

## SCIENCE'S COMPASS

mal Welfare Act (AWA). The survey question the authors use to justify this conclusion, however, is biased. Respondents are asked whether these animals should "receive AWA protection."

Use of the term "protection" blurs the concepts of "care" and "AWA coverage/regulation." With the question framed as one of "AWA protection" versus "no protection," respondents to the survey are not given an option of affirming the support for the ethical care and use of animals under current regulations (namely, those of the Public Health Service).

HOWARD H. GARRISON\*

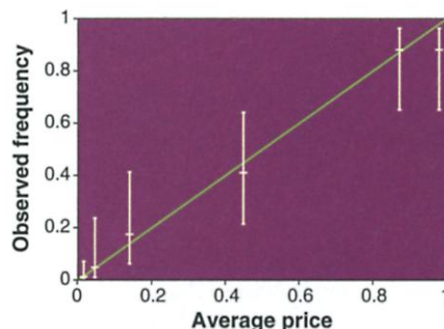
Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, MD 20814-3998, USA

\*Director of the Office of Public Affairs

## The Real Power of Artificial Markets

ASSESSING THE PROBABILITIES OF FUTURE events is a problem often faced by science policymakers. For example, CERN, the European laboratory for particle physics, recently had to judge whether the probability of discovering a Higgs boson was

high enough to justify extending the operation of its collider (see *Science*, 22 Sept., p. 2014, and 29 Sept., p. 2260). At the Foresight Exchange (FX) Web site (<http://www.ideosphere.com/>), traders can actually bet on the outcomes of unresolved scientific questions, including whether physicists will discover the Higgs boson by 2005. The going price of the security (0.77 as of 24 January) can be seen as the market's assessment of the probability of the particle's discovery. FX is only a game, run with play money (FX dollars). Empirical studies (1), laboratory in-

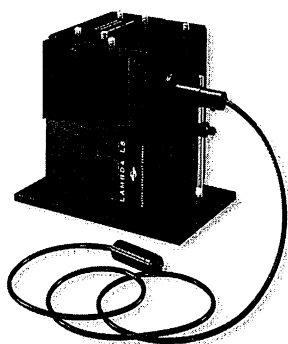


Past prices of securities in the play-money FX market accurately forecast true outcome frequencies for scientific and societal questions.

vestigations (2), and policy proposals (3) suggest that prices of real-money securities do constitute accurate likelihoods, because traders have strong (monetary) incentives to leverage pertinent information. But can we place legitimate credence on the accuracy of FX prices, which are determined solely through competition in a play-money market game?

To an extent, yes. We find that FX prices strongly correlate with observed outcome frequencies. We collected historical price information for 161 expired securities, corresponding to questions that had been definitively answered "yes" or "no," recorded prices 30 days before expiration, sorted securities by price, and grouped them into six price ranges. The figure is a plot of observed frequency (the actual number of "yes" securities divided by the total number) versus average price (in FX dollars) for each group. Error bars display 95% confidence intervals, under an assumption that outcomes are independent Bernoulli trials with a uniform prior. We find similar accuracy in another play-money market called the Hollywood Stock Exchange (<http://www.hsx.com/>). Prices of securities in Oscar, Emmy, and Grammy awards correlate well with actual

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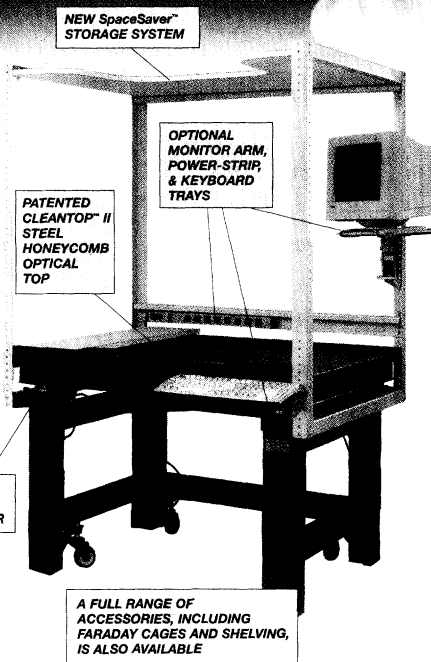
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V I B R A T I O N S O L U T I O N S



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award outcome frequencies, and prices of movie stocks accurately predict real box office results.

DAVID M. PENNOCK,<sup>1\*</sup> STEVE LAWRENCE,<sup>1</sup>  
C. LEE GILES,<sup>2</sup> FINN ÅRUP NIELSEN<sup>3</sup>

<sup>1</sup>NEC Research Institute, 4 Independence Way, Princeton, NJ 08540, USA. <sup>2</sup>School of Information Sciences and Technology and Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA 16801, USA. <sup>3</sup>Informatics and Mathematical Modeling, Technical University of Denmark, DK-2800 Lyngby, Denmark.

\*To whom correspondence should be addressed.

E-mail: dpennock@research.nj.nec.com

### References and Notes

1. R. Forsythe, T. A. Rietz, T. W. Ross, *J. Econ. Behav. Organ.* **39**, 83 (1999).
2. C. R. Plott and S. Sunder, *Econometrica* **56** (no. 5), 1085 (1988).
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## CORRECTIONS AND CLARIFICATIONS

**PERSPECTIVES:** "What drives societal collapse?" by H. Weiss and R. S. Bradley (26 Jan., p. 609). The Harappan 3B civilization of the Indus valley was mistakenly referred to in the first column on p. 610 as Harappan C3.

**POLICY FORUM:** "The future of the Brazilian Amazon" by W. F. Laurance *et al.* (19 Jan., p. 438). In the second column on p. 439, the notes (3–5) cited in the top paragraph should have been (3, 4, 6), and note (8) cited in the third paragraph in this same column should have been (9).

**BOOKS ET AL:** "Rhetoric and the math melodrama" by D. F. Wallace (22 Dec., p. 2263). In note 4, the superscripts in the equation pertinent to Fermat's Last Theorem were set on the line. The equation should have read  $x^n + y^n = z^n$ .

**RANDOM SAMPLES:** "Science and technology medals awarded" (24 Nov., p. 1495). The beginning of the second paragraph should have read, "Until a few decades ago...all life was divided into prokaryotes and eukaryotes," not "divided into plants and animals."

## Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted by e-mail (science\_letters@aaas.org), the Web (www.letter2science.org), or regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.