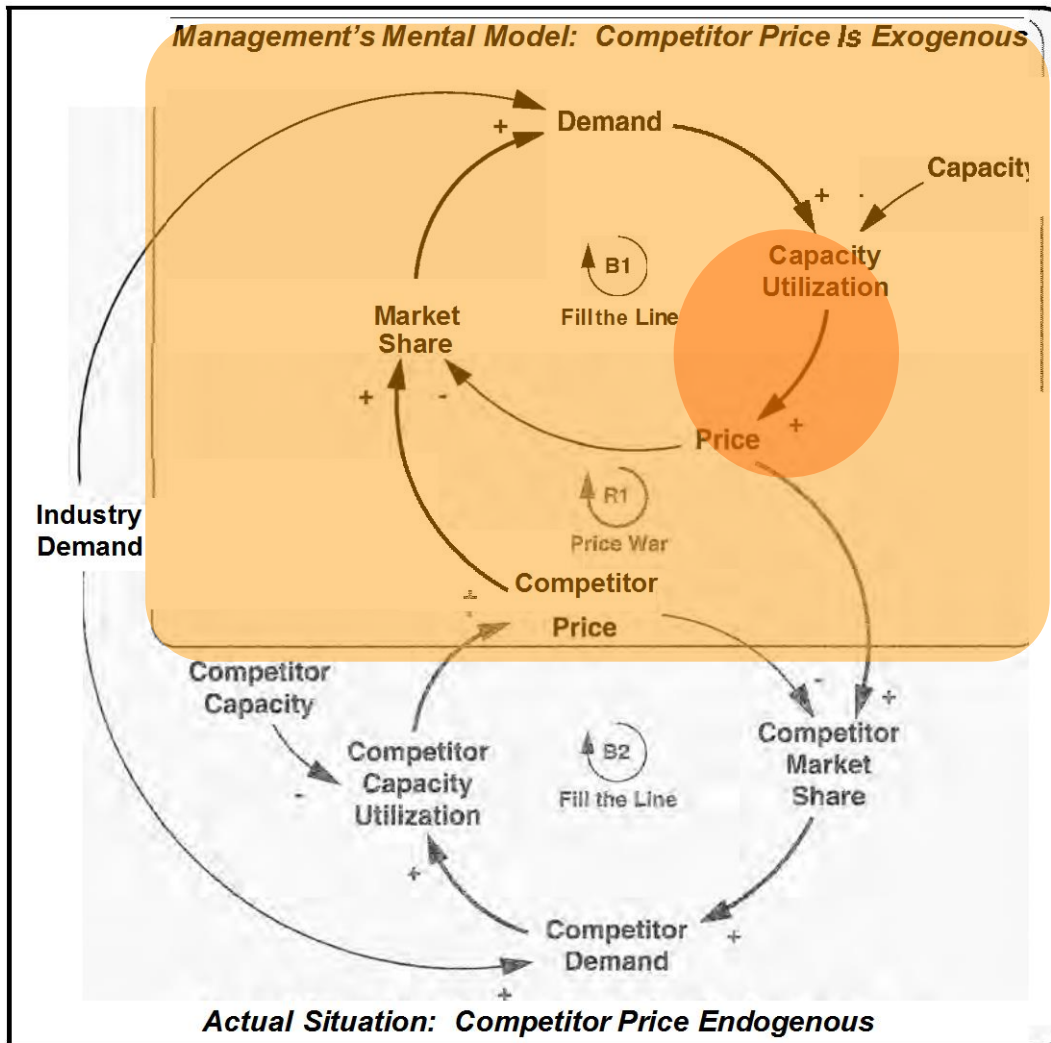
Individual & Organizational Responses to Bounded Rationality

People and organizations have developed a number of ways to simplify the task of decision making.

- Habit, Routines, and Rules of Thumb

- Goal Formation and Satisficing

- Problem Decomposition

Intended Rationality

- Decision makers are irrational or just plain stupid?

- NOT at all

- Human behavior is usually purposeful and motivated by *a certain logic.*

- A decision rule is intendedly (=locally) rational if it would produce reasonable and sensible results if the actual environment were as simple as the decision maker presumes it to be.

Management's Mental Model: Competitor Price Is Exogenous

Actual Situation: Competitor Price Endogenous

- An intendedly rational pricing policy can lead to an inadvertent price war.

- *Top:* Mental model of a firm in which competitor prices are believed to be exogenous. Cutting prices to Fill the Line (B l) when capacity utilization falls is locally rational if the boundary of management's mental model cuts the feedbacks to competitor prices.

- *Bottom:* When competitor firms behave the same way and also cut prices to boost their own capacity utilization (B2), then the intendedly rational decision to lower prices in the hope of stimulating demand creates the reinforcing feedback R1 (shown by the thick lines) and a price war ensues whenever industry demand drops below capacity.

Overconfidence

- Overconfidence: the confidence bounds people provide around their estimate of an unknown quantity are too narrow.

- More information, more confident, while accuracy did not improve.

- Thousands of repetitions provide feedbacks enabling to learn from experience (weather forecast, gambling) but there is little chance to learn from experience in most social/business situations.

  Examples:
  - The Challenger explosion estimated 1 in 100,000.
  - Underestimating the likelihood of declining share price during 1920s and 1980s-90s

Overcoming Overconfidence

- List all the reasons your opinion could be wrong.

- Solicit the opinions of a diverse group especially those with opposite views.

- Suspect statements that something is absolutely certain, inevitable or a one in million chance.

- **When formal models are available, conduct extensive sensitivity tests.**

The War on Drugs

- Use of Cocaine dramatically increased in 1980s

- Billions spent to increase enforcement, focusing on the supply side
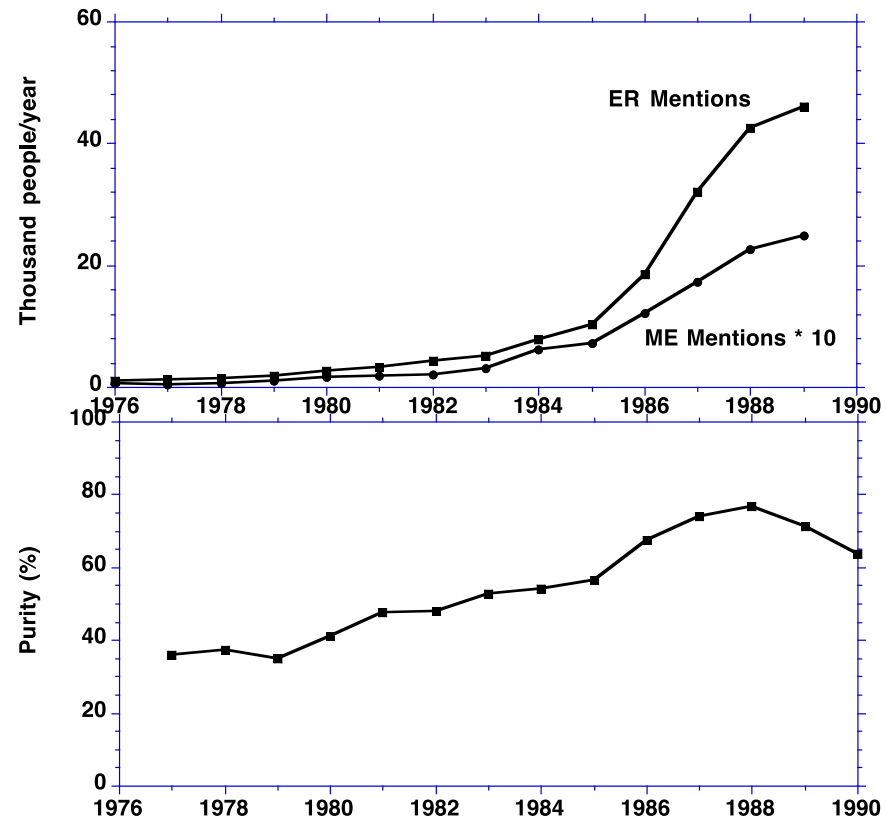
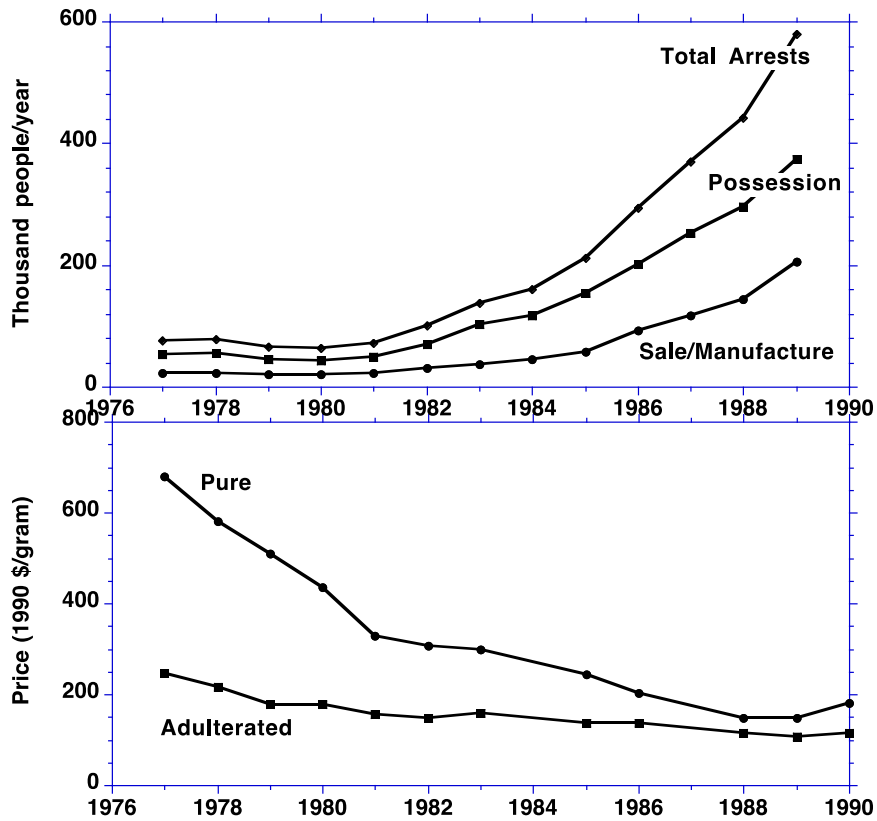- On demand side: "Just say NO"

- Did it work?

It seemed to be working…
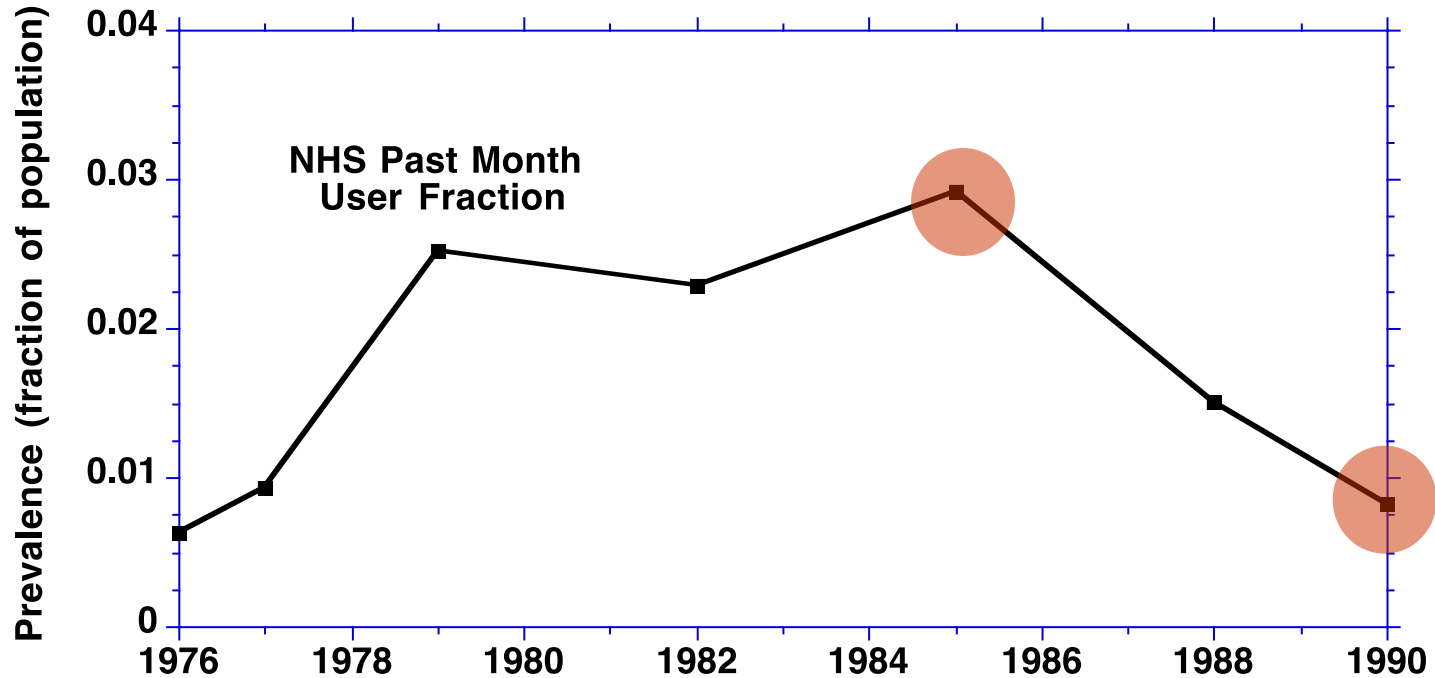
Down from 3% in 1985 to 1% in 1990

But, the problem was getting worse...

Source: **Homer (1993, 1997).**

As a result,..

- Cocaine use was up sharply and availability was growing.

- The same failure of prohibition in 1920s and 1930s.

- Critics argue " interdiction could never work and call for stronger demand-side measure (MacCoun and Reuter, 1997)"
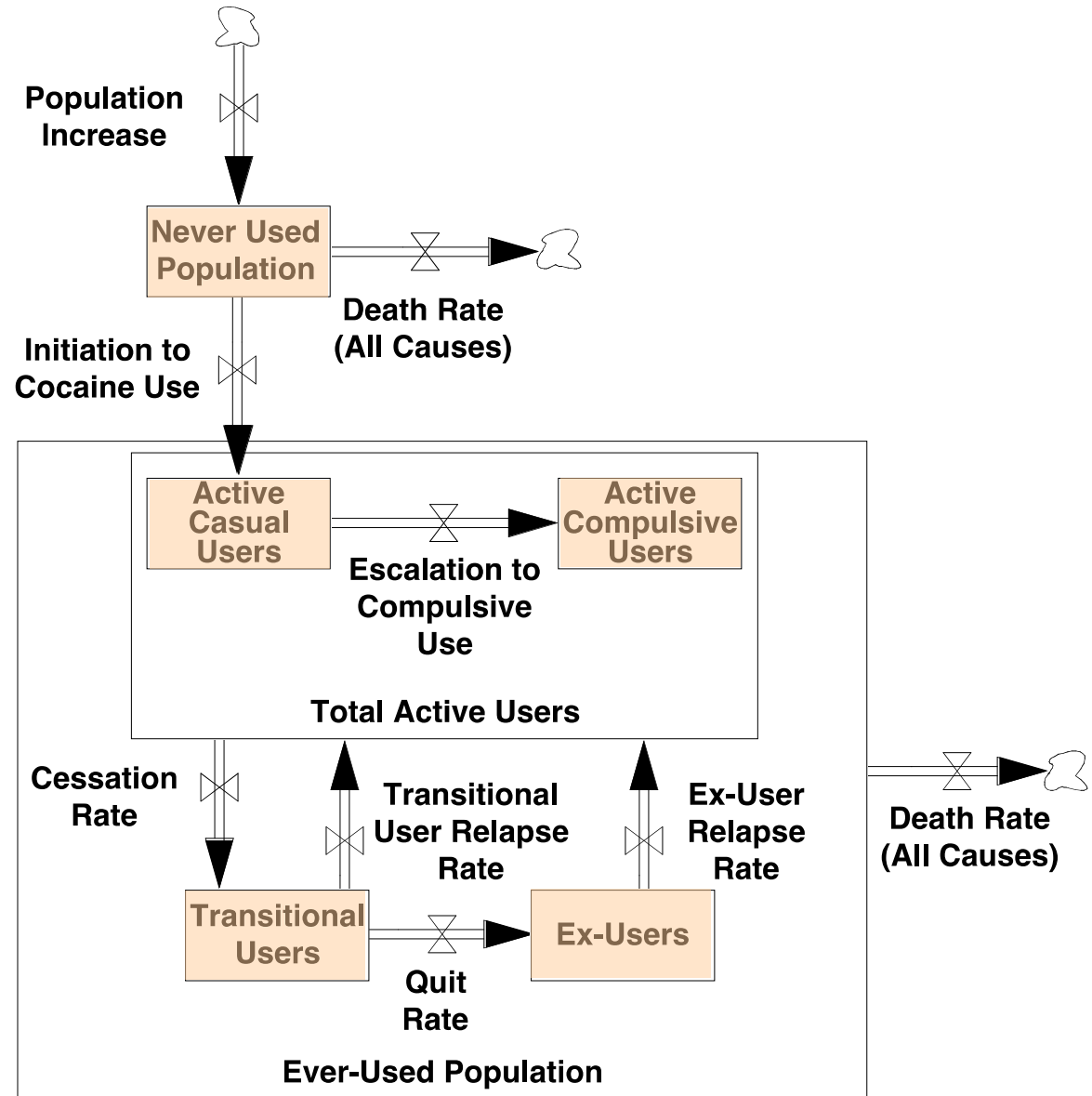
How to explain?

Supporters

- Rising arrest rates by greater enforcement, not by greater drug use

- Falling prices, rising purity, surge in ER by substitution of more potent crack for the less pure power form
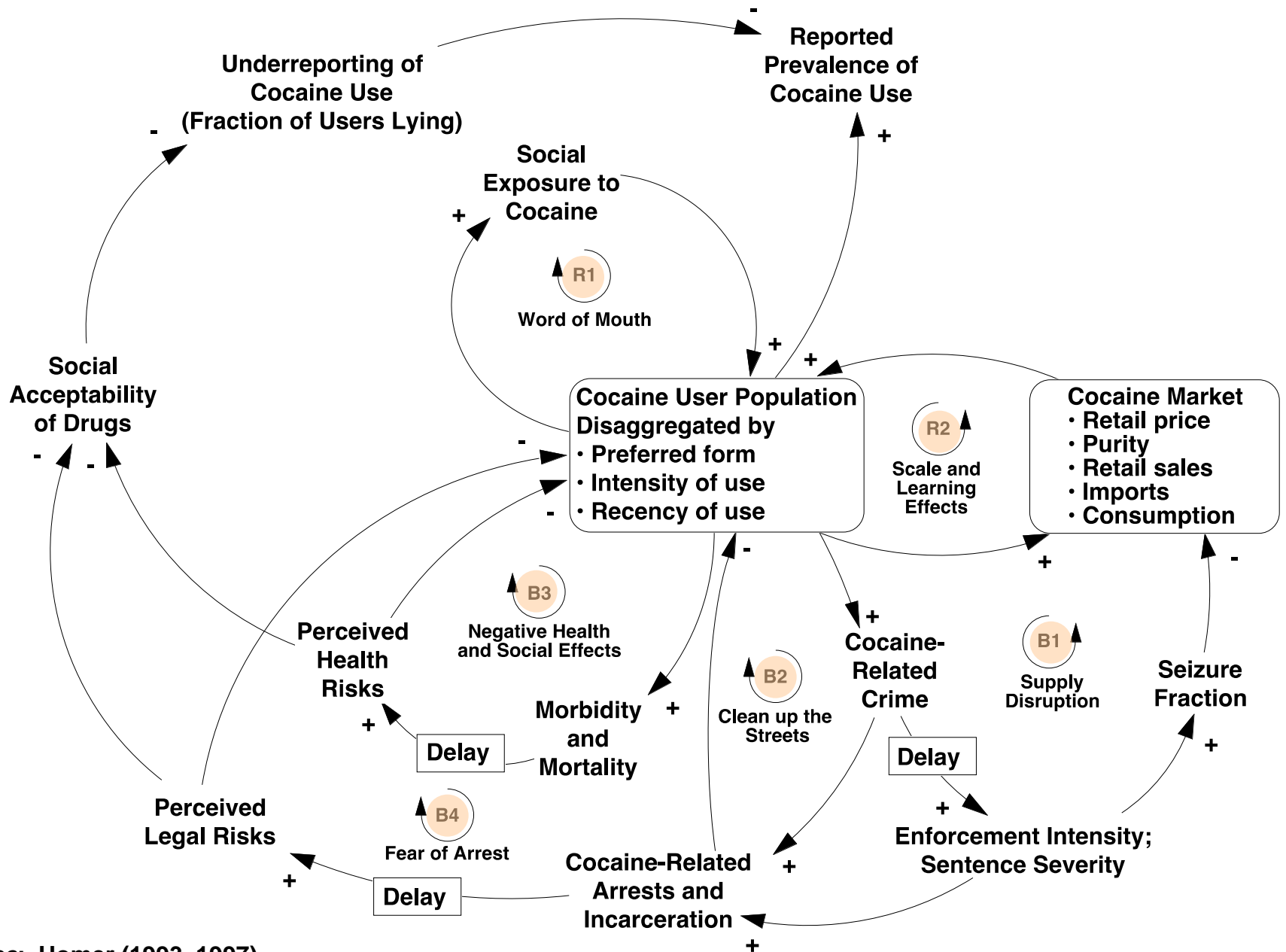
Critics

- Cocaine users are less likely than law-abiding citizens to be selected for the survey. Thus,

- They are likely deny they use drugs.

System Dynamics Model

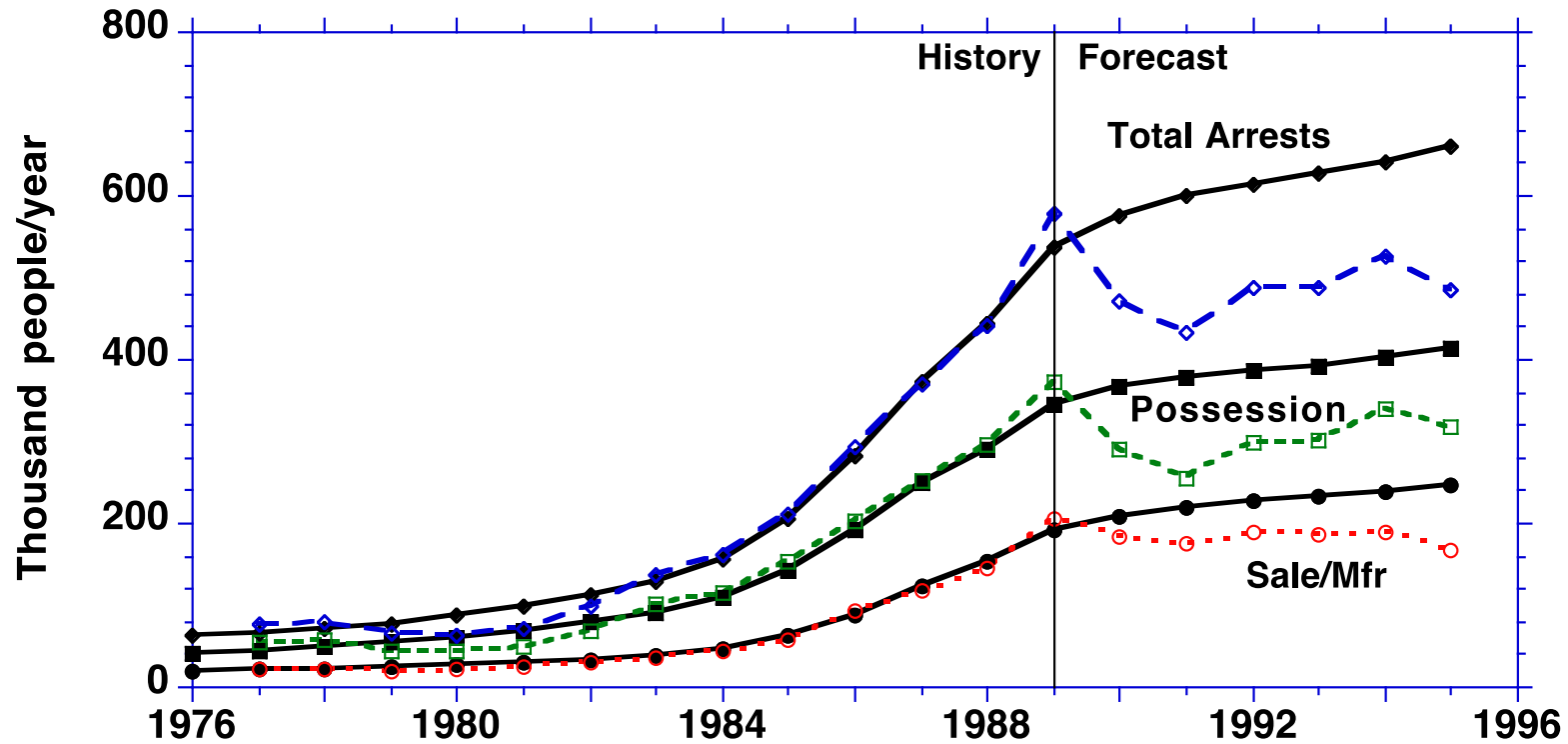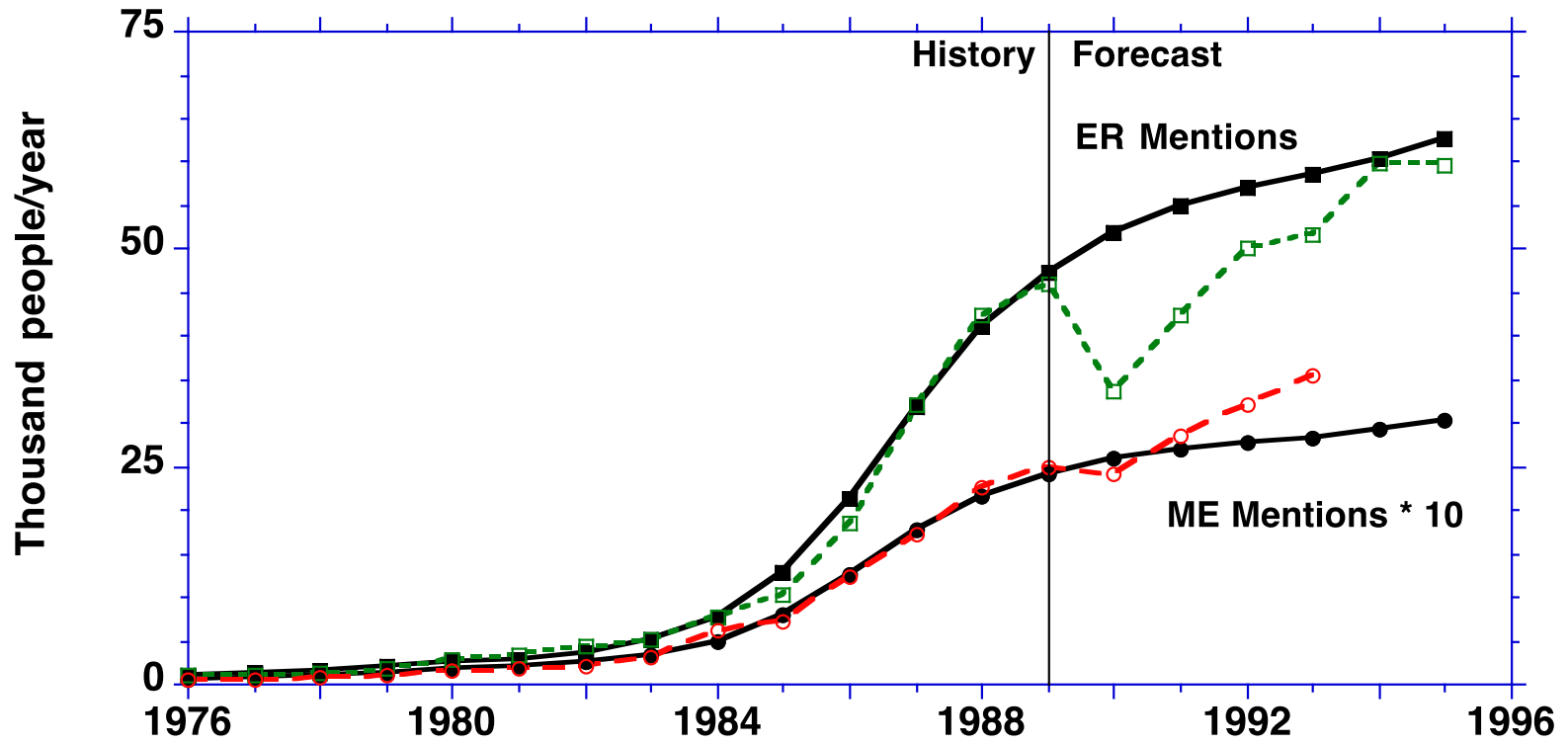The national Institute of Justice commissioned a study, 1980s

Source: Homer (1993, 1997).

Source: Homer (1993, 1997).

Simulated / Actual Data

Figure — Prevalence (fraction of population) vs. year (1976–1996), showing Simulated Actual Past Month User Fraction, NHS Past Month User Fraction, and Simulated Reported Past Month User Fraction, divided into History and Forecast regions.
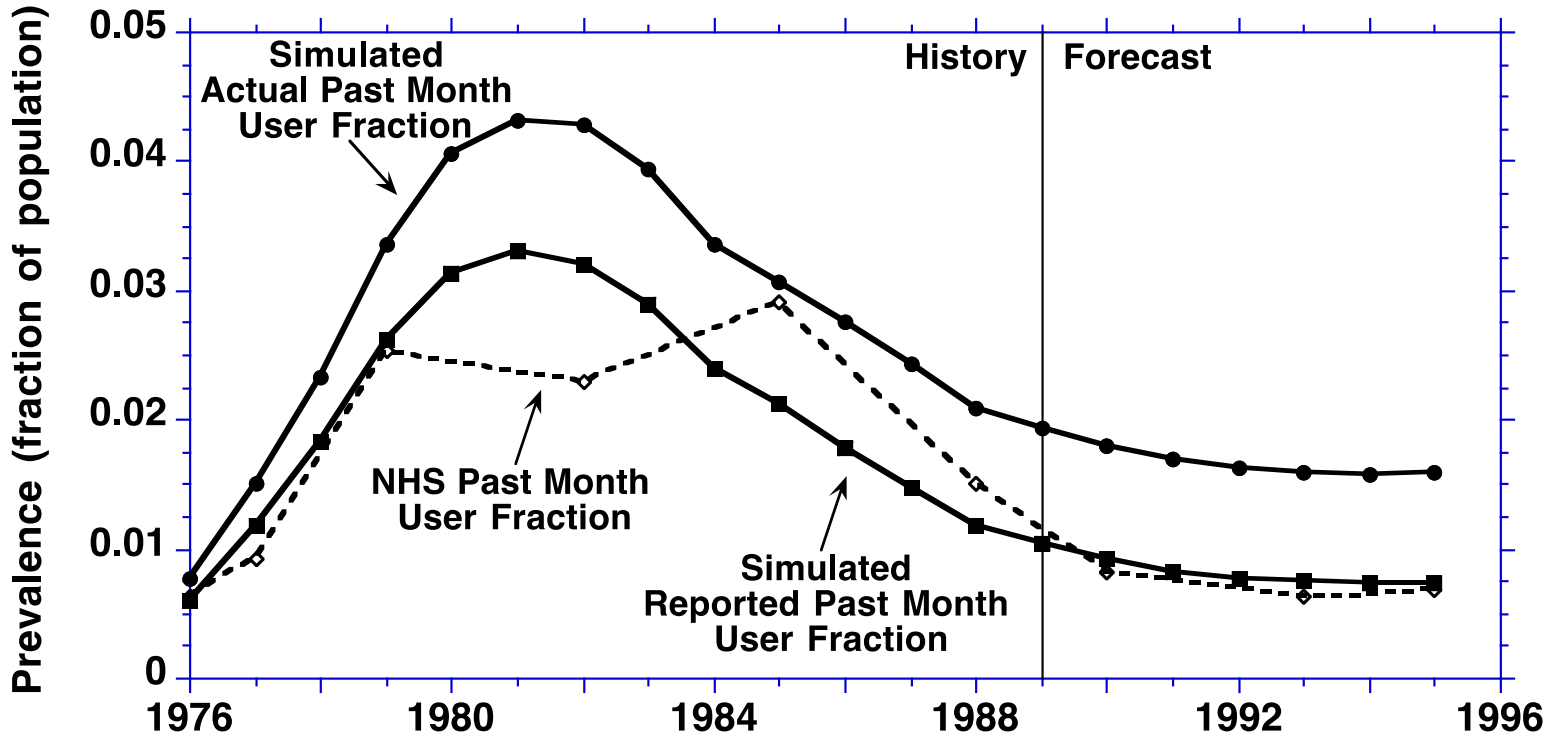
References

- Avraham Shtub, Jonathan F. Bard, Shlomo Globerson, "Project management : engineering, technology, and implementation", Englewood Cliffs, NJ, Prentice Hall, 1994
- Frederick E. Gould, Nancy Joyce, Chapter 8, "Construction project management", Upper Saddle River, NJ, Prentice Hall, 1999
- James M. Lyneis *, Kenneth G. Cooper, Sharon A. Els, "Strategic management of complex projects: a case study using system dynamics", System Dynamics Review, Vol. 17, No. 3, 2001
- Christopher M. Gordon, "Choosing appropriate construction contracting method", J. of Construction Engineering & Management, Vol. 120, No. 1, 1994
- Feniosky Pena-Mora, Jim Lyneis, "Project control and management", MIT 1.432J Lecture Material, 1998
- Barrie, D.S., and Paulson, B.C., "Professional Construction Management", McGraw Hill, 1992
- Halpin, D.W., "Financial and Cost concepts for construction management", John Wiley & Sons, 1995
- Yehiel Rosenfeld, "Project Management", MIT 1.401J Course Material, 2000
- Sarah Slaughter, "Innovation in construction", MIT 1.420 Course Material, 1999
- Gray and Hughes, "Building Design Management",.
- Murdoch and Hughes, "Construction Contracts: Law and Management", E&FN SPON, 1996
- Gray, Hughes and Bennett, "The Successful Management of Design", Reading, 1994
- Sterman, J., "Business Dynamics", Mcgraw-Hill, 2000