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EVOLUTIONARY MODELING IN THE
ANALYSIS OF NEW PRODUCTS

Glen L. Urban
Richard Karash

424-69

September 1969

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Introduction

Although many sophisticated management science models have been built to help solve many management problems, very few complex models have achieved continuing usage. The problem of implementing models is significant and a problem that will become more difficult as the state of the art advances and even more complex management science models and information systems are developed. Implementation difficulties include: (1) gaining management attention, understanding and support, (2) limited availability of data to support models, (3) high risk due to large fund commitments, and (4) long model development times which do not allow the demonstration of short term benefits. The authors propose that the introduction of models as an evolutionary movement from simple models to more complex but related models will reduce these difficulties. This paper will discuss the advantages of evolutionary modeling through SPRINTER, an on-line set of models for evolutionary use in analyzing new frequently purchased consumer goods. This description is non-mathematical. Those who would like to review the mathematics of SPRINTER, see Urban [3].

SPRINTER Models

SPRINTER mod I:

SPRINTER mod I describes the acceptance process of a new consumer product by a process of trial, repeat, and loyalty. These three classifi-

*The authors would like to credit Jay Wurts for the programming of the data management system for SPRINTER.

cations and the flow of people between them by purchase or non-purchase are shown in Figure One. All potential users are initially in the trial class. When they try, they move to the preference class where at the next purchase opportunity they either repeat and move to the loyalty class or return to the potential trial class. Those who repeat in the loyal class remain in that class, while others are returned to the preference class.

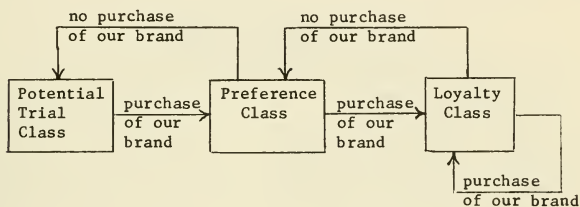


FIGURE ONE
SPRINTER mod I Product Experience Classes

Figure Two shows the process flow. The parameters are the trial rate per period, the first repeat rate, second repeat rate, and frequencies of purchase. The distribution of frequencies of purchase is used to specify the length of the holding period between purchase opportunities.

This is an extremely simple model and given a set of trial, repeat, and purchase rates, it can be used to predict sales and profit in each period.¹ Mod I is basically a specific statement of the model used by most new product managers. Mod I is designed to be a translation of the manager's implicit model. In this way the manager can feel at ease with the model and

¹See Appendix A-1 for input and output for mod I run.



realize it is a tool to aid in his current thinking. The computer model is a little more explicit than the manager in its consideration of the frequency of purchase and trial rate changes over time, but it is usually viewed by the manager as similar to his current procedure. The data needed for mod I could be subjective data based on pretest product use studies, appeal tests, or comparisons to past products. However, panel data from test markets could be used to empirically estimate trial and repeat rates. The model is an on-line model so the manager can quickly try many alternate sets of input to generate sales and profit forecasts.

The simple mod I model can be extended by the use of the behavioral science option. In this mod IBS model the trial rate is broken down into a process of gaining awareness, developing intent to try given awareness, and finding the product. See Figure Three. The added inputs are the percent of people aware, the fraction of those aware who will state a predisposition to try the product, and the percent availability of the product in each period.

The basic contribution of the behavioral science option is better understanding of the process of trial. It separates the effects of the advertising budget, appeal, and distribution. Awareness changes will depend on budget changes, the intent rate will depend upon the appeal effectiveness, and the availability on the extent of distribution. Mod IBS could be run on subjective data, but it probably would require that test market awareness questionnaires be collected. The questionnaires would measure specific recall to ads and the predisposition to try.² The behavioral science option usually begins to extend the manager's implicit

²See [5].



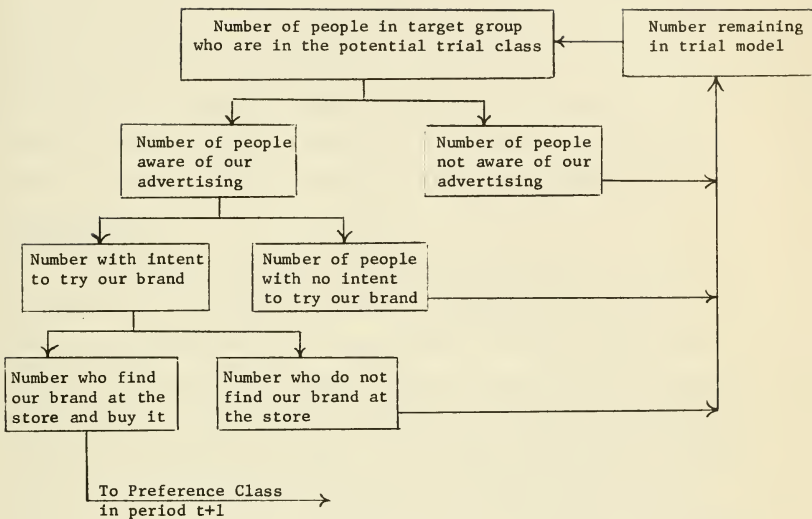


FIGURE 3

MOD I BEHAVIORAL SCIENCE OPTION
POTENTIAL TRIAL CLASS FLOW



model, but it does so by emphasizing the consumer decision process. This is usually intuitively appealing and understandable to the manager. Mod IBS also extends the data needs by requiring awareness, intent, and availability parameters. Mod IBS produces a sales forecast, but begins to set the framework for looking at changes in strategy.³ For example, awareness could be changed to reflect a greater budget expenditure, or availability could be changed to reflect a different introductory middleman deal.⁴

SPRINTER mod II:

SPRINTER mod II explicitly faces the issue of finding the best strategy for the new product by linking the controllable variables of price and advertising to the diffusion process. It further extends mod I by considering the trial and repeat processes in significantly more detail. Mod II extends the trial process description to include specific awareness levels and in-store brand selection. A new behavioral phenomenon is added in mod II. This is forgetting. People are moved from higher awareness states to lower states at the end of each period to reflect their forgetting of awareness. The repeat process in the preference class is described as a series of steps in mod II while in Mod I it was one aggregate repeat rate. The repurchase process in mod II is one of gaining awareness, developing preference, formulating intent, finding the product, and selecting the brand in the store.

Trial experience may be negative, so in mod II those who have a negative trial awareness are segmented in the preference class. If they

³See appendix A-2 for mod IBS input.

⁴See [2] for a more detailed discussion of mod I and IBS.



do not repeat, they are not returned to the potential trial class as in mod I; rather they remain in the negative awareness state. The non-buyers in the loyalty class are also segmented in mod II. The class definitions for mod II are given in Figure Four.

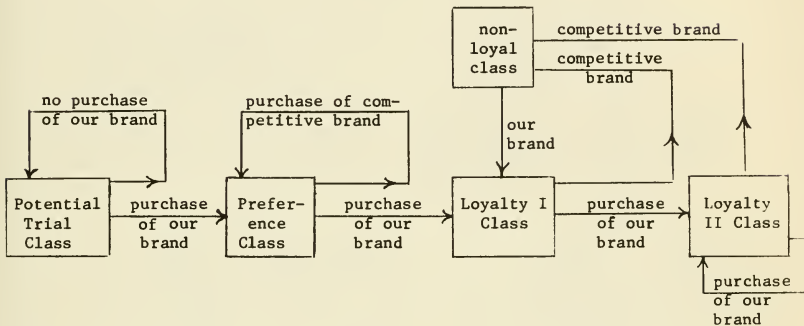
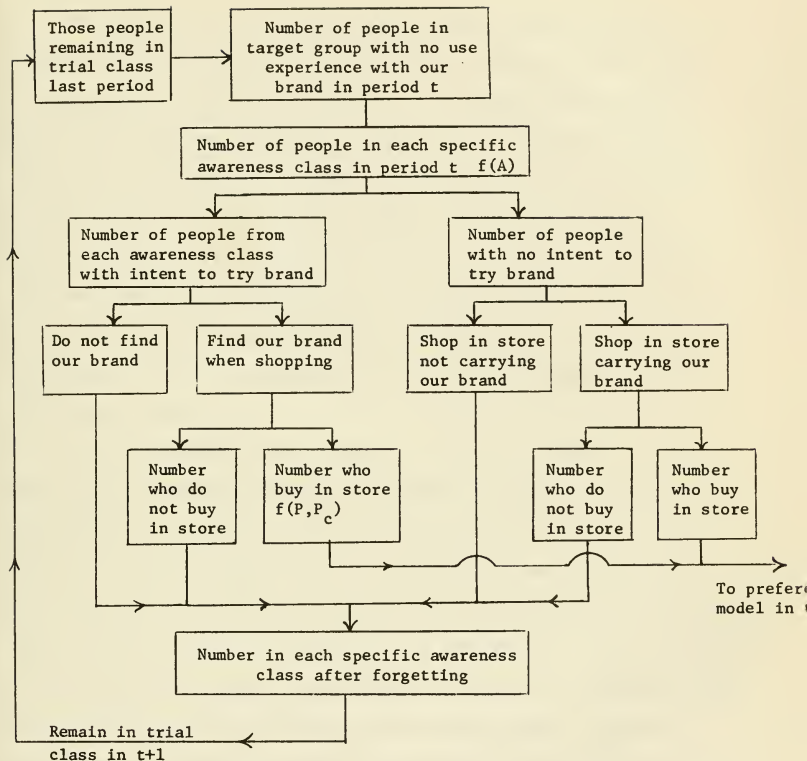


FIGURE FOUR
MOD II PRODUCT EXPERIENCE CLASSES

The potential trial class process is described in Figure Five. Members of the target group who have not tried, gain awareness as the result of advertising. The advertising functions are explicitly stated in the model. This response function specifies the percent of people aware given a particular advertising expenditure. The overall awareness is segmented into specific awareness states. There are four states and they are defined as: (1) unaware, (2) aware of brand only, (3) aware of ads and brand, and (4) aware of specific advertising appeals.



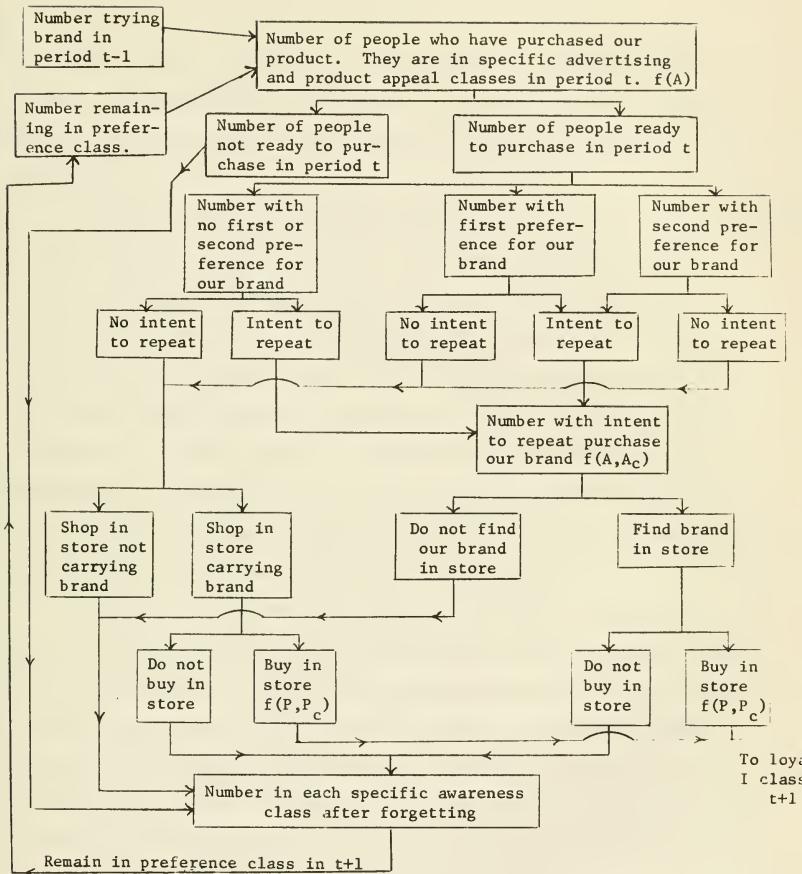


- A = our advertising
 P = our price
 P_c = competitive price

FIGURE FIVE
 MOD II OVERALL POTENTIAL TRIAL CLASS FLOW DIAGRAM

The intent rate for people in each of these classes is used to determine the total number with intent to try. Those with intent look for the brand and find it in proportion to the product's availability. After having found the product some fraction of the people with intent will exercise that intent. This fraction is a function of the price of our brand relative to the competitive brand. Persons with no intent also go through the in-store process so that those who are convinced by the brand's point of purchase activity can buy the product. Those who purchase move to the preference class. Those who do not try experience forgetting by moving from higher to lower awareness classes and remain in the potential trial class.

In the preference class, people are classified on the basis of their usage experience and advertising effects. See Figure Six. The classes are brand aware only, aware of ad appeals but no definite opinion, positive opinion and negative opinion. These awarenesses depend upon the trial results, but they are also a function of advertising because advertising can effect the perception of the brand's characteristics. Since all consumers do not purchase each period, a distribution of frequency of purchase is used to place triers from the last period into holding classes. Only those people ready to purchase some brand in the product class in the particular period are moved through the preference, intent, and choice process. The rates of stated first and second preference for our brand in each awareness state are used to find the total number of people with first preference, second preference, or no preference for our brand. The number of people with an intent to repeat depends upon the fraction of those with first preference



- A = our advertising
 A_c = competitive advertising
 P = our price
 P_c = competitive price

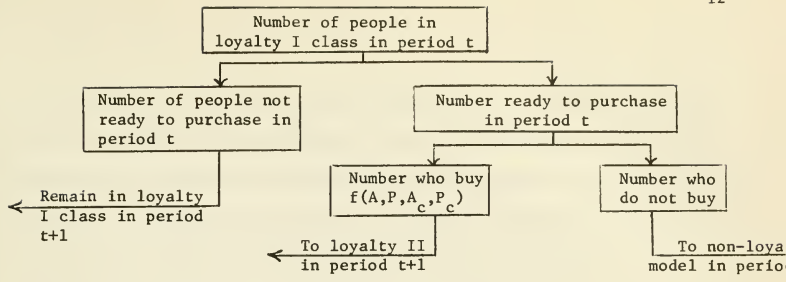
FIGURE SIX
MOD II OVERALL PREFERENCE CLASS FLOW DIAGRAM

who display intent, the fraction of those with second preference with intent, and the fraction of those with no preference who display intent. These fractions are made functional upon our advertising relative to competitors.

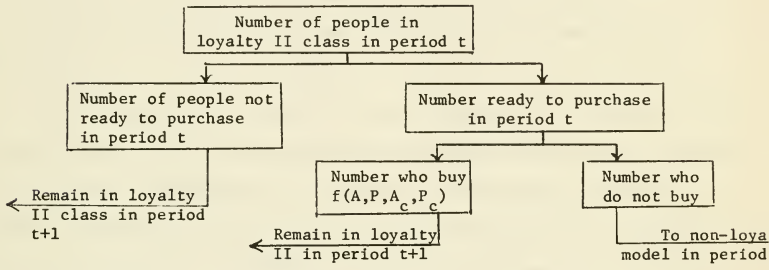
The number of people with intent is the fraction who intend to repeat in each preference state times the population of that preference state. Those with intent who return to the same store where they tried our brand, find the product; if they do not return they find it in proportion to the overall availability. When in a store with the product and with intent, some fraction will exercise this intent. This fraction is a function of our price relative to competitors. Some fraction of the people in the store with no intent may also repurchase after seeing our point of purchase display. Those who buy move to the loyalty I class while those who buy another brand stay in the preference class.

The loyalty classes are described in Figure Seven. The number of buyers is simply determined by the multiplication of the repurchase probability times the number of people in the product experience class who are ready to buy. In the loyalty I and II classes, however, the fraction of people repeating is a function of the advertising and price of our brand relative to competitors. This is included since a large price-off deal or advertising expenditures by competitors may reduce the repurchase rate of people even if they have consecutively used our brand two or three times.

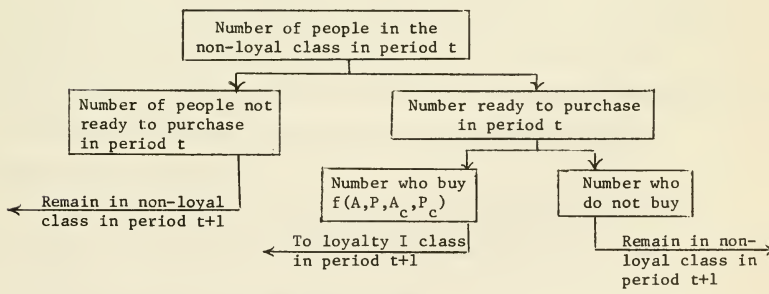
The SPRINTER mod II model when given a price and advertising strategy for our firm and competitors will generate a sales and profit forecast. In mod II there is a SEARCH option so that a combination of strategy alternatives



7A Loyalty I Class



7B Loyalty II Class



7C Non-Loyal Class

A = our advertising
 A_c = competitive advertising

P = our price
 P_c = competitive price

FIGURE SEVEN
 MOD II LOYALTY CLASSES

can be evaluated.⁵ For example, three prices and five advertising levels could be evaluated in all combinations to find the strategy that gives the greatest total discounted profit over a planning period. After viewing these alternatives, a new set can be generated so that the manager can iteratively proceed until he finds a "good" or "best" strategy. Mod II also permits a probability distribution to be assigned to the sales level, so the probability of achieving a payback or rate of return objective can be calculated. These are useful in evaluating the risk-return balance in a GO-ON-NO decision for the brand.⁶

The extensions added to mod I in mod II, enable mod II to make a number of new contributions. Most importantly, the linking of the strategy variables to the process enables the model to recommend a best strategy. The best strategy along with the risk output of mod II directly link to the analysis decision of GO-ON-NO. In SPRINTER mod II a significant amount of new detail is added to the process description.⁷ This detail promotes a more complete and exact understanding of the diffusion process and allows a more accurate diagnosis of problems in the brand's sales. Mod II represents a real extension and improvement relative to most existing procedures of analysis, but it evolves these new capabilities from the implicit and existing procedures modeled through mod I.

While mod II adds new meaningful detail to the process and supplies the SEARCH capability, these extensions require new data and more data

⁵See appendix A-4 for computer search.

⁶See [4] for more detail on this decision procedure.

⁷See appendix A-3 for examples of detailed output of mod II.

analysis. Mod II would need in addition to the awareness questionnaires of mod IBS, store audits, media audits, and consumer panel data. But the most demanding new inputs are the functions linking the variables to the process. These may be obtained by examining differences between prices in stores or advertising between cities or over time, but the best method would be to use experimental design. The results would be monitored in the awareness, point of purchase, and usage data. This data when analyzed by statistical methods can yield estimates of the mod II parameters.⁸ The data needs of mod II are relatively large, but each bit of data is interpreted and used in the model so the data encourages empirical learning about the process. The model's capability to effectively use test market data is an important reason for its existence. Without a model, data tends to be aggregated and used ineffectively.

SPRINTER mod III:

SPRINTER mod III continues the evolution by adding more variables, more detail in the process description, and new behavioral phenomena.⁹ In mod III samples, coupons, point of purchase displays, shelf facings, middleman deal and the number of sales calls, as well as, price and advertising are included. Samples give some people a pseudo trial and move them to the preference class. Coupons give those who intend to redeem them an in-store price reduction. Special displays and the number of shelf facings exert a functional effect on the fraction of people who exercise their intent to repeat. Middleman deals and the number of sales calls are used

⁸See [3] for a discussion of the statistical approaches.

⁹For a detailed and mathematical treatment of SPRINTER mod III see [3].

in a sub-model of the process of gaining distribution and determine the percent availability. In mod III more detail exists in the number of classes of stores (three store types can be structured), the number of awareness states (ten awareness states can be defined), and the number of competitors (four competitive brands can be defined).¹⁰

The most significant new behavioral process is the exchange of word of mouth. This is structured by determining how many users recommend the product and how many non-users request information. If the information transfer is to a non-user who is in an awareness state lower than the content of the personal communication, he is moved to the higher awareness state. In mod III, industry advertising and sampling effects are included. If all the firms advertise more, this can add new people to the potential trial class. In mod III the interactions between new and old products of the firm are encompassed by specifying how many of the new product triers or repeaters would have purchased an old brand of the firm. The goal in mod III is the change in the total profit of the firm's product line.¹¹

The final mod III extension is in the competitive area. In mod III searches for our best strategies can be run against competitive strategy rules. For example, what is our best strategy if our competitor follows our advertising with a one period lag? This capability can be used to construct a payoff matrix of our strategy versus competitors. The effects of competitive variables (e.g. coupons, price, samples) are also included. This is important in separating the true effects in test market when the competitor has attempted to confuse the test market by heavy sampling, coupons, or price off.

¹⁰See appendix A-5 for mod III process output.

¹¹See [3] and [4] for explicit definitions.

Mod III allows a detailed strategy to be found since eight variables are considered.¹² The model also allows a very detailed understanding and specification of the diffusion process. This is useful in diagnosing problems, generating revised forecasts, and finding new best strategies. The adaptive control is especially important in early national introduction. The data needs of mod III are similar to mod II except that larger sample sizes are needed to separate the new effects and more experimentation is needed since more variables are included. New data is needed to monitor word of mouth exchanges and sales call reports are required to parameterize the sub-model that describes the growth of availability. More depth is required in the monitoring of competitive data since mod III models the competitive interaction at high level of detail.

Mod III is the last model in the evolutionary SPRINTER series. The evolution built from the simplest implicit model to a model with eight strategy elements, a disaggregate definition of structural components, and a high level of behavior process detail.

EVOLUTIONARY USAGE OF SPRINTER MODELS

The major benefit achieved by the evolutionary usage of mod I, II, and III models is an orderly growth in management's understanding of the model. Each model is designed to be a reasonable step from the previous model. In this way managers can gain confidence in the model and be convinced of the face validity of the structure. This evolutionary acceptance and understanding by the manager is a key to continuing usage of models

¹²See appendix A-6 for mod III search where samples change the best price level as specified in mod II.

and improvement in new product analysis. The managers must be convinced that they are the masters of the model so that do not feel they are losing control of the decision.

Another benefit of evolutionary usage is an orderly development of the data collection and analysis support system. As movement is made from one model to the next, the data specification and statistical capabilities can be efficiently developed. This allows movement to mod III where the normative advantages of strategy recommendation and adaptive planning can be tapped. Initial experience with mod III indicates that profit can be increased substantially (greater than 50%) by using these capabilities.¹³ The greater profits and the model's explicit risk output allows a more analytical GO-ON-NO decision that in the long run can reduce the new product failure rate.

An important advantage of evolutionary models is that marginal costs and marginal benefits can be compared at each state of the project. This capability reduces the risk of the failure. Modeling projects usually aim at fairly complex, sophisticated end-product models. But in an evolutionary system there is no need to commit a large amount of funds to the final model unless the initial evolutionary models prove to be attractive on the basis of their costs and benefits. The evolutionary approach reduces risk in the case of SPRINTER usage since, if mod I or mod II do not achieve their objectives, the project can be aborted without expending the total mod III project budget. The risk of failure due to lack of continuing usage is also reduced since during the evolution management is being educated in the use of the model and the collection of data.

¹³See [3].

Table one gives the per product data acquisition and analysis costs and the model acquisition cost ratios for SPRINTER. These costs of the evolutionary modeling system must be compared to the costs of a single effort directed toward the desired final model. For an integrated set of models like SPRINTER, the only added data costs are for data collected at one stage that is not required at succeeding stages. These are minimal in SPRINTER. However, if evolution is through a set of less closely related models (e.g. a stochastic brand switching model to a math programming optimization model), data may not be completely compatible.

	<u>mod I</u>	<u>mod II</u>	<u>mod III</u>
Data collection cost (est. \$000's)	0-10	25-50	50-75
Data analysis cost (\$000's)	0-5	10-15	15-25
Model acquisition cost ratios	1	3	5
Computer run times per iteration (SDS940 computer and 36 period iteration)	1 second	10 seconds	20 seconds

TABLE ONE
ESTIMATED COSTS

The acquisition cost ratios in Table One reflect the splitting of the development cost between multiple users since SPRINTER is implemented in a model utility. The total model system development cost was over \$200,000. This cost is probably a little greater than the cost of developing a mod III level model initially. However, the evolutionary plan can reduce the development costs in some situations since the model builder learns where to allocate additional detail as he develops the first models. The model

builder also learns to understand the manager more fully. This improves the atmosphere of mutual understanding that is important in implementing models. The authors feel that the additional development cost is small, if it exists, and is vastly overshadowed by the benefits of evolution.

A final benefit of evolutionary systems is the ability to demonstrate short run rewards. The first model may be available relatively quickly, about six months for mod I, so that the project can show some benefits early. It may take longer to reach the point of potential application of the desired final model under an evolutionary program, but not to reach the time of continuous usage. The authors feel that the limiting constraint on progress in the application of models is management understanding and that the evolutionary adoption of a set of models will speed this education process. With the increasing commercial availability of models like SPRINTER on time shared computer utilities, the model effort will not be limited by software development but can evolve as fast as managerial understanding and data availability permit.

Even if the management and data were initially ready for mod III, there may be need for a mod I and II model in the new product analysis. This is because the analysis is a sequential one. First a decision is made to test market the product. At this point not much data is available so it would be appropriate to use mod I to examine the sales and profit effects of the test market goals. In fact, mod I has been found to be very useful in developing a compatible set of awareness, trial, usage and repeat rate goals for test markets. As early test data arrives, or if a "mini-test" was conducted, mod II might be more appropriate than mod III.

If the product is small in terms of its expected sales volume, mod III might be too costly, so mod II might be used. The choice of the mod I, II, or III models might also depend on the particular manager. If the manager's style is less analytical he may feel more comfortable with mod II rather than III. The choice of usage of mod I, II, or III will depend on the stage the product is in the decision network, the management level of understanding and cost-benefit tradeoff.

CONCLUSION

This paper has discussed a set of three evolutionary models for the analysis of new frequently purchased consumer goods. They evolved from a simple predictive process flow model with four parameters to a complex normative behavioral process model with over fifty parameters. The evolution proceeded along the dimensions of level of detail, number of variables, and quantity of behavioral process content. The advantages cited for this evolutionary approach are: (1) increased managerial understanding and acceptance, (2) orderly development of data base and data analysis capability, (3) opportunity to make marginal cost-marginal benefit analyses, (4) reduction of project risk by the availability of abort opportunities at marginal analysis points, (5) learning by model builders about level of detail for model and about managers, and (6) the availability of short term benefits.

These advantages encourage efficient system design and continuing usage by managers. Although cited relative to the specific SPRINTER series, the authors feel these advantages can be generalized to many other model based system projects in other decision areas. Some evidence to support

this generalization is represented in John D. C. Little's advertising model, ADBUDG, and brand management model, BRANDAID.¹⁴

¹⁴See [1].

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2. Urban, Glen L., "SPRINTER mod I: A Basic New Product Model," Proceedings of the American Marketing Association (Summer 1969) forthcoming
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APPENDIX A-1: MOD I INPUT AND OUTPUT

Figure A1-1: Mod I Input

1 SAVE DATA
 2 PRINT DATA
 3 CHANGE DATA
 4 OUTPUT
 5 RESTART
 ANS=2

[User's typing is underlined.]

1 FULL PRINT
 2 ONLY SPECIFIED LINES
 ANS=1

1 BRAND:THIGAMIJIG
 2 PER. LEN.: MONTH
 3 NAME OF FIRST PER.: APRIL
 4 NO. OF PER.: 36.00
 5 SIZE OF TARGET GROUP (THOUS.):COLUMN 5
 6 TRIAL RATE (%):COLUMN 6
 7 AWARENESS (%): COLUMN 7
 8 PREDISPOSITION TO TRY (%): COLUMN 8
 9 AVAILABILITY (%): COLUMN 9
 10 MAX. PURCHASE INTERVAL: 8.000
 11 % WITH INTERPURCHASE INTERVAL: COLUMN 11
 12 REPEAT AFTER 1 TRIAL (%): 70.00
 13 REPEAT AFTER 2 TRIALS (%): 90.00
 14 PROMOTIONAL BUDG.(THOUS. OF \$): COLUMN 14
 15 FIXED INV. (THOUS. OF \$): 300.0
 16 TARGET RATE OF RETURN(%): 33.00
 17 PRICE: 1.060
 18 GROSS PROFIT MARGIN (% OF SALES UNIT): 43.50
 19 % USING EXISTING BRANDS: 100.0

[Column numbers refer to following page.]

	(6)	(11)	(14)	(5)
	TRATE	FREQ	PROMTN	TARGET
1	3.080	5.000	352.0	14700
2	2.860	8.000	274.0	14700
3	2.640	10.000	274.0	13000
4	2.420	12.000	274.0	13000
5	2.200	15.000	266.0	12400
6	2.090	25.000	266.0	12400
7	2.035	22.000	266.0	12500
8	2.013	3.000	112.0	12500
9	1.991	.000	112.0	11900
10	1.980	.000	112.0	11900
11	1.980	.000	350.0	12400
12	1.980	.000	350.0	12400
13	1.980	.000	350.0	15100
14	1.980	.000	298.0	15100
15	1.980	.000	298.0	13400
16	1.980	.000	298.0	13400
17	1.980	.000	292.0	12800
18	1.980	.000	292.0	12800
19	1.980	.000	292.0	12900
20	1.980	.000	122.0	12900

[TRATE is the percent of the trial class who will try in each period.]

[FREQ. is the distribution of inter-purchase intervals for the target population. This data shows that 5% of the target group buy in this product class every period, 8% every two periods, etc.]

[PROMTN is the promotional expenditures of our firm by month in thousands of dollars.]

[TARGET is the size of the target population in thousands.]

Figure A1-1 Cont.

	TRATE	FREQ	PROMTN	TARGET
21	1.980	.000	122.0	12300
22	1.980	.000	122.0	12300
23	1.980	.000	386.0	13300
24	1.980	.000	386.0	13300
25	1.980	.000	386.0	16600
26	1.980	.000	328.0	16600
27	1.980	.000	328.0	14700
28	1.980	.000	328.0	14700
29	1.980	.000	382.0	14000
30	1.980	.000	382.0	14000
31	1.980	.000	382.0	14200
32	1.980	.000	424.0	14200
33	1.980	.000	424.0	13400
34	1.980	.000	424.0	13400
35	1.980	.000	446.0	14600
36	1.980	.000	446.0	14600

Figure A1-2: Mod I Output

1 SAVE DATA
 2 PRINT DATA
 3 CHANGE DATA
 4 OUTPUT
 5 RESTART
 ANS=4

1 STANDARD OUTPUT
 2 EXCLUDE SPECIFIED LINES
 3 INCLUDE SPECIFIED LINES ONLY
 ANS=1

1 OUTPUT FOR THIGAMIJIG
 2 FIRST PERIOD: APRIL
 3 LENGTH: MONTH
 4 DATA FROM FILE: /EVOL CASE/

PER.	TOTAL BUYERS	MARKET SHARE	INDSIZE (NO.)	PROFIT (DOLS)	TOTAL DPROF
1	.453M	10.88	4.16M	-.143M	-.139M
2	.423M	10.26	4.13M	-78809	-.214M
3	.375M	10.35	3.62M	-.101M	-.307M
4	.379M	10.55	3.59M	-99192	-.396M
5	.395M	11.61	3.41M	-83760	-.470M
6	.419M	12.35	3.39M	-72834	-.531M
7	.526M	15.41	3.41M	-23376	-.551M
8	.566M	16.59	3.41M	.149M	-.431M
9	.577M	17.79	3.24M	.154M	-.310M
10	.568M	17.55	3.24M	.150M	-.196M
11	.607M	17.98	3.38M	-70203	-.248M
12	.578M	17.13	3.37M	-83616	-.309M
13	.757M	18.41	4.11M	-853.8	-.309M
14	.730M	17.76	4.11M	38610	-.283M
15	.741M	20.36	3.64M	43779	-.254M
16	.788M	21.65	3.64M	65272	-.211M
17	.802M	23.10	3.47M	77837	-.162M
18	.773M	22.26	3.47M	64246	-.123M
19	.869M	24.85	3.50M	.109M	-57962
20	.843M	24.13	3.49M	.267M	97106
21	.880M	26.44	3.33M	.284M	.258M
22	.938M	28.18	3.33M	.310M	.428M
23	.932M	25.88	3.60M	43623	.452M
24	.891M	24.76	3.60M	24804	.465M
25	1.09M	24.22	4.50M	.117M	.524M
26	1.10M	24.41	4.50M	.179M	.612M
27	1.03M	25.96	3.98M	.148M	.683M
28	1.04M	26.16	3.97M	.151M	.754M
29	1.11M	29.34	3.78M	.129M	.813M
30	1.08M	28.45	3.78M	.114M	.864M
31	1.21M	31.60	3.83M	.176M	.940M
32	1.18M	30.88	3.83M	.121M	.991M
33	1.17M	32.28	3.61M	.113M	1.08M
34	1.16M	32.28	3.61M	.113M	1.08M
35	1.17M	29.62	3.94M	91718	1.12M
36	1.22M	31.11	3.94M	.119M	1.16M

[INDSIZE is total number of purchases in this product class.]

[TOTAL DPROF is the cumulative discounted profit.]

Figure A1-2 (Cont.)

6 PAYBACK: 22.00

7 PROFIT/INVESTMENT RATIO: 3.873

PER.	PTRY	TPREF	TLOYAL	TRIERS	TBPREF	TBLOYAL
1	14.7M	.000	.000	.453M	.000	.000
2	14.2M	.453M	.000	.407M	15846	.000
3	12.1M	.838M	15846	.321M	39616	14261
4	11.8M	1.10M	53877	.287M	66844	25671
5	11.0M	1.30M	.118M	.242M	96539	57022
6	10.8M	1.41M	.208M	.225M	.131M	62144
7	10.7M	1.45M	.333M	.218M	.195M	.113M
8	10.6M	1.40M	.515M	.213M	.241M	.111M
9	9.87M	1.28M	.744M	.197M	.221M	.159M
10	9.77M	1.18M	.948M	.193M	.196M	.179M
11	10.2M	1.12M	1.12M	.201M	.178M	.227M
12	10.0M	1.09M	1.28M	.199M	.165M	.214M
13	12.6M	1.07M	1.42M	.250M	.164M	.343M
14	12.4M	1.13M	1.54M	.246M	.162M	.322M
15	10.6M	1.18M	1.67M	.209M	.161M	.371M
16	10.4M	1.20M	1.79M	.206M	.165M	.416M
17	9.68M	1.21M	1.91M	.192M	.170M	.440M
18	9.56M	1.21M	2.03M	.189M	.171M	.412M
19	9.54M	1.20M	2.16M	.189M	.183M	.497M
20	9.43M	1.19M	2.28M	.187M	.183M	.473M
21	8.72M	1.16M	2.41M	.173M	.180M	.527M
22	8.63M	1.14M	2.54M	.171M	.177M	.590M
23	9.53M	1.12M	2.65M	.189M	.170M	.573M
24	9.42M	1.13M	2.75M	.186M	.165M	.540M
25	12.6M	1.14M	2.86M	.249M	.173M	.668M
26	12.4M	1.22M	2.96M	.246M	.175M	.677M
27	10.4M	1.29M	3.06M	.205M	.175M	.652M
28	10.2M	1.32M	3.16M	.202M	.177M	.660M
29	9.40M	1.34M	3.26M	.186M	.189M	.734M
30	9.29M	1.34M	3.37M	.184M	.191M	.700M
31	9.39M	1.33M	3.48M	.186M	.207M	.818M
32	9.29M	1.31M	3.60M	.184M	.208M	.791M
33	8.40M	1.28M	3.72M	.166M	.200M	.798M
34	8.32M	1.25M	3.83M	.165M	.192M	.808M
35	9.44M	1.23M	3.93M	.187M	.185M	.794M
36	9.33M	1.24M	4.03M	.185M	.187M	.853M

[Population of trial, preference and loyalty classes (PTRY, TPREF, and TLOYAL) and number of buyers in each class (TRIERS, TBPREF, and TBLOYAL).]

1 BRAND:THIGAMIJIG
 2 PER. LEN.: MONTH
 3 NAME OF FIRST PER.: APRIL
 4 NO. OF PER.: 36.00
 5 SIZE OF TARGET GROUP (THOUS.): COLUMN 5
 6 TRIAL RATE (%): COLUMN 6
 7 AWARENESS (%): COLUMN 7
 8 PREDISPOSITION TO TRY (%): COLUMN 8
 9 AVAILABILITY (%): COLUMN 9
 10 MAX. PURCHASE INTERVAL: 8.000
 11 % WITH INTERPURCHASE INTERVAL: COLUMN 11
 12 REPEAT AFTER 1 TRIAL (%): 70.00
 13 REPEAT AFTER 2 TRIALS (%): 90.00
 14 PROMOTIONAL BUDG.(THOUS. OF \$): COLUMN 14
 15 FIXED INV. (THOUS. OF \$): 300.0
 16 TARGET RATE OF RETURN(%): 33.00
 17 PRICE: 1.060
 18 GROSS PROFIT MARGIN (% OF SALES UNIT): 43.50
 19 % USING EXISTING BRANDS: 100.0

	(7)	(8)	(9)	(11)	(14)	(5)
	AWARE	PREDIS	AVAIL	FREQ	PROMTN	TARGET
1	30.00	.174	61.00	5.000	352.0	14700
2	30.00	.145	66.00	8.000	274.0	14700
3	35.00	.109	69.00	10.00	274.0	13000
4	35.00	.095	73.00	12.00	274.0	13000
5	35.00	.081	77.00	15.00	266.0	12400
6	35.00	.076	79.00	25.00	266.0	12400
7	35.00	.073	82.00	22.00	266.0	12500
8	35.00	.071	85.00	3.000	112.0	12500
9	35.00	.067	90.00	.000	112.0	11900
10	35.00	.063	90.00	.000	112.0	11900
11	35.00	.063	90.00	.000	350.0	12400
12	35.00	.063	90.00	.000	350.0	12400
13	35.00	.063	90.00	.000	350.0	15100
14	35.00	.063	90.00	.000	298.0	15100
15	35.00	.063	90.00	.000	298.0	13400
16	35.00	.063	90.00	.000	298.0	13400
17	35.00	.063	90.00	.000	292.0	12800
18	35.00	.063	90.00	.000	292.0	12800
19	35.00	.063	90.00	.000	292.0	12900
20	35.00	.063	90.00	.000	122.0	12900
21	35.00	.063	90.00	.000	122.0	12300
22	35.00	.063	90.00	.000	122.0	12300
23	35.00	.063	90.00	.000	386.0	13300
24	35.00	.063	90.00	.000	386.0	13300
25	35.00	.063	90.00	.000	386.0	16600
26	35.00	.063	90.00	.000	328.0	16600
27	35.00	.063	90.00	.000	328.0	14700
28	35.00	.063	90.00	.000	328.0	14700
29	35.00	.063	90.00	.000	382.0	14000
30	35.00	.063	90.00	.000	382.0	14000
31	35.00	.063	90.00	.000	362.0	14200
32	35.00	.063	90.00	.000	424.0	14200
33	35.00	.063	90.00	.000	424.0	13400
34	35.00	.063	90.00	.000	424.0	13400
35	35.00	.063	90.00	.000	446.0	14600
36	35.00	.063	90.00	.000	446.0	14600

[AWARE is the percent of trial class who are aware of brand or advertising.]

[PREDIS is the percent of AWARE who have a predisposition to try and who would try if they found the brand in a store.]

[AVAIL is the percent who find the brand in a store.]

APPENDIX A-3: MOD II PROCESS OUTPUT

Figure A3-1: Mod II Simulation

*SIMULATE TO 36

PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY
1	14.3M	.418M	-.003	.418M	.000	.017
2	13.9M	.773M	17511	.373M	17511	.017
3	11.9M	1.04M	59567	.316M	45745	13822
4	11.6M	1.23M	.127M	.268M	76200	39494
5	10.8M	1.35M	.221M	.221M	.110M	70374
6	10.6M	1.44M	.324M	.222M	.126M	.105M
7	10.5M	1.51M	.455M	.226M	.159M	.137M
8	10.2M	1.55M	.604M	.226M	.184M	.171M
9	9.43M	1.58M	.741M	.214M	.180M	.204M
10	9.23M	1.63M	.862M	.212M	.170M	.236M
11	9.53M	1.67M	.978M	.217M	.171M	.265M
12	9.33M	1.73M	1.08M	.214M	.161M	.292M
13	11.8M	1.81M	1.20M	.262M	.182M	.317M
14	11.6M	1.89M	1.31M	.264M	.179M	.344M
15	9.62M	1.93M	1.43M	.237M	.200M	.370M
16	9.41M	1.95M	1.56M	.227M	.206M	.400M
17	8.63M	1.96M	1.68M	.209M	.204M	.429M
18	8.45M	1.96M	1.79M	.203M	.200M	.456M
19	8.38M	1.96M	1.91M	.201M	.204M	.481M
20	8.21M	1.96M	2.01M	.202M	.203M	.505M
21	7.45M	1.94M	2.11M	.186M	.202M	.527M
22	7.31M	1.91M	2.22M	.180M	.207M	.548M
23	8.15M	1.91M	2.31M	.197M	.199M	.569M
24	8.00M	1.92M	2.39M	.196M	.192M	.587M
25	11.1M	1.98M	2.48M	.265M	.196M	.604M
26	10.8M	2.06M	2.56M	.270M	.199M	.622M
27	8.77M	2.08M	2.65M	.227M	.204M	.641M
28	8.60M	2.09M	2.74M	.217M	.207M	.662M
29	7.75M	2.07M	2.83M	.197M	.215M	.683M
30	7.61M	2.05M	2.92M	.191M	.212M	.703M
31	7.68M	2.03M	3.00M	.192M	.215M	.722M
32	7.55M	2.00M	3.09M	.189M	.214M	.739M
33	6.64M	1.96M	3.16M	.169M	.207M	.755M
34	6.53M	1.93M	3.23M	.164M	.200M	.770M
35	7.61M	1.92M	3.28M	.186M	.195M	.782M
36	7.49M	1.91M	3.34M	.187M	.192M	.793M

VALUE= 1.49M FSSP=1 PTPBK= .591 PRETN= .655

['SIMULATE' command initiates this 36 period run. Underlining indicates the user's typing. The columns show the trial, preference and loyalty class populations and the buyers from each. 'VALUE' is total discounted profit, 'FSSP' is first self-sustaining period, 'PTPBK' is probability of achieving payback target, and 'PRETN' is probability of achieving rate of return goal. The input parameters that produced this simulation are not shown.]

*S TO I

PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY
1	14.3M	.418M	-.003	.418M	.000	.017

[User gives abbreviation 'S' for 'SIMULATE' command. Only one period is simulated so that the details of the trial class in the first period can be shown.]

* COMMENT--EXAMINE TRIAL MODEL FIRST PERIOD

[Comment lines may be entered anywhere while using SPRINTER.]

!DADAWT
 '!' NOT EXPECTED
DADAWT
 / DADAWT 4.41M

[User typed an extra character - SPRINTER indicates the error and waits for the next command.]

[The colon is followed by a data name to indicate which data is to be referenced. SPRINTER data items may be scalar, vector, or matrix and fixed point or floating point. Once data has been specified, commands are available to enter values, change values, and print values. The single character "/" is the command to print the specified data. 'DADAWT' is the number in the trial class who become aware of ads or appeals.]

AWTBEF
 / AWTBEF
 AWCLS 1 -->5
 9.47M .823M .704M 3.71M .000

[Trial class composition of awareness after advertising but before forgetting and before removing those who try. This is an example of a vector which is manipulated by the SPRINTER data management commands. The trial awareness classes are: (1) unaware, (2) brand aware, (3) aware of ads, (4) aware of appeals, and (5) negative reaction.]

TRINT
 / TRINT
 AWCLS 1 -->5
 .000 19757 .153M .961M .000

[Number in trial class with intent to try, by awareness class. 'M' indicates millions.]

TTRINT
 / TTRINT 1.13M

[Total number in trial class who intend to try.]

RTFIND
 / RTFIND .682M

[Number in trial class who have intent to try and who find our brand in a store.]

NTFIND
 / NTFIND 8.16M

[Number in trial class who do not intend to try, but who find our brand in a store.]

RTBUY
 / RTBUY .409M

[Number in trial class who have intent, find our brand in a store and buy it.]

Figure A3-2 (Cont.)

<u>INTBUY</u> / NTBUY	8160	[Number in trial class who do not intend to try our brand, but who do buy it after finding it in a store.]
<u>TTBUY</u> / TIBUY	.418M	[Total number of triers.]
<u>AWTAFT</u> / AWAFT		[Trial class awareness after forgetting and after removing this period's triers.]
AWCLS	1 -->5	
	12.6M .880M .291M .533M .000	
<u>INTRIAL</u> / NTRIAL	14.3M	[Total population of trial model after removing first period triers.]

Figure A3-3: Mod II Preference Class Detail

* COMMENT--CONTINUE THROUGH SECOND PERIOD, SHOW PREFERENCE CLASS.

*SIM CON TO 2 [CONTINUE option of SIMULATE command continues the simulation started in Figure A3-2 (above)].

PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY
2	13.9M	.773M	17511	.373M	17511	.017

!AWPBEF
/ AWPBEF [Preference class awareness composition after advertising but before forgetting and removal of buyers. Awareness classes for the preference class are: (1) unaware, (2) brand aware, (3) aware of advertising, (4) negative reactions, and (5) positive use experience.]

AWCLS 1 -->5
.000 83527 .214M 30070 90210

!DADAWP
/ DADAWP .334M [Number who become aware of ads, who have positive use experience, or who develop negative reactions this period.]

!FPRF*EF
/ FPREF [User mistyped the data identifier, but corrected his error using a SPRINTER editing command. The "*" indicates that the preceding character is erased. 'FPREF' is the number who have first preference for our brand. These people may or may not be ready to buy this period.]

AWCLS 1 -->5
.000 16705 .109M .000 63147

!TFPREF
/ TFPREF .189M [Total number in preference class with first preference for our brand.]

!SPREF
/ SPREF [Number who have second preference for our brand, by awareness class.]

AWCLS 1 -->5
.000 16705 25873 .000 9021

!TSPREF
/ TSPREF 51600 [Total number with second preference for our brand.]

!TPFINT
/ TPFINT 19825 [Number in preference class who intend to purchase our brand this period.]

Figure A3-3 (Cont.)

<u>RPFIND</u> / RPFIND	18432								[Number with intent to purchase our brand this period and who find it in a store.]
<u>NPFFIND</u> / NPFFIND	12631								[Number in preference class who do not intend to purchase our brand but who are ready to purchase some brand this period and who find our brand in a store.]
<u>RPBUY</u> / RPBUY	17511								[Number with intent who find our brand in a store and buy it.]
<u>NPBUY</u> / NPBUY	.000								[Number without intent who find our brand in a store and buy it.]
<u>TPBUY</u> / TPBUY	17511								[Total number of buyers in preference class.]
<u>BHLDP</u> / BHLDP									[Preference class buyers by holding class. These classes are defined as distribution of time between purchases from this product class. All second period preference buyers from holding class 1 (they buy every period) because they must have entered the preference class by buying in the
HLDCLS 1 -->7	17511	.000	.000	.000	.000	.000	.000	.000	trial class in the first period.]
<u>AWPAFT</u> / AWPAFT									[Preference class awareness after forgetting and removing buyers.]
AWCLS 1 -->5	.000	.272M	80060	24657	23787				
<u>NPREF</u> / NPREF	.773M								[Number in preference model after removing buyers and adding second period triers.]

APPENDIX A-4: MOD II SEARCHES

Figure A4-1: Mod II Advertising Search

*SIMULATE TO 36 ADV 5 10

ADV	VALUE
-20.%	1.70M
-10.%	1.74M
0.%	1.49M
10.%	1.01M
20.%	.500M
-10.%	1.74M

[Search 5 levels of advertising at 10% increments from reference advertising levels. All simulations are for 36 periods. Last line shows best discounted profit was at a 10% reduction in advertising.]

1ADFIRMC=1M=1,36X=.9

[Change advertising for our firm (C=1) for all 36 periods by multiplying reference levels by .90. The SPRINTER commands operate on whole subarays of values.]

*SIMULATE TO 36 ADV 7 2

ADV	VALUE
-6.%	1.72M
-4.%	1.73M
-2.%	1.73M
0.%	1.74M
2.%	1.69M
4.%	1.65M
6.%	1.60M
0.%	1.74M

[Continue searching from reduced advertising levels. Search 7 levels of advertising at 2% increments for 36 periods.]

Figure A4-2: Mod II Price Search

*SIMULATE TO 36 PRICE 5 10

PRICE	VALUE
-20.%	1.66M
-10.%	2.20M
0.%	1.49M
10.%	1.31M
20.%	.744M
-10.%	2.20M

[Search 5 levels of price at 10% increments from reference price. All simulations are for 36 periods]

*:PRSUGC=1M=1.36X .9

[Reduce our suggested price by 10% for all 36 periods.]

*SIMULATE TO 36 PRICE 7 2

PRICE	VALUE
-6.%	2.04M
-4.%	2.15M
-2.%	2.24M
0.%	2.20M
2.%	2.14M
4.%	2.05M
6.%	1.93M
-2.%	2.24M

[Continue search from reduced price levels. Seven increments of 2%.]

Figure A4-3: Mod II Price and Advertising Search

*SIMULATE TO 36 ADV 3 10 PRICE 3 10

ADV	PRICE	VALUE
-10.2	-10.2	2.44M
-10.2	0.2	1.74M
-10.2	10.2	1.56M
0.2	-10.2	2.20M
0.2	0.2	1.49M
0.2	10.2	1.31M
10.2	-10.2	1.73M
10.2	0.2	1.01M
10.2	10.2	.840M
-10.2	-10.2	2.44M

[Advertising and price have been reset to their reference levels. Search all combinations of 3 10% increments in advertising and 3 10% increments in price. Best level is 10% reduction in both.]

!ADFIRMC=1M=1,36X .9

[Reduce both price and advertising by 10%.]

!PRSUGC=1M=1,36X .9*SIMULATE TO 36 ADV 3 2 PRICE 3 2

ADV	PRICE	VALUE
-2.2	-2.2	2.47M
-2.2	0.2	2.43M
-2.2	2.2	2.37M
0.2	-2.2	2.48M
0.2	0.2	2.44M
0.2	2.2	2.38M
2.2	-2.2	2.44M
2.2	0.2	2.40M
2.2	2.2	2.34M
0.2	-2.2	2.48M

[Continue search from reduced advertising and price levels. But profit is given by a further 2% reduction in price, and is nearly \$1M higher than profit obtained by the reference marketing mix.]

APPENDIX A-5: MOD III PROCESS OUTPUT

Figure A5-1: Mod III Simulation

*SIMULATE TO 36

PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY
1	14.3M	.713M	6363	.529M	6363	.817
2	13.6M	1.36M	49658	.512M	44582	5076
3	11.4M	1.81M	.139M	.400M	98235	36012
4	10.8M	1.90M	.267M	.239M	.146M	86956
5	10.0M	1.91M	.425M	.192M	.185M	.141M
6	9.82M	1.89M	.597M	.191M	.207M	.192M
7	9.73M	1.84M	.798M	.193M	.242M	.236M
8	9.53M	1.78M	1.01M	.195M	.258M	.279M
9	8.75M	1.74M	1.18M	.185M	.227M	.319M
10	8.57M	1.73M	1.31M	.181M	.190M	.353M
11	8.88M	1.74M	1.43M	.188M	.175M	.382M
12	8.69M	1.76M	1.53M	.189M	.169M	.408M
13	11.2M	1.81M	1.66M	.237M	.188M	.432M
14	11.0M	1.87M	1.78M	.252M	.192M	.459M
15	8.98M	1.88M	1.92M	.219M	.210M	.487M
16	8.78M	1.87M	2.06M	.203M	.214M	.517M
17	7.99M	1.85M	2.18M	.187M	.203M	.547M
18	7.81M	1.84M	2.30M	.179M	.192M	.576M
19	7.74M	1.82M	2.41M	.177M	.195M	.601M
20	7.56M	1.80M	2.52M	.174M	.195M	.625M
21	6.80M	1.76M	2.63M	.159M	.197M	.648M
22	6.65M	1.71M	2.74M	.152M	.200M	.671M
23	7.48M	1.69M	2.84M	.168M	.189M	.693M
24	7.31M	1.69M	2.93M	.171M	.176M	.712M
25	10.4M	1.74M	3.01M	.233M	.178M	.730M
26	10.1M	1.82M	3.10M	.255M	.182M	.748M
27	8.01M	1.85M	3.19M	.213M	.184M	.768M
28	7.82M	1.85M	3.29M	.191M	.188M	.791M
29	6.95M	1.82M	3.39M	.170M	.197M	.814M
30	6.79M	1.78M	3.49M	.160M	.197M	.837M
31	6.83M	1.75M	3.58M	.159M	.196M	.858M
32	6.68M	1.71M	3.67M	.157M	.194M	.878M
33	5.74M	1.66M	3.76M	.137M	.185M	.896M
34	5.61M	1.61M	3.83M	.128M	.175M	.913M
35	6.66M	1.59M	3.90M	.148M	.169M	.927M
36	6.51M	1.58M	3.96M	.154M	.167M	.940M

VALUE= 1.57M FSSP=1 PTPBK= .574 PRETN= .643

[In this Appendix, the user's typing is underlined. Above output shows populations of Trial, Preference and Loyalty classes and buyers from each. 'VALUE' is total discounted differential profit, 'FSSP' is first self-sustaining period, 'PTPBK' is probability of achieving payback target, 'PRETN' is probability of achieving rate-of-return goal. In the simulations of this appendix, our firm distributes 1 million samples and 1 million coupons each of the first three periods.]

Figure A5-2: Mod III Trial Class Detail

<u>*S TO 1</u>									
PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY			
1	14.3M	.714M	6188	.529M	6188	.017			
[User starts a one period simulation to calculate first period trial class results.]									
VALUE=-.355M FSSP=1 PTPBK= .050 PRETN= .050									
<u>* COMMENT SHOW DEPTH OF BEHAVIOURAL DETAIL IN TRIAL MODEL FIRST PERIOD</u>									
* [Comment lines can be entered.]									
<u>*:CPTRCV</u> [User enters data management mode by typing ':' and specifies the data 'CPTRCV'. This is the number of trial class people who receive coupons. "M" stands for "million". The remainder of the 1M coupons missed the target market.]									
/	CPTRCV	.575M							
<u>:USAMPL</u> [Number of trial class who use a sample and move to the preference class.]									
/	USAMPL	.190M							
<u>:DADAWT</u> [Number of trial class who become aware of ads or appeals.]									
/	DADAWT	4.44M							
<u>:AWTBEF</u> [Number in each awareness class before forgetting and word of mouth processes and before removing first triers. Eight of the ten awareness classes are used in this set of data: (1) unaware, (2) brand aware, (3) aware of ads, (4) aware of appeal #1, (5) aware of appeal #2, (6) aware of appeals #1 and #2, (7) negative reaction to ads and/or brand, (8) positive use experience.]									
/	AWTBEF								
AWCLS	1 -->10								
	9.45M	.843M	.766M	2.98M	.708M	.000	37273	.000	.000
<u>:TRINT</u> [Number with intent to try by awareness class.]									
/	TRINT								
AWCLS	1 -->10								
	.000	20409	.167M	.722M	.222M	.000	.000	.000	.000
<u>:TTRINT</u> [Total number in trial class with intent to try who do not hold coupons.]									
/	TTRINT	1.12M							
<u>:CPTINT</u> [Total number in trial class with intent who do hold coupons.]									
/	CPTINT	.167M							
<u>:RTFIND</u> [Number in trial class with intent and no coupon who find the product in a store by store type. Store types are: (1) Drug, (2) Food, and (3) Variety.]									
/	RTFIND								
STYPE	1 -->3								
	.430M	.148M	.104M						

Figure A5-2 (CONT)

ICTFIND
/ CTFIND

[Number in trial class with intent and coupon who find the product in a store.]

STYPE 1 -->3

72148 24849 17499

INTFIND
/ NTFIND

[Number in trial class without intent who find the product in a store.]

STYPE 1 -->3

5.19M 1.79M 1.26M

IRTBUY
/ RTBUY

[Number of trial class with intent and no coupon who buy product.]

STYPE 1 -->3

.258M 88875 62587

ICTBY+UY
/ CTBUY

[User mistyped the data identifier 'CTBUY', but recovered using a SPRINTER editing command to erase one character. The erasure of the extra "Y" is indicated by the "+". This data is the number of the trial class who bought using a coupon.]

STYPE 1 -->3

68674 23805 16656

INTBUY
/ NTBUI

[Number of trial class who bought without having intent to try our product.]

STYPE 1 -->3

6749 2324 1637

ITBUY
/ TTBUI .529M

[Total number of trial class buyers.]

IAWTAFT
/ AWAFT

[Trial class awareness after forgetting, word-of-mouth and moving buyers to the preference class.]

AWCLS 1 -->10

12.4M .928M .316M .325M 29746 .167M 83149 .000 .000 .000

INTRIAL
/ NTRIAL 14.3M

[Number of people in trial class.]

Figure A5-3: Mod III Preference Class Detail

*
** COMMENT--CONTINUE THIS SIMULATION THROUGH SECOND PERIOD TO SHOW
* BEHAVIORAL DETAILS OF PREFERENCE CLASS.*SIMULATE CONTINUE TO 2

[The simulation started in Figure A5-2 (above) is continued through the second period. The user's typing is underlined.]

PER	T-POP	P-POP	L-POP	T-BUY	P-BUY	L-BUY
2	13.6M	1.36M	49658	.512M	44582	5076

*IUSAMPJ?
IUSAMPL
/ USAMPL .179M

[The user struck an incorrect key (;), SPRINTER questions his input.]

[The user correctly specifies the data item 'USAMPL', the number of people promoted from the trial class to the preference class by their use of a sample. Of the 1M samples distributed in the second period, 17.9% were used by trial class people. The "/" command initiates printout of the specified data.]

IDADAWP/ DADAWP .529M

[Number of preference class who become aware of ads or appeals.]

IAWPBEF/ AWPBEF

AWCLS 1 -->10

.000 .293M .106M .249M 52842 3135 98175 .197M .000 .000

[Number of preference class people in each awareness class before forgetting, word of mouth, and moving buyers to loyalty class. This awareness is produced by usage and advertising. Awareness class definitions are given in Figure A5-2 (above).]

IFPREF/ FPREF

AWCLS 1 -->10

.000 58601 26620 .137M 31705 1881 .000 .138M .000 .000

[Number in preference class who indicate a first preference for our brand. These people may or may not be ready to buy this period.]

ITFPREF/ TFPREF .393M

[Total number with first preference for our brand.]

Figure A5-3 (Cont.)

INPBUY
/ NPBUY

[Number who bought our brand, but had no intent to do so. These people found the brand in a store and were influenced by price and special displays.]

STYPE 1 -->3

821.9 344.7 255.5

ITPBUY
/ TPBUY 44582

[Total buyers from the preference class.]

IBHLDP
/ BHLDP

[Preference class buyers from each frequency of purchase class. These classes are defined by the previous average interval between purchases of this class of products.]

HLDCLS 1 -->7

34540 10042 .000 .000 .000 .000 .000

IAWPAFT
/ AWPFT

[Preference class awareness after forgetting, word of mouth and removal of buyers.]

AWCLS 1 -->10

.000 .699M .000 .121M 2436 12632 82535 36613 .000 .000

INPREF
/ NPREF 1.36M

[Preference class population after removing second period buyers and adding second period triers.]

APPENDIX A-6: Mod III SEARCHES

Figure A6-1: Mod III Price Search

*SIMULATE TO 36 PRICE 5 10

[Search 5 increments of 10% from reference suggested price.]

PRICE	VALUE
-20.%	1.31M
-10.%	1.94M
0.%	1.29M
10.%	.637M
20.%	-.299M
-10.%	1.94M

*:PRSUGC=1M=1,36X .9

[Reduce our (c=1) suggested price for all 36 periods (M=1,36) to the level indicated by the previous search. Price is multiplied by .9 (x.9) to obtain the 10% reduction. The sub-array of values is changed.]

*SIMULATE TO 36 PRICE 7 2

[Continue searching on a finer grid. A further price reduction of 2% is indicated.]

PRICE	VALUE
-6.%	1.73M
-4.%	1.86M
-2.%	1.96M
0.%	1.94M
2.%	1.90M
4.%	1.83M
6.%	1.73M
-2.%	1.96M

Figure A6-2: Mod III Advertising Search

*SIMULATE TO 36 ADV 5 10

[Search 5 increments of 10% from reference advertising level.]

ADV	VALUE
-20.%	1.32M
-10.%	1.44M
0.%	1.29M
10.%	.989M
20.%	.661M
-10.%	1.44M

!ADFIRMC=1M=1,36X .9

[Reduce our advertising by 10%.]

*SIMULATE TO 36 ADV 7 2

[Continue searching on a finer grid. No further change in advertising is indicated.]

ADV	VALUE
-6.%	1.37M
-4.%	1.39M
-2.%	1.42M
0.%	1.44M
2.%	1.41M
4.%	1.39M
6.%	1.36M
0.%	1.44M

Figure A6-3: Mod III Price and Advertising Search

*SIMULATE TO 36 ADV 3 10 PRICE 3 10

ADV	PRICE	VALUE
-10.X	-10.X	2.09M
-10.X	0.X	1.46M
-10.X	10.X	.820M
0.X	-10.X	1.94M
0.X	0.X	1.31M
0.X	10.X	.645M
10.X	-10.X	1.64M
10.X	0.X	1.01M
10.X	10.X	.326M
-10.X	-10.X	2.09M

[Simultaneous search of both variables from reference values gives same optimum as separate searches of each alone. This is not generally the case. The user aborted the second search before it was complete. The best levels up to the point of the abortion are indicated.]

*:ADFIRM

C=1

M=1,36

X .9

:PRSUG

C=1

M=1,36

X .9

*SIMULATE TO 36 ADV 3 2 PRICE 3 2

ADV	PRICE	VALUE
-2.X	-2.X	2.09M
-2.X	0.X	2.06M
-2.X	2.X	2.02M
0.X	-2.X	2.12M
0.X	0.X	2.09M
0.X	-2.X	2.12M

Figure A6-4: Mod III Price and Advertising
Search with Coupons and Samples

*:SMFIRM
C=1
M=1,3
=1000000
/ SMFIRM

COMPNY \ MONTH 1 -->3
1 1.00M 1.00M 1.00M

:CPFIRM
C=1
M=1,3
=1000000
/ CPFIRM

COMPNY \ MONTH 1 -->3
1 1.00M 1.00M 1.00M

*SIMULATE TO 36 ADV 3 2 PRICE 3 2

ADV	PRICE	VALUE
-2.7	-2.7	2.13M
-2.7	0.7	2.14M
-2.7	2.7	2.13M
0.7	-2.7	2.17M
0.7	0.7	2.18M
0.7	2.7	2.16M
2.7	-2.7	2.14M
2.7	0.7	2.15M
2.7	2.7	2.14M
0.7	0.7	2.18M

[Samples and coupons are added to our marketing mix. User specifies 1M of each for each of the first three periods. Search will commence from advertising and price levels set on previous page (each 10% below reference).]

[Samples and coupons have increased profit from 2.09M to 2.18M. No further price reduction is now indicated so samples exerted a mix effect on the best price.]

Figure A6-5: Mod III Price, Advertising, and Samples Search

*SIMULATE TO 36 ADV 3 2 PRICE 3 2 SM 3 50

ADV	PRICE	SAMPLE	VALUE
-2.7	-2.7	-50.7	2.18M
-2.7	-2.7	0.7	2.13M
-2.7	-2.7	50.7	2.06M
-2.7	0.7	-50.7	2.18M
-2.7	0.7	0.7	2.14M
-2.7	0.7	50.7	2.08M
-2.7	2.7	-50.7	2.16M
-2.7	2.7	0.7	2.13M
-2.7	2.7	50.7	2.08M
0.7	-2.7	-50.7	2.21M
0.7	-2.7	0.7	2.17M
0.7	-2.7	50.7	2.09M
0.7	0.7	-50.7	2.21M
0.7	0.7	0.7	2.18M
0.7	0.7	50.7	2.12M
0.7	2.7	-50.7	2.19M
0.7	2.7	0.7	2.16M
0.7	2.7	50.7	2.11M
2.7	-2.7	-50.7	2.18M
2.7	-2.7	0.7	2.14M
2.7	-2.7	50.7	2.07M
2.7	0.7	-50.7	2.18M
2.7	0.7	0.7	2.15M
2.7	0.7	50.7	2.09M
2.7	2.7	-50.7	2.16M
2.7	2.7	0.7	2.14M
2.7	2.7	50.7	2.09M
0.7	0.7	-50.7	2.21M

[Search commences from advertising, price, sample, and coupon levels set on preceding pages (price and advertising 10% below reference, 1M samples and coupons for each of the first three periods.) The user may specify any set of search variables and increments in free form using the SPRINTER command 'SIMULATE'. This search has 3 increments of 10% for advertising and price, 3 increments of 50% for samples.]



BASISMENT

Date Due

NOV 17 75	APR 29 78	MAR 07 1992
DEC 05 76		APR 13 1984
JUL 29 78	JAN 4 '80	NOV 13 1988
JAN 15 77	JAN 16 '80	
MAR 15 77	JUN 19 '80	
OCT 14 77		
MAR 21 78	APR 03 '80	
APR 3 '79	JUL 02 '81	
	MAY 26 '80	
	OCT 11 '85	
		1986
	APR	
MAR 22 78	DEC 18 1986	
FEB 4 78		
FEB 15 79	APR 17 78	



419-69

3 9080 003 702 179



420-69

3 9080 003 702 153



421-69

3 9080 003 671 192



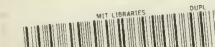
422-69

3 9080 003 702 120



423-69

3 9080 003 671 184



424-69

3 9080 003 671 127



3 9080 003 671 176



426-69

3 9080 003 671 168



427-69

3 9080 003 702 260



428-69

3 9080 003 702 252



429-69

3 9080 003 702 245

