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A "PROTOTYPING" APPROACH FOR INCORPORATING LARGE DATA BASES INTO MEDIA PLANNING SIMULATIONS: AN EXAMPLE USING MAGAZINE MEDIA

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ABSTRACT

Media planning simulations are commonly used in both industry and marketing education to estimate the frequency distribution of media exposure for a given advertising campaign. Typically, these simulations rely on media exposure data from syndicated research services, such as MediaMark Research (MRI) or Simmons Market Research Bureau (SMRB). However, when media are not included in these syndicated studies (i.e. they are "unmeasured"), they must either be excluded from the simulation, or artificial data themselves must be simulated so that they can be included. This is usually done through a process of "prototyping," or using a measured medium as a prototype for developing the unmeasured parameters. This study describes and tests a method of prototyping in which prototypes are selected through a judgmental process.

INTRODUCTION

Over the years, media planning has provided a fertile ground for the growth of simulation research. For instance, in 1961, Agostini published his classic formula for estimating the reach and frequency of a media schedule from single medium and media pair audience data. Gensch (1973) and Rust (1986) provide good reviews of this research as of the early 1 970s and mid-i 980s, respectively. However, the research continues with no apparent diminution (e.g. see Ju, Lee, and Leckenby 1994). The literature has also spawned numerous comprehensive planning models, using simulation as a basis for predicting the results of alternative decisions (Little and Lodish 1966,1969; Aaker 1968, 1975; Gensch 1973), as well as simulations that seek to model the decision making process actually used by planners (Fleck 1973).

All of these models depend on audience data as a basis for the simulation. These data are readily available from a host of syndicated services, such as Nielsen, MediaMark Research (MRI), and Simmons Market Research Bureau (SMRB). Furthermore, they are relatively economical for industry applications. But not for educational simulations. This is particularly true if the simulation is based on "single-source" data, relating media to target markets that reflect product usage instead of conventional demographics. The expense of data under current licensing arrangements would be exorbitant. And even if this problem were resolved, the sheer bulk of the data make them very unwieldy.

The purpose of this paper is to describe an alternative approach to constructing a media database for use in educational simulations. It draws on the principle of "prototyping" of media.

While there are several different approaches to the "prototyping" process, they all use a "prototype" media vehicle as a basis for estimating the audience parameters of another in the media simulation. In our application, a simulation can incorporate data from a relatively small number of magazine "prototypes" into the simulation, and from these synthesize a much larger media audience data base.

MAGAZINE PROTOTYPING

Regardless of source of data used to drive a media simulation, the breadth of media it can accommodate is limited by the availability of data. Some relevant media are bound to be omitted from the base. This is particularly true of magazine data. There are countless numbers of small magazines that may provide useful advertising media, but which are excluded from large-scale syndicated studies due to economic constraints. These are known as "unmeasured" magazines.

The usual remedy is to synthesize the missing data through a process known as "prototyping" (Baron 1990/1). This process uses magazines whose audiences are believed to be similar to those of the unmeasured magazine as a basis for simulating the unmeasured magazine audience parameters. Three parameters are of particular interest: (1) the audience size; (2) the target market concentration; and the (3) the audience duplication, or overlap, with other relevant magazines in which the advertiser might choose to place messages.

In order to derive the audience parameters, the process uses two types of data. The first are syndicated product-media data, such as MRI or SMRB. These, of course, are the data to which the process seeks to add the unmeasured magazine. But they also provide the measured magazines whose audiences provide the basis for simulating the unmeasured audience. The second type of data are circulation figures obtained from the magazine itself. These represent the number of copies of the magazine in circulation, as opposed to the number of people reading an average copy.

The prototyping process begins with the selection of a magazine to serve as a "prototype" for the unmeasured magazine. The traditional approach -- what we will refer to as the "editorial similarity" approach -- is to divide magazines into different editorial classifications -- "women's service", "business", "fashion", and so forth. Unmeasured magazines are then classified in a similar manner, and prototypes are assigned from the same classification. However, they can also be selected through more quantitative approaches, such as Baron's (1991/2) profile-distance method.

Baron's profile-distance approach has achieved the status of an industry standard for practitioners, in large part because it accommodates any title, regardless of whether it fits neatly into any preconceived magazine classification. However, research suggests that it performs no better than the traditional judgmental approach for magazines that do fall into an editorial classification (Cannon and Boglarsky 1992).

APPLYING THE PROTOTYPING PRINCIPLE TO MEDIA PLANNING SIMULATIONS

Recall that the application of the prototyping concept to educational media simulations is to synthesize a relatively large database from a much smaller set of media data. The end result need not be a comprehensive set of advertising media, but rather, one that represents a reasonable number of alternative vehicles from each of the major media types. Applied to magazines, this means that the simulation should include alternative titles from each of the major editorial classifications.

Given this objective, using the editorial similarity approach to prototyping makes sense. Furthermore, the profile-distance does not make sense. First, compiling the magazine readership studies needed to make the method work is cumbersome for developers of educational simulations. Second, storing the required demographic profiles requires the simulation to incorporate a very large database, which is one of the things our application of prototyping is designed to avoid.

Following this logic, this study will use the traditional editorial similarity approach, adapting the magazine categories developed by Cannon, Williams and Doyle (1992), summarized in Table 1. The magazine audience parameters will be estimated as described below.

TABLE 1.
MAGAZINE CATEGORIES

MAGAZINE CATEGORIES	DESCRIPTION	EXAMPLE(S)
Glamor	Editorial content places an emphasis on fashion and outward appearance rather than on interpersonal relations.	*Vogue* and *Harper's Bazaar*
Home (Literary)	Magazines that have a home orientation, but fictional stories and other more lengthy literary editorial material in addition to short homemaking ideas.	*Ladies Home Journal, Redbook, McCall's, Good Housekeeping*
Black	Commonality of black editorial interest with some glamour features.	*Ebony, Jet,* and *Essence*
Business	News and commentary on financial and managerial subjects.	*Forbes, Fortune, Money, Business Week,* and *The Wall Street Journal*
News	Mass Appeal Magazines that provide current information and commentary regarding a broad range of current events or topics.	*Newsweek, Time, Life,* and *US News & World Report*
Automotive	This category includes magazines that are geared toward automobile enthusiasts.	*Road & Track, Car & Driver*
Home (Non-Literary)	The Home Operations/Non-literary category includes magazines that feature short articles and "how to" tips on homemaking.	*Woman's Day, Family Circle,* and *Better Homes and Gardens*
Do It Yourself	The Do It Yourself category focuses on woodworking and home improvements.	*The Family Handyman* and *Home Mechanix*
Men's Sexually Oriented	While the editorial material may include cultural or intellectual material, the common factor in the "Sexually Oriented" category is the presence of sexually oriented pictures and editorial material.	*Penthouse* and *Playboy*
Sports News and Features	These magazines provide news and commentary on current developments in sports	*Sporting News* and *Sports Illustrated*
Men's Sexually Oriented	While the editorial material may include cultural or intellectual material, the common factor in the "Sexually Oriented" category is the presence of sexually oriented pictures and editorial material.	*Penthouse* and *Playboy*
Outdoor	The "Outdoor" category provides information and features regarding outdoor sports such as hunting and fishing.	*Outdoor Life* and *Field and Stream*
Science	The common theme is an editorial focus on scientific discoveries or information.	*Science, Science Digest,* and *Scientific American*
Sensationalistic/Gossip	A focus is on sensationalistic stories that would tax the credibility of other news media. Magazines that lean toward a personality and gossip orientation would also fall into this category.	*National Enquirer* and *The Star*
Epicurean	The common theme is food and drink.	*Food & Wine* and *Bon Appetite*
World Culture	Magazines in this category focus on features and photographs of interesting, scientific, cultural, historic, or nationalistic aspects of the world.	*Smithsonian, National Geographic* and *Travel and Leisure*
Golf	The obvious commonality is an editorial focus on the sport of golf, primarily from a participative perspective.	*Golf Digest* and *Golf Magazine*

Conversely, readers per copy can be estimated where audience and circulation data are available as follows:

Sunday Supplements	The common factor is a general interest editorial appeal and a common distribution as part of the Sunday newspaper.	*Sunday* and *Parade*
Tennis	It is analogous to the "Golf" category	*Tennis* and *Tennis World*
Parenting	The focus in on the raising of babies and young children.	*Parents* and *Parenting*
Sophisticated Living	This category includes magazines that celebrate the enjoyment of "high society".	*Town & Country*, *Harpers Bazaar*, and *Vogue*
Working Woman	This category encompasses two subcategories: (1) an appeal to women who work to bring in extra income to their families and (2) an appeal to women who work for extra income to finance the decorating of their homes.	*Working Woman*, *Working Mother*, and *1001 Home Ideas*
Natural Health	There is an emphasis on internal health, featuring issues of nutritional and natural diet.	*Organic Gardening* and *Prevention*
Fashionable Home Decorating and Collectibles	This category includes magazines with an emphasis on such things as conspicuous home fashion and antiques rather than on practical decorating and money-saving projects or on high-fashion architecture.	*Metropolitan Home*
Western Home Oriented	This category includes home-oriented magazines with circulation in the Western United States.	*Sunset*
Outdoor Sports	This category includes magazines that appeal to young, physically active, outdoor-oriented people.	*Runner's World* and *Ski*
Cultural/Literary	A grouping of magazines maintaining a "cerebal" orientation with an editorial focus on noted authors and literary figures.	*Saturday Evening Post*, *Self*, and *Esquire*
Health	Magazines in this category appeal to people's desire to maintain a healthy lifestyle, including proper weight, diet and exercise. They differ from magazines in the natural health category in that they emphasize a more general approach to health rather than an emphasis on vitamins and natural remedies.	*Health*, *American Health*, and *Weight Watchers*
Consumer Service	Magazines in this category aid consumers in their purchase decisions.	*Changing Times* and *Consumer Digest*
Contemporary Culture	Music/personality/youth oriented news and commentary related to pop culture.	*Rolling Stone* and *US*

Adapted from Cannon, Williams and Doyle (1992)

As we noted, the circulation data are available from the magazines themselves. Readers per copy can be obtained by dividing audience data by circulation. Of course, audience data are not available for unmeasured magazines. But there are at least some magazines for which audience data are available in each editorial classification. A practical estimate of readers per copy can be obtained by applying formula (2) to all the magazines available, and then averaging the resulting RPC figures for each editorial classification. The average RPC figures for the editorial classifications given in Table 1 are presented in Table 2.

.**Estimating Audience. Size**.

Given circulation and readers-per-copy, audience can be estimated by the following formula:

$$M = C \times RPC \qquad (1)$$

where

M = magazine audience
C = magazine circulation
RPC = readers per copy

$$RPC = M/C \qquad (2)$$

TABLE 2.
AVERAGE READERS PER COPY

Magazine Categories	Average Readers Per Copy
Glamour	4.46
Home (Literary)	4.03
Black	5.26
Business	4.98
News	6.89
Automotive	5.92
Home (Non-Literary)	4.67
Do It Yourself	3.00
Sports News & Features	6.78
Men's Sexually Oriented	3.53
Outdoor	8.11
Science	3.69
Sensationalistic	4.88
Epicurean	3.90
World Culture	3.79
Golf	3.69
Sunday Supplements	2.11
Tennis	2.15
Sophisticated Living	5.54

Estimated RPC are an average derived from audience data taken

Working Women	3.73
Parenting	5.69
Natural Health	3.64
Fashionable Home	2.56
Western Home Oriented	3.03
Outdoor Sports	6.65
Cultural/Literary	5.12
Health	5.20
Consumer Service	4.45
Contemporary Culture	4.88

from MRI (1990/91) and circulation data from MediaWeek's Guide to Media (1991). Circulation figures are available from every magazine, and are summarized by Standard Rate and Data Service, as well as a host of published media guides. Thus, to estimate audience data, one need only classify each magazine into one of the available editorial classifications, use the RPC figures for that classification, and apply formula (1). For instance, World Tennis has a circulation of 525,000. It falls into the "Tennis" editorial classification, thus giving it an estimated RPC of 2.15. Therefore, the estimated audience is (525,000 x 2.15 = 1,128,750).

Estimating Target Mark Selectivity

Target market selectivity is generally expressed in terms of an index, where a value of 1 .0 represents a non-selective medium, or one for which the likelihood of a media audience member being a member of the target market is no greater or less than it is for a randomly selected member of the population as a whole. The index is computed using the following formula:

$$I = \frac{PMT}{PUT} \qquad (3)$$

where

I = index of target market selectivity

PMT = proportion of the media audience who are members of the target market

PUT = proportion of the universe (total adult population) who are members of the target market

The data required to estimate the index can be taken from any syndicated product media service, such as MRI or Simmons. These need only be averaged across the available magazines in each magazine category. Target markets are typically defined by product usage categories. Table 3 presents average indices for each magazine category and ten selected product categories that might be used as a basis for a media simulation.

As the formula suggests, the key to estimating duplication is the index (112). The value of U is readily available from MRI or

TABLE 3.
AVERAGE INDEX OF TEN PRODUCT CATEGORIES

CATEGORIES	SPORTS CAR (12.0*)	DOM BEER (12.0)	HAIR COND (56.3)	FILM (53.7)	CHEW GUM (57.3)	MOUT WASH (61.7)	DOG FOOD (19.6)	HEAD. REM (66.9)	JUICE (56.2)	CHAR. (30.3)
GLAMOR	136**	85	134	116	121	104	111	105	108	99
HOME (Literary)	96	69	124	114	111	107	116	105	108	93
BLACK	80	112	106	66	119	119	32	99	96	129
BUSINESS	128	113	93	122	101	100	122	100	108	92
NEWS	106	111	99	111	101	100	115	100	104	94
AUTOMOTIVE	157	154	87	109	108	96	129	98	106	110
HOME(Non-Lit.)	93	72	120	113	109	106	112	104	107	94
TECHNOLOGY	205	250	173	229	197	205	274	203	228	212
SPORTS NEWS	218	136	148	166	152	163	147	154	166	166
SEX. ORIENTED	248	367	166	194	211	189	220	198	193	272
OUTDOOR	163	224	128	166	157	154	194	154	156	169
SCIENCE	207	261	192	254	188	182	269	196	233	185
SENSATIONAL	98	97	113	94	113	106	93	103	97	126
EPICUREAN	100	117	116	110	123	101	100	117	107	96
WORLD CUL.	116	104	102	121	97	104	124	101	108	94
GOLF	116	126	92	120	100	103	127	101	105	88
SUNDAY SUPP	211	206	205	214	198	201	221	201	209	187
TENNIS	291	247	171	234	230	176	295	198	187	169
SOPHISTLIVING	196	134	186	170	167	160	152	156	157	140
WORK WOMEN	108	75	131	120	121	107	124	105	116	103
PARENTING	97	71	129	123	121	96	116	106	124	103
NAT. HEALTH	164	178	209	214	192	212	232	204	211	159
FASHION HOME	104	111	120	130	104	109	116	104	106	78
WESTERN HOME	128	69	104	121	99	86	126	98	107	86
OUT. SPORTS	156	136	102	127	107	86	164	100	110	81
CULTURAL	181	167	170	157	171	160	157	154	162	156
HEALTH	108	78	120	111	111	107	117	104	106	90
CONS. SERVICE	222	219	197	238	210	209	240	209	219	189

* Number of users as a percentage of total population.

** Average selectivity indices taken from MRI (1990/91).

Estimating Magazine. Audience. Duplication

Audience duplication is analogous to target market selectivity. The greater the selectivity of one media audience to another, the greater the duplication. The actual duplication can be estimated (as a percentage) by the following formula:

$$D_{12} = R_1 \times R_2 \times I_{12} \times U \qquad (4)$$

where

D_{12} = number of people included in the audience of both magazine 1 and 2.

R_1, R_2 = proportion of the universe (U) who are in the audience of magazine 1 (the equivalent of a rating in broadcast media)

I_{12} = selectivity index of magazine 1 on magazine 2

Simmons. R_1 and R_2 can be obtained by applying the following formula, again using data available from MRI or Simmons:

$$R = \frac{M}{U} \quad (5)$$

The logic of prototyping suggests that the selectivity index for magazines within a given magazine category should be very similar to each other. For purposes of developing a media simulation, then, one need only know the index of magazines on other magazines within a given category and the index across categories. The index within categories can be estimated by averaging the index of each magazine on every other magazine within the same category.

Ideally, the index across categories would be developed by averaging the index of each magazine within a particular category on each magazine within a second category. For instance, the index of fashion magazines on business magazines would be the average of each magazine within the fashion category on each magazine within the business category. That is, it would be an average of Glamour on Business Week, Glamour on Forbes, Glamour on Fortune, Cosmopolitan on Business Week, Cosmopolitan on Forbes, etc. In practice, however, the number of different possible combinations makes this approach impractical.

An alternative is to select a single magazine to represent each category. This produces a single index for each combination of categories. In order to develop a more stable estimate of the index, the process may be repeated, changing one or more of the magazines. In the case of values presented in Appendix I, the process was repeated three times. In the first iteration, the magazine with the strongest loading on a particular category (based on the data provided by Cannon, Williams, and Doyle 1992) was used to represent the category. In the second iteration, the magazine with the second strongest loading was selected. In cases where only one magazine was available to represent a category, the same magazine was used in the second analysis. In the third iteration, the magazine with the third strongest loading was used, or, if the category did not include a third magazine, the magazine with the strongest loading was used once again. After three iterations, the result was three indices for each pair of categories. These three indices were then averaged to get the final estimate.

The results of this process are shown in Appendix 1. Diagonal values of the matrix represent the average indices within a given magazine category, and the off-diagonal values represent the average of three indices relating two different categories.

In practice, the media planning process would not rely on simple audience duplication data, but duplication within a given target market category. However, several methods exist for estimating this without the benefit of additional data. Cannon (1982) suggests a relatively simple approach, based on the assumption that there are no three-way audience-audience-market interactions. Incorporating this into equation (4), we get the following equation:

$$TD_{12} = TR_1 \times TR_2 \times TI_{12} \times TU \quad (6)$$

where

TD_{12} = number of people included in the audience of both magazine 1 and 2.

TR_1, TR_2 = proportion of the universe (U) who are in the audience of magazine 1 (the equivalent of a rating in broadcast media)

TI_{12} = selectivity index of magazine 1 on magazine 2

TU = the target market (the universe of target market members)

Note that the equation is identical to equation (4), except that it represents target market rather than total population data. The value of TI_{12} is assumed to be identical to 112 (Appendix I), given our assumption that there are no three-way audience-audience-market interactions. TU is readily available from MRI or Simmons. The number of target market members in the media audience (TM) is also available from MRI or Simmons. This enables us to estimate value of TR_1 and TR_2, as follows:

$$TR = \frac{TM}{TU} \quad (7)$$

SUMMARY AND CONCLUSIONS

The objective of this paper has been to describe a process through which a large number of different target markets (product usage categories) and magazine vehicles might be incorporated into an educational media simulation. Such a simulation faces three problems:

Incorporating a large number of target market categories and alternative media into a simulation requires a potentially very large database. This makes the simulation program very large and cumbersome.

The date contained in the base involves proprietary information. Not only must it be obtained from the companies who sell it, but the designer must also obtain releases to use it in a commercial product.

The base is necessarily limited to “measured magazines” -- those included in the syndicated research study from which the data era being taken.

These problems are not as difficult for simulations that are used in actual media planning situations. Typically, an agency will already have access to the data upon which the simulation feeds. The key to design, then, is simply to make the system user friendly and powerful. For educational simulations, however, the simulation package must generally be complete with data. Furthermore, it must be relatively economical, since students will usually have to buy other classroom materials (textbook, etc.) in addition to the simulation.

The process described in this paper is particularly attractive for educational simulations because it addresses the economy issues, both in program size and licensing costs. No licensing is needed, because the database is synthesized rather than copied from an existing source. Indeed, a viable simulation could be created using the data contained in this paper. Furthermore, it could be customized to include any magazines that can be classified into the categories discussed in tables 1 to 3, and in Appendix I. Finally, any errors that might result from the process of synthesizing the media data are not likely to be significant for educational purposes. Educational simulations are concerned with general patterns of media usage, not the accuracy of actual audience figures.

Consistent with this logic, future research should include efforts towards identifying better and more comprehensive media types. Eventually, these should be expended to include additional media classes. Again, the key will be to do this without overloading the program with data storage requirements.

REFERENCES

Aaker, David A. (1968) "A Probabilistic Approach to Industrial Media Selection," Journal of Advertising Research 8:4 (September), 46-54.

Aaker, David A. (1975) "ADMOD: An Advertising Decision Model," Journal of Marketing Research 13:1 (February), 37-45.

Agostini, Jean-Michael (1961) "How to Estimate Unduplicated Audiences," Journal of Advertising Research 1:1 (March).

Baron, Roger B. (1990/1991) "Using the Profile-Distance Method to Select Unmeasured Magazine Prototypes," Journal of Advertising Research 30:6 (December/January), 11-18.

Cannon, Hugh M. (1982), "A New Method for Estimating the Effect of Media Context," Journal of Advertising Research 22: 5 (October/November), 41-48.

Cannon, Hugh M. and Cheryl Boglarsky (1992) "Matching Unmeasured Magazines to Target Markets: A Test of Two Methods," Proceedings of the 1992 Conference of the American Academy of Advertising, 95-99.

Cannon, Hugh M., David L. William, and Richard L. Doyle (1992), "Toward a Scheme for Selecting Judgmental Magazine Prototypes," Proceedings of the 1992 Annual Conference of the American Academy of Advertising, 107-116.

Fleck, Robert A., Jr. (1973). "How Media Planners Process Information," Journal of Advertising Research 13:2 (April), 14-18.

Gensch, Dennis H. (1973) Advertising Planning: Mathematically Models in Advertising Media Planning. Elsevier Scientific Publishing: Amsterdam.

Ju, Keun-Hee, H.K. Lee, and John D. Leckenby (1990), "A Further Test of a Simple Reach/Frequency Model," *1990* Conference of AAA.

Leckenby (1994) "A Dirichlet Model Applicable to Asymmetrical Media Schedules." Proceedings of the 1994 American Academy of Advertising Conference

Little, John D. C. and Leonard M. Lodish (1969. "A Media Planning Calculus," Operations Research 17 (January-February), 1-35.

Little, John D. C. and Leonard M. Lodish (1966). "A Media Selection Model and Its Optimization by Dynamic Programming," Industrial Management Review 8 (Fall), 1 5-23.

MRI (1991) Study of Media and Markets 1990/91 Doublebase. New York: MediaMark Research.

MediaWeek's Guide to Media. (1991). Battaglia Michael J. (ed.) New York, NY.

Rust, Roland (1986). Advertising Media Models: A Practical Lexington, MA: D.C. Heath.

APPENDIX I

SELECTIVITY INDICES RELATING EACH PAIR OF MAGAZINE CATEGORIES*

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
M1	2963														
M2	327	1127													
M3	277	153	3390												
M4	169	117	220	3877											
M5	196	171	174	301	942										
M6	96	64	163	314	223	3397									
M7	237	320	141	124	136	72	698								
M8	84	130	126	226	187	395	158	7073							
M9	110	83	177	248	236	436	81	262	3099						
M10	115	75	201	226	186	394	81	237	370	2138					
M11	113	111	74	188	180	352	112	387	308	308	2184				
M12	140	153	92	301	307	211	125	191	254	170	213	1137			
M13	208	187	225	126	154	182	171	175	183	196	164	72	934		
M14	286	213	126	361	244	208	194	215	167	140	148	550	126	3907	
M15	206	180	115	405	230	184	167	237	181	171	188	412	111	349	3624
M16	148	107	54	414	199	210	125	186	340	235	197	202	101	265	316
M17	111	111	108	140	117	105	114	120	127	109	102	128	100	124	112
M18	228	132	130	528	380	504	115	158	539	278	193	352	176	358	285
M19	650	336	341	368	256	206	228	186	178	150	151	301	199	391	352
M20	357	354	254	285	210	147	296	254	110	106	169	254	201	281	227
M21	338	267	208	189	194	155	241	163	161	134	176	98	200	194	172
M22	179	258	150	222	172	122	226	342	147	100	212	203	155	267	234
M23	389	244	193	400	228	221	242	220	131	127	86	361	113	660	342
M24	177	172	39	275	185	151	189	135	104	87	135	387	66	421	271
M25	236	114	98	403	271	564	111	238	392	328	272	476	107	308	294
M26	443	306	349	318	262	238	219	250	235	255	209	313	225	298	338
M27	369	315	343	254	234	148	262	221	186	155	194	253	188	355	255
M28	193	206	165	563	226	216	198	469	207	176	223	307	135	339	362
M29	400	223	304	268	260	399	165	268	321	320	188	173	233	199	315

	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29
M16	4111													
M17	135	345												
M18	673	143	1562											
M19	208	113	292	5438										
M20	159	114	230	403	4953									
M21	133	103	237	267	684	3757								
M22	140	118	141	294	292	347	3132							
M23	253	128	199	771	476	213	254	4113						
M24	183	111	183	305	238	144	219	620	1017					
M25	348	120	1092	415	183	237	138	445	272	4457				
M26	267	114	389	663	376	253	319	495	255	347	9677			
M27	183	115	306	429	486	372	461	354	258	332	508	5167		
M28	353	125	326	286	283	197	460	408	272	252	383	374	4146	
M29	194	117	315	428	303	264	181	267	138	303	417	342	165	4943

*Diagonal values represent the average index of each magazine within the category on every other magazine within the same category. Off-diagonal values represent an average of three representative indices relating the two categories. Estimates are on data taken from MRI (1990/91).

M1 = Glamour
M2 = Home (Literary)
M3 = Black
M4 = Business
M5 = News
M6 = Automotive
M7 = Home (Non-Literary)
M8 = Do It Yourself
M9 = Sports News & Features
M10 = Men's Sexually Oriented
M11 = Outdoor
M12 = Science
M13 = Sensationalistic
M14 = Epicurean
M15 = World Culture
M16 = Golf
M17 = Sunday Supplements
M18 = Tennis
M19 = Sophisticated Living
M20 = Working Women
M21 = Parenting
M22 = Working Women
M23 = Fashionable Home Decorating
M24 = Western Home Oriented
M25 = Outdoor Sports
M26 = Cultural/Literary
M27 = Health
M28 = Consumer Service
M29 = Contemporary Culture