



HENRY ASSAEL

Stern School of
Business, New York
University

From Silos to Synergy

A Fifty-year Review of Cross-media Research Shows Synergy Has Yet to Achieve its Full Potential

Before the advent of the Internet, media planning focused on individual media and used exposure—opportunity to see—as the criterion of effectiveness. Since then, the focus has shifted to the interaction between media (particularly on- and offline media) with a shift in emphasis to opportunity to act and to sales and ROI measures of effectiveness. This article traces the move from silos to synergy over a 50-year period, much of it reported in the *Journal of Advertising Research*. After 1994, the concept of synergy came to be increasingly identified with interactive media effects. Most notably, a few researchers saw the importance of tying cross-media effects to sales and ROI because, as one study found, media allocation criteria differ under conditions of synergy compared to the traditional silo framework for budgetary decisions. Although much has been accomplished as described herein, the promise of cross-media research has yet to be achieved. Interactive media studies have tended to focus on limited paired media comparisons. Key areas of synergistic effects such as the distinction between sequential and simultaneous media exposure have yet to be explored. And only two studies could be cited that sought to utilize cross-media effects to establish media allocation criteria based on the association of media interactions to ROI. Of most importance is the lack of reliable measures of cross-media effects. Ideally, single-source systems would measure multi-media exposure and purchase behavior for the same respondent. The data burden placed on respondents, however, makes such systems difficult to implement. The technology resulting in the proliferation of media has outstripped the means to measure cross-media effectiveness. Until adequate measures of interactive media effects are developed, cross-media research will not reach its full potential.

INTRODUCTION

Cross-media research has received increasing attention in recent years. The Web and mobile technologies have driven an explosion of media alternatives, giving impetus to a cross-media perspective. Cross-media research is nothing new, but its emphasis has changed from silos to synergy.

Before Internet advertising became such an important part of the marketing mix, media research tended to follow a “silo” approach (i.e., a focus on individual media). Most research was devoted to measuring the effectiveness of television. Audience-measurement issues regarding the validity and reliability of reach and frequency dominated. Based on a content analysis of the *Journal of Advertising Research* from inception to the early 1990s, it is estimated that research devoted to television outnumbered research on all other media by at least a five-to-one ratio. When analyses took place across media, generally the objective was to create unduplicated audiences to maximize reach on the most cost-efficient basis.

In the last 15 years, the means of transmitting advertising influence through the media has changed dramatically. Television still is the dominant medium, but commercials can now be received on different platforms. Mobile technology has given marketers the ability to advertise at the right time and place. Social networks have increased the multiplier effect of word-of-mouth so that viral marketing strategies are now commonplace. When YouTube, Facebook, and Twitter can be regarded as media, cross-media research takes on a different meaning.

The proliferation of media has resulted in the following:

- A shift in the criteria of media selection from reach and frequency (opportunity to see) to criteria related to opportunity to act (brand attitudes, media

Key areas of synergistic effects such as the distinction between sequential and simultaneous media exposure have yet to be explored.

engagement, purchase intent) and to behavior¹

- An evaluation of the interaction of media in influencing consumers, particularly the degree to which on- and offline media reinforce each other
- Research on the nature and effects of cross-media synergies
- A move from aggregate-level to individual-level research as the ability to track individual consumers improves. As a result, maximization increasingly is centered on influence at the individual level rather than reach and frequency at the aggregate level.

The multiplicity of media and new technologies has also led to a renewed focus on maximizing ROI as the objective of media planning. Maximizing sales has long been the objective. In line with a silo approach, however, planning tended to be linear and additive, emphasizing the incremental benefits of media buys within given constraints. The current emphasis on integrated marketing communications (IMC) as applied to media planning means a greater focus on *interactive* rather than *main* media effects. An IMC perspective also has led to increased interest in single-source data as a basis for media selection. Systems are needed to measure cross-media consumption for individual consumers and to relate media interactions to purchase behavior.

This article will review the literature in cross-media research both in the *Journal of Advertising Research* since its inception 50 years ago and in other key marketing

¹ This transition reflects a shift from cognitive to affective to behavioral criteria of effectiveness.

journals (See Figure 1 for a summary of advances over time). It will consider the following:

- The state of media and cross-media research prior to the advent of the Internet
- The focus on an *intra-media* or silo approach during this period
- The transformation of media research to a more integrative *inter-media* focus, and the resultant emphasis on *media synergies* (defined as the joint impact of multiple media that exceed the total of their individual parts)
- The importance of utilizing sales and ROI criteria to provide allocation guidelines in cross-media planning
- Measurement issues and future directions for cross-media research.

A PERSPECTIVE ON CROSS-MEDIA RESEARCH

This paper will use 1994 as a somewhat arbitrary date to delineate cross-media research before and after the beginning of the popularization of the Internet. Two inter-related streams of research define cross-media in both periods—studies to evaluate media based on exposure to the message and those based on response to the message.

Research on media exposure was very different before and after 1994. Prior to 1994, it was dominated by a focus on media selection to maximize exposure. The perspective was additive and incremental in determining the combination of media, focusing on one medium at a time.

Year	Analytical Contribution	Key Contributors
MODELS TO OPTIMIZE REACH		
1962	Linear programming models for media scheduling	Day (1962), Engel & Warshaw (1964)
1963	High assay model for media scheduling	Moran (1963)
1965	Integer programming for media scheduling	Zangwill (1965)
1970s	Proprietary models to optimize reach and frequency	Industry sources
MODELS TO ESTIMATE REACH		
1970s	Development of models based on binomial distributions	Various
1984	<i>Development of mixed media schedules based on stochastic modeling</i>	Rust & Leone (1984)
INTER-MEDIA RESEARCH PRE-1994		
1973	<i>Determine interactive media effects at individual level</i>	Lodish (1973), Ruse & Leonbe (1984)
LINKAGES TO ROI PRE-1994		
1981	<i>Link media schedules with different GRP weights to sales</i>	Zufryden (1981, 1982)
INDIVIDUAL EFFECTS OF TRADITIONAL MEDIA AND WEB		
1997	Traditional media and web	Coffey & Stipp (1997), Sunder et al. (1998)
JOINT EFFECTS OF TRADITIONAL MEDIA AND WEB		
2003	Joint effects of print and web	Numberger & Schwaiger (2003), Wakolbinger et al. (2009)
2004	Joint effects of television and web	Chang & Thorson (2004), Dijkstra et al. (2005)
STUDIES OF SYNERGISTIC EFFECTS		
2005	Sequential vs. simultaneous exposure	Pilotta & Schultz (2005), Enoch & Johnson (2010)
2003	Media cannibalization	Naik & Raman (2003), Enoch & Johnson (2010)
2010	Cross-platform research	Industry sources
STUDIES OF CROSS-MEDIA ALLOCATION		
2003	Cross-media allocation model	Naik & Raman (2003)
2007	Estimation of cross-media synergies for allocation	Havlena et al. (2007)

Figure 1 Progression of Media and Cross-media Research over the Last 50 Years Outlining the Nature of Analytical Advances over Time and Citing the Main Contributors in Each Area

(KEY: Regular type = silo approach; bold type = synergistic approach; italics = transitional approach)

This was an *intra-media* or *silo* approach. Research on media exposure after the Web became more concerned with the integrative effects of media combinations and, ultimately, on the synergistic effects of media. This was an *inter-* or *cross-media* approach.

The second stream of research focusing on consumer response always has sought

to use sales and ROI criteria for evaluation. Before the Internet, evaluation also tended to concentrate on individual media so that ROI was estimated for one medium at a time. After the Web became an important part of the marketing mix, some researchers began evaluating multiple media based on sales and ROI measures. These studies tended to be placed under

the umbrella of IMC, with media evaluated on a more interactive basis within the overall communications plan.

There have been few such studies, however, and the promise of linking cross-media effects to sales and ROI has yet to be realized. Further, despite the advances in cross-media research, some researchers have decried the continued silo mentality

in the post-Web era. Writing in 2009, Schultz, Block, and Raman noted the continued focus on individual media and the lack of adequate multi-media measures:

Multimedia understanding would seem to be critically important today [yet] most distribution measures are based on single media form identification, that is, television viewing is measured separately from radio listening, which is measured separately from magazine readership which is measured separately for outdoor exposure and so on. Today even the newer forms of media such as mobile, word-of-mouth, and even social media are also measured separately and individually with no regard for the simultaneous media consumption of the participating audiences.

INTRA- AND INTER-MEDIA RESEARCH BEFORE THE INTERNET

This section of the paper will consider the two streams of research cited above.

- Research on measuring cross-media effects based on exposure
- Research on measuring effectiveness based on sales and ROI.

Regarding research on exposure, although the period prior to the Web was dominated by a silo approach, some significant advances were made toward a cross-media focus on synergy.

Research on Media Exposure Pre-1994: An Intra-media Approach

Media research always has been concerned with the right mix of media to optimize sales within budget constraints. Because of the difficulty of relating advertising expenditures to sales in the 1960s and 1970s, researchers devoted more attention to maximizing reach. Reach was media-specific; sales were subject to a

broad range of effects beyond ad expenditures. As noted by Zangwill in the *Journal of Advertising Research* (1965):

Sales can be influenced by so many factors that it is sometimes very difficult to filter out the net effect of the media mix. Thus instead of directly trying to maximize sales, it has been recommended that media should be selected to achieve a clearer goal, that of getting the ad to the potential customers.

As a result, the objective was maximizing reach rather than maximizing sales.

In the 1960s and 1970s, two approaches emerged in selecting media to maximize reach. One was based on sequential algorithms to optimize reach; the other was based on stochastic models to estimate reach.

Algorithms to Optimize Reach. In the early 1960s, media researchers began to focus on programs to optimize reach within budget constraints and required assumptions such as the nature of the target audience and scheduling restrictions.

The *Journal of Advertising Research* was instrumental in reporting on these optimization models. The first of these methods was *linear programming*, adopted by BBDO around 1962. The linear programming algorithm—originally designed to solve transportation and production scheduling problems—was applied to media scheduling in papers by Day (1962), Engel and Warshaw (1964), Kotler (1964), Brown and Warshaw (1965), and Stasch (1965).

Like subsequent optimization models, linear programming was designed to determine an optimal media schedule by assigning a weight to each medium based generally on audience size and demographics of the target group. Selection was based on an iterative process to maximize some objective criterion, usually exposure, given budget and institutional constraints

such as availability of media, timing, and regional coverage.

The algorithm could not account, however, for duplication of exposures, purchase discounts provided by the media, or the marginal decrease in effectiveness of exposures with increased frequency. Furthermore, Bass and Lonsdale (1966) found that given realistic restraints, the algorithm was reduced to selecting media based on cost per thousand.

As a result of these limitations, other algorithms were considered for media-mix optimization. Among the first was the High Assay Model developed for Young & Rubicam by William T. Moran in 1963. The algorithm used marginal principles to select the most productive media vehicles and, in so doing, accounted for both audience duplication and the decay effect of increased frequency. It was also able to account for purchase cycles and brand-switching rates that linear programming did not consider.

Optimization models were improved further by the introduction of integer programming (Zangwill, 1965), which reduced each media alternative to a yes/no selection. In specifying every iteration in a media schedule, integer programming was able to account for discounts in scheduling while further adjusting for audience duplication and necessary variations in scheduling.

Subsequent refinements attempted to improve on these media optimization algorithms. Most notably, Dennis H. Gensch in 1969 attempted to deal with two restrictions of the model: First the assumption that each individual within a defined medium has the same probability of exposure; second, the necessity to rely on past exposures for media estimation. Gensch proposed an Ad-Me-Sim (Advertising-Media Simulation) model to overcome these restrictions by predicting future exposure based on estimations from

Like subsequent optimization models, linear programming was designed to determine an optimal media schedule by assigning a weight to each medium based generally on audience size and demographics of the target group.

the most recent exposures. As these estimates are on the individual level, this also addressed the assumption of homogeneity within media.

Perhaps the most important restriction of these optimization models, however, was that, as Douglas B. Brown (1967) noted, they rely on an “incremental search heuristic.” In 1970, Alan D. Shocker cited the problem with such an approach:

The incremental approach will tend to include media options which have high gains in effectiveness on the first (or early) insertions. It will bias against media options with lower relative effectiveness in early insertions but which because of accumulation and minimal duplication of audience, exhibit increasing returns or less rapidly diminishing returns later.

These restrictions point to the fact that the incremental approach of these optimization algorithms of the 1960s required evaluating media one at a time. Such a silo approach dominated media selection through the 1970s and 1980s.

In the 1970s and 1980s, advertising agencies developed proprietary optimization models utilizing data from syndicated services such as Interactive Market Systems, Telmar Market Statistics, and Harris Media Systems. A 1984 survey of the 200 largest ad agencies found that 91 percent used such models for magazine schedules,

87.3 percent for spot television, and 63.6 percent for network television (Rice and Leckenby, 1986). In studies reported in the *Journal of Advertising Research*, attention shifted from optimization algorithms to the evaluation of models for specific classes of media.

These proprietary models continued the focus on an *intra-media* or silo approach compared to the *inter-media* or cross-media approach that emerged subsequently. Typical of the *intra-media* approach in the 1970s and 1980s were studies focusing on the evaluation of reach and frequency for magazines (Leckenby and Kishi, 1982; Leckenby and Boyd, 1984); spot television (Headen, Klompmaker, and Teel, 1976); and network television (Headen, Klompmaker, and Teel, 1977; Rust and Klompmaker, 1981).

Stochastic Models to Estimate Reach. Estimating reach based on stochastic models was the second stream of research in the selection of media based on reach. Whereas optimization algorithms were deterministic and sequential, stochastic models were probabilistic and random. A review of the *Journal of Advertising Research* during the 1960s and 1970s suggests that the focus on deterministic models was primarily industry-driven—with the largest ad agencies employing them—whereas the focus on stochastic models was more academic-driven.

The purpose of stochastic models is to estimate reach based on effective frequency so as to develop media schedules. Four types of models were employed:

- the binomial distribution
- the beta binomial distribution
- the negative binomial distribution
- the Dirichlet distribution.

(see Metheringham, 1964; Greene, 1970; Liebman and Lee, 1974; Headen et al., 1977).

The nature of these models is not central to the issue of cross-media research. They were applied most frequently to estimate exposure to network television and print media on an individual basis, reflecting the dominant *intra-media* approach at the time. In critiquing these models in 1981, Fred S. Zufryden noted that “research efforts have generally proceeded in different directions with little effort given to providing a link between exposure and purchase patterns.”

Roland T. Rust and Robert P. Leone conducted one of the few studies to apply stochastic models to mixed media schedules in 1984. They criticized stochastic models for “simply lump[ing] the vehicles in the various media together in such a way that exposure to a television ad is assumed to be equivalent to exposure to a magazine ad.” They used the Dirichlet distribution to develop an estimation model based on the joint distribution of exposure across television and magazine ads—a significant advance from estimation based on *intra-media* exposure to estimation based on *inter-media* exposure.

**Inter-Media Research before 1994:
Precursors of Cross-media Research**

Although an *intra-media*/silo approach dominated the pre-Web period, there were some significant attempts at taking more of a cross-media perspective that

anticipated the subsequent focus on media synergies. Whereas the silo approach during this period viewed audience duplication as something to be minimized, early cross-media research took a more holistic view of duplication as potentially reinforcing sales effects.

Perhaps the first conceptual foundation for cross-media research was presented in the *Journal of Advertising Research* by Leonard M. Lodish in 1973. Lodish recognized the need to determine the interactive effects of media on exposure at the individual level. Implicitly, such media interactions could have positive effects on subsequent behavior. To that end, he proposed an algorithm to determine such interactions among print, television, radio, and newspapers.

Writing more than 10 years later, Roland T. Rust and Robert P. Leone (1984) cited the need to identify such interactions in the context of potential media synergies. They criticized prior optimization algorithms for relying on media weights that do not take account of the interaction between media: print and broadcast media have different roles in terms of product effectiveness, awareness, and image, and combinations of media might be synergistic in providing support in one role or another. Like Lodish, they emphasized the need for providing estimations of joint exposures across media and propose a model for such estimations.

Several studies have explicitly examined the synergistic effects of media during this period. One of the earliest found that point-of-purchase displays produced more sales when they were tied in with concurrent television advertising (Dickson, 1972). Another analyzed the synergies between newspaper and television advertising based on a 1973 Kentucky Fried Chicken campaign in which newspaper coupon offers were advertised on television, significantly increasing redemptions

(Jain, 1975). Although not a surprising result, Jain's paper cited the campaign as an example of increasing ad effectiveness by contacting the consumer in a different psychological context, resulting in fresh interest for an otherwise tired subject (see Bogart, 1967).

Similar synergistic effects are being cited today for the interaction between online and offline exposure. A later study evaluated the interaction between newspapers and radio in advertising savings and checking accounts for a commercial bank and demonstrated media synergies for cross-product advertising (Jagpal, 1981). And, in 1989, Edell and Keller found synergies when an audio track from a television advertisement was played on the radio. (When hearing the radio ad, consumers visually replayed the television commercial.) This interaction reinforced recall but not comprehension and evaluation because little effort was required to recall the television ad from the radio stimulus. The study is notable for considering cross-media effects in the context of information processing.

Cross-media studies in the 1970s and 1980s were few, but the articles appearing in the *Journal of Advertising Research* at the time did lay the groundwork for the attention devoted to cross-media effects with the advent of the Web and the subsequent focus on cross-media synergy.

The research cited earlier was primarily concerned with means of maximizing exposure. The focus on exposure was marked during this period by attempts to estimate the frequency required to achieve a sales effect (labeled *effective frequency*). A debate emerged within the pages of the *Journal of Advertising Research* as to how many exposures constituted effective frequency, illustrating the predominant focus on exposure at the time (Krugman, 1972; Sissors, 1978, 1982; Kamin, 1978; Leckenby and Boyd, 1984; Naples, 1997). The overall

perspective was on exposure, leading to the more complicated issue of consumer response as the criterion of effectiveness.

Research Linking Media Effects to Sales and ROI before 1994

There has been substantial research linking advertising expenditures to sales, despite problems of controlling for other effects. As early as 1964, the Advertising Research Foundation published *Sales Measures of Advertising: An Annotated Bibliography*, demonstrating the substantial body of literature on the subject. Books by Darrell B. Lucas and Stuart H. Britt (1963) and Kristian Palda (1966) and articles by Robert C. Lavidge and Gary A. Steiner (1961) and Thomas T. Semon (1964) were notable in contributing to attempts to link advertising exposure to sales results.

These early studies had the potential for taking a more holistic view of media effects by modeling aggregate advertising expenditures *across* media to sales. The problem is that, in linking ad expenditures to sales, these models did not parcel out the effects of alternative media expenditures. As Zufryden (1981) noted, "The main problem is that these models are insensitive to the specific allocation of budget dollars to media alternatives."

Few studies have attempted to link media expenditures to sales results in an attempt to determine ROI on a medium-specific basis. One obvious reason is the difficulty in doing so. Michael Hugues noted in 1975. "It is well known that the relation between [media] exposure and purchase is generally too complex or too weak to be measured. What we can try to measure with some chance of success are the effects of advertising on the aims of the campaign, on the themes of the messages." Hugues then used criteria of recall and awareness in measuring the effectiveness of television, radio, and print in a campaign for Renault.

Few studies have attempted to link media expenditures to sales results in an attempt to determine ROI on a medium-specific basis.

Long before the arrival of the Internet, writing in the *Journal of Advertising Research* in 1981, Zufryden was the chief proponent of the need to establish linkages between media effects and sales. He cited the need to determine “what specific media schedule would be most cost effective in view of the anticipated sales impact of our brand.” The problem, he observed, is that the typical criterion of media effectiveness is not sales but other criteria presumably associated with sales such as increasing exposure, awareness, or changing consumer attitudes.

The kinds of media-selection models cited earlier, Zufryden wrote, focus on “either reach or frequency goals relative to a target market” as the objective rather than sales results. He cites the reason as a “general lack of knowledge about the advertising-exposure/purchase-response relationship due to the complex interrelationships among its component factors.”

Zufryden (1981) utilized controlled split-cable television tests to establish a methodological framework for testing the effect of media schedules on purchasing behavior. Media schedules with different gross rating point (GRP) weights were run, and sales results for each test group were measured through household diary panels. The model accurately predicted the effects of variations in media schedules on cumulative purchase rates by household. Of most significance, Zufryden proposed an ROI approach to media selection “by studying the trade-offs of the added sales generated against the marginal cost of purchasing additional spots. Such trade-off analyses would be required to support

any budget-setting implications suggested by model results based on alternative media schedules.”

Zufryden may have been the first to attempt to directly link media schedules to sales based on a conceptual foundation and an analytical model. Prior to that, others have attempted such links on a more *ad-hoc* basis. An early study by Ward J. Jenssen (1966) related exposure to television, radio, and print to coupon redemption. And, in the Kentucky Fried Chicken study cited earlier, Dickson was able to associate point-of-purchase displays tied to concurrent television ads with sales results in 1972.

CROSS-MEDIA RESEARCH IN AN INTERACTIVE AGE

The growing popularity of the Internet as an advertising medium provided a key impetus to cross-media research. Early on in the digital age, many marketers used television and print ads to drive visitors to their Web sites, leading to research on the interaction between online and offline exposure. Studies comparing traditional media and the Web individually and in combination were common. Increasing interest in the interaction of traditional and Web-based media led to a focus on *synergy*. By 2005, cross-media research was inextricably tied to the concept of synergy, to the point where synergy could be conceptualized and attempted to be measured.

The focus on synergy crystallized into the application of the concept of IMC to cross-media planning. As applied to cross-media, an IMC approach would require an integrative media plan capable

of measuring the interactive effects of media components on exposure, attention, and behavior. The application of an IMC approach to cross-media leads to the most difficult issue of all: Linking cross-media effects to sales and ROI.

This section will reflect the progression cited earlier, beginning with studies showing the link between traditional media and the Web, both on an individual basis and in combination. Second, the drive toward synergy is considered, citing studies refining and expanding the concept. Third, the paper extends the concept of synergy to conceptualization and model building so as to measure cross-media effects on ROI. Cross-media planning and allocation will be considered within the framework of integrated marketing communications. The fourth consideration in this section is measurement issues that need to be resolved for cross-media planning—particularly the need to develop single-source databases and the use of data fusion in the absence of single-source systems.

The *Journal of Advertising Research* was instrumental in reporting the drive to synergy and its link to an IMC perspective during the post-Web period, devoting an issue to IMC in March 2004.

Individual and Interactive Effects of Traditional Media and the Web

Early studies of interactive media effects examined the role of traditional media in promoting the use of the Web. One paper noted the power of television to promote Web sites, citing the tremendous traffic increase at NBC’s Olympic Web site during the 1996 Olympics after NBC had advertised the site on television (Coffey and Stipp, 1997). The authors also noted that the increase must have been caused, to a large degree, by consumers watching both media simultaneously—an early example of multi-tasking on the Web.

Several studies also reported on the

role of print to encourage Web site visits. In 1995, one study found that about two-thirds of respondents learned about Web sites through magazines (Gupta, 1995). In a study of 413 advertisements 9 years later, 61.5 percent of ads included a Web site reference (Kanso and Nelson, 2004). More recently, a print campaign for the Toyota Yaris drove a 32-percent increase in the brand's Web traffic (Newspaper Marketing Agency, 2007). Despite these consistent findings, however, Kanso and Nelson reported in the *Journal of Advertising Research* that "advertisers are not fully considering the potential benefits of Web-print marketing strategy" (2004). The two authors advocated going beyond a simple Web site listing and highlighting the distinctive benefits of the site so as to produce true print/Web synergies.

These studies viewed synergy in the context of one medium (television or print) encouraging the use of another (the Internet). Subsequent studies have tended to view synergy as the joint effects of media on some dependent variable such as exposure, recall, or consumer attitudes, but rarely purchase behavior. Most of these studies focused on the interaction between print and the Web and found that the Web alone, or in combination with print, was no more effective than print alone.

One study compared recall from print and online ads and actually found that respondents remembered more content from print (Sunder, Obregon and Upal, 1998). Another study presented identical ads in print and on the Internet and found little difference in recall between the two (Gallagher, Foster, and Parsons, 2001). A third study analyzed the effects of advertising executions using emotion online and in print and found no significant difference between them (Diehl and Terlutter, 2006).

These studies examined print and Web advertising individually. The primary

Classic Excerpt: Cross-Media

A Tested Model of Purchase Response to Advertising Exposure

Fred S. Zufryden

Author's note: Writing in the *Journal of Advertising Research* in 1981, Zufryden was the first to establish a methodological framework for testing the effects of media schedules on purchasing behavior at the individual consumer level. Until then, models (1) tended to ignore media effects as opposed to advertising effects, (2) focused on exposure rather than sales, and (3) were at the aggregate rather than the individual level.

"Why the lack of managerial focus on the evaluation of media plans with respect to anticipated sales-related effects? One reason is the general lack of knowledge about the advertising-exposure/purchase-response relationship due to the complex interrelationships among its component factors (e.g., memory-decay, carryover, and diminishing-return effects). To further elaborate on this assertion, it is useful to examine the state of the art in order to explore previous studies and their limitations...."

"The bulk of research has examined aggregate models of advertising expenditures to sales response.... The main problem is that these models are insensitive to the specific allocation of budget dollars to media alternatives. Furthermore, as these models examine

aggregate behavioral response (e.g., total sales), they do not explain purchase patterns such as trial, repeat purchase, and penetration of a brand over time in response to a company's advertising efforts...."

"Another important area of research has been concerned with the development of media-selection models.... Although such models may be helpful and use easily obtainable data, they may not provide media mixes that are consistent with higher-level company objectives.... A further limitation that is shared with previous models is that they do not provide dynamic measures of consumer purchase patterns such as trial, repeat purchase, and cumulative penetration...."

"Research efforts have generally proceeded in different directions with little effort given to providing a link between [media] exposure and purchase patterns."

Fred S. Zufryden, "A Tested Model of Purchase Response to Advertising Exposure." *Journal of Advertising Research* 21, 2 (1981): 7-16.

focus in identifying cross-media synergies, however, obviously requires studying multi-media effects. Several studies have taken a cross-media approach, going a step further than the research cited earlier in evaluating the joint effects of

media, particularly print and Web ads. For example, one study found little difference in recall and brand attitudes in the combination of print and Web advertising compared to print advertising alone (Numberger and Schwaiger, 2003).

Similarly, a more recent 2009 study also compared the individual and joint effects of print and Web advertising and found some small directional advantage to cross-media advertising on measures of recall and recognition but no statistically significant differences (Wakolbinger, Denk, and Oberecker, 2009).

Many of these print/Web studies occurred in the early stages of Internet advertising, when banner Web ads were predominant. Text-like banner ads probably fared poorly in comparison to print ads. Subsequently, with streaming ads more akin to television commercials, the Web might be found to be a more effective medium in combination with print, combining the ability for both visual and textual elements as opposed to text alone. Yet there has been little study of *different types of Web ads* in combination with print. Such studies might demonstrate more synergistic cross-media effects.

A number of studies examined television/Web synergies and multi-media campaigns involving three or more media. One paper, for instance, found that a television/Web campaign led to significantly higher attention, message credibility, and positive thoughts compared to individual media (Chang and Thorson, 2004). Citing the cross-media campaign as synergistic and the individual media campaigns as repetitive, the authors ascribed brand-attitude formation through synergy to a central processing route and attitude formation through repetition to a peripheral route (see Petty and Cacioppo, 1986). Another paper also ascribed positive effects to cross-media synergies in studying print, television, and the Web. It concluded that a multi-media campaign is more effective in producing positive brand attitudes and purchase intent than an individual media campaign (Dijkstra, Buijtsels, and vanRaaij, 2005). And, in a rare cross-media study that focused solely on

traditional media, Edell and Keller in 1999 found synergies between print and television. A print ad linked to an already seen television ad improved the prospects of a print ad's being read, and a print ad that includes visual elements of a subsequently viewed television ad enhances processing of the television ad.

The consistent finding is that print/Web synergies are not as effective as television/Web synergies. A reasonable hypothesis is that greater synergies are achieved through the visual/textual connections provided by television and the Web than the text-only connections provided in most print/Web studies. As noted, however, streaming Web ads potentially could produce a visual connection in combination with print.

Despite the movement of research from silos to synergy since the development of the Web, the focus still tended to be more on opportunity to see than opportunity to act. Most studies relied on cognitive variables such as exposure and recall as measures of effectiveness. Few studies relied on affective variables such as brand attitudes or, more important, behavioral variables such as purchase intent or actual purchases.

The Drive to Synergy: Refining and Expanding the Concept

By 2005, research was refining and expanding the concept of synergy. Notably, a distinction was made between *simultaneous and sequential synergy*, with contradictory opinion as to the dominance of each cited in the *Journal of Advertising Research*.

This distinction, in turn, raised the issue of the *directionality* of synergy, given the likelihood that in the interaction between two or more media, one medium is likely to be more dominant than another. Also, for the first time, the concept of *negative synergy* (total media effects are less than the effects of their individual components)

appeared with attempts to measure *cross-media cannibalization*. And media companies began to study exposure to their messages on a *cross-platform* basis, as opportunities multiplied to distribute the same content across a greater variety of media.

Synergy through Simultaneous versus Sequential Ad Exposure. Synergy can occur through simultaneous or sequential media consumption. This critical distinction has tended to be overlooked in most cross-media studies. The studies cited earlier wherein traditional media drive Web consumption are clearly sequential. Almost all research, however, studying the individual and joint effects of media after 1994 does not make this distinction.

Recognizing that simultaneous and sequential exposure are not mutually exclusive, opposing views as to which form of synergy is most important have appeared in the *Journal of Advertising Research* in recent years. Don E. Schultz is the main proponent of simultaneous exposure (multi-tasking) as a source of synergy (Shultz, Block, and Raman, 2009). In a 2005 *Journal of Advertising Research* paper, Joseph J. Pilotta and Schultz write:

Consumers multitask with media, i.e., flipping through a newspaper while in front of the TV, listening to the radio while thumbing through a magazine, and so on. Yet, these consumer media behaviors have received little advertiser or researcher attention....

The authors cite a study of simultaneous media consumption showing the preponderance of multitasking on a pairwise basis between online, television, magazines, newspapers, and radio. More than 80 percent of respondents engaged in simultaneous media usage, with the most predominant occurrence being between

Synergy can occur through simultaneous or sequential media consumption. This critical distinction has tended to be overlooked in most cross-media studies.

online and television. Pilotta and Schultz conclude that traditional measures of exposure are not relevant when one is engaged in a variety of activities.

By contrast, Glenn Enoch and Kelly Johnson, also writing in the *Journal of Advertising Research*, found that sequential exposure is a more important source of synergy than multitasking (2010). They used Nielsen's convergence panel to study exposure to ESPN ads on television and online. They supplemented this source by studying exposure to ESPN ads on other platforms—among them radio, magazine, and mobile:

They found that multitasking could account for only a small fraction of the total increase in media usage. They cite a typical

ESPN fan who watches "SportsCenter" as he gets ready for work, listens to [radiocast of the television show] "Mike & Mike" on the way to work, uses ESPN.com to keep up with sports news during the day, and either watches ESPN on TV at home or goes out and uses ESPN mobile. ESPN fans (and persons in general) are using different media platforms at different times and in different places for different purposes.

An ESPN point of view more likely would subscribe to sequential exposure given the importance the company attaches to each of its individual platforms.

The Direction of Synergy. When synergy occurs between two media, the effects are not likely to be equal. One medium is likely

to produce more positive interactive effects than another. This was true in the Pilotta and Schultz 2005 study. They found that, when engaged in simultaneous consumption, almost half of respondents were more likely to pay more attention to one medium than another. As synergy is construed to be positive, this means that the more dominant medium is also more effective.

For example, when multitasking between online and television, the authors found that online was dominant 26 percent of the time and television was dominant 22 percent, meaning that the two media were close to being equally effective in their synergistic effects.

The question of directionality also occurs when media consumption is sequential. In the Edell and Keller study cited earlier, print reinforced television in one way, and television reinforced print in another. The dominance of one over the other should influence budget allocations based on synergy.

Is Synergy Positive or Negative? Convergence versus Cannibalization. Although synergy is assumed to be positive, it could have negative effects if cross-media consumption results in the sum being less than the individual parts. This could occur through distraction in the process of multitasking or through *media cannibalization*, in which exposure to one medium occurs at the expense of another. Although negative synergies have been recognized as warranting measurement (Naik and Raman, 2003), little has been done to test a distraction hypothesis.

The only study cited that addressed the issue of negative synergies was by Enoch and Johnson (2010). In their analysis of different ESPN platforms, the authors sought to determine whether digital media were cannibalizing television. Such cannibalization would mean that heavier users of digital media were spending less time watching television. Enoch and Johnson found the opposite: the heaviest users of the Internet were above-average watchers of television. The reverse was also true: the heaviest television viewers were above average in-home consumers of the Internet.

Enoch and Johnson conclude: "Cross-media usage is not zero-sum. Doing one behavior more does not mean doing another behavior less—in other words, the growth of one behavior does not necessarily come at the expense of other behaviors."

If these results can be generalized to other media, there is little support for the likelihood of negative synergies in cross-media effects.

Cross-Platform Research. In the last 2 or 3 years, media companies have given more attention to the potential for synergies by delivering their content across a variety of different media under their corporate umbrella. The combination of mobile delivery, the Web, and traditional media have resulted in a series of industry-led initiatives to measure the effectiveness of cross-platform exposure.

ESPN is in the forefront of such efforts because it is the one company whose corporate brand umbrella stretches across television, radio, magazines, the Web, and mobile. The Enoch and Johnson study (2010) reported on cross-platform research primarily between television and the Web. More recently, ESPN embarked on a program to measure the results of its sponsorship of the 2010 World Cup across all

five of its media platforms in a program called ESPN XP. Spurring this research were data that found that about half of ESPN media users were exposed to content from more than one medium—double the rate of cross-platform exposure 5 years before (WARC, 2010). A key element of the project was measuring exposure to all platforms from the same respondents through a single-source research facility (an online survey conducted by Knowledge Networks), allowing the company to determine cross-platform interaction at the individual respondent level.

The television networks also have initiated research into the delivery of programs and advertising on a cross-platform basis. NBC's sponsorship of the 2010 Winter Olympics afforded an opportunity to measure ad and program exposure across television, the Web, and mobile media, utilizing the same single-source measurement system as ESPN. One feature of the project was utilizing mobile devices (Portable People meters) to measure out-of-home television exposure, providing a more complete accounting of television program exposure across platforms and locations.

Toward a Cross-media-ROI Link: An Integrated Marketing Communications Framework

The promise of cross-media research will not be achieved until cross-media effectiveness can be linked to sales and ROI. Studies in support of such linkage almost were nonexistent before the Web. And they're still surprisingly rare.

This section of the paper cites two studies that contribute to such an ROI focus in that they provide key implications for cross-media budgetary allocations. The author then cites the conceptual framework for such an approach to be found in the concept of integrated marketing communications.

Criteria for Cross-Media Allocations to Maximize Synergy. As noted, almost all the post-Web studies cited earlier have focused on exposure or recall rather than purchase intent or behavior. One of the rare exceptions is a study reported in the pages of *Journal of Advertising Research* in 2007 that studied the joint effects of television, print, and the Internet (Havlina, Cardarelli, and deMontigny, 2007).

The study is significant on two counts:

- It estimates cross-media synergies based on media exposure *at the individual consumer level*. The intent was to identify incremental gains of different combinations of cross-media exposure over individual media effects.
- It used both brand attitudes and purchase intent as measures of effectiveness, a step in the direction of opportunity to act as the criterion.

The authors could identify the point of diminishing returns in brand attitudes and purchase intent for quintiles of high-to low-exposure segments and make specific recommendations accordingly. As reach and frequency increased, the greatest incremental gains could be achieved for the lower-level exposure segments. The authors recommended keeping media duplication high for television and print given synergy between the two, with a frequency level of 3+ targeted to the lowest quintile.

Of most importance, the study was able to make recommendations regarding the allocation of media effort based on cross-media results. Such budgetary recommendations lead directly to the ability to link cross-media effects to ROI.

In 2003, Naik and Raman made an equally significant contribution in developing a formal cross-media allocation model. Their key finding was that *budgetary allocation criteria differ under conditions*

of synergy compared to additive media effects. When media are considered individually, classical allocation principals apply. Dollars are allocated to the most effective media to the point where incremental revenue equals incremental cost. In a regression model, the beta weights for each medium would be proportional to their effectiveness.

In the interactive case, the effects of one medium must be considered in light of its effect on other media. Synergy means that media impact positively on each other. By definition, the most effective medium has a greater impact on the least effective medium. Maximizing synergy means *allocating proportionately more money to the less effective medium to equalize the impact between the two*.

The key notion is that synergy increases as the interaction between the less and the more effective media increase. In a regression, the introduction of an interaction term would result in tempering the effects of individual media so the beta weight of the most effective medium would be reduced proportionately more than the least effective medium. As increasing synergy means increasing effectiveness, allocating proportionately more to the less effective medium would increase profits.

This allocation criterion also has implications for the size of the media budget under conditions of synergy. As effectiveness increases owing to media interactions, one option would be to reallocate the existing budget with a heavier weight to the less effective medium. Naik and Raman, however, find that as effectiveness increases, advertisers should increase spending for the less effective medium rather than reallocate spending. This means that *under conditions of synergy, the total media budget should be increased*.

Naik and Raman's allocation rule under synergy not only seems counter-intuitive, it contradicts the traditional budgetary

In the interactive case, the effects of one medium must be considered in light of its effect on other media.

allocation criteria used historically in the framework of additive media planning. Interestingly, however, both Havlena et al. and Naik and Raman reached similar conclusions: to maximize synergy, allocate proportionately more money to the lowest exposure segment (Havlena et al.) or to the least effective medium (Naik and Raman).

Naik and Raman introduce another important concept resulting from synergy—what they term a “catalytic effect” (Raman and Naik, 2004). Such an effect accounts for a medium that, in itself, might not contribute to profits. In interaction with other media, however, it has a positive effect. Such catalytic effects are consistent with allocating dollars to seemingly less effective media. A medium may not warrant support on an individual basis but may merit more advertising dollars on a catalytic basis.

As noted, there has been little follow-up to the two studies cited to further the understanding of media allocations under conditions of synergy. The key limitation to such studies are the rigorous data requirements. Cross-media effects can best be determined by single-source data measuring exposure across media for the same individual. Linking these interactive effects to sales and ROI require the further burden of determining purchase behavior from the same single-source panel. These issues are considered in a later section of this paper.

Conceptual Foundations of Cross-media Planning: An IMC Approach

IMC provides both an organizational and a conceptual framework for a synergistic approach to media planning. The 4A’s

(American Association of Advertising Agencies) defines IMC as:

a concept of marketing communications planning that recognizes the added value of a comprehensive plan that evaluates the strategic role of a variety of communications disciplines, e.g. general advertising, direct response, sales promotion and public relations—and combines these disciplines to provide clarity, consistency and maximum communication impact.

The goal of integration clearly implies that, if coordinated, the promotional mix will be greater than the sum of its parts. As Duncan and Everett note in a 1993 *Journal of Advertising Research* paper: “The basic concept of IMC is synergism, meaning the individual efforts are mutually reinforcing with the resulting effect being greater than if each functional area had selected its own targets, chosen its own message strategy, and set its own media schedule and timing.”

IMC was formalized as a paradigm for planning in the late 1980s (Novelli, 1989; Caywood, Schultz, and Wang, 1991), with Schultz the foremost proponent of the need to apply IMC to marketing planning (Schultz, 1991, 1993). By 1993, IMC was sufficiently established to warrant an industry-wide survey of its general use and advantages (Duncan and Everett, 1993). That report found broad claims among organizations of its utilization but failures in implementation. The most important advantages cited by managers for integrating promotional planning were reducing media waste and giving the company a competitive edge. Barriers to implementation—most notably turf

battles and fear of budget reductions—were widely cited.

The greatest constraint, however, in the application of an IMC approach to cross-media planning was that it remained an organizational rather than an analytical planning framework. Schultz cited this drawback in 1993 by faulting managers for taking an “inside out” approach in implementing IMC. Rather, IMC should take an “outside in” approach by “start[ing] with the customer or prospect and then work back to determine and define the forms and methods through which persuasive communications programs should be developed” (Schultz, 1993).

More than 10 years later, the *Journal of Advertising Research* devoted an issue to IMC (March, 2004), concluding that: “After over a decade of growth, IMC can hardly be considered a ‘management fad,’... However, we can make out only a fuzzy image of what IMC will be when it grows up” (Cook, 2004).

Despite these perceived shortcomings, the link between IMC and cross-media planning is clear: the need to *integrate* media platforms to create cross-media synergies. As a key paper in the special *Journal of Advertising Research* issue noted: “This increasingly important area of ‘cross-media platforms’ is receiving great attention by firms seeking to implement an IMC approach” (Zahay et al., 2004). In the same vein, as Naik and Raman articulated their paper developing a cross-media allocation model (2003):

Integrated marketing communications emphasize the benefits of harnessing synergy across multiple media to build brand equity....The added value aspect of IMC is created by the joint impact of multiple activities (e.g. television and print advertisements). In other words, the combined effect of multiple activities exceeds the sum of their individual effects.

The importance of Naik and Raman's work is that they took the IMC approach a step closer to an analytical framework by developing a model that could achieve synergy so as to maximize sales and ROI. A key point often overlooked is that an effective IMC approach requires a link between integrated media planning and ROI maximization. Naik and Raman recognized this point. And Schultz recognized this link even earlier in stating that the final step in IMC planning requires linking integrated promotional vehicles to ROI performance (Schultz and Kitchen, 2000).

The bottom line is that as one paper noted in the special *Journal of Advertising Research* issue on IMC: "Little has been done to resolve the fact that the theoretical concept of IMC remains vague and uncertain... There is no recognized measurement system in place to gauge [its] influence" (Kitchen, Brignelli, Li, and Jones, 2004). As a result, more can be done to develop prescriptions to achieve cross-media integration through an IMC perspective. IMC remains the most promising paradigm to achieve cross-media synergy.

Measurement Issues in Cross-media Research

Traditionally, media exposure has been measured based on individual silos, with separate services for television (Nielsen), magazines (MRI and Simmons), radio (Arbitron), newspapers (Scarborough), and online exposure (Nielsen net ratings).

A key requirement, however, in identifying synergies in cross-media effects is the need to determine interactions between media at the individual consumer level. Such measures require a *single-source system*—namely a service that determines cross-media exposure from the same respondent. Further, if cross-media effects are to be related to sales and ROI, a single-source system would have to determine

A key requirement, however, in identifying synergies in cross-media effects is the need to determine interactions between media at the individual consumer level.

purchasing behavior and cross-media exposure for the same respondent.

Commenting on the state of cross-media measurement in 2000, one observer noted: "Effective media strategies must be multimedia strategies. If the planner agrees with this conclusion and wants to start with the allocation of the media budget to media categories, he will very soon find out that there are no syndicated surveys for multi-media planning (Franz, 2000).

Ten years later, there still are no syndicated single-source systems capable of measuring cross-media consumption, let alone linking cross-media consumption to purchase behavior.

And, in fact, syndicated single-source systems have had a sorry history. Early attempts focused on linking television exposure to purchase behavior rather than on measuring cross-media exposure (Assael and Poltrack, 1991; Jones, 1995). Arbitron's ScanAmerica service, introduced in 1991, combined set-top box People Meters with in-home scanners so that media exposure and purchases could be determined from the same household. Nielsen quickly introduced ScanTrak, which combined media exposure and purchase behavior from two separate sources—Nielsen's television rating service and its HomeScan service providing in-home scanner data.

Whereas Arbitron looked to a single-source system, Nielsen relied on *data fusion* to establish the media-to-purchase association by finding common variables

between the two samples and assigning probabilities of exposure and purchase behavior to individual respondents in each sample accordingly (Baynton, 2003; Doe, 2007). ScanAmerica quickly failed because of issues of validity and reliability owing to the burden of measuring both media and purchase consumption from the same sample. ScanTrak never got off the ground because data fusion methodology was not sufficiently accepted, possibly owing to the lack of reliability of the estimated probabilities assigned to one sample from another.

These failures spoke to the problems of establishing a single-source system capable of measuring cross-media consumption. The burden today would be even greater on any sample to measure exposure to the media available to consumers, from television and cable programs to Web sites, to smartphones.

Arbitron promoted one solution to the problem of cross-media measurement: a passive *portable people meter* (PPM), the size of a cell phone designed to be carried around all the time and capable of picking up audio signals from television, cable, radio, and mobile devices. In 2004, it launched Project Apollo to test a single-source syndicated service designed to measure cross-media exposure. Project Apollo utilized data fusion to combine cross-media measures from the portable people meter with Nielsen's HomeScan purchase data, providing for a cross-media-to-ROI link.

By 2008, however, Arbitron withdrew Apollo from further testing. The problems included the excessive cost of the project, doubts about the reliability of data fusion, and resultant lack of industry support.

There still is some promise for a single-source syndicated service. Arbitron has not given up on the portable people meter. In 2009, it announced that it plans to use the device to track both television and radio. Data Fusion methodologies may be refined to the point of being an acceptable surrogate for single source (Gilula, McCulloch, and Rossi, 2006). And the Coalition for Innovative Media Measurement (CIMM)—an industry grouping of leading media, advertising, and research companies—is seeking reliable cross-media measures. One CIMM initiative is a prospective study in which participating consumers would receive a dedicated iPhone in exchange for reporting their media use several times a day (*Wall Street Journal*, 2010).

Until a new single-source service becomes operational, the industry will have to rely on much the same type of cross-media data utilized in the studies cited above—more modest two-by-two measures of cross-media consumption and measures based on survey research rather than passive instruments.

FUTURE DIRECTIONS FOR CROSS-MEDIA RESEARCH

Cross-media research is at a crossroads.

The technology resulting in the proliferation of media has outstripped the means to measure cross-media effectiveness. Research on the synergistic effects of media is becoming more sophisticated: witness the distinction between sequential and simultaneous synergies, the identification of the issue of the directionality of synergy and, most important, development of criteria for budgetary allocations based on synergy. These issues

deserve further attention. Data capabilities, however, are not keeping pace.

Indeed, until the gap between research needs and measurement capabilities is filled, cross-media research will not reach its full potential. Industry initiatives such as the cross-platform research cited earlier and the creation of the CIMM look promising. The focus of these efforts, quite rightly, is the development of cross-media measures. Even such programs, however, have their shortcomings, the most important being inadequate attention to establishing a link between cross-media effects and return on investment.

Directions For Future Research

This article has suggested areas that deserve further exploration in the future.

To name a few:

Further research is needed on the differential effects of sequential versus simultaneous cross-media exposure. Under what conditions do they occur; what are their effects on purchase behavior?

More research is warranted on the direction of cross-media effects, particularly regarding on- and offline exposure. What are the effects of online ads on offline effectiveness and the reverse? What are the effects when one medium is more dominant than another?

Based on the studies cited earlier, it appears that a visual/textual connection (as with television and the Web) produces the greatest synergies. This hypothesis deserves further testing.

In this regard, studies have looked at the interactive effects of Web ads with traditional media, identifying Web ads as a homogenous entity. Research is needed to determine how text versus streaming interact differently with traditional media, as one form is more verbal and the other more visual.

Little has been written about potential negative effects of cross-media exposure.

Enoch and Johnson's 2010 study found little evidence of cannibalization in their study of exposure to various ESPN platforms. Cannibalization could occur, however, when consumers regard one medium as a substitute for another (e.g., the Web as an alternative to magazines or newspapers). Further, research could be conducted to test a distraction hypothesis in simultaneous cross-media exposure.

Social networks are media. Witness the wide range of companies placing ads on Facebook and Twitter. Yet there is hardly any mention in the cross-media literature regarding the interaction among social media, the Web, and traditional media.

The same can be said for delivering content and ads through mobile media: there is a need for research incorporating mobile media in studying cross-media effects.

There also are a number of issues regarding cross-media measurement that deserve further exploration: given the burden on respondents of cross-media measures in a single-source system, can passive measures be developed on a cost-effective basis? Can data fusion methods be refined to the point where they can serve as reliable surrogates for a single-source system?

Barring development of a comprehensive single-source system, can more modest survey methods be utilized? (Both ESPN and NBC used Knowledge Networks' online panel for this purpose in their cross-platform studies.)

Perhaps the greatest need is further research on budgetary allocation guidelines that can be provided by cross-media effects. The author found only two studies—Havlena, 2007; Naik and Raman, 2003—that addressed this issue. Until the marketing community gets to the point of linking cross-media effects to ROI, media planning will continue to have a silo orientation, and cross-media research will operate on the periphery. **JAR**

ACKNOWLEDGMENT

In the context of this Fiftieth Anniversary issue, Dr. Assael notes that he was a friend of (and worked closely with) Charlie Ramond, founder of the *Journal of Advertising Research*, during the early years of the *Journal*.

.....
HENRY ASSAEL is professor of marketing at the Stern School of Business, New York University and former chairman of the marketing department at Stern. His research interests and publications are primarily in the areas of media research, market segmentation, advertising evaluation, and survey research methods. Current research includes developing multi-media choice models and developing integrated measures of media effectiveness.

He has written more than 30 articles for scholarly journals, 14 of which appeared in the *Journal of Advertising Research*. He has edited a 33-volume series on the history of marketing and a 30-volume series on the history of advertising. He is the author of three widely used texts: *Consumer Behavior: A Strategic Approach* (seven editions); *Marketing: Principles and Strategy* (three editions); and *Marketing Management-Strategy and Action*.
 Email: hassael@stern.nyu.edu

REFERENCES

- ADVERTISING RESEARCH FOUNDATION. In L. Kruger and C. Ramond, eds. *Sales Measures of Advertising: An Annotated Bibliography*. New York: Advertising Research Foundation, 1964.
- ASSAEL, HENRY, and DAVID F. POLTRACK. "Using Single-Source Data to Select Television Programs Based on Purchasing Behavior." *Journal of Advertising Research* 31, 4 (1991): 9-17.
- BASS, FRANK M., and RONALD T. LONSDALE. "Exploration of Linear Programming in Media Selection." *Journal of Marketing Research* 3, 2 (1966): 179-188.
- BAYNTON, PAUL. "Data Integration or Fusion." ESOMAR Media Mix Audience Measurement Conference, June 2003.
- BOGART, LEO. *Strategy in Advertising*. New York: Harcourt Brace & World, 1967.
- BROWN, DOUGLAS B. "A Practical Procedure for Media Selection." *Journal of Marketing Research* 4, 3 (1967): 262-269.
- BROWN, DOUGLAS B., and M. R. WARSHAW. "Media Selection by Linear Programming." *Journal of Marketing Research* 2, 1 (1965): 85-88.
- CAYWOOD, CLARKE, DON SCHULTZ, and PAUL WANT. "Integrated Marketing Communications: A Survey of National Consumer Goods Advertisers." *Northwestern University Report*, 1991.
- CHANG, YUHMINN, and ESTHER THORSON. "Television and Web Advertising Synergies." *Journal of Advertising* 33, 2 (2004): 75-84.
- COFFEY, STEVE, and HORST STIPP. "The Interaction Between Computer and Television Usage." *Journal of Advertising Research* 37, 2 (1997): 61-67.
- COOK, WILLIAM A. "IMC's Fuzzy Picture: Breakthrough or Breakdown?" *Journal of Advertising Research* 44, 1 (2004): 1-2.
- COOK, WILLIAM A., and VIJAY S. TALLURI. "How the Pursuit of ROMI Is Changing Marketing Management (Return on Marketing Investment)." *Journal of Advertising Research* 44, 3 (2004): 244-254.
- DAY, R. L. "On Methods: Linear Programming in Media Selection." *Journal of Advertising Research* 2, 2 (1962): 40-44.
- DICKSON, JOHN P. "Coordinating Images between Media." *Journal of Advertising Research* 12, 1 (1972): 25-28.
- DIEHL, S., and R. TERLUTTER. "Der Einfluss der Medien auf die Wirkung emotionaler Werbung." *Marketing – Zeitschrift für Forschung und Praxis* 28, 3 (2006): 155-168.
- DIJKSTRA, HEIDI, E. J. J. M. BUIJTELS, and W. FRED VANRAAIJ. "Separate and Joint Effects of Medium Type on Consumer Responses: A Comparison of Television, Print, and the Internet." *Journal of Business Research* 58, 3 (2005): 377-386.
- DOE, PETE. "Cross Media Connections." Presentation to Advertising Research Foundation Committee on Multi-Media Measurement, 2007.
- DUNCAN, THOMAS R., and STEPHEN E. EVERETT. "Client Perceptions of Integrated Marketing Communications." *Journal of Advertising Research*, 33, 1 (1993): 30-38.
- EDELL, JULIE A., and KEVIN LANE KELLER. "The Information Processing of Coordinated Media Campaigns." *Journal of Marketing Research* 26, 2 (1989): 149-163.
- EDELL, JULIE A., and KEVIN LANE KELLER. "Analyzing Media Interactions: The Effects of Coordinated TV-Print Advertising." Working Paper, Marketing Science Institute, 1999.
- ENGELL, J. F., and M. R. WARSHAW. "On Methods: Allocating Advertising Dollars by Linear Programming." *Journal of Advertising Research* 4, 3 (1964): 42-48.
- ENOCH, GLENN, and KELLY JOHNSON. "Cracking the Cross-Media Code: How to Use Single-Source Measures to Examine Media Cannibalization and Convergence." *Journal of Advertising Research* 50, 2 (2010): 125-136.
- FRANZ, GERHARD. "The Future of Multimedia Research." *International Journal of Market Research* 42, 4 (2000): 459-499.
- GALLAGHER, KATHERINE, K. DALE FOSTER, and JEFFREY PARSONS. "The Medium Is Not

- the Message: Advertising Effectiveness and Content Evaluation in Print and on the Web." *Journal of Advertising Research* 41, 4 (2001): 57-70.
- GENSCH, DENNIS H. "A Computer Simulation Model for Selecting Advertising Schedules." *Journal of Marketing Research* 6, 1 (1969): 203-214.
- GILULA, ZVI, ROBERT E. MCCULLOCH, and PETER E. ROSSI. "A Direct Approach to Data Fusion." *Journal of Marketing Research* 43, 1 (2006): 73-83.
- GREENE, J. L. "An Experimental Investigation of Attitude Change and Choice of a New Brand." *Journal of Marketing Research* 10, 1 (1970): 12-18.
- GUPTA, S. "HERMES: A Research Project on the Commercial Uses of the World Wide Web." Retrieved 1995 from URL:<http://www.umich.edu/~gupta/hermes/index.html>.
- HAVLENA, WILLIAM, ROBERT CARDARELLI, and MICHELLE DEMONTIGNY. "Quantifying the Isolated and Synergistic Effects of Exposure Frequency for TV, Print, and Internet Advertising." *Journal of Advertising Research* 47, 3 (2007): 215-221.
- HEADEN, ROBERT S., JAY E. KLOMPMAKER, and JESSE E. TEEL. "TV Audience Exposure." *Journal of Advertising Research* 16, 6 (1976): 49-52.
- HEADEN, ROBERT S., JAY E. KLOMPMAKER, and JESSE E. TEEL. "Predicting Audience Exposure to Spot TV Advertising Schedules." *Journal of Marketing Research* 14, 1 (1977): 1-9.
- HUGUES, MICHEL. "An Empirical Study of Media Comparison." *Journal of Marketing Research* 12, 2 (1975): 221-223.
- JAGPAL, HARSHARAJEET. "Measuring Joint Advertising Effects in Multiproduct Firms." *Journal of Advertising Research* 21, 1 (1981): 65-69.
- JAIN, CHARMAN L. "Broadcast Support to Newspaper Ads." *Journal of Advertising Research* 15, 1 (1975): 69-72.
- JENSSEN, WARD J. "Sales Effects of TV, Radio, and Print Advertising." *Journal of Advertising Research* 6, 2 (1966): 2-7.
- JONES, JOHN PHILIP. "Single-Source Research Begins to Fulfill its Promise." *Journal of Advertising Research* 35, 3 (1995): 9-16.
- KAMIN, HOWARD. "Advertising Reach and Frequency." *Journal of Advertising Research* 18, 1 (1978): 21-25.
- KANSO, ALI M, and RICHARD ALAN NELSON. "Internet and Magazine Advertising: Integrated Partnerships or Not?" *Journal of Advertising Research* 44, 4 (2004): 317-326.
- KITCHEN, PHILIP J., JOANNE BRIGNELL, TAO LI, and GRAHAM SPICKETT JONES. "The Emergence of IMC: A Theoretical Perspective." *Journal of Advertising Research* 44, 1 (2004): 19-29.
- KOTLER, PHILIP. "Toward an Explicit Model for Media Selection." *Journal of Advertising Research* 4, 1 (1964): 34-41.
- KRUGMAN, HERBERT E. "Why Three Exposures May Be Enough." *Journal of Advertising Research* 12, 6 (1972): 11-14.
- LAVIDGE, ROBERT C., and GARY A. STEINER. "A Model for Predictive Measurements of Advertising Effectiveness." *Journal of Marketing* 25, 4 (1961): 59-62.
- LECKENBY, JOHN D., and MARSHA M. BOYD. "How Media Directors View Reach/Frequency Model Evaluation Standards." *Journal of Advertising Research* 24, 5 (1984): 43-52.
- LECKENBY, JOHN D., and MARSHA M. BOYD. "An Improved Beta Binomial Reach/Frequency Model for Magazines." *Current Issues and Research in Advertising* (1984): 1-24.
- LECKENBY, JOHN D., and SHIZUE KISHI. "Performance of Four Exposure Distribution Models." *Journal of Advertising Research* 22, 2 (1982): 35-44.
- LIEBMAN, L., and E. LEE. "Reach and Frequency Estimating Services." *Journal of Advertising Research* 14 (1974): 23-25.
- LODISH, LEONARD M. "Exposure Interactions Among Media Schedules." *Journal of Advertising Research* 13, 2 (1973): 31-34.
- LUCAS, DARRELL B., and STUART H. BRITT. *Measuring Advertising Effectiveness*. New York: McGraw Hill, 1963.
- METHERINGHAM, R. A. "Measuring the Net Cumulative Coverage of a Print Campaign." *Journal of Advertising Research* 4 (1964): 23-28.
- MORAN, WILLIAM T. "Practical Media Decisions and the Computer." *Journal of Marketing* 27, 3 (1963): 26-30.
- NAIK, PRASAD A., and KALYAN RAMAN. "Understanding the Impact of Synergy in Multimedia Communications." *Journal of Marketing Research* 40, 4 (2003): 375-388.
- NAPLES, MICHAEL J. "Effective Frequency: Then and Now." *Journal of Advertising Research* 37, 4 (1997): 7-12.
- NEWSPAPER MARKETING AGENCY. "National Newspapers Drive Readers to Advertiser Websites." 2007, URL: <http://www.nmauk.co.uk/nma/do/live/whyNewspapers?sectionArticleTypeId=25>.
- NOVELLI, WILLIAM D. "One-Stop Shopping: Some Thoughts on Integrated Marketing Communications." *Public Relations Quarterly* 34, 4 (1989-90): 7-9.
- NUMBERGER, SIEGFRIED, and MANFRED SCHWAIGER. "Cross Media, Print, and Internet Advertising:

- Impact of Medium on Recall, Brand Attitude, and Purchase Intention." *EFOplan*, 2003.
- PALDA, KRISTIAN. "The Hypothesis of a Hierarchy of Effects: A Partial Evaluation." *Journal of Marketing Research* 3, 1 (1966): 13–24.
- PETTY, RICHARD E., and JOHN T. CACIOPPO. *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*. New York: Springer-Verlag, 1986.
- PILOTTA, JOSEPH J., and DON SCHULTZ. "Simultaneous Media Experience and Synthesis." *Journal of Advertising Research* 45, 1 (2005): 19–26.
- RAMAN, KALYAN, and PRASAD A. NAIK. "Long-Term Profit Impact of Integrated Marketing Communications Program." *Review of Marketing Science* 2 (2004): 1–21.
- RICE, MARSHALL D., and JOHN D. LECKENBY. "An Empirical Test of a Proprietary Television Media Model." *Journal of Advertising Research* 26, 4 (1986): 17–21.
- RUST, ROLAND T., and JAY E. KLOMPMAKER. "Improving the Estimation Procedure for the Beta Binomial TV Exposure Model." *Journal of Marketing Research* 28, 4 (1981): 442–448.
- RUST, ROLAND T., and ROBERT P. LEONE. "The Mixed Media Dirichlet Multinomial Distribution: A Model for Evaluating Television-Magazine Advertising Schedules." *Journal of Marketing Research* 21, 1 (1984): 89–99.
- SCHULTZ, DON E. "Integrated Marketing Communications: The Status of Integrated Marketing Communications Programs in the U.S. Today." *Journal of Promotion Management* 1, 1 (1991): 99–104.
- SCHULTZ, DON E. "Integrated Marketing Communications: Maybe Definition Is in the Point of View." *Marketing News* 27, 2 (1993): 17.
- SCHULTZ, DON E., and P. J. KITCHEN. *Communicating Globally: An Integrated Marketing Approach*. London: Macmillan Press Ltd., 2000.
- SCHULTZ, DON E., MARTIN BLOCK, and KALYAN RAMAN. "Media Synergy Comes of Age—Part 1." *Journal of Direct Data and Digital Marketing Practice* 11, 1 (2009): 3–19.
- SEMON, THOMAS T. "Assumptions in Measuring Advertising Effectiveness." *Journal of Marketing* 28 (1964): 43–44.
- SHOCKER, ALAN D. "Limitations of Incremental Search in Media Selection." *Journal of Marketing Research* 7, 1 (1970): 101–103.
- SISSORS, JACK Z. "Vehicle Exposure Measurements and Beyond." *Current Issues and Research in Advertising* 1 (1978): 107–120.
- SISSORS, JACK Z. "Confusions About Effective Frequency." *Journal of Advertising Research* 22, 6 (1982): 33–38.
- STASCH, STANLEY F. "Linear Programming and Space-Time Considerations in Media Selection." *Journal of Advertising Research* 5 (1965): 40–46.
- SUNDAR, S., S. NARAYAN, R. OBREGON, and C. UPPAL. "Does Web Advertising Work: Memory for Print vs. Online Media." *Journalism and Mass Communication Quarterly* 75, 4 (1998): 822–835.
- WAKOLBINGER, LEA M., MICHAELA DENK, and KLAUS OBERECKER. "The Effectiveness of Combining Online and Print Advertisements: Is the Whole Better than the Individual Parts?" *Journal of Advertising Research* 49, 3 (2009): 360–372.
- WALL STREET JOURNAL. "Tallying Up Viewers." July 26, 2010, p. B4.
- WARC. "ESPN Pursues 'The Number' with Marketing Research Dream Team." March 2010.
- ZAHAY, DEBRA, JAMES PELTIER, DON E. SCHWARTS, and ABBIE GRIFFIN. "The Role of Transactional versus Relational Data in IMC Program: Bringing Customer Data Together." *Journal of Advertising Research*, 44, 1 (2004): 3–18.
- ZANGWILL, WILLIAM I. "Media Selection by Decision Programming." *Journal of Advertising Research* 5, 3 (1965): 30–36.
- ZUFRYDEN, FREED S. "A Tested Model of Purchase Response to Advertising Exposure." *Journal of Advertising Research* 21, 1 (1981): 7–16.
- ZUFRYDEN, FRED S. "Predicting Trial, Repeat, and Sales Response From Alternative Media Plans." *Journal of Advertising Research* 40, 6 (2000): 65–72.