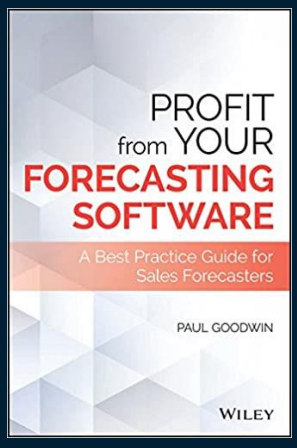
Forecasting Book Club




# Paul Goodwin's
# *Profit From Your Forecasting Software*
## *Chapters 10-11*

Michael Gilliland
SAS

1

Forecasting Book Club

# Chapter 10
# New Product Forecasting

2

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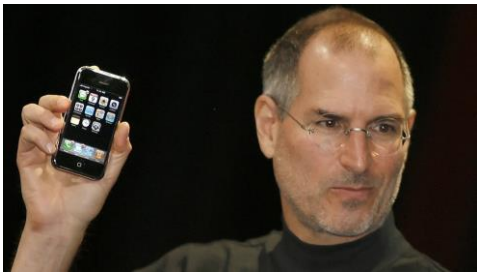
- **Many NPF Situations**
  - Refinement of existing products
  - New markets for existing products
  - New to the world products




3

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- **Many NPF Approaches**
  - Executive Opinion/Decree (evangelical forecasting)
  - Sale Force Rollup (bottoms-up forecast)

**Gilliland, M. (2014). Role of the sales force in forecasting. *Foresight: The International Journal of Applied Forecasting* 35: 8-13.**

4

Forecasting Book Club

- **Many NPF Approaches**
  - Executive Opinion/Decree (evangelical forecasting)
  - Sale Force Rollup (bottoms-up forecast)
  - Delphi Method (anonymous structured process)
  - Prediction Market (anonymous wagering)
  - Analogy (utilize history of "like" product)
  - Diffusion Modeling (spread of product adoption)

***Goodwin focuses on just these last two approaches***

5

Forecasting Book Club

- **Use of Judgment in Forecasting: Disadvantages**
  - Cognitive biases
    - Overinfluence of recent events
    - Optimism bias
    - Advocacy bias
    - *Groupthink*
  - Biased feedback

6

Forecasting Book Club

- **Use of Judgment in Forecasting: Advantages**
  - Compensates for lack of historical information
    - Data unavailable (new products)
    - Too difficult/costly/time consuming to collect (e.g. test market)
  - Compensates for the lack of future information
    - Too difficult/costly/time consuming to collect (market research)
    - Difficult to quantify (fads and fashions)

7

Forecasting Book Club

# Forecasting by Structured Analogy



8

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- **Use of analogies is a common practice**
  - House Pricing (real estate “comps”)
  - New Product Forecasting (look-alike products / similar characteristics)

9

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- **Structured Analogy Approach**
  - Combines analogies with structured judgment
    - Guided statistical analysis that incorporates human judgment
    - Attempts to remove judgmental bias by providing a historical context for each decision
    - Attempts to validate and test the decisions
    - Choice of analogy is driven by a statistical process

10

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## Structured Analogy Data Requirements

- Associated with each product (new and historical) are attributes that categorize the product.
  - Product type (toy, music, clothing, shirts, etc.)
  - Season of introduction (summer-item, winter-item, etc.)
  - Financial (price, competitor-price, etc.)
  - Demographic (gender, age, ethnic, etc.)
  - Physical characteristics (style, color, size, etc.)
  - … and many others
- Some product attributes cannot be easily quantified.
  - Aesthetic appeal, Beauty, Fads, etc.

11

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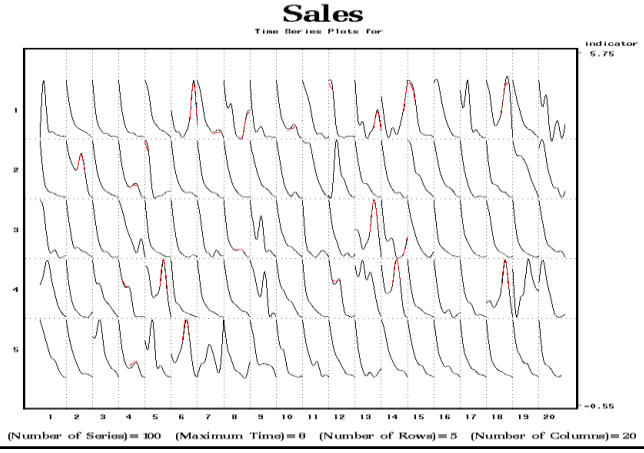
## Structured Analogy data requirements

- Historical data on all past new product introductions




12

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# Structured Analogy – NPF Process

- **Query Step** - finds a set of *candidate products* that have similar *attributes* to the *new product*.
- **Filter Step** - removes *inappropriate* or *outlier products* from the set of *candidate products* to form the set *surrogate products*.
  - Select most appropriate surrogates given several choices of filters and/or clusters of candidate products
- **Model Step** - extracts statistical model features from the set of *surrogate products*.
  - Select most appropriate model given several choices
- **Forecast & Override Step** - uses the extracted statistical model features to forecast the *new product* and compensate for timing.
  - Manually override if necessary

13

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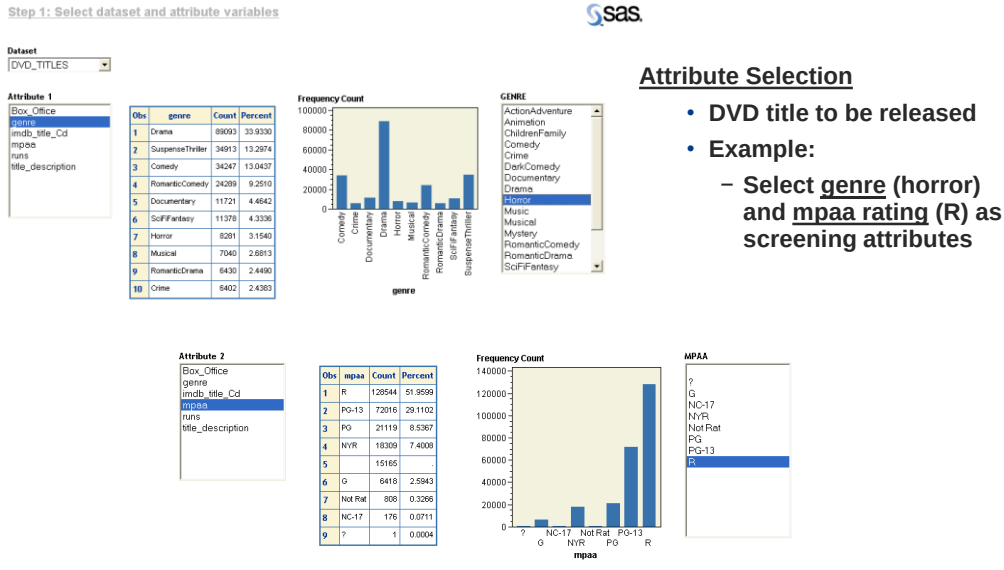



**Attribute Selection**

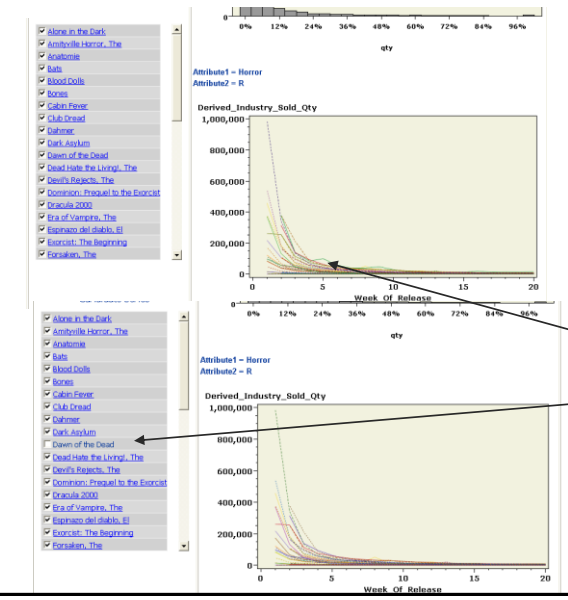
- **DVD title to be released**
- **Example:**
  - **Select genre (horror) and mpaa rating (R) as screening attributes**

Note: The selected attributes can coincide with marketing plans, sales feedback, etc…

14

## Forecasting Book Club

Step 2: Query step




### Query Step

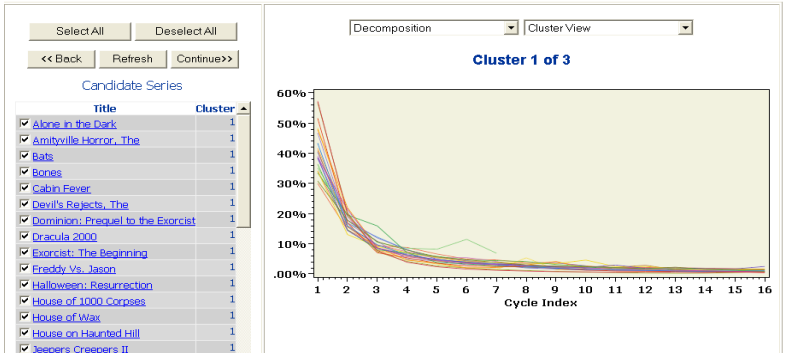
- Explores candidate titles with similar attributes
- Allows for outlier filtration
- Forms a set of surrogate titles

Decided that "Dawn of the Dead" was an outlier – removed from candidate list

15

## Forecasting Book Club

Step 3: Filter step




Decided that "Cluster 1" reflected desired pattern

### Filter Step

- Explores clustered titles
- Select surrogate cluster based on anticipated pattern
- Prepares for statistical modeling

16

## Forecasting Book Club

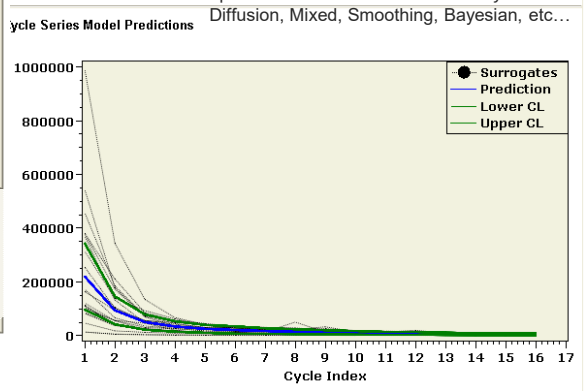
Candidate Series

| Title | MAPE |
|---|---|
| Alone in the Dark | 90.23 |
| Amityville Horror, The | 32.29 |
| Bats | 905.09 |
| Bones | 173.51 |
| Cabin Fever | 24.01 |
| Devil's Rejects, The | 48.04 |
| Dominion: Prequel to the Exorcist | 1598.29 |
| Dracula 2000 | 88.02 |
| Exorcist: The Beginning | 121.30 |
| Freddy Vs. Jason | 19.82 |
| Halloween: Resurrection | 99.96 |
| House of 1000 Corpses | 30.08 |
| House of Wax | 28.87 |

Step 4: Model step

Loess Model

Drop down menu has access to variety of models: Diffusion, Mixed, Smoothing, Bayesian, etc…



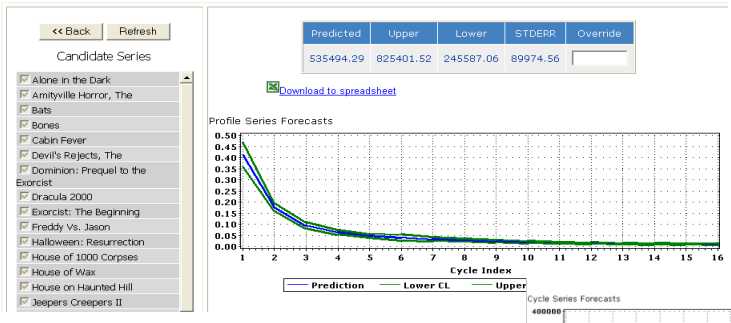

**Model Step**

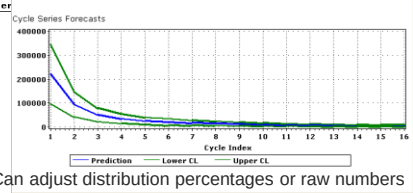
- **Generate best statistical model that fits the surrogates**
  - **Multiple models, weighting criteria, etc…**
- **Evaluate error for each surrogate**
- **Prepare for forecast modification**

17

## Forecasting Book Club

Step 5: Override step




Can adjust distribution percentages or raw numbers

| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 |
|---|---|---|---|---|---|
| Predict | 220291.78 | 94460.42 | 50697.24 | 34317.58 | 25358.50 |
| Upper | 343237.36 | 146452.08 | 79252.93 | 53688.28 | 40004.25 |
| Lower | 97346.20 | 42468.76 | 22141.54 | 14946.87 | 10712.76 |
| Override | | | | | |

**Forecast & Override Step**

- **Generate the profile model for the new product**
- **Provide cycle view, percentage view and absolute quantity view**
- **Allow for overrides**
- **Export to other applications**

18

Forecasting Book Club

- **Structured Analogy approach -- Summary**
  - Appropriate in many situations
  - Statistical analysis and data visualization are incorporated with human judgment
    - Construction of the NPF model is not fully automated
  - Can be used to evaluate the risk / uncertainty in forecasts from other sources (e.g. product manager)

***The software does the grunt work, making the NPF process as automated, efficient, and objective as possible***

19

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## Diffusion Modeling

20

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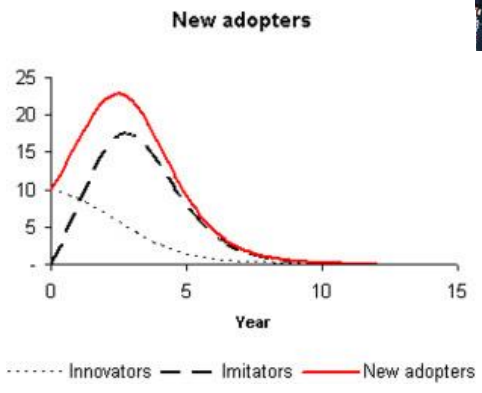
- **Bass Diffusion Model**
  - Innovators
  - Imitators




21

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- **Bass Diffusion Model - Parameters**
  - Market size (number of potential adopters)
  - Coefficient of innovation $p$ = tendency of people to buy because of advertising/media exposure
  - Coefficient of imitation $q$ = tendency of people to buy based on word-of-mouth from earlier buyers

22

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## Bass Diffusion Model - Formula

Number of adopters in a period =

[*p* × number of potential customers who have yet to adopt at start of period]

\+ [q × proportion of market who have already adopted at start of period

× number of potential customers who have yet to adopt at start of period]

23

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## Bass Diffusion Model – Applying the model

- Estimate market size, *p* and *q* from available periods of history
  - If no history, estimate *p* and *q* from analogous products
  - Can estimate market size from consumer intention surveys or other means
- Forecast future periods using these parameters
- Check forecast for reasonableness

24

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## Bass Diffusion Model - Limitations

- Forecasts adoption (new buyers) – not total sales
- Estimate of *p* and *q* is critical
- Assumes market size and *p* and *q* remain unchanged
- Other types of S-curves may better fit cumulative adopters
- Not all new products have a single peak of adoption

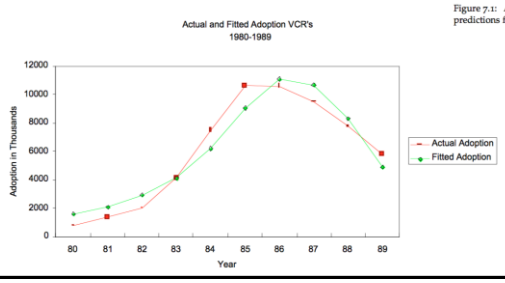


Figure 7.1: Actual versus Bass model predictions for VCRs.

25

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## Worst Practices in New Product Forecasting

Gilliland, M. Worst Practices in New Product Forecasting. *Journal of Business Forecasting* (Winter 2012-13).

26

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- **Unrealistic accuracy expectations**
- **Reverse engineering the forecast**
- **Cherry-picking analogies**
- **Insisting on a wiggle**
- **The Hold-and-Roll**
- **Ignoring the product portfolio**

27

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- **New Product Forecasting - Summary**
  - Have low expectations for accuracy
  - Utilize multiple methods (benefits of combining)
  - Use structured judgment
  - Use Bass model when appropriate – but with caution

28

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# Chapter 11
# Summary: A Best Practice Blueprint for Using Your Software

29

Forecasting Book Club

- **Desirable characteristics of forecasting software**
  - Obviously:
    - Ease of use
    - Speed (of interface and computations)
    - Accuracy of calculation
    - Wide range of methods
    - Able to interface with other systems
    - Training and support

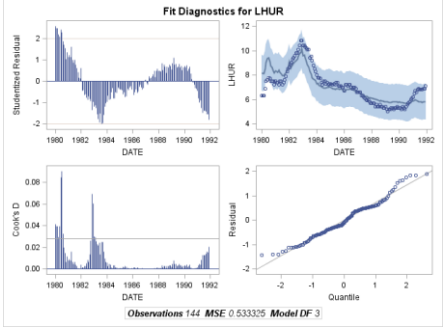
30

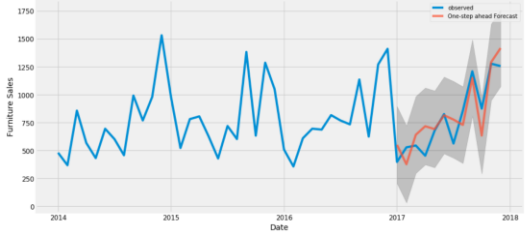
- **Desirable characteristics of forecasting software**
  - Data preparation and management capabilities
    - Data quality / completeness / master files
    - Missing values / outliers
    - Data transformations

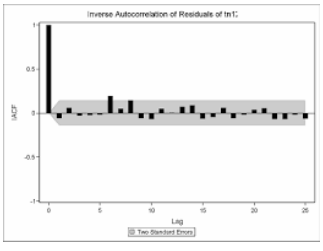
31



- **Desirable characteristics of forecasting software**
  - Data preparation
  - Graphical displays




32

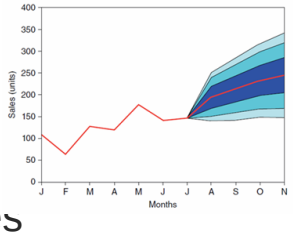
Forecasting Book Club

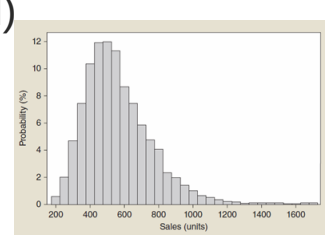
- **Desirable characteristics of forecasting software**
  - Data preparation
  - Graphical displays
  - Automatic modeling / method selection
    - Penalize more complex methods using information criteria
    - Clear demarcation of fit (training) period and hold-out (test)
    - Multiple accuracy measures available
    - Rolling origin evaluation

33

Forecasting Book Club

- **Desirable characteristics of forecasting software**
  - Data preparation
  - Graphical displays
  - Automatic modeling / method selection
  - Combinations / events / predictor variables
  - Hierarchies (organizational and temporal)
  - Probabilistic forecasting




**Goodwin, P. (2014). Getting Real About Uncertainty. *Foresight* 33: 4-7.**

34

Forecasting Book Club

- **Desirable characteristics of forecasting software**
  - Data preparation
  - Graphical displays
  - Automatic modeling / method selection
  - Combinations / events / predictor variables
  - Hierarchies (organizational and temporal)
  - Probabilistic forecasting
  - Support for judgment

**Baker, J. (2021). Maximizing FVA Through Machine Learning and Nudges. *Foresight* 60 (forthcoming).**

35

Forecasting Book Club

- **Desirable characteristics of forecasting software**
  - Data preparation
  - Graphical displays
  - Automatic modeling / method selection
  - Combinations / events / predictor variables
  - Hierarchies (organizational and temporal)
  - Probabilistic forecasting
  - Support for judgment
  - Presentation of forecasts

36

Forecasting Book Club

# Implementing a Forecasting Solution

Gilliland, M. (2010). *The Business Forecasting Deal*.

37

Forecasting Book Club

- **Why do implementations fail?**
  - Perceived failure
    - Doesn't deliver what was promised /expected
    - Due to poorly managed expectations
  - True failure
    - Software never installed
    - Software installed but never used
    - Software installed and used – but terrible at forecasting!

38

- **Preproject Assessment**
  - Realistic evaluation of IT infrastructure and capabilities
    - Basic data elements available?
    - Sufficient history available?
    - Data management practices in place?
    - Skillset of IT resources vs. contractors

39



- **Request for Information / Proposal**
  - Long list of “requirements”
    - Focused on minute and irrelevant details
    - Exposes customer’s lack of understanding
      - E.g. “Software uses artificial intelligence? Y/N”
  - Selection process often “fixed” for favored vendor
  - Alternative RFI/RFP:
    - What is your understanding of our business problem?
    - How do you propose to solve it?

40

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- **Evaluating Software Vendors**
  - Beware of the dirty tricks of selling
  - Beware of claims about ROI
  - Be skeptical of references

41

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- **Warning Signs of Failure**
  - Assessment questions:
    - Are sufficient IT and business resources engaged?
    - Is upper management committed?
  - Is the project staying on plan (time and budget)?
    - Set early hurdles for go/no-go decisions

42

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# Paul Goodwin's Blueprint for Best Practice

43

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- **The Blueprint**
  1. Restrict judgmental interventions
  2. Automate the forecasting process
  3. Feed the computer with data
  4. Acknowledge uncertainty / use Pis
  5. Judge a method by quality of its forecasts, not fit to history

44

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- **The Blueprint**
  6. Simplicity may beat complexity
  7. Measure the bias
  8. Forecast at appropriate level of aggregation
  9. Combine forecasts
  10. Correlation does not prove causation

45

Forecasting Book Club

# Questions

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46