

Date: Fri, 25 Sep 2009 12:34:02 -0400To: "Dr. Baruch Fischhoff - Chair, Social Science Analysis for National Security Project" <baruch@cmu.edu>,  
From: Lloyd Etheredge <lloyd.etheredge@yale.edu>

**Subject: 17. Predator/Prey Models: Forecasting a Global  
Financial System with Asymmetries of Brainpower  
and Money**

Dear Dr. Fischhoff:

Thank you for your email message and discussion of your plans. I am forwarding an analysis for President Obama's Council of Advisers on Science & Technology concerning problems of moving at maximum speed to diagnose and correct whatever went wrong in all of the agencies & institutions - including the intelligence agencies - whose explicit or implied job was to keep us from waking up one morning to discover that the worst global economic crisis since the Depression was underway.

The list includes the US intelligence agencies (spending, now, about \$75 billion/year), the Treasury Department, Federal Reserve system, SEC, the Council of Economic Advisers and National Economic Council; the Joint Economic Committee, CBO forecasters and oversight Committees and staffs of both the House and Senate; the National Science Foundation/National Science Board and their advisory committees (as you know, the National Academy of Sciences runs CNSTAT, a key advisory committee for innovations in economic statistics), our scientific and professional societies, research universities, leading and trusted newspapers, professional journals, and other information age new media. Beyond the water's edge: the International Monetary Fund and World Bank (with *lots* of Ph. D.'s too) and many, many counterpart national government/academic/media institutions in all major countries.

These people and institutions were supposed to be reality-connected.

We have not begun to come to terms with these institutional failures. - I assume that

the urgent improvement of the intelligence community's international economic models/forecasts is within your mandate. As you may know, Admiral Blair has [correctly, in my view] decided that the stewardship of the scientific/academic world was unacceptable and has tasked Leon Panetta to rethink economic theory, rebuild economic forecasting and data systems [probably using covert methods in the case of the shadow banking systems of the world] and give a daily brief to the President (a decision referenced briefly in the attached article). But I don't think this is going to work unless you diagnose why our Best & Brightest scientific/academic world failed so catastrophically and recommend a better (e.g., joint) solution.

Lloyd Etheredge

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September 1, 2009

Dr. John Holdren, Co-Chair  
President's Council of Advisers on Science and Technology  
1650 PA Ave., NW – Old EOB  
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&

Dr. Eric Lander, Co-Chair  
President's Council of Advisers on Science and Technology  
Broad Institute – Room 6013  
7 Cambridge Center  
Cambridge, MA 02142

&

Dr. Harold Varmus, Co-Chair  
President's Council of Advisers on Science and Technology  
c/o Memorial Sloan Kettering Cancer Center  
1275 York Ave.  
New York, NY 10065

## Re: PCAST and Better Economic Performance

Dear Drs. Holdren, Lander, and Varmus:

Scientific leadership can help to navigate the current economic crisis and strengthen economic performance. We need a light touch of high-level leadership by PCAST to get projects underway.

There are three dimensions of new opportunities: 1.) a better system of trustworthy institutions; 2.) better economic theory/social science; 3.) strong, pro-scientific, advocacy to move beyond an era of mindlessness and complacency.

PCAST's members are among the best people in the country to think boldly and strategically about scientific leadership and (e.g., Drs. Shaw and Levin) to organize needed projects, especially at a time when government Departments are focusing on Emergency Room responses that we hope will work.

### **I. Institutional Failures and Design Opportunities.**

Nationally (and internationally) there are an extraordinary number of institutions whose explicit (or implied) responsibility is to keep us from waking-up one morning and discovering that the worst national/global economic crisis since the Depression is underway: the Treasury Department, Federal Reserve system, SEC, a Council of Economic Advisers and National Economic Council; the Joint Economic Committee, CBO forecasters and oversight Committees and staffs of both the House and Senate; the National Science Foundation/National Science Board and their advisory committees, our professional societies, and research universities; leading and trusted newspapers, professional journals, and other information age news media. Beyond the water's edge: the International Monetary Fund and World Bank; and many, many counterpart national government/academic/media institutions in all major countries. These people and institutions were supposed to be reality-connected.

We have not begun to come to terms with these institutional failures.

### **II. Scientific Failures and Upgrade Opportunities**

I enclose a letter (12/23/2002) from Dr. Robert Reischauer, former Head of CBO (and a member of the Executive committee of Harvard's Board of Overseers) and also a column by John Kay, "67 Ways to Guess Gross Domestic Product" (Financial Times, 11/1/2005, p. 17) that provide an historical snapshot, for non-specialists on PCAST, of known scientific erosion. Our problems are much worse than neglect of financial sector models: We have a changing and faster world (from national, steel plant/manufacturing economies to a global, information age economy) with outdated conceptual models and data systems (and key government data that are collected slowly and become mostly reliable only many months too late). More than a decade ago, Alan Greenspan was warning Congress that economists had passed the point of diminishing returns for research based on the existing government datasets. Since then, government forecasts – i.e., not just of the current crisis – have worsened as the older scientific models and data systems have continued to lose their grip on a changing world.

Last-generation macroeconomic theorists admired the fixed-coefficient equations of Newtonian physics. But today's new global economy looks more like a complex – evolving - biological system.

For example, it would be easy to sketch a competing model that national political systems and economies live – today – in a still-evolving global financial ecosystem that can be modeled by the Lotka-Volterra equations for a predator-prey system. Our national political systems, economies, and taxpayers are the prey. In each cycle, weaker predators disappear and the alpha predators survive and grow stronger.

As a background to their review of current government learning plans you might want to brief PCAST members that [while it has not been reported prominently by the Times or PBS] the current economic crisis is not unique. From the late 1970s through 2003 the world has had (according to IMF data) 117 systemic banking in 93 countries in which much or all of the capital of the system was exhausted. In Martin Wolf's assessment (Fixing Global Finance, Johns Hopkins UP, 2008, pp. 32-33) the banking industries developed strategies of privatizing their gains during the upside of financial bubbles, then secured government bailouts from taxpayers as losses during the crisis phase became large enough to wipe-out remaining bank equity and destroy the economy. In 27 of the earlier crises, taxpayers were stuck with added public debt equal to, or greater than, 10% of GDP, often much more (given current projections, the US will be at the high end). The problem is not "irrational exuberance" (i.e., of the prey, in the classic predator-prey model) but a modus operandi, a set of dots that we need good science to connect. A good Lotka-Volterra investigation would rewrite the textbooks in political science and economics; it is just one of many opportunities for Nobel Prizes in economics implicit in the current crisis.<sup>1</sup>

- If we suddenly awoke to discover that the established coefficients and models of the physical universe had changed, an energized (and, perhaps, scared) NSF would shift immediately into a fast discovery mode to develop new R&D data systems, underwrite teams of researchers, and solve the problem. But I think PCAST will be surprised by how little leadership is available. We need PCAST's leadership so that the many failed/responsible institutions begin to work together, with effective leadership and resources for new R&D data systems, and a mandate for fast discovery science.

### **III. Moving Beyond an Era of Mindlessness**

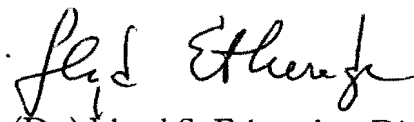
Social sciences were marginalized, and our national capacities began to erode, in the first Reagan Administration. New economic data systems and research were a (partly, unintentional) victim in a larger lobbying drive for economic deregulation. The strategy has included new "think tanks" in Washington, appropriating academic symbols of prestige like endowed Distinguished Chairs and stacks of publications; a decision to launch a loud "culture war" of ideas and media attacks to replace the movement for evidence-based social, health, economic, and international policies; and acquiring new broadcast capabilities. In America, \$300+ million was spent for lobbying to secure deregulation of the banking and other industries (and another \$370 million to continue and sustain the process –

for example, to defeat re-regulation legislation as the recent housing bubble began to grow.)<sup>2</sup>

Democratic political institutions (here *and* abroad) and our institutions for advocating steady scientific progress have not been designed for the amount (and asymmetries) of money and brainpower in the system.

One of the opportunities for a strong PCAST – and a role that I hope you will consider - is to become a pro-science advocate, identifying important opportunities for evidence-based and effective public policy to recover, protect, and strengthen economic growth.

With my best regards,



(Dr.) Lloyd S. Etheredge, Director  
Government Learning Project

Cc: Members, PCAST (Bierbaum, Cassel, Chyba, Gates, Jackson, Levin, Mirkin, Molina, Moniz, Mundie, Penhoet, Press, Savitz, Schaal, Schmidt, Schrag, Shaw, Zewail)

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<sup>1</sup> Leaders of the largest hedge funds (etc.) appear to be smarter and more purposive at what they are doing than most governments of the world. They also hire very smart people, with financial rewards and challenging work, and can create, organize, and leverage financial assets to wield a new level of economic power. The Lotka-Volterra asymmetries of brainpower and money should be included in any social science model of how the world has been changing. The US GDP is only about \$14 trillion but the total value of bank deposits and equities in the world grew rapidly to more than \$241 trillion (in 2007; from \$123 trillion in 2003 – much faster than world GDP ) before the current crisis. Assets controlled by a small number of the largest sovereign wealth and hedge funds probably exceed the US GDP. The ability to move even a fraction of this wealth across national boundaries begins to change the equation of political power.

<sup>2</sup> The problem is not merely campaign contributions but money to hire superbly capable lobbyists and strategists – former staffers and Committee members, and others with an intimate knowledge of government processes and key individuals (what they care about, who they listen to, how to make a case.) For lobbying details: Center for Public Integrity, Who's Behind the Public Meltdown? (2009), online at [www.publicintegrity.org](http://www.publicintegrity.org)) and T. Mann & N. Ornstein, The Broken Branch, (2008 reprint), Oxford UP. The strategic success in 2001, esp. in electing the 2001 Congress, was the tipping point in securing mindlessness.

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**ROBERT D. REISCHAUER**  
President

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December 23, 2002

Dr. Lloyd S. Etheredge, Director  
Government Learning Project  
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P. O. Box 208215  
New Haven, CT 06520-8215

Dear Dr. Etheredge:

Thank you for your letter and thoughtful attachment. I am in complete agreement that the economic data we collect has significant deficiencies that limit our ability to understand the economy's problems and chart future policy.

We don't collect some information that is needed and gather much that we could do without. We collect other data in insufficient detail and almost always take too long to release the data for it to be useful in policy decisions.

As you know better than I, there are many reasons for this situation. What we collect and how we collect it reflects the forces at play in the first half of the last century and those forces do not want to give anything up. Congress has little interest in devoting more scarce budget resources to collect new and better information. Few economists who use the data appreciate its limitations. They have been raised on certain data sets and treat them as if they are part of the underlying environment, not subject to change. They put a premium on continuity and don't want discontinuity in the data sets they know and use.

I don't think I would be as critical as you are about CNSTAT/NCR. I don't think they would have much of an impact even if they had done the studies and made the recommendations you think warranted. Nor do I think universities (Yale or Harvard) or the Fed could make much of a dent in the problem. Rather, I think a presidential or congressional study commission is called for—one with a clear mandate and a promise that added resources will be devoted to strengthening the statistical system based on the commission's report. Unfortunately, the prospects for such an initiative rising to the top of policymakers' lists of things to do is very, very low.

Nevertheless, I wish you well in your efforts.

Sincerely,



Sixty-seven ways to guess Gross Domestic Product  
by John Kay

[01 November 2005 Financial Times, p. 17]

The private value of predicting official statistics before their release is large but its social utility is zero, which is why procuring it is at once the best paid and most futile form of economic research.

At 8am last Friday, the Bloomberg financial information service carried 67 different predictions of US gross domestic product growth in the third quarter. The median was 3.6 per cent. At 8.30am, the Bureau of Economic Analysis issued its official estimate of 3.8 per cent. This modest difference was well received by the market: the Dow Jones index rose immediately by 50 points and was up 170 points – almost 2 per cent – on the day.

As the figure was announced there were cheers in some dealing rooms, commiserations in others. Wall Street economists who get these numbers right earn large bonuses: those who miss the mark soon miss their salary cheques as well.

Although these 67 figures are described as estimates of GDP growth, none of the 67 houses had really made an independent assessment of trends in American national income. The figures compiled by the BEA are based on extensive data collection using the legal powers, moral authority and financial resources of the US government under assurances of confidentiality. Such an exercise could not easily be replicated by any research firm or investment bank and is not.

Moreover, if anyone did try to measure GDP independently of the federal government, it is likely that they would come up with a substantially different answer. The official statistics are based on samples, cover only a fraction of economic activity and are open to considerable revision. The BEA's own assessment is that this figure will be revised by up to 1-2 per cent on two-thirds of occasions. It is therefore more likely than not that the number – itself still an estimate – will be outside the range of between 3 per cent and 4 per cent which included almost all analysts' judgments and the BEA's own provisional figure. If an infinitely knowledgeable analyst actually established the correct answer, his

prediction would probably be off the chart: not just in this quarter, but every quarter. He would soon lose his job.

How is it that all estimates are so close together when the underlying uncertainties are so large? The 67 teams of analysts are not trying to guess what actually happened to American national income in the third quarter. The traders who use their figures do not want an estimate of what is really going on: they want an estimate of what the BEA will announce. And so the economists who service them are trying to guess the number in the press release. Their main source is other statistics that the BEA has already issued. That is why their judgments, although not necessarily right about the economy, are close to the actual BEA figure. Their analysis is also influenced by the numbers posted by the other 66 analysts. It is dangerous to be right, but safe to be conventional.

The lazy equity analyst focuses on trying to anticipate quarterly earnings announcements, forming a symbiotic relationship with company finance officers and investor relations people who are trying to massage market expectations. A better observer can sometimes add value by penetrating corporate public relations and obtaining his or her own information.

But the BEA is trying to find the truth and is better placed to do so than any Wall Street economist. The bureau is not concerned to please the market and, unlike companies, is serious about confidentiality. Financial economists might as well be lazy since they have little to add to the work of the bureau. Correctly predicting the official estimate 30 minutes before its release may be profitable but contributes nothing to our understanding of the economy. The private value of such information is large but its social utility is zero, which is why procuring it is at once the best-paid and most futile form of economic research.

Keynes likened professional investment to a beauty contest, in which "it is not a case of choosing those which are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligence to anticipating what average opinion expects the average opinion to be". And it is so, to the power of 67.

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Table 2 - Systemic Banking Crises (1970-2008)  
Three-Year Moving Average

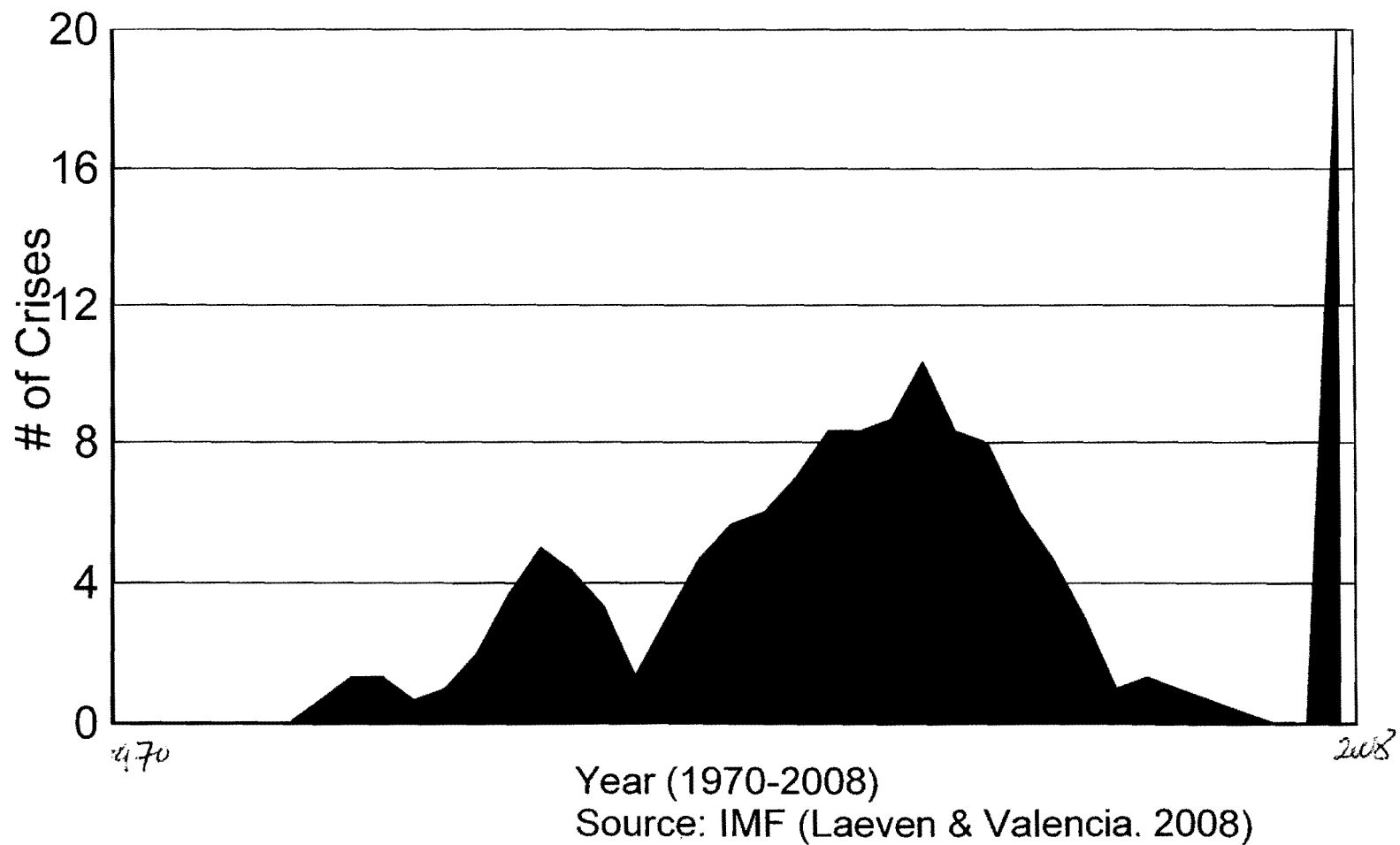


Table 3. Selected Indicators on the Size of the Capital Markets, 2007  
(In billions of U.S. dollars unless noted otherwise)

	GDP	Total Reserves		Stock Market Capitalization		Debt Securities		Bank Assets		Bonds, Equities, and Bank Assets <sup>2</sup> (in percent of GDP)
		Minus Eqd <sup>1</sup>	Capitalization	Public	Private	Public	Private	Total		
World	54,849.9	6,449.1	65,105.6	28,629.3	51,585.8	80,215.1	95,168.5	241,089.3	439.6	
European Union	15,741.1	279.7	14,720.8	8,779.3	19,432.3	28,210.5	48,692.0	81,493.5	589.7	
EU area	12,220.6	172.1	10,940.1	7,958.4	15,397.8	23,004.2	35,897.1	68,141.5	557.6	
North America	15,243.6	100.5	22,108.8	7,419.2	24,481.9	31,911.1	13,851.9	67,871.8	443.2	
Canada	1,453.1	6.8	12,865.8	1,853.3	12,865.8	12,865.8	6,432.9	19,308.7	144.3	
United States	13,790.5	93.7	10,242.9	5,565.9	23,725.8	30,325.9	11,684.0	41,649.8	300.9	
Japan	4,384.4	952.8	4,863.8	7,147.7	2,068.0	9,213.7	10,086.9	23,064.3	548.6	
Memorandum items:										
EU countries										
Austria	371.2	10.7	236.4	217.3	438.4	655.6	615.9	1,508.0	406.2	
Belgium	459.0	10.4	404.4	508.7	547.5	1,054.2	2,324.4	3,080.0	654.1	
Denmark	310.5	32.5	309.9	82.5	113.9	707.2	1,082.4	2,080.5	670.1	
Finland	212.1	1.2	210.9	13.5	15.2	15.2	15.2	15.2	15.2	
France	2,591.8	45.7	2,737.1	1,447.2	2,823.1	4,370.7	10,230.4	17,338.3	650.3	
Germany	3,320.8	44.3	2,105.2	1,700.3	3,302.3	5,802.7	6,800.1	14,308.0	430.8	
Greece	312.8	0.6	285.0	453.8	134.0	587.8	513.0	1,365.7	438.7	
Ireland	281.2	0.8	143.9	58.9	577.5	1,830.7	2,352.1	900.4	304.4	
Italy	2,117.5	28.4	1,072.5	2,018.0	2,183.9	4,202.9	4,336.0	8,611.5	453.9	
Luxembourg	49.7	0.1	166.1	0.0	94.6	2,014.0	3,689.0	1,608.3	3,234.4	
Netherlands	777.2	10.3	574.5	315.6	1,689.4	2,014.0	3,689.0	6,457.6	659.8	
Portugal	144.0	11.3	178.9	58.0	2,582.9	3,142.9	2,720.4	1,871.5	539.5	
Spain	1,453.8	27.0	1,581.6	168.6	483.1	651.6	684.3	1,832.8	423.9	
Sweden	2,803.4	49.0	3,851.7	913.5	2,928.0	3,841.5	11,655.0	19,348.2	680.2	
United Kingdom	2,803.4	49.0	3,851.7	913.5	2,928.0	3,841.5	11,655.0	19,348.2	680.2	
Emerging market countries <sup>3</sup>	17,270.8	4,084.7	20,860.2	5,001.3	2,786.5	7,786.9	18,258.1	47,085.2	272.2	
China										
Asia	7,680.4	2,138.8	13,782.7	2,645.8	1,826.9	4,472.7	11,620.2	28,875.6	389.0	
Latin America	3,841.0	445.2	2,292.2	1,456.5	628.5	2,065.1	2,260.8	6,638.1	182.3	
Middle East	1,557.8	312.6	1,275.9	39.5	84.3	1,335.6	1,335.6	2,735.3	175.6	
Africa	1,107.7	289.5	1,181.7	89.0	78.9	1,680.0	864.5	2,214.2	201.0	
Europe	3,289.9	848.6	2,417.6	770.4	178.9	947.3	2,177.0	5,541.9	168.5	

Sources: World Federation of Exchanges; Bank for International Settlements; International Monetary Fund; International Financial Statistics (IFS) and World Economic Outlook database as of April 16, 2008; ©2008 Bureau van Dijk Electronic Publishing-Bankscope, and Standard & Poor's Compustat Global Vantage (IFS) and World Economic Outlook database as of April 16, 2008.  
<sup>1</sup>Sum of the stock market capitalization, debt securities, and bank assets.  
<sup>2</sup>The aggregate comprises the group of Other Emerging Market and Developing Countries defined in the World Economic Outlook, together with Hong Kong SAR, Israel, Korea, Singapore, and Taiwan Province of China.  
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IMF, Global Financial Stability Report  
 4/2009, p. 177

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Source: IMF, Global Financial Stability Report 9/2004 edition.