The topic of Media Planning has consumed whole books, let alone book chapters. Nevertheless, we will attempt in this chapter to give an overview of the key media planning concepts and definitions. Media planning is mostly about the placement and timing of advertising messages. In their daily lives media planners must define a target audience, decide which media (TV, radio, online, etc.) are appropriate and stipulate the dates and times for the advertisements. All this must be done while trying to achieve an audience exposure target and keep within a budget. Since media planning is a very practical and structured component of advertising, we also discuss the key steps and decisions that arise in the media planning process. Table 5.2.1 lists the key steps in media planning in sequential order and outlines the structure of this chapter and how it relates to other chapters.

This chapter is organized according to the steps listed in Table 5.2.1. In addition, we also define a number of key media planning terms and briefly discuss some media data sources. We also introduce and discuss some basic models used for estimating media exposure. After an example of a media plan, the chapter concludes with a summary.

Media planning is an important and sophisticated component of advertising management, but we have space here for only a brief introduction. More detailed discussion of the key topics can be found in a number of classic books and articles, including Aaker and Myers (1987), Barban et al. (1993), Katz (1995), Little (1979), Little and Lodish (1969), Rossiter and Danaher (1998), Rust (1986), Surmanek (1985) and Sissors and Baron (2002). More recent texts on media planning have been written by Brierley (2002) and Kelley and Jugenheimer (2004).

**MARKETING OBJECTIVES**

Media planning objectives can be divided into the categories of marketing, advertising and media objectives. In this section we primarily discuss marketing and advertising objectives. Marketing objectives are “higher level” objectives, which determine the advertising objectives and the strategy and tactics necessary to achieve the objectives. A common marketing objective is the attainment of increased sales or market share. Kelley and Jugenheimer (2004: 47) note that good marketing objectives are those with goals that are quantifiable, such as increasing sales by 2% in the next year. Simply stating that the objective is to increase sales is too vague and does not help set the downstream advertising and media objectives. Another marketing objective might be the repositioning of a product via advertising of brand attributes, such as price and nutrition for a breakfast cereal.

<table>
<thead>
<tr>
<th>Step</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Marketing Objectives</td>
<td>Sets sales or market share targets</td>
</tr>
<tr>
<td>Define Target Audience</td>
<td>Decide on who to aim the advertising at and find out their media consumption</td>
</tr>
</tbody>
</table>

![Figure 5.2.1 Household ratings for Friends and Seinfeld](http://sage-ereference.com/hdbk_advertising/Article_n19.html)
Media Planning: The SAGE Handbook of Advertising

Decide which media (TV, radio, print, internet, etc.) are appropriate for your objectives and your budget. Is the intention to expose a lot of people just once to the campaign or a smaller group many times, i.e., breadth versus depth?

Consider the timing, placement and size/length of advertising. Addresses issues like total advertising budget and how it might be spread over different media. Also covers media buying discounts and negotiation.

Evaluate the success of the campaign after it is executed. Measures of effectiveness include ad awareness, recall and likeability. Other measures are brand attitude, sales and market share. Attainment of media objectives within budget are also relevant.

Advertising objectives are tailored to the marketing objectives, but are specific to the domain, as opposed to another element of the marketing mix. For example, if the marketing objectives is to increase sales, and it is known that brand awareness is a precursor to sales, then an appropriate advertising objective may be to increase brand awareness. However, if awareness is already high, a more appropriate marketing objective might be to increase brand preference, in which case a suitable advertising objective is to enhance attitude towards the brand (Katz, 1995: 41). Other chapters in this book deal with advertising awareness (Chapter 4.2), response modelling, i.e., the effects of advertising on sales (Chapter 4.3), budgeting (Chapter 5.3) and ad scheduling (Chapter 5.4). For this reason we will not go into any detail on such advertising objectives.

Decisions on the marketing objectives have a downstream effect on media planning. For example, if a firm is pursuing a "push strategy" to achieve its marketing objective of increasing sales, then advertising effort should be directed at channel partners. Hence, advertising messages are more appropriate in trade publications rather than mass appeal consumer magazines. Barban et al. (1993: 16) illustrate this for a packaged good, where a push strategy results in print ads in newspapers and radio, which are cheaper than television. Even for this simple example it is apparent that the 'below the line' spend to the trade, this necessarily reduces the 'above the line' spend on consumer advertising. In turn, this might leave insufficient funds for a successful TV ad campaign, resulting in advertising in newspapers and radio, which are cheaper than television. Even for this simple example it is apparent that the initial marketing objectives have a large impact on later decisions about media and therefore media objectives.

Hence, we cannot emphasize enough the importance of setting marketing objectives first.

Media objectives include targets for the proportion of the target audience exposed to the advertising campaign or perhaps the number of times target audience members are exposed. Before discussing media objectives in detail, we need to define several key terms that are commonplace in media planning.

### MEDIA PLANNING TERMINOLOGY

There are several terms that are commonly used in the context of media planning (see Sissors and Baron, 2002; Surmanek, 1985; and Rust, 1986, for extensive glossaries). Unfortunately, these terms have not always been defined consistently in the past. To remove any ambiguity, we use a simple illustration based on the viewing of two television sitcoms that enjoyed enormous success over the past decade, *Friends* and *Seinfeld*. Neither show is still in production, but at their peak they both attracted large audiences. For the purposes of this illustration, suppose the target audience is all US households with a TV set. A *household rating* is the percentage of households with TVs that tune into the program. Suppose that in a particular week *Friends* rates a 15, while *Seinfeld* rates a 10. This means that 15% and 10%, respectively, of households tune into *Friends* and *Seinfeld*. As both shows are prime time comedies, they will have some overlap in audience, with say 5% of households watching both programs in a week. This 5% of households is common to both shows and is called the *duplicated* audience.

The ratings and the duplication are depicted in Figure 5.2.1. The rating for *Friends* is comprised of two parts, the 10% of households that view just *Friends* and a further 5% that view both shows, making a combined rating of 10+5 = 15 for *Friends*. Seinfeld's total rating is 10, comprised in a similar way, being 5 + 5 for the exclusive and duplicated viewers.

So far we have discussed only the viewing of programs, but not advertisements. It is very common for media audience suppliers to provide program ratings, with advertising ratings assumed to be equal to those of the program. Of course, this is unlikely to be true in reality, since there is evidence of people switching channels...
during commercial breaks (Danaher, 1995; Yorke and Kitchen, 1985). Some countries, such as the UK, use commercial break ratings rather than program ratings, but even this is not an exact advertising exposure measure. The conventional way around this complex issue of ad exposure versus program exposure is to describe a viewer of a program (or reader of a magazine or newspaper) as having an opportunity to see (OTS) when they are exposed to a media vehicle. A media vehicle is a generic term for the delivery channel for a media message and could any one of television, radio, newspaper, magazine, outdoor or the internet. Hence, when someone watches a program, they have an opportunity to see all of the commercials that are broadcast during that program. The true advertising exposure is anywhere from 50 to 95% of those watching a program (Danaher, 1995; Kneale, 1988; Yorke and Kitchen, 1985).

Returning to the example in Figure 5.2.1, suppose that an advertiser places a single 30 second commercial in Friends and also places this commercial into Seinfeld in the same week. In media planning parlance, commercials or ads are often called insertions. We say that an insertion has been placed in Friends and another in Seinfeld, making a two insertion ad campaign.

We are now ready to define some key media planning terms.

**Reach**

Reach is defined as the percentage of the target audience exposed to the advertising campaign at least once in a specified time period. In the UK, reach is called coverage, a term which nicely conveys the meaning of reach. That is, it is a measure that counts all the unique households (or people) that are covered by the campaign. In the packaged goods industry an equivalent term is penetration, being the percentage of households that have purchased a product in a certain time period. For the example in Figure 5.2.1, the reach of the campaign is 10 + 5 + 5 = 20%. This is the sum of the percentage of people exclusively exposed to Friends or Seinfeld, plus those exposed to both programs. Notice that those households exposed to both programs are counted only once in the reach calculation. For this reason, choosing two media vehicles with high duplication in audience is not a good way to increase reach (we illustrate this in the section on Models for Estimating the Exposure Distribution).

Notice that reach can also be calculated from the nonreach, i.e., from those not seeing either vehicle. Figure 5.2.1 shows that 80% of households see neither program. Hence, the percentage seeing at least one program is 100 – 80 = 20%.

**Gross Rating Points**

Gross Rating Points are defined as the sum of the ratings for the ads placed in all the media vehicles, ignoring any duplication across media vehicles. For the example in Figure 5.2.1, the Gross Rating Points for the two-insertion advertising schedule are 15 + 10 = 25. If there had been two insertions in Friends and three in Seinfeld, the Gross Rating Points would be 2 × 15 + 3 × 10 = 60. Therefore, Gross Rating Points are simply the sum of the ratings across all of the insertions in an advertising campaign, or a particular time period, such as a week. Often advertisers set GRP norms for ad campaigns, expecting, for instance, 200 Gross Rating Points per week for a TV campaign. A “heavy” advertising weight would be 300–400 Gross Rating Points per week.

Since Gross Rating Points are very easy to calculate, they are commonly used to gauge the strength of an ad campaign, and are generally considered to be the “currency” of media planning. This is in part due to their portability across different media types. The concept of the sum of ratings applies equally well to newspapers, radio and magazines. However, part of the reason the internet has struggled to gain acceptance as a mainstream advertising medium is the difficulty of defining a GRP for the internet (Smith, 2003).

As might be expected, Gross Rating Points and reach are related, but not linearly. Generally, reach increases as Gross Rating Points increase, but at diminishing return levels. This gives rise to “reach curves,” which are charts that relate Gross Rating Points to reach (Surmanek, 1985: 34; Wood, 1998). There is another link between Gross Rating Points and reach, which we now discuss.

**Frequency**

The term frequency goes hand-in-hand with reach. Unfortunately, frequency has not been consistently defined in the literature (Dixon, 1991; Kelley and Jugenheimer, 2004; Rust, 1986) and this had led to a number of misconceptions about what frequency actually is. The term frequency is intended to convey how often someone is exposed to an ad campaign. We define frequency, or more precisely, average frequency, as the average number of exposures among those reached by the advertising campaign (Barban et al., 1993: 54; Surmanek, 1985: 29).

Returning to the example in Figure 5.2.1, only 20% of households are reached by the campaign that has single insertions in each of Friends and Seinfeld. Of those households reached, 10% see Friends only and 5% see Seinfeld only. These households have just one exposure each. There are a further 5% of households exposed twice to the campaign. Hence the average number of exposures among those seeing any ads is

\[
\frac{1 \times (0.1 + 0.05) + 2 \times (0.05)}{0.2} = 0.25/0.2 = 1.25.
\]
Therefore, the average frequency, or frequency as it is popularly known, is 1.25 exposures. Notice in the calculation that the average number of exposures is divided by the reach. This is because frequency is calculated among the subset of households or people that are reached by the campaign. This seems reasonable, as those who are not reached by the campaign see no ads (Sissors and Baron, 2002: 99).

Although there is no formal link between Gross Rating Points and reach, there is a formula that links reach, frequency and GRPs. It is

\[ \text{Reach} \times \text{Frequency} = \text{GRPs}. \] (1)

This formula only makes sense when frequency is defined as the average number of exposures among those reached. For the example in Figure 5.2.1, \( \text{Reach} \times \text{Frequency} = 20 \times 1.25 = 25 \), which equals the Gross Rating Points we calculated earlier. The reach/frequency formula in equation (1) illustrates an important trade-off between reach and frequency. For a fixed level of GRPs, when reach increases, frequency must decrease, and vice versa. This has big implications for media planning and scheduling. For instance, a straightforward way to get a high reach is to choose popular media that do not overlap much in audience. This lack of overlap results in fewer households or people being exposed multiple times, thereby lowering the average frequency of exposure. Conversely, an easy way to increase frequency is to have multiple insertions in the same TV program, magazine or radio station. Due to audience loyalty to a particular TV program or magazine, this results in multiple exposures to the same households or people. This increases the average frequency of exposure, but does little to increase the reach, since few new unique households are exposed.

**Exposure distribution**

A less well known, but very important concept in media planning, is the exposure distribution, sometimes known as the frequency distribution (Barban et al., 1993; Rossiter and Danaher, 1998). The exposure distribution is the percentage of the target audience exposed no times, just once, just twice and so on. The exposure distribution for the example in Figure 5.2.1 is given in Table 5.2.2.

Table 5.2.2 Exposure distribution for the example in Figure 5.2.1

<table>
<thead>
<tr>
<th>Number of exposures</th>
<th>Percent of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

The reason the exposure distribution is so useful is that all three audience measures of reach, frequency and Gross Rating Points can be calculated directly from the exposure distribution, as we now demonstrate.

Firstly, reach is the percentage exposed to the ad at least once, being either one or two exposures in this case. Table 5.2.2 shows that the reach is 15 + 5 = 20%. Alternatively, reach is 100 - nonreach = 100 - 80 = 20%, as before. Secondly, the Gross Rating Points in Table 5.2.2 are the total ratings, being \( 1 \times 15 + 2 \times 5 = 25 \). Notice that the duplicated audience (5%) is multiplied by 2, as each of households receives 2 exposures. Thirdly, the frequency, or more precisely the average frequency among those reached, is \( (1 \times 15 + 2 \times 5)/20 = 1.25 \).

The calculation of these three audience measures gives some insight into how the reach/frequency formula in equation (1) is derived. Multiplying reach by frequency results in \( 20 \times (1 \times 15 + 2 \times 5)/20 = 25 \), which equals the 25 Gross Rating Points calculated earlier. This shows that Gross Rating Points are the average exposures (multiplied by 100) among the entire target group, not just those reached. Hence, an alternative way to write equation (1) is

\[ \text{Reach} \times \left[ \frac{\text{Average Exposures}}{\text{Reach}} \right] = \text{GRPs}. \] (2)

Equation (2) highlights two things. First, average frequency is, by definition, the average number of exposures divided by the reach. Second, that Gross Rating Points can also be thought of as the average number of exposures among the entire target group, not just those reached. In our example, GRPs = 25, but this is in percent form, meaning that the average number of exposures among all households is 25/100 = 0.25. Contrast this with average frequency, which is 1.25, being the average number of exposures among just those reached. Hence, the reason that Gross Rating Points and frequency are linked is not due to some magical law of media planning. It is a linkage that results from the (correct) definition of frequency. By definition, frequency is Gross Rating Points divided by reach and this, in turn, gives rise to equation (1).

We have belaboured the definition of reach, frequency and Gross Rating Points as there have been a number of erroneous discussions of frequency and the formula in equation (1). See, for example, Kelley and Jugenheimer (2004: 19) who appear to define frequency as the total number of insertions in the campaign. See also Dixon (1991) who defines the average frequency among the entire target group rather than just those reached. He effectively defines average frequency to be the same as GRPs, as also noted by Farris and Parry (1991) and Cook (1991). The definitions stated here are consistent with the intended meaning of frequency, as illustrated in...
the authoritative texts of Barban et al. (1993: 57), Sissors and Baron (2002: 99) and Surmanek (1985: 29).

Another reason the exposure distribution is important is that for more complex ad campaigns than depicted in Figure 5.2.1, an exposure distribution can either be compiled from the raw data or estimated by a mathematical model (Chandon, 1976; Rust, 1986; Danaher, 1992) and media exposure measures can be calculated directly from the empirical or estimated exposure distribution. Moreover, the exposure distribution is the basis for calculating other media effectiveness measures, such as the proportion of the target audience exposed to at least 3 ads, often called effective frequency (Krugman, 1972; Naples, 1979). Effective frequency at the 3+ level was the cornerstone of advertising media planning for almost three decades, but Jones (1995) has questioned its importance, and has advocated a preference for reach (1+) as a desirable criterion for an ad campaign. Either of these criteria can be obtained with ease from the exposure distribution.

Cost per thousand

Until now, our media terminology has addressed audience size and frequency of exposure, but not advertising cost. Generally speaking, the larger the audience for a media vehicle, the higher the cost, particularly within a single medium such as television. To enable cost comparisons across alternative media vehicles, a common measure is the cost per thousand, conventionally abbreviated as CPM, where the M designates the Latin word for one thousand, mille. For example, in Figure 5.2.1, suppose there are 100,000,000 households in the US with a TV set. Then a household rating of 15 for Friends means that 15 million homes watch this show, while 10 million tune into Seinfeld. If a 30 second commercial on national television costs $350,000 for Friends, while a Seinfeld commercial costs $280,000, then the respective CPMs are $350,000 × 1000/15,000,000 = $23.33 and $280,000 × 1000/10,000,000 = $28.00. In words, this means that the cost of reaching 1000 households by broadcasting a commercial on Friends is $23.33. Since the CPM for Friends is lower than that for Seinfeld in this hypothetical example, Friends is better financial deal. An appealing feature of CPMs is that they are "portable" across different media, being easy to calculate for magazines and radio, for instance. Since all ad campaigns operate within a budget, CPMs provide a simple way to compare both across different media types, such as television and radio and within a single medium, such as comparing Seinfeld and Friends.

A related cost efficiency measure is cost per rating point (CPRP), which is the ratio of the insertion cost to the rating (in percent). Hence for Seinfeld, the CPRP is \( \frac{280,000}{10} = \$28,000 \).

SOURCES OF MEDIA DATA

All media planning requires the analysis of data from the respective media types. Detailed descriptions of how media data are collected for traditional media ranging from TV to cinemas are given in the book by Kent (1994). The methodology behind comScore Media Metrix measurement of internet audiences is given by Coffey (2001). Some of the larger media measurement suppliers provide details of their methodology on their websites (see, for example, http://www.agbnielsen.net and http://www.tns-global.com). We give just a short outline of how media audiences are measured for some key media.

Television

In many countries, television ratings are determined by a peoplemeter panel of homes. The USA and UK, have about 6000 peoplemeter panel homes. Many other countries operate smaller panels, ranging from 300 to 600 homes. Panels are normally designed to represent the country with respect to region, level of TV viewing, size of household, number of TVs in the home, age of main household shopper, presence of children, and several other demographic variables, via a stratification system known as control matrices (Kent, 1994).

A peoplemeter is literally a "black box" that sits on top of the TV set and continually monitors all the television activity. To ensure that the peoplemeter records what the people in the house are watching and not just what the TV is doing, all eligible householders use a remote control to "log in" when they are watching TV. Data are collected in real time, but generally the data are sent to a central processor in the early hours of the morning. Ratings for the previous day are available to clients the following morning, usually in the form of minute-by-minute ratings. Peoplemeters are relatively sophisticated but they depend on compliance by panelists. Non-compliance occurs when someone is watching TV but has not logged in or is logged in but not watching. Most countries check for this with "coincidental surveys" (Danaher and Beed, 1993). In these surveys, panelists are called by telephone and asked if they were watching television at the time the phone rang. Their verbal response is compared with the actual peoplemeter records at that time instant. Danaher and Beed (1993) report that over 90% of panelists pass this test of compliance.

Another popular method for measuring TV ratings is via a diary panel. Here, booklets which list each channel and quarter-hour for a week (sometimes longer) are left in the home to be completed every day by each eligible person living in the home. The diary method has shown a bias towards reporting viewing of TV shows which might be considered socially acceptable. As a result, programs like evening news shows usually have higher ratings by the diary method because people think they "always watch the news" or "should watch" when, in fact, they often miss one or two nights (Beed, 1992). A further problem with diaries is that people often under-record their viewing to daytime and late-night television and small (often cable) channels. With the rapid profusion of small channels in the past 15 years, this is clearly a problem for the TV diary method.

Print
As print survey questionnaires often use show-cards, print media surveys are usually accomplished with face-to-face interviews of people aged 10 years or older. Telephone surveys are also common. The samples tend to be large and fully national, being spread evenly over a year. The survey asks each respondent which vehicles he or she has recently read or looked at from a long list of magazines and newspapers. Two question formats commonly used for weekly magazines are the “reading habit” and “recent reading” methods, which asks about the number of issues read in recent past. The primary format used in the U.S. is the recent reading method, particularly by SMRB (Simmons) and MRI (Mediamark).

For daily and suburban newspapers, respondents are asked to recall their reading behaviour over the last seven days. For instance, if they are interviewed on a Wednesday, they’ll be asked if they read a particular newspaper on the previous Wednesday through Tuesday. Days when the newspaper is not published are omitted from the questioning.

Print media audience measurement worldwide is therefore mostly based on recalled vehicles read (reach) and recalled reading occasions (frequency).

Radio

Radio-listening audiences are typically measured by the diary method (similar to that used in some countries for television). Diaries are dropped off in randomly selected homes for later pickup. Respondents tick (check off) the appropriate station box in the diary for every quarter-hour of radio they listen to. A relatively recent technology has been developed by Arbitron (http://www.arbitron.com) that can handle both radio and television audience measurement. It is called the "portable peoplemeter" and consists of a small device about the size of a pager (there is also a wristwatch version) that is worn by a panelist throughout the day and evening. It has the capability to detect an inaudible signal from a TV or radio station. Each station has a unique identifier that is captured whenever the panelist is within earshot of a TV or radio station. Trials have been conducted in Philadelphia, Manchester, UK and currently Houston, which show that the technology is steadily improving.

TARGET MARKET DEFINITION

One of the cornerstones of marketing is segmentation. Products and services do not appeal to everyone equally and this gives rise to clusters of people, households or firms that have a higher than average uptake or potential uptake of an advertising offer. Target markets can be set in many ways, based on any or all of personal demographics, geographic location, users of a product and buyers or nonbuyers of a product.

Traditionally, demographic factors have been the predominant method for defining a target. For example, a popular target group among television advertisers is women aged 18–49, as this group is often the grocery buyer in a household. Such demographic targets are usually based on market research that profiles buyers or users of a product by an array of demographic variables such as age, gender, income, occupation, family size, presence of children and socio economic status. For instance, a soda brand may find that their product has a higher than average consumption rate for high-income men aged 25–34. The media planner then sets about finding media that appeal to this target group. That is, an attempt is made to match a product’s users with the appropriate media, with demographic factors acting as an intermediary. This method of targeting is called "indirect matching" (Assael and Poltrack, 1991) and is extremely common in the advertising industry. An alternative is "direct matching," where a database of users or buyers of a product is scrutinized to see which TV programs or magazines these users/buyers watch the most. As Assael and Poltrack (1991, 1994) argue strongly in favor of direct matching over indirect matching, as using demographics as an intermediary dilutes the strength of the relationship between product user and their media consumption.

While it is hard to fault this logic, the barrier to direct matching is a lack of "single-source" data that directly link buying behaviour to media consumption. It is much more common to have separate databases, one on buying behaviour and a separate one for media consumption (such as Nielsen's peoplemeter panel data). Attempts at nationwide single source data have proven financially costly and burdensome for sample respondents (Rossiter and Danaher, 1998: 64–6). Some notable exceptions are MediaMark Research's (MRI's) nation-wide sample of magazine readership that also asks about the usage of 500 categories and 6000 brands (Kelley and Jugenheimer, 2004: 53). The clear limitation here is that the MRI service is primarily aimed at magazine media planning, rather than say, television. In the UK, Taylor Nelson produce the TGI service that links product consumption and media consumption, but in that case data fusion is used to link two separate databases, with demographics being one of the factors used in making the linkage. Therefore, there is still an element of indirect matching in the TGI method.

At the heart of indirect matching is a technique called "indexing." Indexing is a simple and intuitive way to help select particular vehicles within a media type, such as television. Staying with the target group of high income men aged 25–34 for a soda brand, Table 5.2.3a lists the TV ratings for five programs, among all people aged 5 or more and among the target group. The index is the ratio of the rating among the target group to the rating among all people. A higher index number indicates that viewing a program correlates well with membership of the target group. Programs with the highest index numbers are candidates for advertising, subject to budget constraints of course.

Clearly, Monday Night Football and David Letterman have high indices and should be considered as suitable television programs for targeting high income men aged 25–34.
In contrast, direct matching uses data on program viewing and product consumption without referring to demographic intermediary variables (Assael and Poltrack, 1991, 1994). For example, Table 5.2.3b gives typical data on soda consumption among viewers of the same five television shows in Table 5.2.3a. A “high soda consumer” is defined to be someone who consumes 50% more than the average person in a week. Table 5.2.3b shows that 8% of viewers of CSI Miami are classified as high soda consumers. This time, the top-ranked shows for reaching high soda consumers are Monday Night Football and Lost. Assael and Poltrack (1991, 1994) report that such differences in program selection between indirect and direct matching are common. They favor direct matching because it properly captures product or service usage with the most relevant potential advertising viewers. Nonetheless, indirect matching is still commonly used due to the lack of widely available single source data.

Table 5.2.3a Example of program indices

<table>
<thead>
<tr>
<th>Program</th>
<th>Rating for Those aged 5+</th>
<th>High income men aged 25–34 Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSI Miami</td>
<td>5.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Monday Night Football</td>
<td>8.9</td>
<td>15.2</td>
</tr>
<tr>
<td>Lost</td>
<td>4.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Desperate Housewives</td>
<td>10.2</td>
<td>8.3</td>
</tr>
<tr>
<td>David Letterman</td>
<td>3.6</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Table 5.2.3b Example of direct matching

<table>
<thead>
<tr>
<th>Program</th>
<th>Percent of viewers that are high soda consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSI Miami</td>
<td>8%</td>
</tr>
<tr>
<td>Monday Night Football</td>
<td>16%</td>
</tr>
<tr>
<td>Lost</td>
<td>14%</td>
</tr>
<tr>
<td>Desperate Housewives</td>
<td>3%</td>
</tr>
<tr>
<td>David Letterman</td>
<td>9%</td>
</tr>
</tbody>
</table>

MEDIA TYPE SELECTION

Kelley and Jugenheimer (2004: 36–42) list the advantages and disadvantages of ten different media types, ranging from newspapers, radio, outdoor and the internet. The selection of media types for a campaign is subjective, but depend very much on the advertising media objectives and the budget. The choice of media will also depend on the media objectives. For example, a campaign that demands a high reach but moderate frequency should concentrate on television and newspaper insertions. However, if high frequency is required and lower reach is acceptable then outdoor and radio advertising are appropriate (Brierley, 2002: 108).

Rossiter and Danaher (1998, Chapter 5) and Tellis (1998: 357–60) discuss many of the issues that are germane to media selection. These include the "fit" of the creative execution with the proposed media, the intended length of time to attain the audience goals, the appeal of interaction (as offered by the internet), whether the ad is informational or transformational, the consumer's involvement with the product or service, the geographic coverage of each media, potential frequency of repeated exposures, the speed of message delivery, the location where the media is consumed and the relative cost of each media.

Decisions about which media to select are linked to the copy or content of the advertisement. For example, if the ad is to be strongly visual or convey an emotional message, it is natural to choose television as the medium. However, television is an expensive medium, so magazines might be the only affordable channel, in which case, the ad copy is likely to be informational (Rossiter and Danaher, 1998). Hence, the decision of which comes first, copy (creative, content) or media choice is not straightforward. Tellis (1998: 88–93) and Aaker and Myers (1987: 460–3) discuss this issue. Rossiter and Danaher (1998: 51–5) discuss how the creative elements of visual appeal, memorability and attitude formation help to drive decisions on media selection. Furthermore, the advertising budget often has a large influence on the choice of media as we now illustrate.

A reasonable starting point for media selection, suggested by David Fletcher of Media Edge in London, is to prioritize each media type, then ask yourself what you can achieve with your number one choice. For example, it would typically cost $4 million for an effective national television advertising campaign in the UK comprising about 500 GRPs. By contrast a newspaper campaign starts to be effective with $1 million ad spend. Moreover, Fletcher commented that media such as print and outdoor are scalable, meaning that doubling the expenditures generally doubles the effectiveness and vice versa for half the expenditure. Scalability of ad spend is not a feature of television advertising effectiveness, however. Since television needs a threshold level of expenditure before becoming effective, a total advertising budget of $6 million could be divided to have the minimum of $4 million on TV, with the balance being split between newspapers and perhaps an experimental medium like the internet or text messages. There is also an implicit, but underresearched, belief that television is the most
effective medium, once the minimum level of expenditure is achieved.

**MEDIA OBJECTIVES**

Media objectives can now be set using the media audience definitions in the section on Media Planning Terminology. Common media objectives are based on reach, frequency and/or GRPs, such as setting a goal of reaching 35% of the target market within a one week period (Jones, 2004: 107). It might take 60 Gross Rating Points to achieve this reach target. Notice the use of a time span in this objective. This is important, as achieving a reach of 35% reach is more demanding in a one-week period than a four-week period. Rossiter and Danaher (1998) formalize this by setting objectives such as the "minimum effective frequency per advertising cycle," where the advertising cycle is typically 4 weeks.

Brierley (2002: 108) suggests that reach targets should be around 75–80% of the target population over the course of the campaign, rather than just a week. A common practitioners’ rule of thumb is that a TV campaign should attain about 200 Gross Rating Points per week. Kelley and Jugenheimer (2004: 94) state that "Most brands rarely set their reach goals less than 50 percent for the purchase cycle. Most stay in the two-thirds to four-fifths range." That is, they set reach targets between 66% and 80% of the target audience. Brierley (2002: 108) makes the observation that, as the number ads in the campaign becomes large, the reach increases at a decreasing rate (diminishing returns). Hence, it is common for an advertiser to accept that once a high reach target is attained, further insertions largely serve to increase just the average frequency of exposure. Such practice leads to the accumulation of effective frequency or effective reach (Naples, 1979), whereby a media planner might want to achieve a "reach of 50% at the 3+ level," meaning that half of the target audience is exposed to the campaign at least three times. In doing so, the usual reach (i.e., reach at the 1+ exposure level) must be higher than 50% and is likely to be of the order 70–90% in order to achieve a 3+ reach of 50%.

A further important consideration when setting media objectives is to assess the advertising of one's competitors. Since many advertisers appear to set annual media budgets in accordance with their market share (Schroer, 1990) and there are demonstrated effects of interference effects of competitor advertising (D’Souza and Rao, 1995; Kent and Allen, 1994), its imperative that an advertiser makes allowance for current and future advertising patterns of their competitors (Lodish, 1971).

**ASSESSING CAMPAIGN EFFECTIVENESS**

Since media purchases are based on historical data (often for the comparable time period in the previous year), media planners must work with forecasts of audience measures in future time periods. For this reason, the actual audience achieved (measured by reach or GRPs, for instance) may differ from the forecast audience. To motivate the modeling issues, consider the observed exposure distribution for two popular weekly magazines, *TV Guide* and *People* based on a sample of 5000 people over a four week period. Let $X_1$ and $X_2$,
respectively, denote the exposures each person has to *TV Guide* and *People*, and \( X = X_1 + X_2 \) is the total exposures each person has to both these magazines. The bar chart in Figure 5.2.2 shows a count of the number of people in the sample with \( X \) exposures, \( X \) ranging from 0 to 8. It is apparent that this is an extremely 'lumpy' distribution. This is because although \( X \) is a simple sum of random variables, two non-ignorable correlations make modeling it difficult (Danaher, 1989b, 1992). One is the intra-vehicle correlation due to repeat reading/viewing to the same media vehicle (Danaher, 1989b; Morrison, 1979) and the other is inter-vehicle correlation, where there might be an overlap (i.e., duplication) in exposure to two vehicles, as illustrated earlier in the Media Planning Terminology section. The example in Figure 5.2.2 has spikes at 4 and 8 exposures. The 4 exposure spike is comprised of people that persistently read just one of the two magazines. Hence, in a four week period, they read all four issues. The 8 exposure spike corresponds to those people that consistently read both magazines.

Suppose a media planner now decides to have five insertions in *People* instead of four. If the survey data asks respondents about their reading habits over the past four weeks we can no longer obtain the observed distribution of \( X \) so a model is needed. The question now is, how much data do we use? Traditionally only the observed frequencies for the marginal distributions of \( X_i \) and the observed bivariate distribution for all pairs of magazines are stored either in tabulated books (e.g., Simmons or Telmar) or on computer files (Chandon, 1986; Leckenby and Kishi, 1982; Rust, 1986). It is this data limitation, particularly for the print media, which makes modeling necessary.

Despite the lumpiness of many observed print media exposure distributions, the most popular model used to estimate total exposures is one based on a smooth beta-binomial distribution, commonly attributed to Metheringham (1964). The mass function of the beta-binomial distribution is

\[
f(X = x) = \binom{k}{x} \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha + x) \Gamma(\beta + x)} \frac{\Gamma(\alpha + x)}{\Gamma(\alpha + \beta + k)}
\]

where \( X = 0, \ldots, k \) and \( \alpha \) and \( \beta \) are parameters to be estimated. The advantages of the beta-binomial model are that it is relatively simple to estimate and requires only readily available survey data for model fitting. While it is an excellent model for one media vehicle (Chandon, 1986; Rust, 1986), Danaher (1992) demonstrates its limitations for two or more magazines due to the lumpiness seen in Figure 5.2.2.

Now generalizing to a multivariate setting, a formal statement of the exposure distribution set-up is as follows. Let \( X_i \) be the number of exposures a person has to media vehicle \( i \), \( X = 0, 1, 2, \ldots, k \), \( i = 1, \ldots, m \), where \( m \) is the number of different vehicles. The exposure random variable to be modeled is \( \sum_{i=1}^{m} X_i \), the total number of exposures to an advertising schedule.

As seen in Figure 5.2.2, in the case of print media, observed empirical exposure distributions are known to be particularly lumpy due to strong intra-vehicle correlation. As a consequence, Danaher (1988, 1989b, 1991) shows that it is necessary to firstly model the joint multivariate distribution of \((X_1, X_2, \ldots, X_m)\), from which the distribution of total exposures, \( \sum_{i=1}^{m} X_i \), can be derived. This is less of a problem with television exposure distributions (Rust, 1986) where loyalty from episode to episode is generally moderate, with intra-exposure duplication factors of the order 0.28 (Ehrenberg and Wakshlag, 1987). In addition, for the television environment there are more vehicle choices than for the print medium (Krugman and Rust, 1993) and this helps to reduce both intra- and inter-vehicle correlation. As a result, models for just \( X_i \) like the beta-binomial, rather than the full multivariate \((X_1, X_2, \ldots, X_m)\) are often adequate for television exposure distributions, which tend to be smooth (Rust and Klompmaker, 1981).

A reasonably robust model for multivariate exposure distributions that captures both the intra- and inter-vehicle correlations is Danaher's (1991) canonical expansion model. It is a generalization of Goodhardt and Ehrenberg's (1969) 'duplication of viewing law.' The mass function for the canonical expansion model is

\[
f(X_1, X_2, \ldots, X_m) = \left\{ \prod_{i=1}^{m} f_i(X_i) \right\} \times \left[ 1 + \sum_{j_1 < j_2} \rho_{j_1, j_2} \frac{(x_{j_1} - \mu_{j_1})(x_{j_2} - \mu_{j_2})}{\sigma_{j_1} \sigma_{j_2}} \right]
\]
where \( f_i(X_i) \) is the univariate distribution for vehicle \( i \), which could be a beta-binomial distribution, \( P_{ij} \) is the correlation between any pair of vehicles, and \( \beta_j \) and \( o_j \) are the mean and standard deviation of the number of exposures for vehicle \( j \). The final model for the total number of exposures is obtained from the multivariate model in the following way:

\[
 f_X(x) = \sum_{(x_1, \ldots, x_m) \in \mathbb{N}^m} \frac{f(X_1, X_2, \ldots, X_m)}{\sum_{x=1}^{k_T} f_X(x)}
\]

Danaher (1991) demonstrates that the canonical expansion model predicts better than all other models across a range of media vehicles. It can also accommodate cross-media situations, whereby an advertising campaign may combine, print, television and outdoor advertising, for example. Video Research International in Japan have successfully used the canonical expansion model for this purpose (Video Research Limited, 2006).

To date very few models have been developed for online media. Leckenby and Hong (1998) adapted the beta-binomial model to internet media planning, but they had to artificially aggregate panel-based website exposure data in such a way so as to force it into the same format as that used in offline media. Rather than restricting the number of exposures to coincide with a pre-specified time period, as done by Leckenby and Hong (1998), Danaher's (2007) internet media exposure model allows each person's exposure level to range from zero to infinity. This is more appropriate for the internet, where there is varying exposure opportunity per website visitor. For a single website the appropriate model is the negative binomial distribution. For many websites, Danaher (2006) uses a Sarmanov distribution (Park and Fader, 2004) to create a multivariate negative binomial distribution. In a rigorous validation exercise, this multivariate negative binomial distribution performs extremely well, doing better than proprietary commercial models.

AN EXAMPLE MEDIA PLAN

We conclude this chapter with a short example of a media plan. A common target demographic for packaged goods is the household shopper, defined to be the person who does the majority of the grocery buying in a home. Suppose the advertiser is Folgers coffee and they have a budget of $350,000 to spend in the St Louis network television market over a four week period. An initial comparison of the television ratings among all people and those who are household shoppers created indices, as discussed in the section on Target Market Definition. All of the ten programs in Table 5.2.4 have indices above 130%, indicating they are suitable for the target audience.

<table>
<thead>
<tr>
<th>Program</th>
<th>Rating, %</th>
<th>Cost/Ins,$</th>
<th>CPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will &amp; Grace</td>
<td>9.1</td>
<td>22 000</td>
<td>2.4</td>
</tr>
<tr>
<td>The Apprentice</td>
<td>8.0</td>
<td>31 000</td>
<td>3.9</td>
</tr>
<tr>
<td>Desperate Housewives</td>
<td>14.7</td>
<td>43 000</td>
<td>2.9</td>
</tr>
<tr>
<td>American Idol</td>
<td>12.1</td>
<td>37 000</td>
<td>3.1</td>
</tr>
<tr>
<td>Lost</td>
<td>7.6</td>
<td>28 000</td>
<td>3.7</td>
</tr>
<tr>
<td>ER</td>
<td>14.9</td>
<td>38 000</td>
<td>2.6</td>
</tr>
<tr>
<td>West Wing</td>
<td>12.2</td>
<td>29 500</td>
<td>2.4</td>
</tr>
<tr>
<td>CSI</td>
<td>12.5</td>
<td>33 000</td>
<td>2.6</td>
</tr>
<tr>
<td>House</td>
<td>8.6</td>
<td>28 000</td>
<td>3.3</td>
</tr>
<tr>
<td>Bones</td>
<td>4.0</td>
<td>15 000</td>
<td>3.8</td>
</tr>
</tbody>
</table>

*These are realistic but not actual ratings and costs – they are for illustration only.

Table 5.2.4 shows that ER is the top rating program among those eligible for advertising, with Desperate Housewives a close second. We also give costs per 30 second commercial slot for each of these programs, from which the cost per thousand (CPM) can be calculated. On a CPM basis, Will and Grace and West Wing are the most cost efficient programs, having the lowest CPM. Table 5.2.4 does not show the duplications among each of the programs, but we can report that many of the pairs of programs do have overlapping audiences, such as Desperate Housewives and ER. Such pairwise duplications have important implications for determining schedules with high reach or frequency. For instance, higher reach is achieved by selecting vehicles that do not overlap much and vice versa for high frequency schedules (Rossiter and Danaher, 1998).

Having selected the initial set of programs it is now necessary to find the mix of programs that maximizes reach or frequency, while keeping within the total budget. For this example we use a simple media model software...
package, called Media Mania, which is reported in more detail in Rossiter and Danaher (1998). It uses the rating for one episode and the reach over two episodes for each program, plus the pairwise duplications as input to Danaher’s (1991) Canonical Expansion model described above.

In this example we employ a feature of the Media Mania software which maximizes the reach or the effective frequency at the 3+ level, while staying within the budget. Table 5.2.5 shows the number of insertions that should be in each program to maximize either reach or frequency at the 3+ level (sometimes referred to as effective reach). The difference between the two media plans is very apparent. The reach strategy spreads the commercials over 8 different shows, with no program having more than 2 insertions. By contrast, the frequency strategy concentrates its commercials into just two programs, with each having 5 insertions.

Figure 5.2.3 shows a bar chart of the full frequency distribution resulting from the media plans in Table 5.2.5. It clearly shows that the reach strategy has a much higher 1+ reach, but this switches over at the 3+ frequency level, where the frequency strategy then has a higher audience. The choice between these two media plans depends on the marketing and media objectives. High reach would be desired when the intention is to expose a lot of people just once or twice, with a view to increasing or maintaining awareness. High frequency might be more suitable when the objective is to counter a competitor who is advertising heavily or when the goal is to induce brand switching among those presently loyal to another brand (Rossiter and Danaher, 1998).

Table 5.2.5 Optimal media plans for reach and frequency strategies

<table>
<thead>
<tr>
<th>Program</th>
<th>Reach strategy insertions</th>
<th>Frequency strategy insertions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will &amp; Grace</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>The Apprentice</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Desperate Housewives</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>American Idol</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lost</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ER</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>West Wing</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>CSI</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>House</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bones</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Reach at 1+</td>
<td>72.5%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Reach at 3+</td>
<td>11.2%</td>
<td>22.7%</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$333,000</td>
<td>$337,500</td>
</tr>
<tr>
<td>GRPs</td>
<td>121</td>
<td>136</td>
</tr>
</tbody>
</table>

SUMMARY

This chapter provided an overview of the media planning process, terminology and how it fits into other components of advertising management. Planning is critical and accounts for much of the total media budget. Fortunately, this stage of advertising decision making has ample support from large databases, accurate forecasting models and a great deal of documentation.

The chapter, covered the setting of marketing objectives and defining the target audience, media selection and objectives, scheduling, buying and budgeting and assessing campaign effectiveness primarily for Gross Rating Points (see Pai et al., 2007 for a broader view of advertising tracking). Models for estimating the exposure distribution were followed by an example of a media plan. Exposure distribution models are required when a media planner requires media effectiveness estimates, such as reach, that are outside the range available from conventional sources. Exposure distribution models fall into three classes, ad hoc, simulation and stochastic.

NOTES

1 Technically the definition of a television rating is a little more complicated than this and depends on the number of minutes viewed by household in a large sample panel.

2 In the UK, Gross Rating Points for television are called TVRs (TV ratings), while in Australia and New Zealand they are called TARPs (Target Audience Rating Points).

3 Network TV sells its advertising time well in advance of the actual broadcast date. Spot TV has a shorter lead
time, while cable TV would be shorter again (Katz, 2003).

4 Additional case examples for Levi Men's Dockers, Samsonite and Sun Microsystems can be found in Barban et al. (1992).

Further Readings

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