

Effects of the global warming alarm: An application of the structured analogies method

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Objectives for the talk

1. To describe evidence leading to the conclusion that alarm over “dangerous manmade global warming” is a political movement.
2. To forecast the effects of this movement.
3. To seek your suggestions and comments.*

*Contact me at armstrong@wharton.upenn.edu.

About Scott Armstrong

Involved in forecasting for almost 50 years.

A founder of the two major forecasting journals.

Author of *Long-Range Forecasting (1978)* and of the *Principles of Forecasting* handbook (2001). Founder of forecastingprinciples.com – and of the pollyvote.com.

A “climate scientist”? I follow the scientific method and I study climate forecasting

Outline for the talk

1. Analysis of the

forecasting procedures, and

validation of global warming forecasts

2. Forecasting the effects of the global warming movement using structured analogies

Full-text papers at publicpolicyforecasting.com

Conclusions with respect to the forecasting process

There are no scientific forecasts of

- (1) Manmade global warming, or
- (2) Net harmful effects due to warming, or
- (3) Net beneficial effects from proposed policies.

Forecasts of dangerous manmade global warming are the product of an anti-scientific political movement.

Why anti-scientific?

Manmade global warming alarm not based on scientific forecasting methods. They lack:

1. Justification for the forecasting methods
2. Objectivity*
3. Testing alternative hypotheses*
4. Fully disclosing methods and data*

Furthermore, the advocates made no proper attempts to validate the forecasts.

* Noted for years by skeptics; also see "ClimateGate," "GlacierGate,"

Forecasts based on a claim that nearly all scientists concur on the dangers of manmade global warming

But...

Voting by scientists is not a scientific approach to forecasting.

Moreover, the claim that “nearly all scientists believe there is a serious threat from manmade global warming” is vague. What % is “nearly all?”

Climate scientists from a 27 country survey were not confident that scientists are able to make reasonable predictions of climate for 100 years (73%) – or even 10 years (68%)
(Bray & von Storch 2007)

U.S. Senator Inhofe’s 700+ list of dissenters

Manhattan Declaration: 1,000+ skeptical scientists

“Robinson Petition”: 31,000+ American scientists dispute GW

No comparable lists of scientists who support GW.

“Robinson petition” states. . .

“ . . . no convincing scientific evidence that human release of carbon dioxide . . . or other greenhouse gasses is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of . . . climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon . . . the Earth.”

<http://www.oism.org/pproject/>

Are “alarmed scientists” opinions based on studies?

- *The Claim*: Published journal articles show almost all climate scientists believe in dangerous manmade global warming (Oreskes 2004 claimed that *none* of 928 “global climate change” abstracts rejected GW).
- Oreskes survey was found wanting by Peiser (2005), and
- Schulte (2008) found 6% of 539 papers rejected GW while 7% explicitly endorsed GW.
- *Climate Change Reconsidered: The Report of the Nongovernmental International Panel on Climate Change*, Idso & Singer (2009) offers analyses of the claims by climate scientists.

Do scientists' opinions provide accurate forecasts?

Research over nearly 80 years has shown that experts' *unaided opinions** are irrelevant for forecasting for problems that involve...

- high uncertainty
- complex situation
- poor feedback

* Unaided by scientific forecasting principles

Can experts make useful climate forecasts?

“Seer-sucker theory”:

Armstrong (1985) summarized studies: people with much expertise are no better than those with little expertise at forecasting change... in complex & uncertain situations.

Tetlock (2005) evaluated:

- 82,361 forecasts
- made over 20 years
- by 284 professional commentators and advisors on politics and economics

Expertise did not lead to better forecasts than those from students or from predicting no-change.

What about climate models?

- They are based on experts' opinions and judgments.
- They produce scenarios* not forecasts.
- Scenarios are not valid for forecasting. They create the impressions that events are much more likely than they are.*

* Scenarios are elaborate stories about the future that are told in the past tense.

Source: Gregory & Duran, in Armstrong (2001)

Audit of IPCC forecasts

IPCC “scenarios” of global temperature change used improper procedures. A forecasting audit* showed:

1. IPCC authors violated 72 of the 89 relevant forecasting principles (from a possible list of 140 principles).
2. Forecasts by scientists, not scientific forecasts.

*Green & Armstrong (2007). Global warming: Forecasts by scientists versus scientific forecasts. *Energy and Environment*, 18, 17-20.

Conditions for long-term climate forecasts

1. Climate is *complex*.
2. Much *uncertainty*:
 - causes of changes are disputed,
 - existence and direction of feedbacks not clear, causal factors are difficult to forecast (e.g., energy from the sun), data are subject to error.
3. No clear-cut trends (graphs of data follow...)

In such conditions, a simple no-change model is appropriate. (It violates a few principles. The violations can be corrected, but the gains in accuracy are expected to be minor.)

Longish temperature series

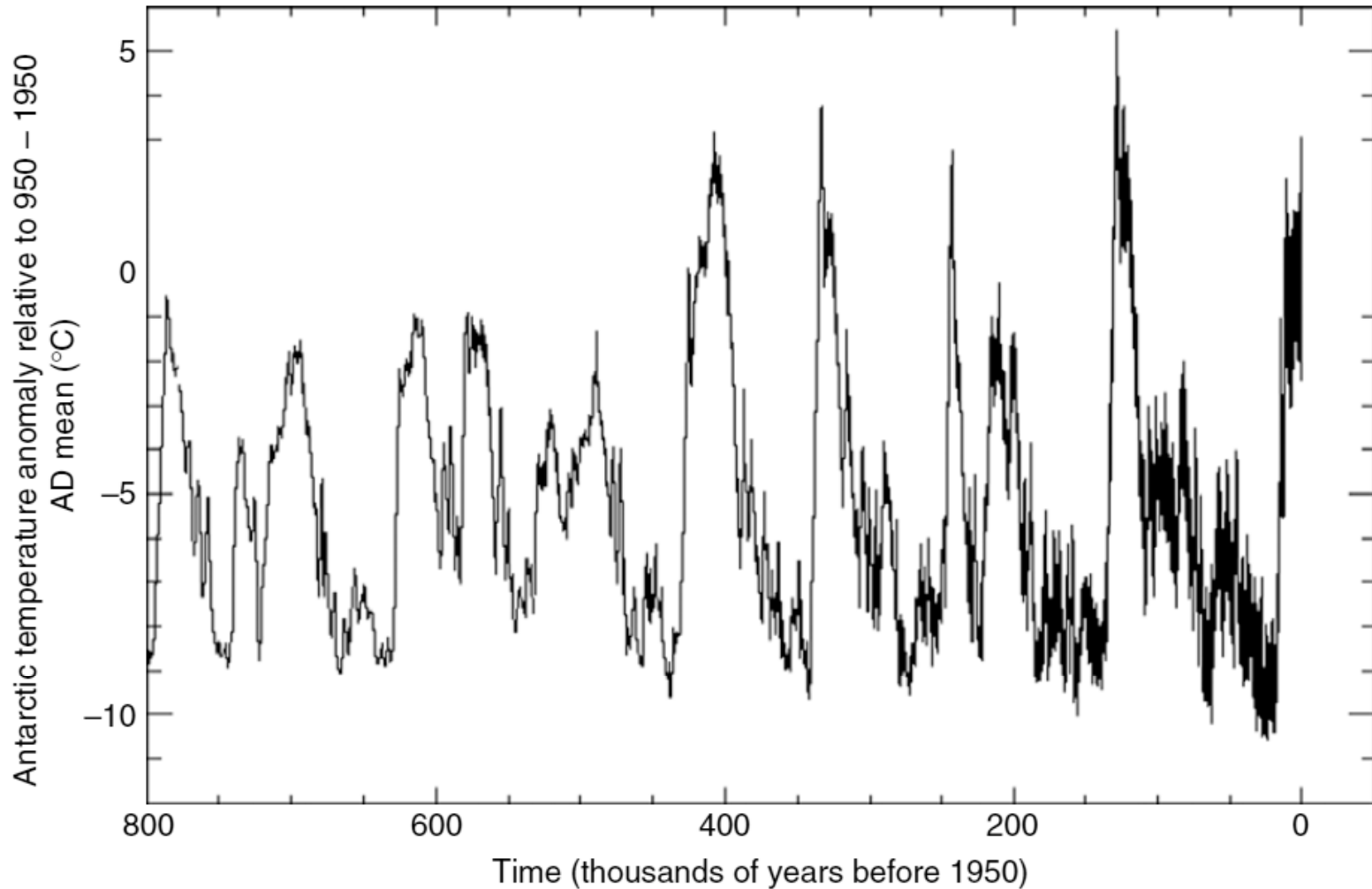
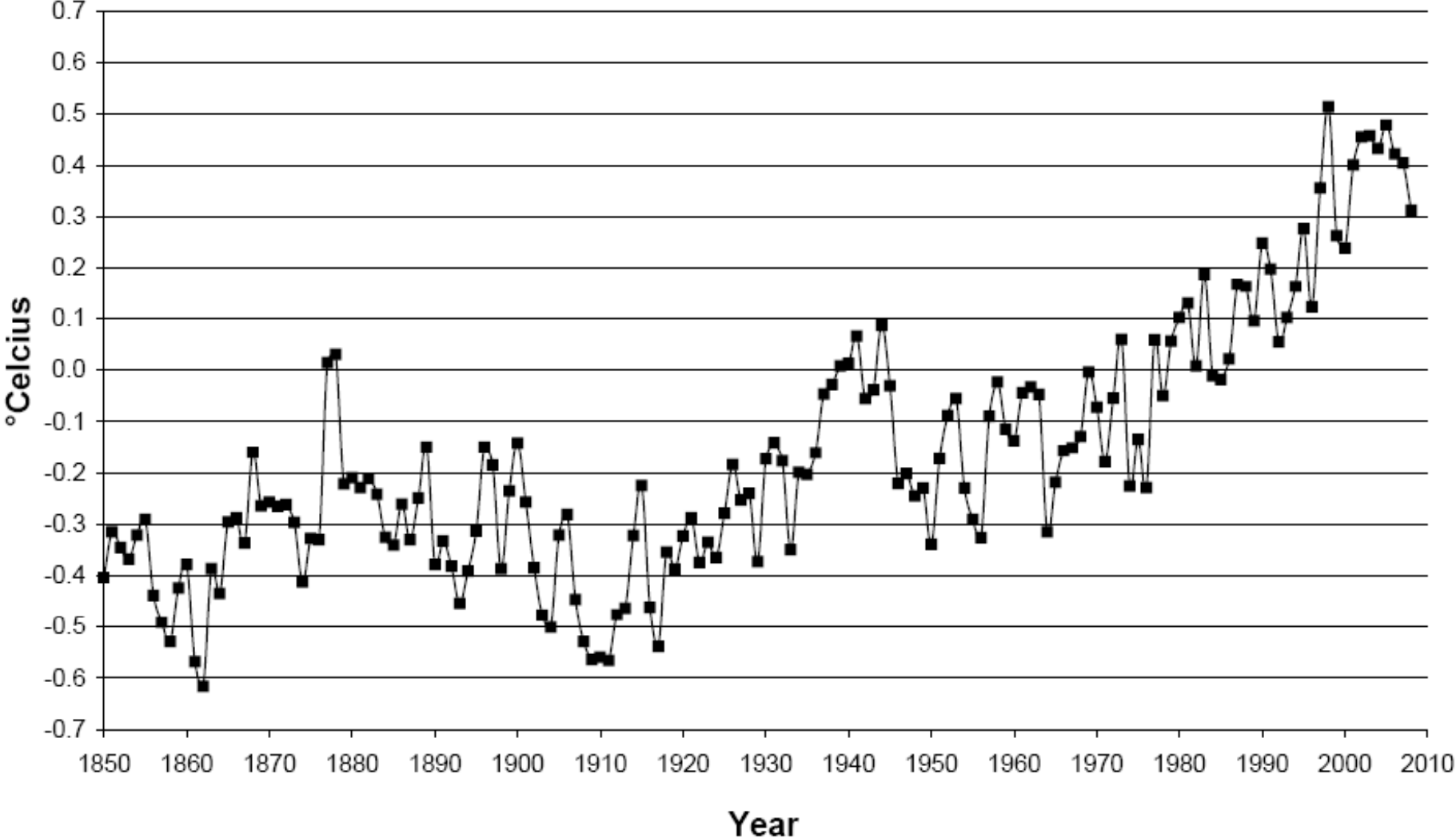


Fig. 1. 800,000-year record of Antarctic temperature change.

Hadley annual temperature 1850-2008

Global surface temperature deviation from 1961-1990 average



Hadley data at center of ClimateGate

Some scientists have concluded that the Hadley data are biased to inflate warming due to:

1. changes in instrumentation
2. heat island effects
3. poor maintenance of weather stations
4. elimination of weather stations
5. falsification of data via biased and unsupported “adjustments.”

Attempted validation of the IPCC forecasts

1992 IPCC report's 0.03°C/year linear projection

We tested IPCC vs. no-change model for 1851 through 2008 (simulated *ex ante*)*

** IPCC model has the advantage because it was "fitted" to these data*

Design of validation test

- Used UK Hadley Centre's best estimate of global mean temperatures from 1850 through 2007 (HadCRUt3)
- Forecast for up to 100 subsequent years on rolling horizon:
 - 157 one-year-ahead forecasts
 - 58 hundred-year-ahead forecasts
 - 10,750 forecasts across all horizons
- Absolute errors calculated vs. 'actual' (taken as "HadCRUt3")

IPCC performance 1851-1975 *

IPCC/No-change error ratio** < 1 means forecast errors are smaller (better) than no-change errors

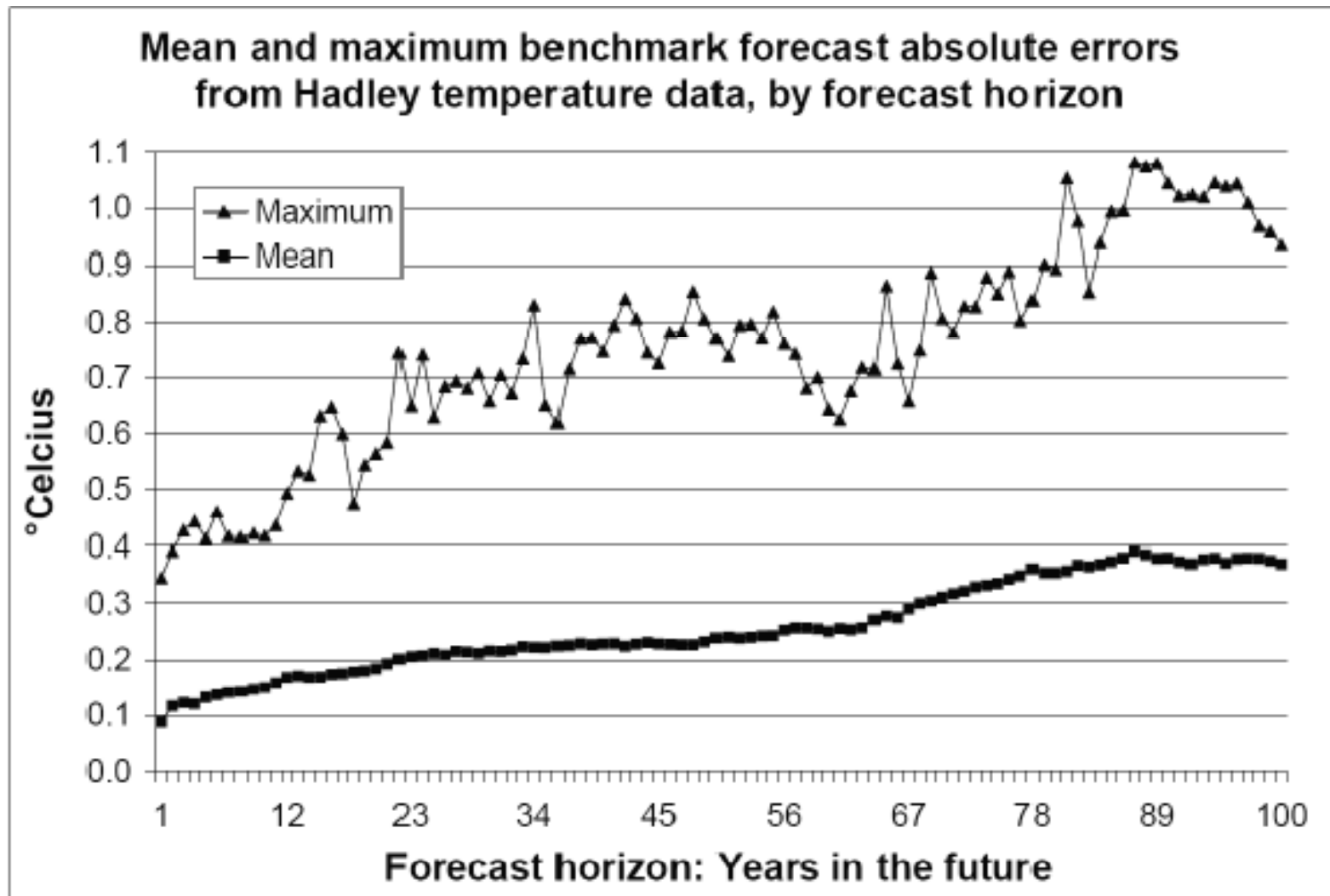
IPCC/No-change Error

	<u>Ratio</u>	<u>n</u>
Rolling (1-100 years)	7.7	10,750
1-10 years	1.5	1,205
41-50 years	6.8	805
91-100 years	12.6	305

* Green, Armstrong & Soon (2009). Validity of climate change forecasting for public policy decision making. *IJF*, 25, 826-832.

** A.k.a. Cumulative Relative Absolute Error or CumRAE

No-change model forecast errors



Correlations between global temperatures and upwardly trending time series

<u>Series</u>	<u>Correlation</u>
Atmospheric CO ₂ 1850-2008	0.86
U.S. Price Index 1850-2009	0.85
NOAA* expenditure 1970-2006	0.82
No change model	0.00

*National Oceanic and Atmospheric Administration

Fit not related to forecast accuracy

Results from this validation study consistent with research on time-series forecasting:

	<u>correlation</u>	<u>Error ratio</u>
Naïve model	0.00	1.0
IPCC	0.86	7.7

Is global warming good or bad?

- When the “CO₂ causes warming theory” was proposed, in the early-1900s (by the Swedish Nobel Prize winner, Svante Arrhenius), he expected that the effects to be beneficial.
- For a review on what is known about the effects of climate change, see Idso & Singer (2009) *Climate Change Reconsidered*.

Ill-conceived attempts to forecast the effects of GW

Our audit of the two key government reports on the effects of global warming on polar bear numbers showed that they properly followed only 13% of relevant forecasting principles.

Rather than a sharp decrease, we forecast a modest increase in the polar bear population.

What is needed to forecast the effects of policies to stop climate change?

Scientific forecasts for alternative plausible policies:

- how they would actually be implemented
- all their effects
- all the costs and benefits of all their effects

Global warming is primarily a political issue

Forecasting about climate change for public policy decision makers is dominated by people with no knowledge of evidence-based forecasting methods.

Those who advocate drastic actions in response to predictions of dangerous manmade warming do not seem responsive to disconfirming evidence.

Forecasting the outcomes of a political movement

How to forecast the outcomes of a political movement that involves conflicts among various interest groups?

Rationality in GW

Scientists advocating GW do not use rational (cost/benefit) arguments.

Consider the statement by biology Professor Stephen Schneider of Stanford – who advocated for government action to prevent global cooling in the 1970s, and then to prevent global warming in the 1990s:

“each of us has to decide what is the right balance between being effective and being honest.”

He also said,

“we have to offer up scary scenarios.”

Forecasting by Structured Analogies

The *Structured analogies* method produces relatively accurate forecasts for situations involving conflicts among various interest groups.

The process facilitates learning from history by using analogies in an objective way.

Use of analogies in forecasting

Analogies are commonly used in an unstructured manner after the fact to support forecasts.

Analogies contain useful information and can aid forecasts if used by experts in a structured and unbiased manner. We call this “structured analogies.”

Prior evidence on structured analogies

Findings from forecasts for 8 diverse conflicts:

<u>Method</u>	<u>% accurate</u>
Guessing	28
Expert unaided judgment	32 (106)
SA with 2 or more analogies	56 (97)

Source: Green & Armstrong (2007). Structured analogies for forecasting. *International Journal of Forecasting*, 23, 365-376.

Structured analogies procedure for global warming

- 1. Identify possible analogies:* Experts with different viewpoints nominate analogies; literature review also used.
- 2. Screen for similarity:* Meet criteria? Outcomes known?
- 3. Code relevant characteristics of analogous situation:* Evidence on analogies' outcomes coded for analysis.
- 4. Forecast target outcomes:* Derived forecasts by using predetermined rule to select outcomes (e.g., use the outcome from an expert's self-assessed most similar analogy).

Criteria for selecting analogies to the dangerous manmade global warming alarm

1. Based on forecasts of material catastrophe arising from effects of human activity on the physical environment
2. Endorsed by scientists, politicians, and media
3. Accompanied by calls for strong action

Our statement of the problem

“The Intergovernmental Panel on Climate Change and other organizations and individuals have warned that unless manmade emissions of carbon dioxide are reduced substantially, temperatures will increase and people and the natural world will suffer serious harm. Some people believe it is already too late to avoid some of that harm.

Have there been other situations that involved widespread alarm over predictions of serious harm that could only be averted at considerable cost? We are particularly interested in alarms endorsed by experts and accepted as serious by relevant authorities.”

Progress on indentifying analogies for GW

Began search on 25 January 2009, and it is still in process.

To date, we have a list of 71 proposed analogies. Of these, we judged 26 to be relevant

Information on the analogies is available at publicpolicyforecasting.com.

Assess similarity

- Initial assessments by Green
- Assessments by Armstrong in process
- Independent assessments will be sought from experts
- Contact Kesten Green at kesten@me.com to participate

Relevant analogies

To date, we have tentatively identified 26 relevant analogies.

In prior research, impressive forecasts were made with only two relevant analogies per expert.

Six examples:

- DDT and cancer (*Silent Spring*) 1962
- Electromagnetic fields and Childhood Cancer 1979
- Acid Rain in the U.S. 1974
- Uncontrolled reproduction and degeneration (Eugenics) 1883
- Population growth and famine (Club of Rome) 1968
- Natural resource shortages and economic collapse 1974

Thumbnail sketches

- Prepare descriptions of about one page for each analogous situation.
- Obtain peer review by experts to improve objectivity, accuracy, and clarity.
- This process is still underway
- Descriptions of six analogies are posted at publicpolicyforecasting.com

Analogous forecasts unscientific

So far, none of the analogous alarms were based on scientific forecasts; they were based on experts' unaided judgments in the form of:

n

1.Unrealistic mathematical models:

3

2.Extrapolating an effect from a large dose to an alarmingly widespread effect at near-zero dose: 7

3.Extrapolating that a weak effect might become important over time or for a large population:

16

26

Forecasts from structured analogies

Among the 26 analogous situations, *government* intervention was called for in 25 (96%).

How accurate are forecasts of alarms?

For each of the 26 analogies, we identified a salient statement of the alarm (a forecast)...

Coded the accuracy of the forecasts

Preliminary coding, found:

19 of the forecasts were categorically wrong

7 of the other forecasts were wrong in degree

None of the forecasts were accurate

We invite you (and others) to code the analogies.

Government policies adopted

Among the the analogous situations that involved calls for intervention, government policies were implemented in 23.

Government actions involved:

- Increased government taxes

- Increased government spending

- Restricting individual liberties

Did government intervention help?

Among the 23 analogous situations in which policies were implemented:

	<u>n</u>
Harm was caused	20
Policies were ineffective/uncertain	3
Policies were effective	0

Structured analogies forecasts

Likelihood of

- a. forecasts coming true is negligible
- b. government action being harmful is 87%

Findings insensitive to the coding

To date, the forecasts behind alarms similar to the GW alarm were all coded as *inaccurate*. This finding has not been sensitive to the preliminary coding of which of the 71 analogies are relevant.

On the value of the scientific method

Forecasts do not yield to political laws or to scientists' opinions.

Thus, it is not surprising that the IPCC's political forecasts do poorly versus scientific forecasts.

Impressions from analogies

Another story for “*Extraordinary popular delusions and the Madness of Crowds*”?

Charles MacKay, 1841

- The alarm rate seems to be increasing over time
- Alarms tend to lose media attention rather than become publicly discredited
- Belief in alarms can persist indefinitely

Alarms based on bad forecasting are a familiar social phenomenon

“As soon as one predicted disaster doesn't occur, the doomsayers skip to another... why don't [they] see that, in the aggregate, things are getting better? Why do they always think we're at a turning point—or at the end of the road?”

Julian Simon, in Tierney (1990) *NYT*

An earlier lament on the politics of alarms

“On what principle is it that when we see nothing but improvement behind us, we are to expect nothing but deterioration before us?”

Thomas Babington Macaulay, 1830

“The Precautionary Principle”

It is a political principle holding that if a government is persuaded that even a small risk of a risk of a high cost eventuality exists, there is no need for a rational analysis.

Contrary to scientific analyses of costs and benefits.

Brings to mind the slogan on the Ministry of Truth building in George Orwell’s 1984: “Ignorance is Strength.”

Scientific forecasting suggests appropriate policy decision is “don’t just do something, stand there!”

For more see “Evidence-based forecasting for climate change: Uncertainty, the Precautionary Principle, and Climate Change” on theclimatebet.com Sept 1, 2008